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THE CANADA FARMER

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The Field.

New Varieties of Potatoes.

Now that the seed catalogues are beginning to be disseminated, it may be as well to put our readers on their guard against becoming unduly excited over new varieties of potatoes. The sudden popularity and rapid spread of the Early Rose, and the large sums of money made out of it during the period of its comparative scarcity, very naturally led cultivators of a speculative turn of mind, to experiment with a view of originating other varieties from which also a golden harvest might be reaped The wish for success in this direction has, no doubt, been father to the thought, that success had really been achieved, in some instances But it is quite safe to say that so far, no such acquisition as the Early Rose has been obtained, if we except the Late Rose, which would seem to be a sort of sub-variety or sport of the Early Rose Again and again, we have had potatoes announced, earlier than the Early Rose, and better in quality, but none of them, so far as we know, have stood the test of a fair competition with that excellent variety For the present, at any rate, we may be content to let well enough alone, so far as an early potato is concerned. For speedy maturity, size, flavor, healthfulness and prolificacy, it certainly has no superior, and its introduction formed a sort of era in the history of our staple esculent It were unwarrantable to conclude that "we ne'er shall look upon its like again" There is great encouragement to continue experimenting upon new sorts, and the fact that the potato needs renewal periodically, by growing fresh seed from the ball, seems to necessitate this course being taken But it is very undesirable that there should be anything like a potato mania, or that people should get into a fever over new candidates for public favor If a potato really has good and substantial claims to popularity, as was the case with the Early Rose, it will soon be discovered, and a general demand will spring up for it. But it is wise and well, we think, to be chary of paying a dollar a pound for comparatively untried varieties, merely because extravagant things are said of them in a price-list, seed catalogue, or advertisement.

These remarks have been suggested mainly by the perusal of a paragraph or two in a Canadian Seed Catalogue just issued, wherein the transcendent excellencies of a new potato are set forth in most glowing terms. "Eight hundred and twenty-six bushels per acre," and "thirteen bushels from one pound of tubers planted," are among the statements made concerning the wonderful productiveness of this novelty. Furthermore, we are told under this head that "yields from 12 to 20 pounds per hill are reported by the hundreds, and in one instance, 28½ pounds were dug from one hill." Generally speaking, the most prolific potatoes, are not the choicest as to flavor, mealiness and whiteness. But this new sort is declared to be an exception, and we are informed that "thousands have testified that they never ate a better potato." Its uniform mealiness of grain, combined with the purest flavor, and its snowy whiteness of flesh, which is not the least affected by its blue skin, cannot fail to make it highly valued as a family potato. "All very fine, Mr. Ferguson." We hope it is true, every word of it. No one would hail the new acquisition more cordially than we, if all these eulogies are deserved. It would beat the Early Rose hollow, and leave all other varieties far in the background But we hardly think we shall invest a dollar in a pound of these extraordinary tubers, unless it be to test them for the special and exact information of the readers of this journal. We are rather sceptical about this novelty for several reasons. One is that the laudation is overdone. We are not prepared to deny that eight hundred and twenty-six bushels to the acre, or what is more likely, a small patch at that rate, may have been grown under peculiar conditions and highly favorable circumstances, but that it is the habit of this potato to yield at that rate under fair, ordinary cultivation, we certainly are not prepared to believe. Then, if such large yields per hill are, as we are told, "reported by the hundreds," and if thousands have testified "that they never ate a better potato," it must already have been diffused somewhat widely. Though the seedsman from whose catalogue we quote, say, "we now offer it to the public for the first time," others must have offered and sold it, more or less, and if the wonderful things already enumerated were true, the agricultural journals would have chronicled the advent and achievements of the novelty, and we should have known something about it from the perusal of our exchanges. A correspondent of the *Country Gentleman* says of it.—"though originating in this county, *it is not introduced much*, and all we know of it is through Messrs.—" (naming a prominent seed firm.) "The high price at which it was held, and our previous experience, has made us shy of investing in it.' It is hardly credible that so superior a potato as this is represented to be, such a prodigy among tubers, could remain so unappreciated as to justify the remark, "it is not introduced much" in the very neighborhood where it originated, and would be likely to be best known.

Seedsmen, like auctioneers, are beginning to be looked upon as untrustworthy, from the extravagant and unscrupulous manner in which they eulogize their wares. An immense amount of disappointment and loss result year by year from these over-fulsome advertisements. If seedsmen for the sake of a transient run of business, will resort to this description of puffery, the duty is devolved on the agricultural journalist of cautioning the public, though in so doing he may have to reflect on a class of people, who while in the main, quite as honest as their neighbors, are equally liable to an over-keen pursuit of the "almighty dollar."

Deep Tillage.

An animated controversy has been going on for some time in the New York Farmer's Club on the above important subject. It would be tedious to attempt a recital of the facts and arguments *pro* and *con*, which have been adduced by the disputants, but it may be useful to note a few points brought out in the course of the discussion. A heavy crop of corn reported in the *Country Gentleman* of December 11th, 1873, has been made a great deal of by the advocates of shallow ploughing. It was grown on a field which had been in sod for eighteen years, and pastured with sheep most of that period. It was ploughed from 2½ to 3 inches deep, as early in the spring as the frost would allow, and harrowed six times just before planting. The soil was well and frequently stirred during the early growth of the corn. At harvest time, the yield was found to average 169 bushels of shelled corn to the acre. This fine crop speaks volumes in favor of sheep husbandry and a thorough working of the soil, but does not bear particularly on the question of deep *versus* shallow ploughing, because it is well known that corn is a plant which finds most of its nutriment near the surface, while the roots incline to spread at the top of the ground, so much so as to need the process of hilling to keep them thoroughly covered.

Several instances of the disastrous results of deep ploughing have been brought forward in the course of this interesting discussion. In one case, a field intended for corn was divided into two equal parts, one half of it being ploughed six inches deep, and the other a foot. It was all well manured, harrowed, and planted. Throughout the season, the advantage was visibly in favor of the shallow ploughed half, and the difference in the yield was as 2 to 5. It should be noted that the deeply ploughed half of this field was not sub-soiled, but just turned over, in the same way as that which was only ploughed to the depth of 6 inches.

Another case was that of a farmer who owed a mortgage debt on his land, which he was anxious to pay. Reading in the *N. Y. Tribune* that by ploughing a foot or more in depth he might double his crops, he determined to try this method of raising the money he wanted. The next season he ploughed nearly his whole farm as deeply as possible. His crops were failures and he was sold out by the sheriff.

It is worthy of note that crops of corn are mostly cited in proof of the benefits of shallow ploughing, and that a sudden deepening of the soil—turning it topsy turvy, and burying the top-soil under the subsoil, is what is combatted as deep ploughing. As in most controversies, there is plainly visible in this one a frequent mistaking of the real issue, while there is obviously some truth on both sides. There is no doubt that it is poor policy to bury a good top soil beneath a hungry barren sub-soil, and no intelligent agriculturist would recommend such a course being

pursued. Stirring the sub-soil, but leaving it still underneath is what would be advised in such a case. By doing this, and liberally manuring the top-soil, the sub-soil would gradually become enriched by the percolation into and through it of the ammoma-charged moisture, supplied by rain, which in its passage down through the soil took with it the soluble portions of the manure. If a soil is to be deepened by bringing a poor sub-soil to the top, the process must be very slow and gradual, no more being raised at a time than can be enriched and made good. When it is proposed to grow Indian corn on a ploughed sward, there is no use going down deeper than the grass roots, which of course form a sort of mat on the surface. But there is no corn ground equal to the Virginia prairie and the rich river bottoms of the Western States, and the depth of these soils is proverbial.

No stiff unvarying rule can be given as to the depth of ploughing. The character of the land must be studied, and the ploughshare graduated to its condition. A deep rich soil should be the thing aimed at. To grow all sorts of crops, and especially to grow root crops in their best luxuriance, both depth and fertility are needed. It would be sheer nonsense to attempt to raise good carrots, mangolds, or turnips in three inches of soil; whatever our neighbors across the lines may do with their big corn crops, we, in this country know very well our success in farming depends mainly on our pursuing a rotation in which root-growing must play a prominent part. Without root crops we cannot raise and feed stock to advantage, and unless we can keep plenty of stock we cannot have manure. We have no doubts or misgivings as to the beneficial effect of deep tillage *provided always*, that the soil be enriched as we deepen it, and that the best of it is at the top, where crops need stimulating into quick growth during the earlier stages of plant life

To Avoid Cut Worms in Corn.

This is the experience of a man in Indiana, as told in the Cincinnati *Gazette*.

"A few years ago my father had a fifteen acre field, well set in timothy, which he wished to put into corn. We commenced breaking it up in February, and finished before the grass began to grow When the ground was dry we harrowed it, and cross harrowed it until it was in fine order, being almost as dry and free from clods as an ash heap We planted in good time, and it came up nicely; but the cut worm destroyed it all, so that it had to be planted over again, and then replanted after the second planting, before we could get anything like a fair stand of corn.

"Our neighbor had a field just across the fence of about the same size. It was on the same slope, and was the same kind of land exactly. It had been in timothy the same length of time that our field had. He broke it up late in the spring, and planted it to corn the same day that we did. The grass had gotten such a start, before he commenced breaking up, that after the field was planted it looked almost as green as a pasture. His corn came up nicely, and there was so little of it destroyed by the cut worms that he did not take the trouble to replant it.

"He raised a good crop of corn on his field while we raised a poor one. His good natured remark was that he fed his cut worms on grass instead of corn."

Potato Blight and Rot.

Dr. Thomas Taylor, of Washington, D. C., communicates to *The Lens* the result of experiments upon potatoes, from the examination into the chemical and structural theories of Dr. Lyon Playfair and the fungoid views of several leading mycologists.

Among other tubers, one-half of a potato brought from Santa Fe, New Mexico, was placed in water with a diseased specimen and the other half in water to which sugar had been added An Ohio potato was similarly arranged, and the effect of allowing it thus to remain for a considerable period noted. On the twentieth day, the Ohio specimen had entirely dissolved, while the Sante Fe potato was uninjured. Comparing the portions in the sugared water, the Ohio tuber appeared a mass of infusorial life, mycelium, and budding spores, with a strong odor, no starch cells being discernible.

The New Mexico specimen showed few infusoria and the starch granules arranged in cellulose, between which bundles of mycelium and budding spores appeared in profusion. No liberated granules were visible Since these experiments, other northern and eastern varieties have been tested by fungoid solutions in contrast with some of the New Mexican varieties giving like results, clearly demonstrating the superiority of the Santa Fe potatoes, over all others thus far examined, in respect to their powers of resisting fungoid and infusorial action.

We note that the government is about to test, by samples of every variety of potato from the above mentioned locality; their anti-fungoid qualities in the open field and in contrast with the usual varieties grown in the section of the country.—*Scientific American.*

Rolling the Ground.

A correspondent of the Germantown *Telegraph* writes: "On dry or wet ground the effect of the roller is found to be salutary. Ploughed and prepared for sowing, dry land is much helped by the roller The blades of grass spring up sooner and retain a firmer hold in the earth. In a season of drought, rolling has saved the crop, when without it the seed would have never sprung from the ground. In wet and heavy ground it is believed the roller, smoothing and hardening the surface, will leave the soil immediately beneath the surface in a better condition to generate the seed. On grass ground that has been heaved by the frost, the roller has an excellent effect in fixing the roots. Rolling the ground is also good when the land has been laid down unevenly the previous year. If the land is too dry, wait till just after a soaking grain, and it will work capitally. It is a good idea to roll ploughed sowed ground before harrowing, as it presses down the furrows that would be turned back and makes the surface less uneven, and the harrow pulverizes it much. We find that on an average not one farmer in four has a roller."

Rotation of Field crops in Ohio.—I would like to give to the readers of the *Rural New-Yorker* my system of rotation of field crops, which works satisfactory for this part of Ohio. I have my farm divided into seven fields; one of them I keep in mixed grass for permanent pasture; the remaining six are farmed in clover, corn, oats and wheat. Every spring I break a clover field and seed a new one, I raise two crops of corn in succession, then turn the corn stubble under for oats; then two crops of wheat, then clover again. I cut one of hay, and the aftermath is left on the land. All the manure that is made during the winter is hauled from the stables fresh and thrown in heaps on this clover field, and is spread in the spring just before ploughing; and all the manure made through the summer is piled up in the barn-yard, and spread on the wheat in the fall, before seeding, as a top-dressing. My crops flourish under this kind of treatment.—*Our Rural New-Yorker.*

Finger-and-toe in Turnips.—Finger-and-toe or anbury in turnips depends upon faulty nutrition, depending in its turn usually upon some deficiency in the soil of the materials essential to plant growth Absence of lime is one of the most notable causes. The distorted, warty, useless anbury roots commonly appear on sandy, peaty, poor clay soils. Frequently we observe them where the top soil has been removed, as in the digging of stones, or in carelessly levelling down highly ridged up land. A portion of a field much carted on or run together will often furnish a large proportion of such diseased plants. Frequently recurring turnips abstracting certain elements from the soil aggravate the mischief. Grubs and worms sometimes supposed to cause anbury, are in reality an effect, not the cause of the disease. The fitting treatment obviously is a dose of that particular material of plant food in which your soil is deficient. If this happens to be lime, the gas lime, as you propose, containing lime, hydroxide, carbonate, sulphate and sulphide will be an appropriate remedy. Ordinary lime chalk, or any other conveniently accessible carbonaceous matters may be substituted. Six or eight tons per acre is a full dressing. As such fertilizers are apt to be washed tolerably rapidly through a porous soil, they are best applied on the surface, spread and mixed by the harrows a week or ten days before the land is ridged up for roots, or before the seed is drilled on the flat. If caustic lime is applied it should not be put on at the same time that guano or other ammoniacal manures, or even good farm, yard dung, is used, since it liberates and may waste the valuable ammonia. Lime, whether caustic or gas, doubtless owes much of its value for the cure of anbury, and other useful purposes, not only to its furnishing lime, but also to its increasing the solubility of phosphates and potash.—*N. B. Agriculturist.*

Grasses and Forage Plants.

The Superior Merits of Alsike Clover.

We are inclined to think that, comparatively speaking, very few farmers are acquainted with this excellent variety of clover, so as to understand and appreciate its high merits as a forage plant. Some have given it a single trial, under disadvantageous circumstances perhaps, and have conceived a prejudice against it. We subjoin a few of the many testimonies in its favor that might easily be culled, and bespeak for it at least a fair trial. In addition to the advantages enumerated in the quotations, it may be stated as a recommendation not to be overlooked, that Alsike clover is better for honey production than white clover even, while bees are unable to extract it from red. No farm is complete without bees, and they will gather more and better honey from this than from any other plant.

The following are mentioned by the *Farmer's Vindicator*, as reasons why the Alsike is superior to our common red clover.

1st Being a finer seed, and from three to four pounds being sufficient to seed an acre; while six to ten pounds being required of any other variety

2d. For hay or pasture it fully doubles the value of the medium clover, being a finer fibre and seemingly having a much sweeter juice.

3d. Having a fibrous rather than a tap root, it does not heave so badly by frost, and will continue its growth for three or four years in succession, each year producing a large yield of hay and seed.

In answer to an enquiry as regards the value of Alsike clover, the *Ohio Farmer* says:

"This clover makes good hay so far as we have heard from the farmers who have raised it. It bears a greater resemblance to white than to red clover, except in height of growth. A farmer who has given it a fair trial says that all stock like it. It is free from dust, and will stand more hard usage from the weather, after being cut, than any other grass with which he is acquainted. It matures at the same time as timothy, making it a good grass to sow with it."

We copy the following from "How to Make the Farm Pay," by G Deitz of Chambersburg, Penn.:

"From a very limited trial we have made with this clover, we are satisfied it is better than our white clover as a pasture grass; unlike the red clover, it is perennial.

"We believe, upon a fair trial, Alsike clover will recommend itself favorably to the farmer, and will be preferred to the red, wherever it can be advantageously grown. This year it has been cut six feet four inches in length, and the average length on one acre was four feet. Our stock prefer it to all other clovers, and the afterswath does not salivate our horses or cattle. It should be sown with timothy or stiff grasses, to hold its fine growth up. It will stay green until after harvest, when it will be as green as the timothy, and not turn black as our red clover, when cut as late as timothy is, after being left standing until after harvest. It can also be threshed with timothy, and the seed easily separated, and it also acts as a flavor to threshed timothy, and all can be fed without waste.

"Alsike luxuriates in damp soils, and will not freeze out as the red clover, and can also be used well as a fertilizer, as it yields a heavy succulent matter to plough under It also has three times the roots that red clover has

"Alsike can be sown in the spring on wheat or oats, in the fall with timothy at seeding time. Three quarts of Alsike and three quarts of timothy make a very good seeding for an acre."

Mr. Elliot Grey, of Tecumseh, Mich., writes to the *Michigan Farmer*:

"The Alsike clover is the best forage crop ever raised. Last season he had taken off a full crop of hay, and this hay he had found was preferred by all his live stock; cows, sheep and horses would leave the best timothy or other feed to eat it when they could get at it. He had found also that where it had been sown, his sheep, cattle and colts left the best young clover, and would feed on the Alsike, which I think is the best."

"In the spring of '73," says a correspondent of the *Country Gentleman*, "I purchased, through an agent of our well known seedsmen, D. Landreth & Son, four pounds of seed. This I sowed with oats, on about five-eighths of an acre, in an orchard, one-half of which was rather poor and sandy, the rest a deep clay loam. After the oats were removed the clover furnished pasture for five hogs and about one hundred and fifty

head of poultry during the balance of the season. This spring it came up very thick, and on the clay soil grew to the height of from three to three and a half feet; on the poorer part from one to one and a half feet. The stalk was very fine, not thicker than medium timothy I saved two-fifths of an acre for seed, the balance, about one-sixth of an acre, being some mixed with red clover and orchard grass, it was cut for hay, and furnished one good load of excellent hay. From the two fifths of an acre saved for seed we hauled three large cart loads of hay, which, being threshed, yielded two and three-fourths bushels of marketable seed, or at the rate of about six bushels per acre. The orchard adjoined the buildings, and the poultry used it as a feeding ground, and trampled it down very much, thus preventing it from yielding better. The straw, after threshing, was all eaten by the horses and cattle. My attention was first called to the subject by reading an article in "How to make the farm pay," in which the following reasons were given for its cultivation: "Allow me to advise my bee-keeping friends who are farmers to cultivate the Alsike clover. For, while it is for pasture or hay far preferable to the red clover, it fully equals it in its secretion of honey and far surpasses the white. Its cultivation would therefore greatly increase the pasturage for bees, which is very desirable. I have ever contended that no plant can be cultivated with profit for bees alone; that bee keeping is profitable alone from the fact that the bees gather what would otherwise be wasted. Yet bee keepers may often cultivate a crop that, while it proves remunerative as a forage crop, will at the same time increase the pasturage for his bees We find the Alsike clover a very superior grass in the following points:

1. For its value as a hay crop on a great variety of soils, growing from ten inches to three feet high, and yielding from one and a half to three tons per acre.
2. For fineness of stalk or haulm.
3. For its multitude of sweet flowers blooming three or four times as much as the red clover, making when in blossom a sea of flowers.
4. Its adaptation to heavy soils.
5. To farmers raising clover seed for market the Alsike clover would, in our opinion, be of great value, as it seeds enormously, and the seed threshes easily by machine, leaving a good quality of hay."

My object in sowing was to test its honey qualities, and while it blossomed, which was fully five weeks, it was covered with bees from earliest light till dark, not even minding stormy weather, from which I obtained upwards of two hundred pounds of honey. The blossoms are a little larger than the white clover, and partake of the color of both parents, the lower half being red and the top white. The seed is much smaller than the red, not more than half as much being required to seed the same land; which, combined with its evident superior feeding qualities, and being much more permanent than red clover—more like the white in this respect—not liable to leave out even in damp soils, make it a valuable crop for farmers to cultivate. The only objection that can be urged against it is that it does not produce as much aftermath as the red.

Grass Lands.

In a discussion on the above subject, so vital to the interests of agriculture in all north temperate climes, at a recent meeting of the Massachusetts State Board of Agriculture, Mr Kilburn, of Lunenburg, said, in giving the results of his own experience:—

"I like the suggestion made by the last speaker, that in sowing grass seed, we should sow those kinds that ripen about the same time. We have a good deal of trouble with our different grass fields, by having the grass ripen at different times through the spring and summer. Some kinds will get ripe and shed their seeds before the main growth of the grass is fit to cut. Take for example, the sweet scented vernal grass, spear grass, or what is sometimes called Kentucky blue grass, and two or three other kinds, the *Danthonia spicata*, for instance, which is sometimes called white top, and sometimes has other names. That if cut early makes very good hay; but if it is cut late, it is not better than the straw of grain that has been threshed, and it frequently gets ripe before the later grasses are fit to cut; red top being one of the latest, timothy or herdsgrass being another, not fit to cut until a certain time; and those other grasses getting ripe first and shedding their seeds, as a good many of them do, before the later grasses are ready for the mower. The sweet scented vernal grass very frequently blossoms in May, and several of the other grasses, for instance, spear grass, or Kentucky blue grass, get ripe and are ready to cut before the other grasses which predominate in the field are fit to be cut. Therefore in sowing down our fields to grass, we ought to use the seeds of those grasses which come to perfection about the same time. I mean for mowing lands; for pastures, I don't care how many kinds I have, but in mowing we want to take the grasses when they need to be cut. There is a particular time when our grass will be going back, or down hill, if we do not cut it, and if we can cut it at the right time we can save it. But when there is a range of four or five weeks in the ripening of the different species of grass, while one kind is gaining another kind is losing. That subject I think has been well presented by the gentleman who has spoken to us on that question, and I think it is one of great importance. Most of these grasses that I speak of will come in themselves without sowing them. The sweet scented vernal grass finds its way in. We have not found it on our land a profitable crop, it ripens too early for the other grasses. It is just so with spear grass, or Kentucky blue grass; it is ripe at a different time from the other grasses, and there is an insect that works upon the grass unfortunately, just above the upper joint, and eats the culm off close to the top. I suppose all farmers have noticed that fact."

The above observations are very common-sense and practical. In seeding down land, regard should always be had to the use it is intended to make of the crop. If it is to be cut for hay, mix only those kinds of grass seed which blossom at about the same time; either all early kinds, or all late kinds. If pasturage is wanted, use all the good sorts you can get; the more the better. In meadows it is a simultaneous ripening that is wanted so that the crop may be cut when at its best, but in pastures a succession of grasses is desirable, so that there may be a good bite of feed for stock from the beginning to the end of the growing season.

Orchard Grass.

At a recent meeting of the New York Farmers' Club, a communication was read from Dr. E. W. Sylvester, of Lyons, N. Y. on Orchard Grass, the substance of which we give as follows:—

This grass is common to almost every country of Europe, North of Africa, and Asia, having been introduced into England from Virginia in 1764; it soon, by its superior value, became a great favorite on the sea-girt isle, where it is much more widely known than in this country, another proof that any article "far-fetched and dear-bought" has the best chance of winning favor and renown. It is particularly as a pasture grass that it has won its laurels, experienced feeders asserting that it will make good pasturage after five days' rest, and its exceeding earliness makes it valuable for those short of hay in the spring. I have cut tufts of it in early spring, grown in a warm situation, which would average nine inches in length, while the remnants of snow-drifts were still in sight, and these specimens, four feet nine inches long, were cut early in June, before the seed had commenced forming, while timothy at the same time was not half grown. In many sections of our country it is common to sow timothy and clover upon the same piece of ground, but a difficulty in harvesting has been found when thus grown together, for the reason that the clover is in full bloom, and requires to be cut some time before the timothy is sufficiently mature for the mower. Now, if we substitute orchard grass for timothy, we shall find that the orchard grass and clover are in bloom at the same time, affording the best possible results.

Most of the members of the club will recollect the late Judge Buel, who labored so long, and with a good degree of success, to form a soil on the almost sterile sand between Albany and Schenectady; and he says of the orchard grass: "I should prefer it to almost every other grass, and cows are very fond of it." Mr. Sanders, a well-known practical farmer and cattle breeder of Kentucky, says: "My observation and experience have induced me to rely mainly on orchard grass and red clover; indeed, I now sow no other kind of grass seed." It will be well to recollect, in this connection, that Kentucky is the home of the blue grass which has so deservedly good a reputation The late Col. Powell, of Pennsylvania, after growing the orchard grass for ten years, declares that "it produces more pasturage that any other grass he has seen in America." Mr. Geddes, the well-known farmer of Onondaga County, N. Y., gave his experience in raising orchard grass in the New York *Tribune* about a year since, giving it a very well-deserved recommendation. But it would occupy too much time to quote more authorities here. It is sufficient to say that all agree that the orchard grass starts very early in the spring; stands drouth exceedingly well; grows very rapidly; must be cropped closely; is very nutritious; is very palatable to stock; it will make a continuous meadow. The writer has a strip of orchard grass, about six feet wide and thirty rods long, which serves as a border to a buck-thorn hedge. It was seeded fifteen years since, and is still very productive.

According to the analyses of twenty-three varieties of grasses, made by Prof. Way, Chemist of the Royal Agricultural Society, orchard grass exceeded all, except two, in albuminous or flesh-forming principles, and these two exceeded orchard grass only by a small fraction of one per cent.

This is not the grass for the lazy farmer or the always-behind-hand stock-grower. Orchard grass pastures must be cropped by the stock, with only intermissions of five or ten days, or what is better, perhaps, kept constantly short. Orchard grass must be cut for hay very early; for, if left to form seed, the stem becomes woody and the leaves very rough, and although at this stage of growth it contains, according to Prof. Way, over ten per cent of alhuminous or flesh-forming principle, yet I think the average stock would grow poor with the labor of extracting the nutrition. In conclusion, will you allow my to advise every thrifty, go-ahead farmer to try a small area of orchard grass; but if you are a slow boat, slip-shod, always behind-hand farmer, let it alone severely.

Hay and Other Crops.

A question widely discussed involves the relative value of the wheat, cotton, tea and hay crops of the world. Which of these products employs the greatest amount of the world's capital? It is said that hay leads the rest, and the items that enter into the account as stated are somewhat startling. Cotton and tea are local crops, while hay is produced everywhere the world over, and thus the hay crop outweighs either of the two. The aggregate reported value of all farm products for 1870 was $2,447,538,658; but as this includes additions to stocks, "betterments," etc, it is probably too high. Now, the hay crop for that year—that is, the grass dried and cured for use or sold—is reported at over 27,000,000 tons. This, at half the selling price in the large cities, would amount to $405,000,000, and is far greater than the agregate home-value of the cotton crop or any other crop. But the "cured hay" is but a portion of the grass crop. The other portion is used on the ground, and it requires considerable calculation to get at the value so used, even in the roughest way.

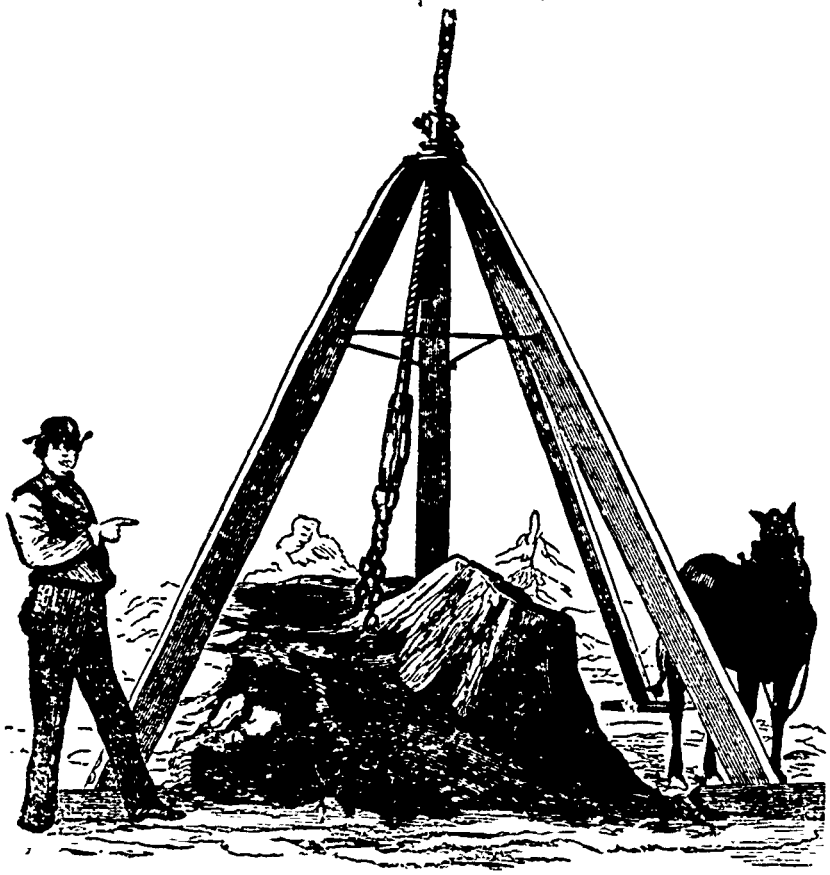
In the first place, live stock, including horned cattle, horses, sheep, swine, etc, to the value of $1,525,000,000 were fed from it that year. Averaging the lives of these at five years, we have one-fifth of that sum as representing the grass fed to them in 1870, namely: $305,000,000; next, we find the value of the animals slaughtered for food in that year to be $309,000,000, and as this is an annual product, the whole of it will, for the present, be credited to the grass crop; next, we find that the butter crop of 1870 was 514,000,000 pounds, which, at the low average of twenty-five cents, amounts to $127,000,000, and this goes to the credit of the grass; next we have 235,000,000 gallons of milk, which, averaged at the low estimate of ten cents per gallon, adds $25,000,000 more to the credit of the grass crop; then we have 100,000,000 pounds of wool, at twenty-five cents a pound, adding $25,000,000 more; and, finally, 53,000,000 pounds of cheese, at ten cents, adding over $5,000,000 to the total of these credits to the grass crop of 1870, which aggregates $877,000,000.

Now let us add the value of the "hay" crop as given above, viz. $450,000,000, and we have a grand total for "hay" and the products of the grass consumed on the ground amounting to $1,292,000,000! This is, of course, subject to deduction, as the meat, butter, cheese and wool producing animals consume other food besides grass and hay. To make ample allowance for this, we deduct the entire value of the corn and oat crops for 1870, estimated at $280,000,000, and this leaves a remainder of $1,082,000,000 to be credited to the hay and grass crop of that year, when the aggregate of all farm products was $2,447,538,658. If our estimates make even the roughest approach to accuracy, the value of that crop was two-fifths of the aggregate value of all farm products, and hence we may infer that two-fifths of the capital then invested in agricultural pursuits was devoted to the grass crop, and this in the United States equals (in round numbers $4,575,000,000. From these figures the deduction is palpable that King Cotton is uncrowned and dethroned, and we may be forced to admit that all "flesh," and all else, is hay, if not "grass."—*Pacific Rural Press.*

Emplements of Husbandry.

Stumping Machines.

Few have an adequate idea of the waste of land occasioned by permitting the stumps to remain even on a ten acre field. It is not alone the simple area, or space occupied by the stump that is lost in each case, but there is besides quite a wide margin of land around it within which the plough or other implement cannot enter for the extending roots. Calculating in this way we find that, as a general rule, or, on an average the quantity of land actually useless around each stump measures about four times the size of the stump itself On very stumpy land we have known as much as a fifth part of the whole practically unavailable.



Stumps, according to their kind and texture, are more or less difficult to get rid of Pine stumps perhaps rank as amongst the most obstinate of all, and unfortunately it so happens that pine land generally is accounted fully as good if not better for grain-raising than almost any other, and is therefore very desirable soil to purchase On hardwood lands, there is but little trouble with the stumps. They generally rot away spontaneously in the course of from six to ten years, and in most cases, after that age, they may be easily pushed or knocked over with no other implement necessarily than an axe or maul.

The same, however, cannot be said of the pine We have seen a stiff old fellow of this tribe as obstinate after twenty years as it ought to be after ten. This quality in the pine arises from the amount of resin (which as our readers are undoubtedly aware is thorough'ly antiseptic) contained in its radical fibres as well as in those of the trunk. Age apparently has no effect in overcoming by means of decay the preservative qualities of the resinous element and therefore to get rid of pine stumps within a generation art is requisite, in other words the stumping machine must be introduced. The earliest style of the stumping machine viz that consisting of long wooden levers and chains and iron-hooked bars, is familiar to most of our readers. We need not describe it, and perhaps would not have mentioned it at all here, but for the purpose of contract with the later inventions.

It will be remembered then that in the old machine the entire stress of the pull came upon the chains or iron bars. So long as these stood the strain of course the machine did its work but even then only with a side pull which laid the stump slowly over, *i. e.* entirely to one side of the hole occasioned by its extraction, and thus necessitated the carrying in a manner of all the earth torn up by the roots back to its original place again. But when the chains and bars failed to withstand the strain upon them and broke—(and how often has this been the case?,—the collapse was attended with very great danger indeed to those in attendance, because a blow from one of those flying pieces was almost certain injury, perhaps death. A large number of deaths, and accidents attended with minor injuries have happened from the use of the old lever stumping machine.

The latter, and we think decidedly better style, of Stumper is that which we illustrate. It is handier than the other in many ways, whilst it is attended by no danger whatever. It consists, as will be seen, of three very strong supports, all meeting at the top, under a very strong wrought-iron plate. Through the centre of this plate a screw-bar, provided with a heavy and strong thread, works. At the lower end of the screw-bar is a hook to catch in any link of the chain in use, whilst above the top iron plate, another powerful iron works nicely on the bar, and in this latter iron is a socket into which fits a lever to which the horse is hitched All required therefore is to fasten your chain to some available portion of the stump; hook the lower end of the screw-bar into one of the links, or into a double of the chain, and then set your horse in motion. Every circuit he makes with the lever of course the lever iron works just one thread space downwards, *i.e.* the stump works the rest of that space upwards, and so on until it comes fairly out of the ground. This style of stump machine is fast superseding others.

One man and a horse can manage it, whilst in the other it sometimes required six and hardly ever fewer than four men to attend it. Another feature of the machine is that it is raised perpendicularly, and the process may be stopped at any moment *it still retaining its rise*, so that the soil may be gradually struck away from it and permitted simply to fall back into its original place. It is so handy also, compared with the cumbrous nature of the other that it can be moved from stump to stump quite handily. It is manufactured of any size screw. The ordinary 3 inch one which is in most cases quite strong enough may be purchased for about $75.

An Irrigating Roller.

A novelty in the shape of an irrigating-roller has recently been introduced among farm implements; that is a roller, hollow in the middle and closed, perfectly water-tight at both ends. Before starting to roll it is filled with water, and then it is so arranged that by means of a handle at the side of the driver he can throw open in an instant, a row of holes in front or behind or at one or both ends just as he chooses. The object is to water and roll at one and the same time. If this implement had been constructed solely to save labor it would have been successful; in fact, as such it is a success, but unfortunately for the purposes of the farmer it is not practicable. In the first place, an ordinary iron roller is quite heavy enough without the addition of a similar weight of water. The iron itself must be thick enough to be substantial and heavy, and if rendered thin, to counteract the weight of water, then, when empty it would be too light for rolling. In addition to this objection we quite agree with the sensible remarks of a contemporary upon the same machine It says, after reviewing the implement in general terms.—"Again, the time when a roller is of most value on a farm is not when we care much to irrigate In the spring of the year we find clover, grass or grain crops somewhat drawn from the ground or loosened by the winter's frost, and we desire to use the roller to press them again into the ground. Every farmer knows that it is an injury to roll the ground when wet, and yet if we wait till the ground is absolutely dry we cannot accomplish the object we desire. So while in some degree wet we roll. No irrigating arrangements will be in order here.

Then it is the custom with some farmers to allow their grain-land to be rather rough in the fall, so that as the grain is drawn a little by winter's frost, the crumbling clods above may in falling cover somewhat the exposed roots. As soon as the winter is over the land must be rolled to make it level. The very first chance that offers for the clods to dry is taken in order that the roller may crush them, and no irrigation plan would for one moment be thought of at this time either. When we plow dry ground in autumn we roll before cross plowing if lumpy; and again roll to pulverize before we harrow, and any watering with it at these times would be out of the question. Indeed there is no time in the whole annual routine of farming operations that we can call to mind that anyone would want to irrigate at the same time that it would be of any benefit to the land to be rolled. We cannot see therefore what is to be gained by this combination It strikes us as a very expensive roller with no compensating benefits.

We wish however that some one would devise some cheap plan whereby liquid manures might be applied to farm lands Much valuable matter annually goes to waste - matter which every one of us knows to be valuable—simply because we lose more in the labor necessary to save it than we recover in the profits made. We hoped when we first saw an account of the combined roller that something useful might come of it to this end at any rate; but if we understand the description it does not "fill the bill."

Flowing Water.—Water flowing in a body, such as a river, will run sufficiently swift with a fall of one foot per mile. A smaller river will require a fall of two feet per mile. A brook would not keep an open course under four feet per mile, while the water in a small covered drain will require at least a fall of ten feet per mile to set the water in motion.

Horticulture.

EDITOR—D. W. BEADLE, Corresponding Member of the Royal Horticultural Society, England.

Growing Nut-bearing Trees from Seed.

A correspondent asks, "What is the best method of growing Butter-nuts, Walnuts, and Hickory-nuts from seed"? To which we can only reply that the best method with which we are acquainted is to plant the nuts in the soil. And yet such a reply hardly seems courteous, for the inference from such an inquiry being made is that the inquirer has met with some difficulty, that he has planted the nuts and that they have failed to grow. For this reason he is led to doubt whether he has proceeded in the proper way, and to suppose that some peculiar treatment is necessary in order that the seed shall germinate.

The writer has planted a great many thousands of seeds of our nut-bearing trees, Chestnuts, Hickory-nuts, Butter-nuts and Walnuts, and has never experienced any difficulty in getting them to grow. The only matter that has been scupulously observed has been to so keep the seed that it should not become seasoned. As soon as the seed has been gathered it has been spread upon the ground in some convenient place and covered with an inverted sod, with enough soil thereon to prevent the sod from drying out. Sometimes the seed has been allowed to remain in this condition until spring, and then planted in drills just as soon as the frost is out of the ground. At other times the seed has been planted in the fall. In all cases there has been a good growth of plants, if the seed has been good.

It should not be forgotten that some seasons are more favorable than others for the perfect maturity of the seed of nut-bearing trees, as well as for the perfecting of grains or fruit, and that more of the seed will produce vigorous plants when that seed is perfect than when it is not fully developed or matured. Again, in some seasons the insects which prey upon the nuts are more numerous than at other times, and many of them are so injured by these insects that they cannot germinate. It may be that our correspondent has failed to notice that the seed with which he has experimented has been poor from one or the other of these causes.

We can not close these remarks without expressing surprise that so little has been attempted in the way of growing nut-bearing trees in this country. The trees are not such slow growers as is generally supposed, they soon come into bearing condition, the nuts are always marketable, and will pay well for the care of the trees until they have reached such a size that they can be thinned out and sold for timber

The Gladiolus.

This favorite autumn flower does not thrive well on stiff, clayey soil, but in moist sandy loam it attains to great perfection. It should not be planted continuously in the same bed, but the locality should be changed each year And while the soil should be rich, it is better that the manuring should be done during the previous season, and the fertilizers thoroughly incorporated with the soil. If the soil be dry, it will be better to use cow dung, but if it be somewhat too moist, manure from the horse-stable is preferable. In planting, set the large bulbs three to four inches deep, and the small ones about two.—There is now a great variety to be had, the colors ranging from bright vermillion, cherry red and scarlet to light rose, bright yellow, cream-color and white, with stripes and spots and tints of nearly every possible hue These bulbs should be planted in the spring, after the freezing weather is passed, and taken up in the fall and kept in a cool, dry place, free from frost.

Variegated Ferns

Amongst the great number of Ferns which are now in cultivation, I can only find about a dozen which can be said to be variegated. These, however, are all very distinct and beautiful, and some few of them, if not all should find a place in every collection of plants; indeed, I cannot too strongly recommend some of them for the beautiful effect which they produce in a Fernery, more particularly when planted out in a naturally constructed rockery, either under glass or in the open air, according to their hardiness. It is a remarkable fact that the genus Pteris should, up to the present time have yielded the geatest number of variegated forms, whilst that large and beautiful family of Maiden-hairs (Adiantum) have not, up to the present date, yielded us a single variety with variegated leaves, except those whose young fronds assume a beautiful rosy-red. This, however, cannot be accepted as variegation, but it serves to heighten the desire to possess a plant which would always maintain such lovely tints. With one or two exceptions, variegated Ferns are easily grown. Like all Ferns, they must have good drainage and a liberal supply of water both from the watering-pot and syringe.

Dryopteris nobilis.

This is a member of small genus remarkable for dwarf and compact habit. The present species, however, is the only member having variegated leaves, and, curiously enough, is the largest grower; the fronds in a young state are simple and entire, and sagittate in shape, deep green in color, with a broad continuous band of white up the centre. As the plant increases in size and age, the fronds become palmate, whilst the centre of each segment retains the band of white. The underside is light green, ornamented with a broad band of marginal sori, in the way of Pteris, from which genus it is distinguished chiefly by its reticulated venation. It requires the temperature of a stove, and should be potted in peat and sand, with the addition of a little light loam. Native of Brazil.

Elaphoglossum L'Herminerl.

This is a member of the Acrostichum family. distinguished by simple entire fronds, and free forked veins. It is a large genus, containing many fine ornamental kinds, this species being, perhaps, the most beautiful; indeed, its style of beauty is entirely distinct from that of all other Ferns. The fronds of this species are from one to three feet in length and from two to three inches broad, thick and leathery in texture, and of a most peculiar and beautiful bright lustrious blue, reminding one of the back of a mackerel It forms a beautiful object when planted in a pocket in the Fernery, or when placed in such a position as will allow its long, ribbon-like, iridescent fronds to hang down over a prominent rock. It requires the heat of the stove Fernery, and should be planted in peat and Sphagnum Moss, It is a native of the West Indies, some parts of Brazil, and Central America.

Anthyrium Goringianum pictum.

This has been proved to withstand unharmed the severity of our winters; nevertheless, I would always cover its crown with some old fronds or dry leaves. Here I would fain make a slight digression. I have often advocated the cause of cleanliness; but experience has taught me that it is possible to be over-scrupulous in matters of this kind connected with the hardy Fernery; for where too much attention has been paid to smart keeping, I have had complaints that even British Ferns were not hardy; and no wonder, for when old fronds are cut clean away, the crowns are so much exposed to cold that they are killed. Besides this, all the dead leaves are carefully raked and cleared away, and thus all the protection Nature gives them is removed. Under such conditions, it is not to be wondered at that many deaths occur in the hardy Fernery. To prevent this, I advise the leaves to be kept round about the crowns of out door Ferns. these may be kept from strewing about by having some fronds of the common Bracken pegged round and over them. The plant now under notice is a valuable addition to any collection of out door Ferns; the fronds attain a length of about 1½ feet, they are broadly lanceolate in outline, two or three times divided, and dark green; along the centre of each of the pinnæ there is a deep reddish band, which is again bordered with white, rendering it very distinct and attractive. It is a deciduous plant from Japan.

Athyrium Japonicum Variegatum.

This is another Japanese plant, and, like the previously named, one perfectly hardy. It is, however, somewhat rare In general appearance it resembles a lax form of our own Lady Fern, with a good proportion af the pinnæ of a white color. It is a deciduous hardy species.

Scolopendrium Vulgare Variegatum.

A dwarf variety of our common Hart's-tongue Fern, with fronds bright green and variously striped with narrow bands of white. It is very pretty, but as it does not assume large proportions, it should be planted in a snug place in the Fernery.

Asplenium Adiantum-nigrum Variegatum.

This is another instance of our native Ferns putting on a parti-colored coat in order to rival, it would seem, their exotic relatives; the deep bright green of the fronds of this plant are irregularly streaked and blotched with pure white It is a distinct and beautiful form, unfortunately somewhat rare.

Polypodium Vulgare Variegatum.

This plant is rather apt to lose its variegation, and for a time to produce only green fronds; when variegated it is irregularly splashed with yellowish white.

Pteris Argyrea.

This is, perhaps, the most beautiful of all the variegated Ferns. In a young state, it is very useful for table decoration, but, when mature, it forms a splendid object in the Fernery, and may be either grown in the cool or tropical house. The fronds are once or twice divided, and grow from 1 to 4 feet in height the pinnæ being broad and pinnatifid. The greater portion of the pinnæ are of a bright lustrous metallic white, the edges forming a border of light green. Native of the East Indies, at considerable elevations.

P. Cretica Albo-lineata.

This is a very handsome Fern, and one that, from its compact and hardiness, comes within the reach of all Fern lovers. It originally came to this country from Java, but was probably taken there by the Dutch. A friend, writing to me from Japan, mentions it as being a very common plant in that country. The fronds are pinnate, about 1 foot or 15 inches high, the pinnæ long and pure white, bordered with bright green. It is a very beautiful greenhouse plant, and so hardy that with a little protection, it may be kept in the open-air Fernery. On this I can speak confidently, having grown it so for several years.

P. Aspericaulis Tricolor.

Nothing can exceed the loveliness of this plant, if in good condition, but this is a great drawback to its cultivation, and I am inclined to think most amateurs fail with this plant through not giving enough water to its roots. The fronds, however, should not be wetted. The fronds are pinnate. the pinnæ broad and pinnatifid, the centre of each of the pinnæ is bright rosy-red, bordered on each side by a band of white, which is finished off by an outer border of dark shining green It is a truly lovely plant, a worthy subject for the amateur's skill in endeavoring to cultivate it. Must be grown in the tropical Fernery. East Indies.

P. Serrulata Variegata.

A somewhat robust form of serrulata, marked in a similar manner to *P. cretica albo-lineata*, but narrower in the pinnæ, and these are slightly serrate at the edges; it is a free-growing pretty plant.

P. Nemoralis Variegata.

This is a very pretty plant, somewhat resembling a small form of *P. argyrea*, but the white in the pinnæ is beautifully suffused with rose; it may be grown in the temperate Fernery.—*Villa Gardener.*

Carpeting Borders Beneath Shrubs.

In places where greenhouse plants are used to decorate the grounds, whether they are turned out, or the pots are plunged, the appearance of the border devoted to them is greatly improved if the surface of the soil be covered with some low-growing and rapidly spreading plant. We have seen Portulacas sown broadcast with very good effect, but the trouble with these is, that the seed germinates slowly, and the plants do not make much show until late in the season. The best attempt we have seen at carpeting was where Gnaphalium lanatum was used. This bedding plant is propagated with ease, grows rapidly, and soon covers the soil with a carpet of neutral grey tint, against which bright foliage and flowers shew to the best possible advantage. This is a point in gardening that has received less attention than its importance demands. If the soil of beds in which plants are temporarily placed, be carpeted with some rapidly-growing plant of a pleasing color, not only is the general effect heightened, but of course much labor in keeping is saved. In permanent shrubberies, too, this is a matter of no little importance. The soil beneath our shrubs is either bare or covered with weeds. Why not grow some pleasing plant which shall cover the ground and save all trouble of weeding? We are trying two plants for this purpose. In one row of shrubs we have set plants of the Money-wort (*Lysimachia nummularia*), which always grows

rapidly enough when allowed to become a weed, and which makes as dense a mat as can be desired. In another clump of shrubs we are trying *Cerastium Biebersteini*, (a variety of Mouse-Ear Chickweed) We have not had either of these long enough upon trial to be able to say more than that they promise well. The common Periwinkle *(Vinca)* would probably be useful in such places, and the Moss Pink *(Phlox subulata)* might be tried. Could we get a set of low-growing plants that would flourish well beneath the drip of shrubs, and completely cover the surface, it would not only greatly improve the appearance of our grounds, but do away with the necessity for weeding. When shrubs are set out to remain in one place for years, the soil should be so well prepared at the outset that there will be no need of the annual forking in of manure that many think it necessary to give their shrubberies every spring.—*The Farmer.*

Canadian Hedges.

We have received the following letter making inquiry about hedge-plants suitable for our climate.

Plympton, January 12th, 1874.

Sir:—Would you be kind enough to answer a few questions of importance to farmers and others, Jan 1st Canada Farmer says a certain kind of honey-locust grown especially for hedges is hardy and durable. Where can it be got true to name, as it seems to be different from the kind we now have here. There are some nursery men here selling osage orange plants two years old, who claim it to be perfectly hardy; and will make a perfect hedge for farm purposes, price $14 per thousand. Now sir is not that cheaper and better than making rails, if it will do that in two or three years; if it is so, why not sell it in older settlements where timber is so scarce and valuable. Here we have an abundance of timber although the winds tumble it down often; a hedge would be much the best. What I want to know is is it known to be the right kind for our cold climate? In three different places near here it is being tried, I suppose from seed, and it is cut down in winter, agents claim plants grown at Cleveland and two years old will stand our climate and still colder, making a first-class hedge; one of the men trying it is a nurseryman near Warwick village.

Now sir will you be kind enough to give me all the information you can in the Farmer, and very much oblige yours &c., M. A BAYLEY

To this inquiry we reply that the

Osage Orange

is not sufficiently hardy to endure our Canadian climate, and will never make a reliable hedge-plant in this latitude. It makes no difference whether the plants are grown here from seed, or the seed is sown in Cleveland, Ohio, and the plants brought here when two years old or at any other age. The osage orange has been tried in the comparatively mild climate of the county of Lincoln, and found to be a failure on account of its inability to endure the winters, and we are fully persuaded that it will not thrive any better in the county of Lambton

The Honey Locust,

is sufficiently hardy to endure the climate, and grows very vigorously and is well filled with thorns. We can not tell our correspondent where plants are to be obtained, but presume that our nurserymen either have them or can get them for him if he wishes to give them a trial. The honey-locust grows so strong that unless much care is used it will become a tree instead of a hedge-plant. We have seen them from twenty to thirty feet high, and covered with formidable thorns five or six inches in length.

The Price.

We have seen advertisements of these plants, and can assure our correspondent that fourteen dollars per thousand is a very high price to pay for two year osage orange. If he would deal with the nurserymen direct, instead of buying of "agents," he would save on an average thirty per cent. The usual price of osage orange is certainly not more than seven dollars per thousand. Honey-locust are usually a dollar or two higher. When will our farmers learn how much they are paying for this agency system? We have often known them to buy fruit trees, grape vines, &c, &c, of these "agents," that could be had of the nurserymen for one fourth of the money. And this is just as true of their reapers, mowers, threshing-machines &c Our farmers pay the "agents," it is not the manufacturers.

Onions on Muck Land.

Herman Glass reported to the Farmer's Club of Monroe County, N. Y, that a few years since he came in possession of a light, sandy soil so exhausted as to be unproductive. On the place were a few acres of muck land, but his neighbors tried to discourage him from attempting to do anything with muck Notwithstanding, he had succeeded in every crop he had attempted to raise, excepting Ruta Baga, and Peachblow potatoes. Has raised good crops of Early Rose and other potatoes with small tops, but Peachblows run too much to vines. Had raised 110 bushels of sound ears of corn per acre. The muck was from one to three feet deep, underlaid with peat, and that with quicksand. No sand mixed with the muck. Timber that grew on the muck, soft maple, and elm.

In 1869 he commenced with one-fourth of an acre of onions,—yield not given; 1871, on two and three-fourths acres, 1,030 bushels, averaging 375 bushels per acre; 1872, on five acres, 1,142 bushels, yielding 228 per acre; 1873, on five acres, 2,425 bushels, or 485 per acre. Of the crop of 1873 he sold, in fall, 2,160 bushels, for $1,793.85, a little more than 85 cents per bushel, and has 265 on hand, for which he can take $1.40 per bushel or $397.50 for the lot, which would make the entire crop amount to $2,191.35, averaging ninety and one-third cents a bushel.

The cost of fertilizers, seed and labor, before harvesting, amounted to $315, or 13 cents a bushel. Cost of harvesting, 10 cents a bushel. Entire cost per bushel, in market, 23 cents, making the crop net 67 cents a bushel, or $321.95 per acre. When the crop is ripe, rakes the onions out, lets them lay on land a few days, turning them two or three times to cure them; then he has them topped, and spread out two or three feet deep, under a shed. Sows in rows fourteen to sixteen inches apart. His land is thrown into beds, a rod in width, that the water may settle into the furrows between Smartweed, purslane, and other weeds natural to muck land trouble him. Prefers Yellow Danvers and Red Danvers, a round, red, solid onion.

He finds unleached wood ashes his best fertilizer. Has tried several other fertilizers, but ashes proves best on his muck land. To succeed in raising onions, must have the right soil, and be so situated as to be able to procure cheap labor. Finds women, and even small girls, his most profitable laborers. Onions on sandy land, in his neighborhood, were mostly destroyed by the onion maggot. He had spread sand on a small piece of muck, and the onions on the sand were destroyed by maggots, but none affected those on muck.—*American Rural Home.*

New Plants.

The Early Mount Lebanon Iris (*I. Histrio*), a near relative of *I. reticulata* is just now in flower on a border in the herbaceous grounds at Kew It bears beautiful blue flowers, spotted with deep purple, its fresh flowers just peeping through the surface of the soil. It is new to our gardens, and deserves general cultivation, It differs from *I. reticulata* in its smaller size, and much fewer, shorter, and broader leaves. and differently shaped inner perianth-segments.

Under the name of *Eremurus robustus*, Dr. Regel describes and figures, in a recent number of the *Gartenflora*, a very handsome hardy Liliaceous plant which has flowered in the open air in the Botanic Gardens at St. Petersburg and Moscow. From a loose crown of narrow ribbon-like leaves, about 2 feet long, it sends up a leafless flower-stem to a height of about 4½ feet, bearing on its summit a dense spike of rosy flowers, 2 feet or more in length, each of the flowers being nearly 2 inches in diameter. This very charming plant, which was discovered in Turkestan, is worthy of a place in the best collections.

In a recent number of the *Gartenflora*, Dr Regel describes a new species of Tulip, from Turkestan, which flowered last year in the Botanic Gardens at St. Petersburgh, and which, he says, is so beautiful that he considers it the Queen of Tulips. The flowers are of a brilliant scarlet (in some varieties purple, or, more rarely, yellow), from 1½ to 2½ inches long, and from 1 to 1½ inches broad, broadly bell-shaped, the points of the divisions of the corolla being much reflected. Flower-stalk from 2½ to 8 inches high. The leaves are thickly covered with oblong tawny spots, reminding one of the leaves of Orchis maculata. A well executed colored figure accompanies the description of this Tulip, which Dr, Regel has named *Tulipa Greigi*, in honor of Mr. S. A. Greig, the President of the Russian Imperial Horticultural Society. —*The Garden.*

About Apple Growing.

Calvin Pitcher, Esq., of Belfast, Me., is an enthusiast in apple growing. His farm of fifty acres, with the exception of about ten acres in pasturage is covered with apple trees of various sizes and ages, though a majority of them are now in bearing. One of his theories is not to use animal manure around or near his trees, but to depend wholly on vegetable manure in the form of mulching. He defends his position upon the ground that the one is the natural method and the other artificial—the latter tending to decay and the former to health.

He kept over 1,200 bushels of apples, mostly Baldwins, through the past winter and spring in his cellar, and has only just sold the last of them, the prices ranging from $1 to $2 per bushel. He says by his mode apples may be kept the year round, without losing their juiciness or crispness; and this method should be understood by every orchardist.

His theory is that early rotting and decay of apples is due to a great extent to a vegetable miasma in the air, which is communicated to it by vegetable evaporation under certain conditions. The effect of miasma is first seen in a minute speck; sometimes as many as a dozen may be counted on the same apple.

His remedy is a daily airing of the cellar or place where the apples are stored, arranging so as to have a brisk circulation until all the stagnant air is expelled and its place occupied by pure, healthy air.

His success has certainly demonstrated the feasibility of his plan. He is one of the most successful growers in this section, and his views are worthy of consideration.—*Country Gentleman.*

Ripening and Keeping of Pears.

Sixty and more years since it was written and printed that in order to have a good pear which naturally ripened in summer or early autumn, it must be gathered a few days, say eight or ten, before its real maturity And, again, in order to have it obtain color of surface, and rich juiciness of flesh, it should be either covered, on a shelf, with flannel, or immersed in bran or wheat chaff. These principles were condensed and printed in the first edition of Downing's work on Fruits; they were before that, incorporated in several English works, and have since been promulgated in nearly every fruit book published.

Mr Gordon, of Brighton, Mass., gave many years since a statement as to the effect of ripening pears in woolen cloths, and the same is recorded in "Field's Pear Culture." We have been twenty-five years or more, pursuing this course of careful gathering (and imbedding in single layers between flannel, with good success. Few who grow or eat of pears know the richness or delicacy of the fruit, until they have eaten of a summer or autumn pear, gathered just as soon as it would separate easily and readily from the tree, and then have been ripened up in flannel wraps and darkness. Temperature is again a point in this matter of ripening, if above 80° Fahrenheit, the pear will be liable to rot at the core, if below 60° it will color, but will not develop its saccharine perfectly, hence many a pear is condemned, because the grower or ripener did not know of the requisites to complete perfection.—F. R. Elliott, *in Cleveland Herald.*

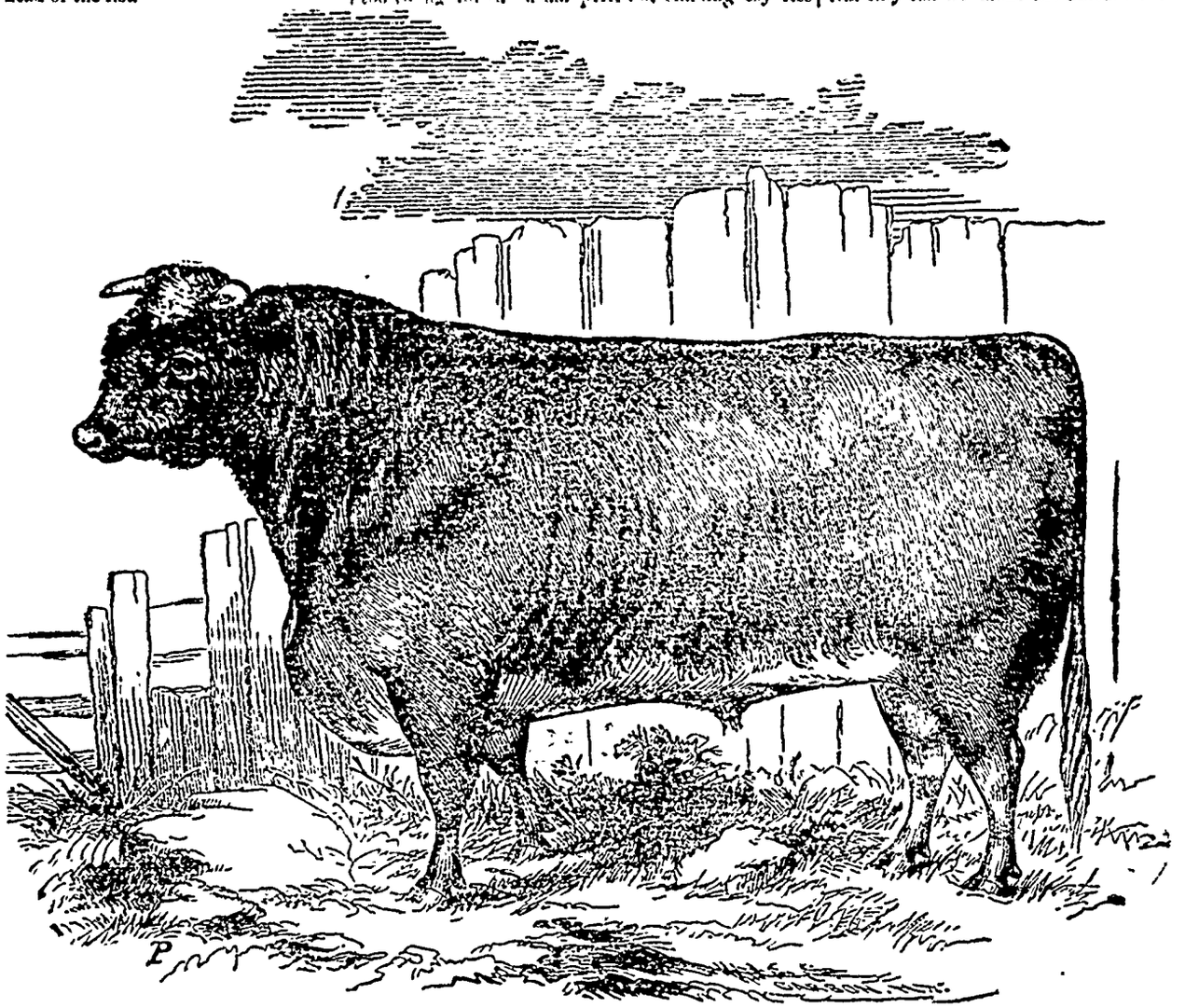
Ferns.—These may easily be transferred from their woodland homes to the shady corner of the sitting-room, and be kept flourishing all winter. A good sized pot is filled a third of the way up with pounded charcoal, and bits of broken crockery; upon this is placed the fern with the soil in which it grew. A covering of moss around the base of the leaves will help to retain moisture, and prevent the fern from finding out that it has been transplanted. A luxury so cheap as this is within the reach of every family.—*Boston Cultivator.*

Camellia Japonica.—The dark green, glossy foliage, and glorious flowers of these plants command the admiration of all. They are more easily cultivated than is generally supposed. They should be potted in a soil composed of two parts sandy loam, one part peat, with a little leaf mould added. They should be syringed three or four times a week, except when in flower, and kept in a close, moist place while growing. Water sparingly if plant is strong and robust, to cause a better bud setting. When this is done, be careful not to allow them to become too dry. The plant flowers freely in temperature of 50 degrees in a moist atmosphere.—*Boston Cultivator*

Breeder and Grazier.

British Baron.

The annexed portrait is that of the Short-horn bull *British Baron*, bred by Col Towneley, and imported by the Messrs. Snell, a yearling in 1871. In 1872 he won the first prize at Guelph Central Exhibition as a two-year-old, the diploma for best Short-horn bull of any age, the silver cup for best bull of any age or breed, and stood at the head of the first prize herd. In 1873 the same record was repeated in full, and at the last Provincial Fair at London he took all the honors competed for, and again stood at the head of the list.



SHORT-HORN BULL, "BRITISH BARON."

The blood of *British Baron* is a combination of the *Booth* and *Bates* strains, his sire being a pure *Bates Oxford* bull, and his dam by a *Booth* bull, descended from the stock bred by the late Sir Charles Knightley. His full sister *Baron Oxford's Beauty* took the first prize as a yearling heifer at the Manchester meeting of the Royal Agricultural Society in 1869, and was imported by Mr. Campbell of New York at a cost of $3000.

Miscarriage.

Aborted! There's the rub. Of all the mysterious accompaniments of cattle breeding, this is the most mysterious and the most deplorable. I have racked my brain incessantly to learn the cause, and to devise some treatment that will serve as a preventive, but thus far neither cause nor preventive have been found. We have not as yet had very many cases, but one case, with a thorough-bred cow valued at a very high price, is bad enough. We not only lose the calf, but we also lose (for the time, at least) much of the value of the dam. In the case of common cows, one that has aborted may be at once dried off and fattened for the butcher, but with thorough-bred ones this cannot be done. We have to do our best to make them carry their next calves to maturity If they once do this they are safe. Thus far, I have had no second abortion by the same animal, and I have tried to avoid it by adopting the plan suggested by Mr. C. L. Sharpless, which is to keep the cow from the bull until the November following the abortion, or, if she has aborted later than July, until the [illegible] November following. Perhaps even December would be better. The object is to have the fœtus too young for the usual period of slinking (say less than seven m[illegible] old) when the cows are turned out too grass. They should then be put on good pasture, no unruly or quarrelsome animals should be allowed among them, and not too many should be put together. If, with all these precautions, they abort again, they may as well be fattened at once—no matter how valuable they may have been.

One thing seems clear, whatever may be the original cause of the disease, it is contagious, and the closest watch should be placed over the herd, whether in the stable or in the field, to see that any cow that shows indications of calving may be at once removed out of sight and hearing and smell of the rest of the herd. It would even be prudent not to allow a cow to calve at her full period in the presence of the others. Whether the birth has been premature or not, the dead calf and the after-birth should be buried in some place remote from them. No cow that has aborted should be returned to the same stable with pregnant ones until at least a month after the accident, for there is some unknown influence emanating from them which spreads the contagion.—*Ogden Papers, Am. Agric.*

Soiling Experience.

My practice is to cut all my green feed with straw cutter and mixed with wheat, bran, corn chop, &c. Cured corn-fodder and fodder from planted corn I cut with a fodder cutter, which, after cutting it in lengths of two to three inches, passes them between masticators, putting it in better condition for feeding than any machine I have seen. There is then no danger of sore-mouthed cattle from hard or sharp edges of cut corn-stalks, but the whole is made soft, and cattle and sheep eat it clean.

I stall-feed altogether, and am careful to have my land well manured and put into such condition that will insure good soiling crops. I think by this system only can we make the amount of manure to use so liberally; and besides, I find a great advantage in having only the one lot, with shade and water, for cattle to run in. They are not restless as when pastured, looking for changes, and produce more milk and butter by being kept quiet.

For one acre of corn I paid $150, and cut and hauled it a mile, and even at this cost I believe it was the cheapest food I bought that summer.

My experience with Hungarian grass last season was very satisfactory; I sowed one bushel to the acre about the middle of June, it grew off finely and yielded me fully three tons to the acre, as I believe; it makes most excellent feed both for horses and cows. Both eat it with a relish, the former fattening on it, and the latter, incredible as it may appear, increasing their yield of butter above what they gave when fed on upland hay.—*Am. Farmer.*

SHROPSHIRES.—Last season, Lord Chesham sold one of his celebrated Shropshire rams to J. Pulley of Herefordshire for $1312.

Saving Land by Soiling.

F. J. O., Whitney's Point, N Y, wants definite information upon soiling as an economy of land, as he has a family with many wants, and only fifty acres of deep, gravelly loam well adapted to corn, clover, rye, etc., from which to supply their wants.

Mr. O. should take courage with such a farm, for when managed fully upon the soiling system, after a few years' preparation, it will be larger than any of his neighbors' who count one hundred acres, with two-thirds of it in pasture, as is the custom of most stock keepers. We would not advise him to go into full soiling at once, for few farms are in condition to do this. But with such land as he mentions, well manured, let him put in one acre of winter rye, sown thickly, to every five head of cattle and horses, the first of September, that it may get well rooted before frost, and if the growth is too large, pasture it some in the fall. This will give a cutting early in May, another in June, and probably another in August, if care is taken not to allow it to head. Then, as early as may be in spring, sow one acre of oats to every ten head, and twenty days later, the same amount. Begin to cut the oats when they first head, and you will finish when in the milk. As early as the climate will permit, sow one acre of common yellow corn to every ten head, and follow this ten days later with the same amount of Western corn. Do not cut any till in tassel unless necessity requires it.

Here you have three-fifths of an acre per head in rye, oats and corn, which will be quite sufficient with a small amount of pasture. This programme may be used during the change from pasturing to full soiling. It takes two or three years to fully establish orchard grass. That should be sown in the fall, according to most experiments with it. Sow next spring one-quarter acre of clover to each head to be soiled, but let one-half be medium clover and the other half large clover. The soiling ground should be near the barn, that it need not be carried far. When the crops are all properly arranged on well-manured land, one-half acre will feed each cow, head of cattle, or horse, through the pasturing season. *-Live Stock Journal.*

How the Cattle Rub!

At this season of the year in the open yards, and even in the stalls, especially where the animals are not brushed over daily, where the feeding is indifferent in quantity and nutritiveness, and where barley straw is used for fodder, or even for litter, animals are too often seen restlessly rubbing. Gates, posts, and partitions are broken, put out of plumb, or knocked down; and what is equally bad, itching animals cannot rest and thrive as they should do. The slightest indication of vermin, the disposition to rub usually about the tail or neck, should prompt an examination and, if need be, a dressing. It is senseless to wait until the unfortunate wretch has removed the hair from his own skin and spread his tormentors amongst his fellows. The pediculi or lice, of which almost every animal has its own particular species, are not difficult to kill. A good scrubbing with soft soap and water will remove them. Linseed or any other oil prevents their migrating, and destroys them; but the efficacy of the oil is increased when to every pint is added an ounce of impure carbolic acid, or of Burnett's zinc chloride solution. Decoctions of tobacco and staves acre also poison the vermin, an ounce to the pint of water being generally used. Where animals have been much infested, a second dressing should take place about a week after the first, and brushing, cleanliness, and usually a more liberal dietary also enjoyed.—*N. B. Agriculturist.*

Self-milking Cows.

It seems entirely impossible to break some cows off this habit, hence many persons have come to the conclusion, after repeated experiments, that it is best to put the cow into a beef barrel. It is generally true that self-milkers are very large milkers, and if this is the case, it will pay to try and break up the habit. Oftentimes the habit is formed in consequence of ir regular milking. The udder becomes so full as to be painful, and the cow, in endeavoring to get relief, licks her bag. By chance she gets hold of a teat, finds relief by drawing the milk, and then fall to repeating it every day.

The following method of treating a self-sucking cow was communicated to this paper some years ago: put a strap around her neck and another around her body about midway. Take a stout stick about the size of a hoe handle, and long enough to reach from one strap to the other. Pass the stick between the fore legs and fasten it to both straps. It will be impossible for her to suck with it on.—*Prairie Farmer.*

Soiling Crops.

J. H. Y. asks about crops for soiling. He intended to sow a patch of rye early in the fall for early spring feed, and another late in the fall for late spring feed (one acre in all), and then to plant two acres of drilled corn for fodder; and wants to know how many cows he can keep from time of first feeding rye to end of corn feeding. The arrangement is not a good one. Probably the late and the early sown rye will shoot at the same time in the spring, the chief difference being that the early sown will make the heavier growth. Rye is only useful for a very early feed. As soon as it blooms it imparts a bad taste to butter, and the straw early gets too hard to be relished by cattle.

A better arrangement would be one-half acre early sown rye, one-half acre early sown oats, two acres corn, planting at four different times from May 15th to July 1st in plots of one-half acre each.

"The cattle having the range of six or eight acres of moderate pasture," the soiling crops should suffice for the supplementary food of from eight to twelve cows, according to how "moderate" the pasture is, and how good the land growing the soiling crops.—*American Agriculturist.*

Raising Calves at an Agricultural College.

The *London Milk Journal* tells how stock is raised at Hohenheim. The rules laid down at this great agricultural college are, that it is best to rear calves entirely by hand, so as to have less trouble with both cow and offspring; and the quality and amount of food must be regulated as follows:

1st week,	daily,	12 lb.	milk,	0 lb	oatmeal, 0 lb. fine hay
2d "	"	16	"	0	" 0 "
3d "	"	20	"	0	" 0 "
4th "	"	22	"	0	" 0 "
5th to 7th	"	22	"	1½	" ½ "
8th week	"	21	"	0	" 1 "
9th "	"	20	"	1	" 1 "
10th "	"	16	"	2	" 3 "
11th "	"	12	"	2	" 3 "
12th "	"	8	"	2	" 10 "

In the ninth week the milk is first mixed with water and a little fine oatmeal. The meal is afterwards mixed with dry fodder. After three months the milk is withheld, and then the young animals receive daily, till two and a half years old, from twenty to twenty-two pounds of hay or its equivalent. But the calves never after receive, even in summer, any dry food till they are nine months old. The average feeding is so divided that the younger portion receive less, the older more, till two and a half years, when they begin to receive the regular rations of the older cattle, including the regular grain fodder, as indicated above. The growth with this treatment is so remarkable that it is only a little surpassed by the rapidly-maturing Short-horns.

	Heifers	Bull's
Average weight of calves at 3 months	232 lbs.	354 lbs
" " " 9 "	351 "	472 "
" " " 1 year	640 "	726 "
" " " 2 "	1,184 "	1,300 "
Daily increase of calves	1 5	1 8
" " " in 2d year	1 4	1 5

The college, whose management of young stock is given above by the *Milk Journal*, was established in 1818 by King William, on the Roville estate in Hohenheim Wurtemburg.

How to Keep a Cow.

At a recent meeting of the *N. Y. Farmers' Club*, Mr. Todd related his experience as follows:—I have a thousand dollar cow which I feed and milk with my own hands every day. She is a cross between the Short-horn and the Durham. About 7 o'clock in the morning she is fed with as much cut hay and cut corn-stalks, in equal parts, as can be pressed into a basket that will hold one and one-fourth bushels. This feed is moistened by pouring over it about one gallon of water, boiling hot. Three quarters of wheat midlings are then mingled with the mass, and when it is given to the cow it is all fragrant and smoking. She likes such warm feed. She is supplied daily three times, as regularly as the time is measured by the clock, with a basket of such cut feed and meal. At noon, also, she gets a peck of turnips. Between meals she has access to about a pound or two of hay. As soon as the cut feed is eaten, she gets two water pails of the usual size full of tepid water, into which about a quart of meal is stirred. She swallows two pailfuls of warm drink morning, noon, and evening as quickly as one will drink a cup of superb coffee. Her calf is now four weeks old, and the milk of two teats is all it can force down. The other two I milk, and such rich milk and such yellow cream and gilt-edge butter is not often seen.—*N. Y. Times.*

What our Farm Stock Eat.

It is calculated from an old table of close experiments, that the quantity of feed to keep stock in good condition in the winter is three pounds of good timothy, or clover hay each day for every 100 lbs. of animal That is, thirty pounds of hay for a cow, or horse weighing ten hundred pounds.

100 lbs. of hay is equal to			45 lbs. wheat.
"	"	"	54 lbs. barley.
"	"	"	59 lbs. oats.
"	"	"	54 lbs. rye.
"	"	"	57 lbs corn.
"	"	"	69 lbs. linseed cake.
"	"	"	374 lbs. wheat straw.
"	"	"	195 lbs. oat straw.
"	"	"	276 lbs. carrots.
"	"	"	504 lbs. cow turnips.
"	"	"	350 lbs. swede do
"	"	"	239 lbs. beets.

Corn fodder cut and secured before frosted, is desirable for any kind of stock, and one acre will give as much substance as a ton of hay. The quantity of corn fodder left on the field frozen and bleached, trod into the mud, and covered with ice and snow, for an animal to wade around in, to satisfy the cravings of an empty stomach, and to plump out its poverty, pinched up ribs, has not been calculated.

The last manner of feeding stock operates best when several farmers of this stamp live in the same neighborhood, so that they can have a mutual aid society, and pass around each morning to help *haul* up the cattle.—*L. R. in Farmers' Union.*

HEAVY STEERS.—I send herewith the weight of two yearling steers of my breeding and raising; weighed this day after travelling 2½ miles:

No. 1—22 months old this day	1,300 lbs.
No. 2—21 months and five days old ...	1,290 lbs.
Total of both	2,670 lbs.

IN FATTENING animals, the great aim of the feeder is to induce them to eat all they can digest and assimilate. How this can best be done depends on circumstances. Change of food will sometimes be attended with advantage and sometimes not. There is one general rule that should be borne in mind: When the animal is hungry, in the morning, feed the less palatable food, such as straw or stalks, and when the animal has eaten as much as it will then tempt it to eat more by giving cut straw or stalks moistened or mixed with bran and meal. The food left in the mangers may be sprinkled with salt and water and put in racks in the yard, and when the cows are turned out to water they will be likely to eat it up clean.

SHEEP are specially fond of clover hay. They will keep in good condition on this alone. But when straw is fed grain should be given in addition, say one pound each per day We are now feeding our sheep (Cotswolds) twice a day, chaffed oat and pea straw, all they will eat, ½ lb. bran, and ½ lb. oats or peas, and 15 bushels of sliced mangels to 100 sheep. We feed mangels only once a day, at noon. We never had them do better Merinos of course, being so much smaller, require less food.

WHEN to feed will depend a good deal on circumstances. Horses and cows should be fed early in the morning, say six o'clock. Sheep need not be fed until after breakfast, say seven or eight o'clock, and then again at four o'clock in the afternoon. They do not like to eat in the dark, unless it is a little in the middle of the night.

SWINE, owing to low prices, have been much neglected. It is a good time to engage in raising improved breeds of pigs. The demand is now good, and is likely to be still better. Pork has advanced rapidly, and the prospects are favorable for a still further advance. Get a good breed, and give good care and feed, and pigs will be as profitable as any stock we can raise.—*Am. Agriculturist.*

VALUE OF CORN FOR HOGS.—A writer in the Cincinnati *Gazette*, gives the following account of the increased profit of feeding corn on the farm to swine, instead of selling the grain in market. His experience is as follows: In August, 1872, I bought thirty-seven head of hogs at four dollars per cwt., the average weight being 126 pounds. Cost of the lot, $186,48. On Dec 10, when I sold them, the average weight was 270 lbs, or a gain of 144 lbs. per head. They ate twelve bushels of corn apiece. This, at twenty-five cents per bushel, would be three dollars. The total cost of the hogs, when fattened, was, therefore, $267,48. I sold them at four dollars per cwt., amounting to $390,60. Balance in favor of feeding, $101,12. By feeding my corn, it brought me nearly forty-eight cents per bushel.

The Dairy.

The Adulteration of Butter.

A short time ago, at a meeting of the Society of Medical Officers of Health, held at the Scottish Corporation Hall, London, under the presidency of Dr Hardwicke, a paper was read by Dr. C. Meymott Tidy upon "Butter and its Adulterations." Dr. Tidy said that butter was generally prepared from cream collected from time to time and allowed to get slightly sour. It was then churned, or, in other words, rapidly stirred. The best temperature for churning was from 50 to 55 degrees Fahrenheit, and hence most churns had an outside vessel either to warm or cool the apparatus as it appeared necessary Churning should not be too slow, or the flavor of the butter would be entirely destroyed, nor too fast, or the butter would be soft and frothy. Butter was also made from fresh cream and from entire milk. This should stand until it was sour, and then be churned at a higher temperature than cream - namely, 60 degrees. More butter was obtained from entire milk than from cream, but there was more work in the churning, and it took longer. Milk on an average yielded from 4 5 to 5 5 per cent. of butter, and it might be roughly stated that a cow yielded about one pound of butter daily It was next taken out of the churn and washed with water, so as to get out the adherent whey. That operation was important, as the butter would otherwise decompose more rapidly. It was then salted, about 4 per cent. of salt being a fair quantity to be added. The amount of stearine, olein and palmatine in the composition of butter was practically *nil*. The first adulteration of butter was water. Let them dry 100 grains of pure water in a weighed capsule for several hours at 220 degrees Fahrenheit, and from 5 to 8 per cent. of water would be produced. Water was incorporated with the butter chiefly when it was in a semi-solid state, and also by beating out and sprinkling. He had been able thus to incorporate 28 per cent. of water with butter. Out of 130 samples of butter purchased at different shops in Kent, seven contained from 7 to 9 per cent. of water twenty-one from 9 to 10 per cent., thirty-four from 10 to 13 per cent, forty-two from 14 to 17 per cent., 17 from 18 to 24 per cent., and 9 over 25 per cent Thus water might become a very serious adulteration of butter. It was his practice when analyzing butter in his capacity as public analyst to state in his certificate the amount of water if over 10 per cent., and to leave the magistrate to draw his own conclusion. The next adulteration was salt. To trace this they should incinerate the remainder of the 100 grains used for drying. In 19 specimens of undoubtedly pure butter, the average mount of salt traceable was 5·2 per cent., and out of 27 samples of butter indiscriminately purchased, he found that two contained less than 3 per cent. of salt, 2 between 3 and 4 per cent., 3 between 4 and 5 per cent, 4 between 5 and 6 per cent, 10 between 6 and 7 per cent., 2 between 7 and 8 per cent., one between 8 and 9 per cent., two 20 per cent., and one 17 per cent. Over 7 per cent. of salt he considered excessive. Adulteration was also introduced by the incorporation with butter of dripping, lard, suet, and other fats. These could not be mixed with butter when they were in a melted state, but only when they were cold, and hence the mixture was never perfect. The fats, unlike real butter, contained stearine, palmatine, &c., in considerable amount. To trace the presence of these fats let them note the melting and solidifying points Butter melted upon an average of 75 degrees and solidified at 63; dripping melted at 79·5, and solidified at 72·5; and suet melted at 82, and solidified at 75. Another test was the taste. The taste of real butter could be detected even when it had been most extensively mixed. Pure butter melted quickly on the tongue, and there was no sense of granulation, but when adulterated with other fats it melted far more slowly, and a peculiar granulated feeling in the mouth was produced as the last few grains disappeared. The odors of butter and of dripping were easily distinguishable, but the smell of lard when mixed with butter, was not so soon detected. Good butter was generally of a rich yellow color, entirely uniform, but when adulterated the color was very much paler, and it was marbled, owing to the imperfect admixture of other fats. He regarded streaky butter generally with suspicion. In good butter a uniform surface was produced by passing a clean knife rapidly over it, but impure butter had a granular appearance. Dr. Tidy concluded by describing other but more technical ways of detecting bad butter, such as the action of ether and the use of the microscope with polarized light. At the instance of Dr. Hardwicke, the society passed a cordial vote of thanks to Dr. Tidy for his interesting remarks on so important a subject A short discussion ensued, in which Dr. Stevenson, Dr. Berneys, and Dr. Tripe joined, and the general conclusions of the lecturer were confirmed Dr. Berneys observed that from 5 to 6 per cent. of water undoubtedly improved butter, and the addition of more than 7 per cent. of salt would render it uneatable. When in a butter of 1s per pound he found no less than 22¼ per cent. of salt and water he could not think it cheap at the price The meeting then terminated.—*N. B. Agriculturist.*

Going into Dairying.

We have before us several letters of inquiries in relation to going into the business of dairying. Advice is wanted about commencing the undertaking, and instruction as to how to proceed. The writers of these letters seem to think that the information asked for may be given in the space of a short newspaper article. They seem to be in ignorance of the fact that dairy farming requires a goodly amount of technical knowledge as well as a knowledge of general farming. Some of these letters come from farmers who acknowledged that they have not been successful in general farming, but who think that they may succeed in a specialty. Some come from parts of the country, where dairying has not been carried on to any considerable extent. The crop of letters on this subject is not in excess of that received in previous years In truth, editors of agricultural papers "may look out for" letters of enquiry respecting dairying about this time in the year. Is dairying profitable? Does it pay better than general farming? Would you advise me to go into the business?

The above are some of the questions usually asked. Now, in general terms, it may be said that dairying is profitable, and that it does pay better than general farming It may be further said that the most prosperous farming communities in the country are those engaged in dairy farming. It may be further said that the fertility of dairy farms has generally increased, while the fertility of farms devoted to grain productions has generally decreased. If anything additional was needed to show the prosperity of dairying, it may be said that the prices of dairy products have advanced, during the past ten years, more rapidly and more steadily than the prices of the ordinary product of the farm. The demand for butter and cheese has increased at home and has extended abroad. The latter product is now generally sold at home for cash, so that there are few losses from bad debts and commissions.

But to advise one to go into dairy farming, that is another thing. Success in this line of business is dependent on quite a number of things, a few of which we will mention. One must have a favorable situation in relation to location, soil and climate. The land must be naturally favorable to produce grass both for hay and pasturage. It must not be liable to drought. Pure water should be abundant and within easy reach. Facilities for cutting and storing ice are desirable, if not essential. Unless one has means to keep cows enough to supply a private dairy with milk, it is necessary for several farmers to unite in the production of it. Indeed, it is very rare for isolated farmers to succeed in dairying. There is no denying the fact that dairy farming is most profitable in neighborhoods where almost every man is a dairy farmer. One man learns from another. There is a sort of mutual inspiration. Children grow up with a knowledge of the business, and almost inherit a love of it.

Then the farmer must be adapted to dairying no less than the farm. He must understand how to breed cows for the dairy, or be such a judge of them that he can buy them judiciously. He should be a lover of cows, and have knowledge of the best ways of taking care of them. He must be a man of regular habits, who will feed and water his cows at stated times, no matter what else is neglected. A man who is in the habit of going to town two or three times a week and of returning at very uncertain hours, will not succeed with a dairy. Perfect punctuality is required The cows require it or they will not give milk. The cheese maker demands it or he will not receive the milk into the factory. The railroad conductor requires it, or he will not take the milk to the city to be sold. Unless a man can be at home, or provide a competent and trustworthy substitute, at stated hours, three hundred and sixty-five mornings and evenings in every year, he had better give up the idea of managing a dairy farm

But it is not enough that the farm and farmer are adapted to dairying. A like adaptation is required of the help in the house and out of the house. Not every good farm hand is a good milk-man, not every girl good at house work is a good milk-maid. As a rule, not one in ten of the men and women who seek work among the farmers can be trusted to milk and to take care of it. All of them must be trained to the business, and no amount of training will make many of them competent. Some despise the work altogether, and many never learn the art of drawing milk as it should be done. Competent and trustworthy men and women, suitable to be employed on a dairy farm, are hard to find. The nurseries and schools for this class of laborers have not been established very long, and the number that has gone out from them is not equal to the demand. Such are a few of the requirements for successful dairy farming. If you have them all, success is tolerably certain. If you are lacking in any one of them, failure is almost equally sure.—*Prairie Farmer.*

A Text for Dairymen.

We make large importations of foreign cheese of what may be called fancy brands. The high price at which it is retailed, viz.:—from forty cents to $1 per pound, certainly restricts the demand. There is little doubt that could cheese of similar character and quality be manufactured at home and sold at half the figures named, the consumption would be largely increased. These charges are now simply prohibitory to the great mass of the people. The taste for cheese has been gradually developing for the past decade, and the consumption of our native product is very much larger than it was a few years ago. When a taste for an article of food has become once established, a demand for variety begins to grow, and excellence of quality as well as new makes are called for. This is precisely our present position.

Factory cheese of greatly improved quality has now taken the place of the former coarse and ill-flavored irregular manufacture of farm dairies. An advanced public taste always demands renewed improvements, or it outruns the supply, gets ahead of its educators, and looks around for other sources from whence its requirements can be met. Undoubtedly this is the explanation of the fact that to-day we see imported cheeses in scores of shops where a few years ago we saw none. The taste is evidently growing for a diversity of cheese, and our dairymen must meet it. There is no question as to its being profitably met.

A striking instance in illustration of this point is given in a report of the Ayrshire Agricultural Association recently published. The ordinary cheese of that district in Scotland, known as the Dunlop cheese is a very good common article, selling at from $10 to $17.50 per 112 pounds. A successful manufacturer of Dunlop cheese changed his make to what is known as the Cheddar, a superior kind considerably imported into this country, and which sells at the Ayrshire cheese fairs at $19 to $20 per 112 pounds. The result of the change was an increase in the profits of his dairy of $5,000 in five years.

It is not possible that an American dairyman could fail of equal success, or that one of our factories which would turn out cheese of the quality and shape of the imported Cheddar or Stilton, could fail in selling its produce at prices very fairly remunerative for its enterprise. Thousands of people would like to eat Stilton cheese but cannot afford to pay sixty cents a pound for it, and many more would like to have upon their tables a shapely cheese of seven pounds weight, equal in flavor to the English Cheddar, if they could do so with a less expenditure than forty cents per pound. Surely there is an inducement in these prices, reduced one-third, to render the manufacture of such cheese desirable. Is it practicable to attempt a new departure in this direction?—*New York Tribune.*

JERSEY BUTTER DEFICIENT IN FLAVOR.—*The New England Farmer* in reference to the above subject, quotes Mr. Flint in saying that Jersey butter does not compare with first class Vermont butter in flavor. and that people judge more by the eye than the taste in purchasing. "There is none of the sweet, nutty flavor in Jersey butter that there is in Vermont butter. The high color is not owing to its richness, but to a peculiar yellow pigment secreted in the Jersey cows and carried off in the milk." *The Farmer* further says that Jersey butter is not as solid as that from common cows. "As a rule the higher the color, the greater the need for ice in the manufacture and sale of butter, from any cow or breed of cows."

Veterinary Department.

Bots in Horses.

Bots are the small grub-like bodies frequently noticed in the newly voided fæces, and in post-mortem examinations are often found adhering to the coats of the stomach. We believe they are present in greater or less numbers in nearly all horses that have been running at pasture during certain months of summer. Bots are the larvæ or grubs of the *Œstrus* or Gadfly, and several kinds have been found inhabiting the alimentary canal of the horse. For a description of the various kinds, and of their origin, we will refer to the remarks of the late Bracy Clark, who bestowed long and particular attention to their origin, effects, &c.:

Mr. Clark has particularized three species of bots, viz, the "*Œstrus Equi*," or large spotted bot, which are the most common and are generally found adhering to the cuticular coat of the stomach. The female Gadfly during the summer months deposits her ova on the horse's leg or sides, which becomes firmly glued to the hair, and after remaining some days in this situation they become ripe, and at this time the slightest application of warmth and moisture is sufficient to bring forth the latent larvæ. At this period, if the tongue of the horse chances to touch the ova, their opercula are thrown open, and the contents readily adheres to the tongue, and with the food are conveyed into the stomach, and these being lodged and hatched, they cling to the cuticular coat.

In speaking of the *Œstrus hemorrhoidalis* or fundament bot, Mr. C. says that the ova are usually deposited upon the lips of the horse, or some part of the body within reach of his tongue.

It may be stated in a few words that the ovum or egg which ultimately forms the bot is deposited on the legs or other parts of the body which the animal can reach with its tongue; and by the application of heat and moisture as in the animal licking himself, the egg is conveyed into the mouth, and from that into its proper midus the stomach, where it grows and finally adheres to the coverings of that organ, especially the cuticular portion.

In the spring months, it becomes detached, and is passed through the alimentary canal and expelled along with the fæces, where from exposure it is changed into the state of chrysalis, out of which it finally changes into a fly.

Bots may adhere to any portion of the stomach, and in post-mortem examinations we have seen them in considerable numbers sticking to the termination of the œsophagus and to the beginning of the small intestines. These little bodies are very frequently blamed for causing disease of the bowels, when the disease is produced by other and far more likely causes. No doubt if they are present in very great numbers, they may excite irritation of the stomach, and interfere with the process of digestion, and in some cases possibly setting up an inflammatory action of the coats of the stomach. But when they only exist in ordinary numbers and as they principally adhere to the cuticular portion of the stomach, we believe very little, if any harm results from their presence. In fact we may safely affirm that two-thirds of the horses of this country are infested with bots to a greater or less extent during the winter months, and at the same time they enjoy perfect health and are in excellent condition. In after-death examinations we often find bots in the stomach, when death had resulted from accidental causes, which could in no way be attributed to disease of the digestive organs, and where up to the time of the accident the animal had been in the most perfect condition. In nearly all the horses that are destroyed at the Veterinary College in this city, for the purpose of dissection, bots are found to exist in the stomach. Very often when horses are suffering from colic or other diseases of the digestive organs which produce severe and violent symptoms, these symptoms are often erroneously supposed to be due to the presence of bots. Should the animal unfortunately die and an after-death examination be made by a party entirely ignorant of the structure and general appearance of the digestion trait, and any bots found, the cause of death is at once put down to the effects of these little bodies—when other well-marked appearances would show the cause of death to have been due to a very common and well-marked disease.

Some people attribute certain milder symptoms as due to the presence of bots in the stomach, such as biting at his body, and rubbing against the stall or manger. Such symptoms we believe are more likely to be due to some irritation of the skin than to the effects of bots.

When they do produce irritation of the stomach, the usual symptoms of indigestion will be present, such as an unthrifty coat, weakness, and a capricious appetite.

Various specifics and remedies are recommended for the removal of bots, but it is very questionable indeed if we possess any medicine in our pharmacopea which has the effect of removing these bodies, without at the same time proving injurious to the animal within which they they are lodged, because they hold so tenaciously to the coats of the stomach. However, at certain seasons of the year, when they are about to let go their hold, and are about to be expelled from the system, their expulsion may be expedited by certain medicines—such as a dose of purgative medicine, or two ounces of oil of turpentine given in half a pint of raw linseed oil, and at the same time a change of feeding for a few days has a beneficial effect. The preparations of iron are also found useful at such times. A favourite remedy in some parts of the country is one composed of sweet milk and molasses, which if it does not do any good, it cannot possible do any harm—except in its administration. Some people very absurdly imagine that the drench is more effectual when poured down the nostrils than when given by the mouth, and we have known several fine animals destroyed from being drenched in the above manner. This method of drenching is highly dangerous and on no account should be resorted to.

Big Head.

Many suggestions have been offered as to the cause of this malady. It has been attributed to eating Indian corn. Prof. Varnell, who has given the best description of the disease to be found in the English language, enters into a lucid examination of its causes, and leaves one with the impression that it is due to food or water deficient in the salts of lime. We are only prepared to state that the disease has long been known, and French and German literature is particularly rich in materials relating to it. It has been witnessed in England, Normandy, Switzerland, Hungary, Saxony, Prussia, and in the south of France.

In these countries it may be said that the disease is enzootic, though it is more frequent in some years than in others, and is generally considered as allied to scrofula. It is usually fatal, and appears to be incidental to youth. It has been called scrofula of the joints *(arthritis)*, big head, from the bones of the head being more frequently involved, though all parts of the skeleton are disposed to take on the abnormal condition. We are prepared to state that the disease is not contagious. With respect to the original causes, we would only say, in the words of an acknowledged authority on such subjects: "It is better to confess these are unknown, rather than by labored and pretended explanations to endeavor to conceal our ignorance." There is no special remedy for big head. The only good that can be effected is indirect, by means of careful dietetic and hygienic management.—*Spirit of the Times.*

—According to a French journal, horses and other animals may be protected from the persecutions of flies by painting with a pencil the insides of the ears, or other parts liable to be bitten, with a few drops of empyreumatic juniper oil (*huile de cade.*)

What Ails the Pigs?

A correspondent, some days ago, wrote stating that his litter of pigs had lost the use of their hind legs, so that they had to drag themselves along to the trough, and asks what was the matter.

We answer, emphatically, paraplegia, otherwise called paralysis of the hind quarters. The treatment indicated is usually to give some physic and move the bowels, which are generally torpid. Castor oil is good, the dose according to the size of the pig. After the medicine is given, if you have a comfortable place immerse the bodies in a hot bath for a few minutes, and having some dry cloths rub them dry, applying considerable friction.

A paste made of mustard with vinegar should then be applied to the skin on each side of the spine (back bones) particularly over the loins; for several days the pigs should not be exposed to the cold air or storms.

As to the causes which produce the disease, it is supposed that sudden changes of the weather, exposure to rain and strong draughts of air often produce an attack of the disease in question. We do not recollect that our correspondent (we lost or mislaid his letter) wrote anything by which we could form an opinion in the present case.—*Vet. Ed. Mass. Ploughman.*

Correspondence.

To Manufacturers etc.

We give below specimen extracts from letters received by almost every mail from the sister provinces of New Brunswick, Nova Scotia, Manitoba, and even British Columbia, sections of country in which, we are happy to state, the Canada Farmer now circulates very extensively. We notice them here for the purpose of directing the attention of manufacturers to the importance of advertising their goods, and so keeping them before the public. We would urge this more particularly upon manufacturers of agricultural implements and machinery in the province of Ontario, inasmuch as for some years at least, this Province will maintain the leading position it now occupies with regard to that class of manufacturers, and will contribute largely to their supply in the sister Provinces

Ditching and Tile-Making Apparatus—*To the Editor of the* Canada Farmer.—Would you kindly inform me where the necessary machinery or apparatus for making drain-tiles can be procured, and the probable cost; also where the ditching machine is manufactured, a cut of which appeared in a recent issue of the Canada Farmer. —W. B., *Truro, Nova Scotia.*

Stumping Machines *To the Editor of the* Canada Farmer.—Which do you consider the best Stump machine in the market, and where, and at what cost can it be purchased? – G. M., *Bracebridge Ont.*

Light Brahma Fowls &c.—*To the Editor of the* Canada Farmer —I notice in your issue of January 15th cuts and description of Light Brahmas. Would you please inform me where I can procure the birds themselves, or their eggs, as I intend going into the poultry-raising business on a small scale? —A Subscriber, *Granby, Q.*

These Canada Thistles.

(*To the Editor of the* Canada Farmer.)

I have been a Canadian farmer for over twenty years, and during that time have had many severe tussles with the Canada thistle, which I ultimately conquered as follows:—

When the land was intended for summer-fallow, I never ploughed in the fall, but waited until the spring work was done, or about the middle of June. I then ploughed the land for the first time, using a chain or ball on the plough, for the purpose of dragging down the thistles, repeating the operation as often as the pest showed itself above ground, and going an inch or so deeper at each ploughing.

When the land was intended for a root crop, I ploughed in the fall, but very deep, and, when prac-

ticable, drilled at the same time. On wet or very damp land I found that the winter frost killed far more of them when exposed than did the summer's sun, and at the same time left the land in a good state for spring seeding. Very much depends however on the sort of plough used. I ploughed a field one spring and sowed the one half of it in peas, summer-fallowing the other half. I cross-ploughed the portion on which the peas had been as soon as the latter were off, the following spring. The field was literally covered with the pests, so I purchased one of the improved No. 4 ploughs, and ploughed it again. The land being too wet for harrowing, I one day set my odd team to plough with one of Gray's iron ploughs. The result was that where the iron plough worked there were afterwards plenty of thistles, while after the No. 4 there remained only a few sickly plants.—*W. W.*

Coal Ashes.

(To the Editor of the CANADA FARMER.)

SIR,—Would you kindly answer the following, through the FARMER?

1st. Are coal ashes a benefit to land, and if so in what proportion to wood ashes?

2nd. If not a benefit, are they a detriment to land? I burn two coal stoves and one wood stove. The ashes are all put together in the ash-pail and emptied around in the garden, and I have been told that I am injuring the land by so doing.—Yours truly,

A SUBSCRIBER.

[Coal ashes consist largely of silex and silicates, and are very deficient in lime. With wood ashes it is quite the reverse. The following statement shows the proportionate quantities in each—

Coal Ashes (Emmons).		Oak Ashes (Liebig).	
Lime	8·36	Lime	59·58
Phosphates	4·59	Potash	5·65
Silica	70·34	Silica	3·37

It will thus be seen that wood ashes contain about six times as much lime as coal ashes, whereas, in the latter the silica predominates in even greater proportion. Now certain plants, as the oak, the apple, the pear, etc., contain little or no silica, while the bark of the cherry, grape, etc., and the stiff glazed stem of the cereals abound in that article; hence we conclude that, whilst to plants of the former class, coal ashes may be of little or no value, to the latter they are invaluable as furnishing the very constituents that enter so largely into their composition. As we hinted before, coal ashes can at any rate do but little, if any, harm, and when, as in the case before us, they are mixed to so large an extent with wood ashes, their fertilizing properties are we think, placed beyond doubt. Ed. C. F.]

The Mocking Bird.

To the Editor of the CANADA FARMER.

SIR,—It is, in truth, a treat of no small magnitude to "listen to the mocking-bird," but I fear your correspondent, Charles Arnold, is in error when he asserts, in your last impression, that the enjoyment of that treat is accessible to the inhabitants of the neighborhood of Paris. He says that "the mocking bird and the thrush (by the way the mocking-bird is a thrush) never fail to build their nests in the branches of an Austrian pine," in that locality.

Now I never heard of the occurrence of the *Turdus polyglottus*, even as a casual visitant, in Canada. Wilson informs us that it is "much more numerous in those States south, than in those north of the Delaware," and I do not think it approaches our Dominion nearer than the New England States, although I need scarcely add that we should hail with delight a migratory visit from so unrivalled a songster.

I cordially sympathize with Mr. Arnold in his remarks respecting the desirability of planting evergreens, and read his article on that subject with much pleasure.

VINCENT CLEMENTI, B. A.

Peterboro', Feb. 24th, 1874.

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The Canada Farmer,

TORONTO, CANADA, MARCH 2, 1874.

Meeting of the Fruit Growers' Association of Ontario.

The Fruit Growers held their winter meeting in the City Hall, Hamilton, on Thursday, the 19th. Feby., 1874. There was present a large number of members, representing nearly all parts of the Province. We noticed members from Prince Edward and Ontario Counties taking an active interest in the discussions, a most gratifying proof that fruit growing is attracting attention in the eastern parts of the Province.

The meeting was called to order at about eleven o'clock, by the president, Rev. R. Burnet, of Hamilton, and after the usual routine business, proceeded to consider the subject of *Pear Blight*. It appeared from the remarks that were made, that while some places, indeed very many, had wholly escaped last summer, or suffered only very slightly from this cause, in other places the blight had been unusually fatal, destroying, in one instance, as much as seventy-five per cent. of the bearing trees. This disease of our pear trees has been more or less prevalent for about forty years, and has been the subject of considerable inquiry or investigation; opinions have been advanced with regard to its cause and cure, too numerous and conflicting to admit of recapitulation here; experiments of great diversity and exhibiting no small amount of ingenuity have been tried upon it, and yet the disease seems to remain shrouded in impenetrable mystery. Those who have been most painstaking in their researches have confessedly been compelled to change their views with regard to it as often as once a year, and seem to feel more than ever, that they have no certain ground to stand upon. Applications and operations that seemed to promise success, and that for some years appeared to prevent or ward off the attacks of the blight, have suddenly failed, and the disease swept through the plantation with fearful fatality, as though the angel of death had been commissioned with a work of extermination. As might be expected, the discussion on this subject was long and earnest, the experiences and experiments of members most amusingly diversified, and the conclusions reached wholly inconclusive.

Yes, unsatisfactory as this may seem, and discouraging to those who have been contemplating the planting of a pear orchard, and who naturally hesitate to embark in an enterprise which promises to end so disastrously, there has been no reason to complain of the results of pear growing as a whole, to those who have undertaken to grow the fruit for market. Said a gentleman to the writer, when showing his fine pear orchard, once fine, but then just blackened by a most destructive visitation of the blight, "that orchard of pear trees looks like a very poor investment, and it is indeed discouraging to see the trees die in this way just after they have come nicely into bearing, and when they might be expected to continue to bear for many years to come, but that orchard has paid me the best of anything I ever grew, it has paid me well and I shall proceed at once to plant another." One thing is certain, so long as we have this pear tree blight to contend with, pears will not be very likely to be grown in excess of the demand.

The meeting next proceeded to discuss the affection known as the *rot* in plums, and to endeavor to ascertain what varieties were least liable to the rot, and what were the best methods of preventing its appearance. The opinion seemed to prevail that no variety was wholly exempt from rot, but that those which bore their fruit in dense clusters suffered most severely, and that generally the Dawson plums suffered less than the larger and lighter colored sorts. Nothing definite was reached as to the cause or cure of this affection of the fruit. Mr. Roy, of Berlin, stated that Glass' Seedling Plum did not grow in clusters and therefore was not subject to rot.

Considerable time was given to the consideration of the best varieties of plum for market, the soils best suited to their growth, and the best methods of protecting the plum trees from the borer, and much very valuable information was elicited from the experience of members on these points.

Another hour was spent in the consideration of the Grape, the best soil for its cultivation, the best preparation of the soil previous to the planting of the vines, and the best method of pruning and training. Mr. Bauer, of Hamilton, brought a vine to the meeting and demonstrated to the members his methods of pruning. The discussions on these subjects were very interesting, and made it very apparent that considerable attention is being given to the cultivation of the vine, and that with usually very satisfactory results.

The president exhibited to the meeting the medals awarded to the Association at the exhibition of the American Pomological Society, last autumn. Four of these were of silver, and one of bronze. Upon one side is embossed a likeness of the venerable president of the American Pomological Society, Marshall Pinckney Wilder, and on the reverse, a very artistic wreath, within which is engraved the presentation to the Ontario Association. It was very gratifying to see that in a competition with the States of the neighboring Republic, Ontario should carry off so many silver medals, and take the lead in both plums and hardy grapes.

There was present at the meeting as a delegate from the Horticultural Society of Western New York, Mr. E. Moody, of Lockport, N. Y., whose presence added much to the interest of the occasion. He gave a very interesting account of what was being done in the way of fruit growing in Western New York. The county in which he resided, the county of Niagara, had received for the fruit crop of 1873, upwards of a million and a quarter of dollars, and while those counties which were chiefly engaged in manufacturing, had suffered severely from scarcity of money during their financial panic, consequent on the failure of Jay Cooke & Co., in that county money had been abundant, so that they had been able to lend a helping hand to adjacent counties that had been less fortunate. That experience had shown that fruit growing was a profitable business, and that the demand for good fruit more than kept pace with the supply.

The secretary stated that the report for 1873 was now printed, and would be mailed to all old and new members as rapidly as possible. That an edition of four thousand had been printed, which it was hoped would prove to be sufficient. Also that the report of 1872 had now been mailed to all, the delay having been occasioned by the unexpected increase of membership, which exhausted the first edition, making it necessary to set up the whole report a second time, and print off a second edition. The report for 1873 is replete with very valuable information, and handsomely illustrated with a colored lithograph of the Salem Grape. A plant of the Salem Grape, and of

the Downing Gooseberry will be sent in the spring to every old and new member who did not receive them in last fall.

At the close of the meeting, the president made some very appropriate remarks in relation to the social element which might be made to contribute much to the enjoyment of these meetings, and suggested that after the earnest discussions of the day, an hour or two might be spent together in a way to bring out a little more of that flow of soul, which gives vivacity and zest to our undertakings, and which occasions might be graced with the presence of the wives and daughters of the members. These suggestions were evidently very favorably received by the members present, and may yet be made to form a feature of some of the meetings of the Association.

The summer meeting will be held in Owen Sound, probably on the second day of July, 1874, of which due notice will be given to all members.

Extensive Cattle Feeding.

There are, in the cattle feeding sheds beyond the Don, here, at the present time, 2,660 head of cattle, all of which are being fed for the butcher. Of these about 1,700 belong to Mr. James Britton The sheds are situated on the lake shore, a short distance east of the Don, and are numbered, for insurance purposes, 1, 2, and 3. Nos. 1 and 2 contain 450 head each, the other over 700 head. The cattle are tied in stalls, with slight partitions between each These stalls they never leave from their entrance till their final exit. Every two rows face each other, at a sufficient distance apart to give room for troughs for the steamed corn and liquid food, as well as for the hay, which form the principal portion of their nutrition. The space in the rear of each two rows of cattle is cleaned twice a day, and it is a matter of surprise to observe the degree of cleanliness that is maintained in every corner of these vast feeding pens. Overhead are the hay lofts, and it will add to the idea of the extent of this scheme when it is known that during the seven months of feeding, the quantity consumed will reach 2,500 tons. This hay is bought entirely in the country, out north-west, 80 or 100 miles from here, baled, and brought in on the cars. The cattle are fed three times a day, their hides rubbed down, and an individual inspection made to see if there is any sign of disease or falling off. Since last November there has been only one death, and three or four cases of sickness; for the sick there is a comfortable infirmary. The general excellence of the stock is a point that strikes the visitor. In the whole number there is not one that belongs to the "Scalla wag" order. Thirty men are employed constantly, and find plenty to do; giving each man over fifty bullocks to feed, clean, and care for. The neighboring sheds contain about 1,000 cattle belonging to Mr. Lumbers; the management of which is similar to that observed in Mr Britton's.

Farm Accounts.

If the question were asked of our Canadian Farmers, "what were the profits of your farm last year?" How many of them would be able to give an intelligent well calculated answer? True, most of them have a sort of general idea that they must have made some profit, because they have more stock, or their stock is of better quality, or they have added a little to their "pile, but after all they cannot speak with any degree of exactness, as they keep no account except what they carry in their heads, or in their pockets. Now what is the reason of this? Our merchants and traders must keep strict accounts, or their business would get into utter confusion, or go entirely to ruin; and why should our yeomen, the "bone and sinew" of our Dominion, be behind other business men in this important particular?

An idea prevails largely, that a Farm Account is very difficult to keep, and we admit that where it is *correctly* kept—where each crop and each department of the farm has its own separate account, it requires a considerable amount of care in seeing that *everything* is entered, and charged or credited in the *proper place*. For such an account we would suggest the keeping of a Diary, in which all the operations of each day should be entered *every night*, and out of this the items might be copied or "posted" once a month, or as often as convenient. Such a record, besides serving as a Day Book for the Farm Account, would prove of great value in comparing the operations, times of sowing, harvesting, prices, and general results of one year with those of another.

But however desirable, it is not essential that a Farmer should be able to give an account of each crop, and each department, in order to arrive at a knowledge of his profit or loss upon a season's operations All that is really necessary is to keep a book, or a few sheets of foolscap paper ruled with money columns, on one page of which is entered all the expenses or money paid out, and on the other all the sales or money received Of course it will be necessary to value the stock, implements, etc., once a year, in order that any increase or decrease in their value may enter into the account. Such an account for a 100 farm might appear as follows:—

1873 April 1	To Stock on hand				
	" Implements on hand				
	" 1½ hands 13 harvest				
July	" hired men 3 months				
	" or threshing				
	" Joiner's bill				
	" Blacksmith's bill				
December 31	" Rent				
	" Balance (profit)				
1874 April 1					

1873 Nov 1	By 200 bushels wheat sold				
	" 100 " oats				
	" 100 " peas				
	" 200 " barley				
1874 Jan 3	" 6 fat cattle				
	" 5 cows				
	" 12 lambs				
	" 100 lbs wool				
	" 9 hogs				
April 1	" Stock on hand				
	" Implements				

It will be observed that we have not charged anything in the above for the farmer's own time or labor, so that the balance of $417 00 is what he has to cover his wages, interest on money invested, etc. As we stated before, the important part of such an account is to see that everything paid out or received is entered *when the transaction takes place.*

In the more extended system of farm accounts, each crop must have its separate account, as for instance, a wheat field would be charged with the expense of ploughing, harrowing, seed and sowing, harvesting and threshing, the value of the manure used, and the proportion of rent, or if freehold, the proportion of money invested; and should be credited with the grain and straw, which, if fed on the place, should in turn be charged to the stock account. This would be taken out of the Diary Day book once a month or at other stated periods—the principle being this, that everything done to a crop should be charged to it, and that it should receive credit for the whole proceeds.

Discouraging.

The following is from the *Mark Lane Express*, a leading authority on British agricultural topics:—

The result of the last three years of agricultural operations, so far as the returns of the wheat crop—which is considered the crowning product of the course of cropping—are concerned, is almost enough to break the heart of the farmers. It is true, the last crop of wheat was partial, some of the growers having been favored with a full average yield; but upon the whole the years 1871, 1872 and 1873 have been far from profitable to the farmer, although the forage crops have generally proved fair, and animal produce of all kinds has sold at high prices But the British farmer must not think he suffers alone in this matter; almost the whole of Europe are making the same complaint of their crops of wheat of last year; and even Russia, which sends us upwards of one-third of our imports, has fallen off nearly one half in 1873. Our own imports have amounted to 12,069,991 quarters against 11,116,536 quarters in 1872. Taking the two years together, the quantity of wheat, and flour as wheat, for the two years amounts to 23,186,527 quarters, being about as much as one year's consumption. Of this, the stock remaining on hand is by no means overwhelming, if we consider the season we have yet to pass through, when the imports fall off whilst the consumption increases. This year, too, we shall have to supply France, the French merchants having declined to speculate in foreign grain at present, although some of them are purchasing flour for delivery in August at very high prices comparatively—say 35f. per sack of 159 kilos, ($10.78 per bbl.). The buyers at that rate, therefore, cannot be looking forward much to lower prices for eight months to come at least. Before the next harvest, the stocks of wheat throughout the world will, in all probability, be so reduced as to keep the price still high; but we must not prophesy either good or bad things, but keep our eye upon the markets, which will soon indicate which way the wind blows.

Practice with Science.

In a letter to the *North British Agriculturist*, Mr. John Wilson, of Edington Mains, in proposing that the Highland and Agricultural Society of Scotland should expend a large sum of money on agricultural "stations" and an agricultural college, says:

"There are two things urgently needed to enable Scottish agriculture to make any decisive progress, and which, in the opinion of many members of this society, it is its special duty and function to promote. These are—(1) one or more stations adequately furnished with land, buildings, apparatus, and a staff of duly qualified agents, where important investigations and experiments could be conducted in such a manner as to yield trustworthy results; and (2) an agricultural college, where the sons of farmers and others could obtain, on moderate terms, such a professional training in the science and practice of agriculture as would prepare them for conducting the business of farming with the greatest advantage to themselves and the community."—*Country Gentleman.*

The Handsome Premium of $500 will be offered at the next Birmingham Short-horn Show and sale, for the best bull from 10 to 20 months old.

Short-horn Bull.—Mr. W. B. Telfer, of Pilkerton, sold the other day to Mr. John Valens, of Beverley, a thorough-bred short-horn bull calf for $250.

Simmers' Cultivators' Guide and Catalogue for 1874 - The Nineteenth Annual Edition of this useful little work is before us, beautifully illustrated and replete as usual with sound and seasonable information on the subjects of seeds and seed-growing. *See Advertisement.*

Attention is Directed to the advertisement in another column of the sale of the "Willow Lodge" herd of Short-horns, belonging to the estate of the late Mr. John Snell, Edmonton, Ont. The animals offered comprise 50 cows and heifers, and 10 bulls. Also 80 head of superior cotswold sheep, and the entire herd of Berkshire swine. Sale on Wednesday, April 8th, commencing at 12 o'clock sharp.

ACCORDING to the *Vermont Farmer*, J. A. Millard, of Essex, raised the past season on that part of his homestead of one acre and 38 rods not occupied by house and barn, four tons of hay, one half ton of corn-fodder, 21 bushels of potatoes, and an abundance of other garden vegetables.

NOT A BAD COMPARISON.—Mr. Evershed, a correspondent of the London Agricultural Gazette, compares the farmer who exhausts his land, to a cow with the bad habit of sucking her own milk: "There is a device of spikes strapped round the nose, which ought to be applied in certain cases, for it is an age when the unnatural has made its appearance among farmers who would suck the soil," and who propose "to sustain the nation by undue robbery of earth's natural resources, which she will require for future generations of her children." If the above is not exactly the turn originally intended in the comparison, it will at least answer equally well, and agrees with the previous remark. "No deceptions, illusions, new dynasties nor demagogues, can have the least influence in making the grass grow. Nothing will do but dung or its equivalent."—*Country Gentleman.*

THE "CANADA FARMER."—The last year's *Farmer*, bound, is to hand, and constitutes, without exception, one of the best agricultural manuals published on this side of the Atlantic. It is now several years since the Hon. George Brown started this journal in connection with his large printing establishment at Toronto, and the zeal and care with which he has had it carried on ever since cannot be too highly commended. Early last year the *Farmer* ceased to be a monthly, and became a fortnightly paper, and it still continues to be, issued on the 1st and 15th of every month. At the same time, Mr Brown renewed the editorial staff largely, and the result is that the *Farmer*, as represented in the volume before us, will compare favorably with anything of the kind published anywhere. The subscription price is low—only $1.50 per annum.—*Galt Reformer.*

AGRICULTURAL EDUCATION IN IRELAND. A system of agricultural education and model farms is in operation in Ireland on a much more extensive scale than people in general have any idea of. It comprises more than 200 separate establishments, with the Agricultural College at Glasnevin at their head. Model, and experimental farms, and training schools are combined, and so managed that their cost to the nation does not exceed £6000 a year. Some of the farms yield considerable profit, that at Glasnevin averaging over £600 a year though the land costs £4 per acre of rental. A correspondent of *The Field* says of the Glasnevin Institute. "From my own personal knowledge, I can bear testimony to the immense good that the model farm has effected. It has sent out a superior class of farmers, land stewards, managers in agricultural implement depots and seed establishments, and persons connected with stock traffic and agriculture, who have greatly assisted in improving farming science and practice throughout the country."

UNSEASONABLE SEASONS.—The mildness of the present season in Britain, though unusual, bears no comparison to that of some winters "long gone by." In 1172 the temperature was so high that leaves came out on the trees in January, and birds hatched their broods in February. In 1289 the winter was equally mild, and the maidens of Cologne wore wreaths of violets and corn-flowers on Christmas and Twelfth Day. In 1421 the trees flowered in the month of March, and the vines in the month of April. Cherries ripened in the same month, and grapes appeared in May. In 1572 the trees were covered with leaves in January, and the birds hatched their young in February, as in 1172; in 1585 the same thing was repeated, and it is added that the corn was in the ear at Easter. There was in France neither snow nor frost throughout the winters of 1538, 1607, 1609, 1617, and 1659; finally in 1662, even in the north of Germany, the stoves were not lighted, and trees flowered in Februrary. Coming to later dates, the winter of 1846-47, when it thundered at Paris on the 28th of January, and that of 1866, the year of the great inundation of the Seine, may be mentioned as exceptionally mild.—*N. B. Agriculturist.*

Beet Sugar, and How it is Made.

By Edward Lefroy Cull

As the object of the writer is to tell people how to make sugar out of beets, and not to write a book, he will dispense with all dissertations as to how to grow the beet, and the various sorts, merely remarking that "the better the land is, in which beets are grown, the better will be the crop," that the beet for sugar must not be grown on black or peaty soil, nor on fresh green manure,- the land must be manured the previous season, and well prepared and ready for seeding in the fall—the seed must be sown as early as possible after the frost is out of the ground; if sown so late in the year as not to grow, it may even be sown in the fall. The ground; should all be prepared the previous fall, and be ready at once in the spring to sow the seed without further ceremony.

Grow the roots small, and close together; take care that you do not have the leaves cut or injured—as some persons will use them for cattle feed. The more beets you have on the ground, the sweeter they are, and the more sugar you will have. All kinds of beet produce sugar, and the sugar of one kind is as good as the sugar of the best, the only difference is that their is *more* sugar in some sorts than in others, even the "mangel wurtzel" will produce sugar, but the "white Silesian beet," the "Vilmorin beet" "Carter's nursery sugar beet" are the best. At present all the best sugar beet seed is produced in France and Germany. When the cultivation of the root becomes a regular crop in Canada, we shall of course produce the seed ourselves—at present it must be imported.

Beet Sugar is obtained from the root by two processes, the one by grating or rasping the root and expressing the juice, which is then treated as hereafter described—the other by "diffusion," which consists in steeping the root in a divided state in water, and is also hereafter described. The first is the process by which the great bulk of the beet sugar made in the world has hitherto been obtained, the latter is a more modern invention, and is alleged to be a far cheaper and equally efficient method of obtaining the same end. I shall describe both methods, leaving it to the reader to adopt whichever is the best suited to his means and ideas. No work of this kind would be complete without a description of both processes.

The Grating or Rasping Process.

To prepare the roots for sugar making they must be washed in a rolling wooden cage, and grated or rasped as finely as possible into pulp, the more absolutely and the quicker this is done the better, and the more success you will have. The pulp must be pressed in cloth or in anyway so as to obtain it as clear as possible. It must run from the press into the boiler, or if circumstances should prevent this, a little lime water must be added. Neither the pulp or the juice must be allowed to stand about, it begins to ferment immediately the root is ground, and then the sugar is destroyed. Nothing will stop the fermentation but lime water. The following are the particulars of these processes.

Washing the Roots.

The roots before being submitted to the rasp, must be thoroughly washed in a rolling cage, great pains must be taken that no dirt shall be allowed to remain on the roots when they come to the rasp, and the heads of the roots and leaf stems must be carefully cut off; and if cattle are kept to consume the portions of the root which come from the press, so that waste would not occur, the whole head of the root ought to be cut off, and fed to the cattle. It has been proved time and again that the extremity of the root end of the plant is the richest in sugar, whilst the portion which is grown above the ground is the part which contains the largest proportion of potash and salt, hence in the continental countries of Europe where the government excise duty is charged on the roots consumed; the entire portion of the root which grows above the ground is cut off and rejected for sugar purposes.—Any plan which will insure perfect cleanliness in the roots, is that best adapted to the work, and the roots should be allowed to drain off all superfluous water, before they come to the rasp.

Rasping the Roots.

The roots should be presented to the rasp endwise, and the rasp (however constructed) should reduce the root to the finest possible pulp. The pulp, should then be passed through rollers working together, which are of sufficient surface to receive and crush the pulp as it comes from the rasp. The rollers will thus reduce the pulp to a perfectly smooth paste, and burst all the cells of which the root is formed, and which cells contain the sugar.

One form of the rasp which will do a great deal of work and is very cheap, is made of a sheet of punched zinced iron fixed around a cylinder of wood, and turned by a winch by hand or by power; another form of rasp (and the best) is made of saw blades let into a wooden cylinder lengthwise, about an inch and a half apart, and fastened into the slits in the cylinder with wedges, this admits of the saws being sharpened with a file in the ordinary manner, the cylinder is then turned by hand or power, and the pulped roots caught in a proper receptacle. The roots on a small scale are presented to the rasp by hand, on a larger scale they are pressed against the rasp either by their own weight or by machinery. On a large scale the rasp is made to revolve with considerable speed. For a large manufactory the cylinder will be made of iron turned in a lathe.

Pressing the Pulp.

The following is the old fashioned plan. There have been, and will be many improvements. The pulp must be placed by small parcels at a time, (according to the size and power of the press), on strong canvas cloths, each cloth being laid over a frame about 2 inches deep, and the size that will go into the press, the cloths must be much larger than the frames. When the frame is full, fold over the cloth first from side to side, then the ends; over then place the cushion of pulp so formed in the press; there must be a strong board, larger than the cushion of pulp, and it must rest on one board while another covers it; one board going one way of the grain, the next above crossing it, and so on, parcels of pulp and boards until you have the press full. Then put on the power very gradually, so that the juice can escape readily from the cloths, without bursting them; press to the full power of the screw, and take care to catch all the juice.

The juice should run from the press at once into the kettles, where the heat should be raised as quickly as possible to 150° Fahrenheit's thermometer, and it should not fall below this heat, so long as the kettle is filling.

When all the juice is out that you can get out at the first operation, with the press; take the cakes of pulp, put them in hot water, and let them soak for an hour. The water must be nearly boiling, as the cakes will cool it sufficiently. When broken up and mixed with the hot water (which they should be at once), the heat ought to be between 150° and 155° (Far.); and if not so, add more hot water until that heat is attained; then cover up, and keep it all hot. This is necessary to prevent fermentation or acctification. Then proceed to press the mashed roots again, in the same manner as at first.

It is scarcely worth while to squeeze the pulp more than twice, although it ordinarily takes three pressings to get out all the sugar. If your press is sufficiently powerful you can get out all the juice at once.

Strain the juice through a fine strainer, and get the juice into the kettles as soon as possible. Neither the first juice nor the product of the second pressing must ever be allowed to fall in heat, below 150°, or souring may commence. When in the kettles, heat the juice as quickly as possible, to just boiling; then add the lime in the following manner; the juice will be very black, and dirty looking, but it will all come right with the lime.

To Make the Milk of Lime.

Get some good, new, hot lime, slake it in boiling water; stir it up and let it settle for a minute or two, and pour the liquor off the dregs; you must leave all the coarse part of the lime behind, only take off the *milk* of lime, which must be quite smooth and without grit.

This should be made and put in a barrel; the lime must be caustic and strong; when kept under water it will keep for any reasonable time in a caustic state. When the juice boils, add some of the milk of lime to it, and stir it slowly. When you find the juice changing color, and curdle, shewing clear in spots, and when it shows signs of settling, you have put lime enough; stir the juice gently until the lime is mixed well through it, but don't urge the juice to a rapid boil; then take out a sample in a glass and see if it clears, and is the color of white wine, if so, enough lime has been put; if not, put a *little* more, but don't put more lime than enough. As soon as the juice boils, the effect will have been produced.

The following observations on straining the juice, will save much trouble:—

If the juice has been properly limed and boiled (and nothing but experience on these heads will teach the operator) there should be a thick scum on the juice which should be carefully removed with a skimmer, and set by itself. As the heat of the juice passes off, (and it should pass off as quickly as possible) the lime and other impurities will settle to the bottom of the boiler, leaving the main body of

the juice clear. As straining the juice from the lime is always a very troublesome operation, the more of this clear juice you can get the better; but even when drawn off clear, it should always be strained through a linen strainer, but when clear it passes readily. When you come to the thick portions, and to the scums, they may be put into close canvass bags, and with boards between, as in the first presses when the roots are grated; pile the bags one on the other, and let the liquor exude through the bags by the pressure of their own weight; it will come through clear, or, at all events, so clear as to be easily strained. As the liquor ceases to run, pile weights on the bags, and in the end press them with the screw. The thick portions are most valuable manure. No mischief will arise from delay in this part of the process, as the lime will prevent the juice from souring or fermentation for any reasonable time.

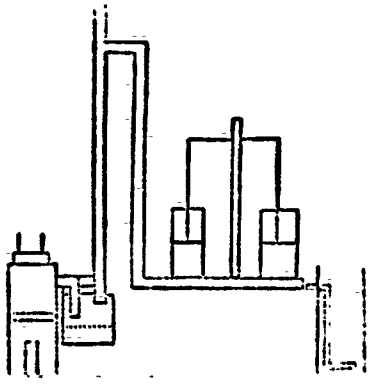
When the juice is all clear and fine it is then ready for the next process, which is called the carbonatation.

Although the juice is so clear and fine, there is still a great deal of lime in it, although you cannot see it—the sugar in the juice renders the lime in a measure soluble.

The lime which is in the juice is in a caustic state, and the object of the next operation is to remove the causticity; when this is done, the lime (before invisible) at once subsides in the liquor, and is removed by settlement and filtration. This operation is called the carbonatation, and is done in the following manner:—

It must first, however, be remarked, that on the perfection of the carbonatation, the whole success of the work will depend, and too much pains cannot be taken in rendering this part of the process complete and easily worked.

You must procure or construct a stove for burning charcoal thus:—(See the accompanying cut.)



A is the chamber of a stove, made of either cast iron or brick, with a fire grate and ash pit, and the means of putting in the charcoal at the top, and then covering up the opening. B B are pipes, made of common stove pipe iron. C is a tub containing water, with a close fitting cover of either wood or iron—iron is best and safest of course. The cover has two holes in it, into which the stove pipes fit tight. The pipe which comes direct from the stove must go down to within an inch of the water, but must not touch it. The water is to catch and retain the dust and ashes, which would otherwise pass over from the burning charcoal; the other pipe only goes just through the cover, the joints of both these pipes where they enter the cover should be made as tight as possible. There should be a common stove damper at E, turning on a centre. When you kindle the fire of charcoal in the stove, shut this damper, and let the first fumes of the charcoal and the smoke pass off into the air. As soon as the charcoal is well lighted, and the smoke and bad smell have passed off, the damper must be opened, and the cover of the stove closed, and the fumes of the burning charcoal must be sucked through the second pipe in the following manner:—

You must have a set of bellows; (common blacksmiths' bellows will answer if made large enough, or a blowing cylinder similar to those used in foundries will do even better) these must be connected with the second pipe by a flexible joint made of leather or otherwise, and there must be the means of readily working them either by hand power or machinery. To the nozzle of the bellows is fixed a flexible rubber pipe, so that when the bellows are worked, the gas from the charcoal is drawn through them, and forced through the flexible pipe. At the end of this flexible pipe is fixed a rose or a pipe pierced with small holes, and heavy enough to sink into, and keep at the bottom of the liquor. The second pipe (B) from the water vessel must be made of sufficient length to allow most of the heat to pass off before it comes to the bellows or blowing cylinder, or you will burn your bellows and leather joint and valves. If the joints of this pipe are not tight enough, paste them up with paper until they are tight.

Having this all in order, (and it must be thoroughly well done) insert the flexible pipe which is attached to the nozzle of the bellows into the liquor to be carbonated, and blow away. The passage of the carbonic acid gas from the charcoal, passing through the limy liquor in fine streams or bubbles, mixes with the lime in the juice and carbonates it, and the lime (on the liquor being rested) falls to the bottom of the vessel in a fine mud.

To prove when the carbonatation is complete, take a small quantity of the liquor in a glass, (get it as fine as possible, or filter it), then with a straw or reed, or other pipe, blow your breath through the liquor in the glass. If it remains fine, the work is done; if the breath muddies the liquor, the carbonatation is not complete, and the bellows must again be worked until the liquor, when tried, is found to remain bright and clear. When blowing the breath through the glass of liquor you must hold your nose, or else the breath will not have sufficient carbonic acid in it to prove the liquor.

The carbonatation must be done when the liquor is only just warm enough to keep grease melted on it—the generality of the books desire the carbonatation to take place in boiling liquor—but this is a grave error, as will be shown further on. Carbonic acid has the effect on hot juice of destroying the crystallizing power of the sugar. When the carbonic acid gas from the charcoal is blown into the liquor, a great deal of effervescence will take place; and the only way to keep down the froth is by the addition of a small portion of clean grease—*the less, however, the better.* When the carbonatation is complete, the liquor must be allowed to settle for a short time; the clear liquor must be strained into the boiler, and the sediment must be squeezed and filtered. The residue is most valuable for manure.

As, however, you have now lost the preservative power of the lime, the liquor will rapidly ferment, or sour, and no time must be lost in transferring it to the boiler, and getting it hot. It must be boiled until about one-fourth of it is evaporated, and it must then be strained through the bone black filter, which will be described further on.

It will come through the bone black of a very much lighter color, and almost free from disagreeable taste and smell. It must then be boiled down to a thick syrup, taking care not to burn it, and it will be ready to set by, in a warm place, to crystallize.

As the boiler is so important a part of the machinery for sugar making, it is well to describe it more particularly. Any kind of boiler will answer, such as sugar kettles, set on an arch, or otherwise, but the writer prefers the following—more particularly because experience has shown, in the Western States, that it is admirably adapted for the purpose. It is made very cheaply, is very lasting, and is extremely economical in fuel:—The shape of the boiler is long and narrow, and the heat of the fire acts on the entire length of the bottom. The sides and ends of the boiler are made of two inch pine plank, fastened together at the angles with screws, and angle pieces of wood, the screws going both into the ends and into the angle pieces. Into the side pieces there are grooves cut one-and-a-half inches wide, and one fourth of an inch deep. These grooves must be carefully cut—*all exactly to one size*—and well and smoothly finished, so that the partitions (to be hereafter described) will all fit into every groove. If this is not carefully done there will be endless trouble. The grooves must be eight inches apart. In making the frame the ends must not come down as low as the sides by two inches. The frame must be twelve feet long, and at least two feet wide. The bottom is made of two sheets of iron, rivetted together at the ends, so as to be water tight. It must be turned up at the ends and sides, and the angles turned in just like a large baking dish; but the ends must turn up three inches longer than the sides. Holes must be punched or drilled all along the sides and ends of the turn up, for the purpose of putting in screws to hold the iron to the wood. The turn up should be two inches at the sides, and five inches at the ends. You then have a long, shallow, iron dish—the wooden frame is made to fit into this—and then the sides and ends of the iron pan are fastened strongly into the sides and ends of the frame.

The partitions are made of wood, eight inches broad, and slide easily into the grooves. On to the lower side of each partition a piece of two-inch strong iron hoop is fastened, by screws; but this iron, although it goes quite to the end on one end of the partition pieces, does not go to the other end by two inches. When the partitions are fitted into the grooves, this vacant space is put alternately at each side, and the iron pieces bear on the bottom of the pan, so that when liquor is poured into one end of the pan it must circulate backward and forward, from side to side, until it reaches the other end.

When the boiler is to be used for heating and defecating the juice, these partitions are taken out, and laid aside; they are only used during the process of evaporating the juice previous to crystallization.

This boiler is set on two walls of brick work, going its entire length. The fireplace is at one end, and the chimney at the other.

When you are evaporating or sugaring off, the partitions must be fitted into their places; there must be two vessels or tubs used with the boiler, one placed near the chimney to hold the charge; the other, at the fire end of the boiler to receive the syrup. There is a tap hole or plug in the end of one of the sides of the boiler to draw off the charge, this must be capable of being partially or wholly closed as required. A sufficient stream is let into the boiler at the chimney end, so that it evaporates as it runs from side to side; and is finally discharged from the fire end in the shape of thick syrup.—When all is done, this syrup is removed to the chimney end, and again made to flow through the boiler, when it comes out all the water evaporates and is fit to sugar off and go into the crystallizing pans. In this state it will keep any length of time without fermentation or change.

The fire must be used with care and judgment, and for sugaring off, a sheet iron plate ought to be used to slide in between the bottom of the pan, and the fire; and thus take off the rashest heat of the fire, and prevent burning.

Before however the syrup is boiled down, to its thickest state, it must be strained through a filter of bone black, which we shall now proceed to describe, this is the most troublesome part of the process from the fact, that the bone black filter will only last a short time, without being returned.

Bone black acts much more energetically on *juice* about one-quarter boiled down, than on *syrup*, therefore the filter should be used whenever the juice has been well boiled, and has been thus only in a measure evaporated, the bone black filter operates better on the hot juice than on cold, and where it can be done, the juice as well as the filter ought to be kept hot throughout the entire process of filtering.

The object of the bone black filter, is to take out the excess of lime, and the other alkaline salts in the juice, and also to purify the syrup from its bad taste; and to destroy its color. A certain portion of the sugar can be crystallized without the bone black, but the bone black should always be used where it is possible to use it.

The Bone Black Filters.

Any one who has a potash kettle can make bone black, and can reburn the bone black when necessary, we shall describe the process with a potash kettle, leaving those who have not one to use some substitute which their own ingenuity must point out. Any thick cast iron vessel that will stand a red heat time after time, will answer, though of course not so well as a potash kettle. The regular sugar manufactories have proper machinery for this purpose, we only wish to point out the substitutes.

Collect all the bones together you can; break them up small, and fill them into the potash kettle, boil them well, steaming is better—and skim off the fat—when they are quite clean from fat, &c., and the water has been drained off, take some wet clay, cover over the bones with the clay, and apply the heat, this must of course be done out of doors, and away from the house, as the fumes will be very offensive; it should also be done out of a building; as the fat in the bones which cannot be got rid of by boiling will generate a great deal of gas as they are heated, this gas will catch fire, and burn with violence, all danger from this source must therefore be guarded against. The fire under the kettle must be urged until every thing is red hot, and until the bones are all burned, and no further smell comes from them. It would be all the better to have a fire over as well as under the kettle, but the ashes from the fire must not be allowed to get into the bone black, if any does, it must be carefully washed out, but no ashes must get in. When every thing is red hot, and the bones so well burned that no more smell or gas comes from them; cover up the whole with good clean clay earth, and let it cool, the wet clay first, and the clay earth afterwards, are to keep the external air from affecting the burning bones, if it was not for this, you would not have "bone charcoal;"

but white bone ashes, which would be worse than useless. When the kettle is cold, remove the clay earth, and afterwards the clay, which was wet and was on the bones.

Take out the bones which now ought to be all perfectly black and tasteless. Make a good heavy rammer of hard wood, cut it to fit the bottom of the kettle, and then pound up the burnt bones little by little in the kettle, a good potash kettle will be plenty strong enough, (there is no fear of your pounding them too fine) - as you proceed you should sift the powdered bones through a sieve, a fine sieve like a timothy sieve will answer, throw back what will not go through, and pound it over again.

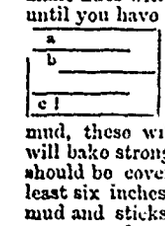
When you have got as much as you want according to the size of your works, (but for a few acres of beet three bushels would answer), put this bone charcoal in a tub with a false bottom, have the bone black about three feet thick—there must be room enough above it for the syrup or juice, when all is done, leach boiling clean water through it, so long as it has either smell or taste, then let it run dry, and the filter will be ready for the juice.

As soon as the filter is found to lose its effect, you must sprinkle boiling water on it —if done gradually the water will take out all the syrup which the bone black retains, the syrup will at first come through of its full strength, the liquor will then get weaker, until finally nothing but water will come. the weak liquor must be used in the fresh ground roots, and thus no loss will take place.

Hot water well washed through the filter will for a time renew its purifying qualities, when it will act no longer, it must be reburned in the potash kettle, the loss from reburning is very trifling, if it is done with judgment.

Boiling Down for Crystallization.

This requires a good deal of judgment, and the greatest care must be taken not to burn the syrup, but at the same time the evaporation must be as rapid as possible, and must be continued until all the water is off, when ready to set by, the liquor will, on being cooled, draw out in a string between the finger and thumb the string will break and the ends turn back in the shape of a hook, and it is the shape of this hook by which you know whether the syrup is boiled sufficiently, nothing but experience will show this, altho' it may appear that you have got all the water off, yet the syrup, on cooling, will sometimes seem to get thinner again, and in this case it must be reboiled. In other cases it will get thicker and crystallize in the course of a short time, when it is set by to crystallize, it must be in *shallow* vessels and in a warm place, and the syrup must be kept at about the heat of new milk, or blood heat. If you have not proper convenience for this you should make a place, thus, make a fire place of mud, or bricks, or stones, if you have them, but mud will do, from this make flues with mud walls backwards and forwards until you have filled up the size of the crystallizing house, make it thus, a, fire place; b, flues; c, chimney. The flues and fireplace may, in the first place, be covered with sticks to hold up the mud, these will afterwards burn out, and the mud will bake strong enough to support itself; the whole should be covered with mud to the thickness of at least six inches, the chimney may also be built of mud and sticks, and carried to a sufficient height to ensure a draught, the sides and top of the house should be of board made quite close, and the roof must have a good overhanging to throw off the water. Mud building is strong enough so long as you keep it dry; the chimney must also be defended from the wet by a roof, but, of course, there must be plenty of exit for the smoke. A fire of chips or any refuse wood lighted in the fireplace, will soon bring this mass of mud flues to a good heat, and when it is once warm stop the chimney and close the fire door; a little fire, lighted once or twice a day, will keep it hot. The crystallizing pans must stand on the surface of the flues and fireplace. The building must be as low as convenience will allow, and for fear of fire it ought to be erected at a safe distance from buildings, of course a good brick building would be better where expense is no object.



In four or five days the syrup will commence to crystallize from the top, the crystals should then be stirred down, and more will form, they seem to increase fastest from the top. When the crystallization is complete, the syrup will be ready to barrel up for sale to the refiner, or if you wish it you can proceed to further operations with it as hereafter described, or where you do not want to make sugar for yourself, but mean to dispose of the syrup to the refiner, the syrup may, as soon as ready, be poured into casks while hot and bunged up for sale *if the water is all out of it*, it will keep for any length of time.

This is as far as the writer recommends the farmer or small manufacturer to go, but as there are many who may wish to pursue the subject to a greater extent, the instructions to that end are given further on. Before proceeding, however, the writer cannot urge the following general observations too strongly on the mind of the reader.

There is nothing in the foregoing processes which a person of ordinary intelligence and information cannot do. The processes are simple, and the result, an article of a certain commercial value.

Refiners of sugar want to get their crude materials with as little done to them by people who do not understand refining as possible; as they have certain processes to go through, and they do not of course want to have to amend the blunders of other persons Any attempt at partial refining, or the use of chemicals by the producer, is quite as likely to be wrong as right, for the after processes. The difficulty with beet sugar has always been the crystallization, and the getting rid of the potash and salt, and the trouble has been what the Germans and French call "slime sugar;" but if the foregoing rules are *exactly* followed, there will be no slime sugar or treacle —scarcely enough to enable you to get off that portion of the syrup which contains the salts, and which must be got out from the mass with the turbine. If you proceed to the second operation, bear these few rules constantly in mind. In the first operation when you add the milk of lime to the juice to clear it:—

1st. Never keep the lime in contact with the *hot juice a minute longer than you can help it;* the lime cannot be dispensed with to clear the juice, but its action on the hot juice produces more or less of slime sugar.

2nd. Do not agitate the juice with the lime in it, more than enough to mix, or you will spoil your filtration; the larger the flakes remain in the juice the better it will filter.

3rd. Never carbonate at any other than a cow milk heat. If you carbonate hot, as most of the books tell you, you will make slime sugar.

Of course, throughout the whole process of boiling, heating, and evaporation, you must be extremely careful neither to burn, nor even brown the syrup The syrup will be always highly colored; but if it has not been burned, all the color comes out without waste in the after processes, and if the process of evaporation is conducted in the best manner, the sugar which crystalizes out of the colored syrup, will be nearly, if not quite white. The burned sugar can never be recovered.

The foregoing instructions are the result of *actual experiment*, and may be relied on as the result of experience of two years' continual experiments on a working scale.

We shall now proceed to discuss the process of "Diffusion."

There is another process for the extraction of sugar from beet root, which is called the "Diffusion process," and it is now almost universally adopted throughout France and Germany—great numbers of the factories being altered from the old grating and pressing process to the diffusatory process, which is thus described:—

ROBERTS' DIFFUSION PROCESS is now acknowledged to be the most economical of any, both in first cost and in working. The apparatus which is used is hardly liable to get out of order, and requires very little attention, while the operations are cleanly and free from filth. Of this process, Mr. Post, United States Consul at Vienna, Austria, wrote, in 1867, as follows:—

"The new process recently invented by Mr. Julius "Robert, a sugar manufacturer, of Seelowitz, Aus- "tria, is working a complete change in the manu- "factories here, and will doubtless exert a great influ- "ence on an extended introduction of beet sugar manu- "facture in the United States, and it is adapted "to extracting the crystalline sugar from either sugar "cane or beet root."

In the United States (and Canada) where labor is so expensive, this innovation must prove of incalculable importance. The only thing required in this new process not necessary in the old, is an additional supply of water, an article tolerably plentiful and cheap wherever this manufacture is likely to be introduced in our country,

That this process is really the great improvement claimed, no longer admits of dispute. Mr. Robert has thoroughly tested it in his factory, and has adopted it, as have also many other factories. Since 1867, no less than 130 of the old beet sugaries of Europe have discarded their old process for the new one.

The apparatus for this process, as well as the principle of its action, is different from that of any other. While the other processes are to extract all the juice from the beet, this process extracts only the crystalizable sugar contained in the juice, and leaves most of the impurities in the cells. To accomplish this result the Beet roots are cut up in small thin slices, and put into a number of vats, which are connected by pipes running from the bottom of one vat to the top of the next succeeding. Water of a certain temperature, (it must be hot, nearly boiling) and of a quantity proportioned to the weight of the beet root in the vats, is mixed with the material in the first vat, and allowed to remain until it takes up a portion of the saccharine matter, or, so to speak, until the sugar in the vat is equalized between the water and the beet root; that is to say, if the beet root contains 8 per cent. of saccharine matter, the water will take up 4 per cent.; this water is then forced into the the second vat filled with the cut slices of beet root.

The water already contains four per cent. of sugar, but the beets having eight per cent. it will again equalize itself, and when forced into the third vat will contain six per cent. of saccharine matter; in this way the water becomes more and more impregnated with saccharine matter, until it contains almost as much as the beet itself. To return to the first vat we find that the first application of water extracted one half the sugar or four per cent., when this water was forced into the second vat; the fresh water which forced it out and supplied its place extracted two per cent. more before the saccharine matter became equalized between the water and the beets. This water is then forced into the second vat, and the fresh water which supplies its place finds the beets containing but two per cent. of saccharine matter, and the next filling finds but one per cent., and in this way the water is extracted to within one half of one per cent.

It is said that by this process the raw material of syrup is much purer than when extracted by any other method, that from the same beets one half per cent. more of crystalline sugar is obtained than by the application of pressure; the expense of pressing-cloths, and the cleaning and renewing them, are done entirely away with; the expense for motive power and machinery is considerably reduced, and the expense of manual labor is much less, requiring but one-fourth the number of laborers necessary for the pressing process.

Within a short time Mr. Robert has introduced a modification of his original apparatus. In this modification the series of vessels is abandoned, and one single chamber is employed instead. In the centre of the chamber is a feeding cylinder containing a feeding screw, driven by gearing from above. The sliced beet root is passed through a hopper to the bottom of the feeding chamber, whence it passes out through openings into the outer cylinder of the diffuser, and gradually rising to the top, is carried off by a regulating rake, driven by independent gearing. From the top of the diffuser, water is slowly supplied through small pipes, meeting in its descent the most exhausted slices as they rise to the discharge level, and passing through to the richer material as it becomes more and more saturated. At the bottom, it issues through perforations or outlet pipes, and is carried off to a cistern, where it is heated, and then returned upon the beet by the central feeding tube, by which the beet is supplied to the diffusing chamber. This apparatus, which has answered well at beet sugar and spirit works, has also been applied to cane sugar factories, where it promises good results.

The heat of the liquor or water supplied must be sufficient to *kill* the vegetable life in the root, as the diffusion process does not take place, or affect the skin of the sugar cells, until the *vegetable life* is destroyed. The heat required in the mass is at least 140° Farenheit, and from that up to nearly boiling.

The shape into which the roots are sliced is such that they will not lie close together, but allow the water of diffusion readily to percolate to every part. Long finger like pieces, cut into a triangular shape, are considered the best, although some cut the roots up into small square masses, and others into fine oblong square pieces. That process is best which keeps the mass most open, and the pieces of root from packing together.

This process does not, however, do away with the necessary defecation with lime—less lime may be necessary, and the scums and curdlings will be less in amount and easier to get rid of, but the lime process must be used until the juice is properly defecated and cleared from impurities.

The carbonatation, as already described, must also be applied to the juice, and the entire process, with the exception of grating or rasping and pressing, must go on as before given.

The spent slices, when not wanted to be fed at once, may have all the waste water taken out of them by being centrifugalled, and the water so obtained will save so much of the sugar, and can be used in

the diffusion vessel instead of fresh water. Cattle do as well on the spent slices as on the pressed cake.

Purification of the Syrup

The great object in the purification of beet root sugar, is the getting rid of the potash and salt, and other saline matters. In the first instance this was done by repeated strainings through bone charcoal, but that being very troublesome, and expensive, several other plans have been tried, and are generally now adopted.

The first of these plans is the "Osmose" process which is founded on the fact that certain substances, and mediums allow readily the passage of salt through them, while the medium prevents the passage of the sugar, except in a very small degree. The principle is an extended one, and is known under the name of "dialysis," but as we only want to show how the process is used in the manufacture of beet sugar, we shall not go into the general question

The usual machinery adopted for the Osmose process is the "Osmogene," and is thus described by Crookes, in his admirable work on beet sugar :—

"The apparatus consists of about fifty cells, "separated by sheets of parchment paper, laid flat, "and connected at the edges all round, the space be- "tween each pair of sheets being fully half an inch. "Each sheet is supported by a cross piece of wood, "and a network of twine. The whole arrangement "is about four feet long, and three feet high. By "a peculiar arrangement of connection the syrup "admitted from below passes through every second "division, while water admitted from above also "passes through every second space, and at last flows "off from below, at a strength from 1° to 2° B, or "say 1° to 2½° Twaddle (this strength is caused by "the salts taken out of the sugar) Owing to the "high diffusive power of the salts, as compared "with that of sugar, the former readily pass through, "together with only a comparatively small portion of "the sugar, which may be saved as before, by fer- "mentation—whilst the potash, and salts are saved "by evaporation, and burning This will no doubt "appear to many too delicate a process to work on "a large scale, but experience proves that it works "well, and that six such machines are sufficient for "a manufactory working daily about 250 tons of "beets."

Modification of the Osmose Process.

The following modification of the Osmose arrangement originates with the author, and has been highly approved of by one of the best sugar engineers in France, who says he shall adopt it in his works in future, as it admits of being cleaned, and renewed better than the ordinary system. It takes more room, but that is a small matter compared with its other advantages. The new system is as follows : Construct a long trough, about 30 inches wide, and 12 feet long. The width must be made to suit the parchment paper, and the length must be made to suit the premises. If you want greater length, make two or more troughs. Let the sides and ends of this trough be about two inches deep, and it must be made water-tight with paint, or with pitch run into the angles. Good paint, or any good cement, is better than pitch, but the latter will answer. This is to hold the water. Then construct another trough of a smaller size, so as to fit easily into the first, but the bottom of this inner trough must be made with very narrow slats, or a network of twine, or wire, the meshes of which must be about an inch square ; the wire should be brass, as it will oxidize less than iron. This is to bear the weight of the thin stratum of syrup. The net-work must be covered with the parchment paper, which must be fastened down so as to be water tight. This may be done with thin strips of wood, nailed down over the edges of the paper, and through to the bottom, or sides of the frame of the inner trough. Water is put in the outer trough, and the inner trough is made to float on the water. You will thus have water on one side of the parchment paper, and syrup on the other side. The water is let into one end of the outer trough, and is made to flow towards the other end, where it is drawn off. The syrup is made to flow on to one end of the parchment paper bottom of the inner trough, and to cover the whole of the parchment paper in a thin stream, and to flow off at the other end, so that the water *very gradually* flows one way and the syrup flows the other way. The current of both liquids, however, is extremely slow. During the passage of the syrup, it parts with the potash and salts through the parchment paper, and into the water, whilst a little water comes through the parchment paper into the syrup. The salts can be recovered from the water by evaporation, where it is worth while, which it will not be on a small scale. After a time, the paper will refuse to pass the salts. It can then be cleaned and renewed by a slight scrubbing with water weekly acidulated with sulphuric acid. Use a corn broom for the scrubbing, but you must, of course, be very careful not to tear the paper.

This is the osmose principle, and when once well understood, the operator can make his "osmogene," as the troughs are called, in any way which will best suit him, or his premises or means allow.

The following is a new method of removing the salts from the syrup. The writer has not yet tried it, but as it forms the subject of an English patent, taken out by Mr. Duncan, of London, England—the great sugar refiner, who has large beet sugar works at Lavenham, Sussex, England- there is no doubt of its being well adapted to the end proposed.

The following is the description taken from the English magazine, "The Sugar Cane."

New Method of Removing Potash from Saccharine Solutions.

"The plan now under consideration consists in adding to the cold syrup sulphate of alumina, so as to form an alum with the whole of the potash present. The solution is then well stirred, and after a few hours standing, the alum separates out in the form of small crystals, technically known as "alum meal." The clear liquor is then run off, and immediately neutralized with milk of lime, finishing up with a little chalk, so as to prevent the necessity of removing any excess of lime by carbonatation. It is possible to use chalk only, but the amount of effervescence is then very great, and the chalk should therefore be added little by little.

"In working this alum process, the solutions should be quite cold. It is also advisable to operate as quickly as possible, consistently with a due separation of the alum, as otherwise more or less sugar would become inverted (that is, not crystallizable)

"Every one part of potash in the syrup requires for conversion into alum about 9½ parts of sulphate of alumina, out of which 2½ parts are required to convert the potash into sulphate, and the remaining 7 to combine with the sulphate of potash, so as to form alum. If the liquor contains any sulphuric acid, either free or combined, the 2½ parts of sulphate of alumina required to convert the potash into sulphate, may be partly or entirely dispensed with.

"When once the liquor has been neutralized (with the lime and chalk), it is heated and filtered in the usual way.

"The precipitated alum (or alum meal) is washed free from syrup with three consecutive washings, using one-third of its weight of cold water each time These washings, after neutralizing with lime and chalk, are used to dissolve up a fresh quantity of the raw beet sugar."

The alum meal is easily dried in a centrifugal machine, or by pressure, or other suitable means.

The sulphate of alumina has the following composition :—

Alumina, ...	15.41
Sulphuric acid, .. .	35.99
Water, ..	48.60
	100.00

It should be as free as possible from iron, and should not contain more acid than given in the analysis.

The solution of sulphate of alumina generally used contains one third of its weight of sulphate of alumina, and has a density of about 24° Baume.

Instead of using a solution, the dry sulphate of alumina, in a finely ground state, may be added to a syrup, and when alum separates under these circumstances, the liquor is actually concentrated to some extent. This, of course, saves evaporation.

The rapidity of settlement of the alum is accelerated by throwing into the mixture a quantity of "alum meal."

Experiments made with beet syrup at Mr. Duncan's sugar works, at Lavenham, have conclusively shown that by means of sulphate of alumina, potash may be almost entirely separated from syrups, not more than 0.2 per cent. (that is two-tenths of one per cent.) being left in solution. By again concentrating the mother liquor, and repeating the process, the whole of the potash may be practically removed.

The advantages of the process are—

1st. The removal of the potash, and ammonia from syrups, without much dilution.

2nd. The removal of a great deal of the coloring, and albuminous matters, and a considerable improvement both in taste and odor.

3rd. The alum produced is equal in value to the sulphate of alumina used, so that the process is comparatively costless.

4th. The plant (or utensils) required is of the simplest description, the cost of labor small, and the entire process is of a continuous, and rapid character.

It will naturally be asked by unscientific practical persons, "What is sulphate of alumina, and what does it cost?" In reply, sulphate of alumina is a natural production in the ground, and occurs in many places like sulphate of lime, or plaster. It is caused by a natural combination of sulphuric acid, and clay, and this substance is found in large quantities wherever alum works are established. Alum is a triple salt, and it requires the presence of the three elements, sulphuric acid, alumina, and potash, to make it. Where these three elements meet they rush together and form alum. In the alum manufactories they introduce the potash to the sulphate of alumina. In the before described process, the sulphate of alumina is made use of to draw the potash out of the beet syrup, and thus get rid of it from where it is not wanted, and is mischievous. There is also alum made with soda, and also ammonia alum, and as all the three alkalies, potash, soda, and ammonia are present in beet syrup, the foregoing process attacks, and removes the soda and ammonia, as well as the potash. There is no doubt that this will prove a most valuable discovery, and tend greatly to the success of the manufacture of beet root sugar.

Another portion of Mr Duncan's process consists in using tartaric acid instead of sulphate of alumina. This is added to the expressed liquor, and the admixture of it with the potash in the juice, when the admixture is made in the cold, forms tartrate of potash, or cream of tartar, which is all but insoluble in cold liquor. It sinks in the juice, and is removed as before described with the turbine, &c. The tartrate of potash so obtained, can by well-known means, which every manufacturing chemist understands, be again converted into tartaric acid, and so used over and over again *ad infinitum* at very moderate expense.

The Turbine on Centrifugal Machine.

The next operation after crystalization, to render the sugar useable, is to free the crystallized sugar from the molasses, which are very badly flavored. For this purpose, the mass into which the boiled juice forms is first mixed with a *little* water, just enough to render it somewhat fluid, and it is then put into the turbine and whirled rapidly round. The outside of the "basket" of the turbine is made of fine wire cloth, or in large concerns of very finely perforated copper ; and the rapid circular motion throws the molasses through the small perforations, leaving the sugar behind; this is, after a short time, (and when no more molasses comes from it) sprinkled with water, and again put in motion, when the water cleanses the crystals of sugar, and again flows out with the molasses, leaving the sugar clear in the basket. On the large scale a jet of steam is used instead of the water. The sugar is then taken out and dried, either by stove heat or otherwise, and the work is finished. This sugar is quite useable, although it flavors somewhat of the beet, but when properly centrifugalled with water or steam, the beety taste is scarcely perceptible, and it is quite good enough for all ordinary household purposes. All the salts, and most of the beety flavor, passes off with the molasses, which are then further purified, either with the osmose process, the sulphate of alumina, or tartaric acid as before mentioned, or with phosphate of ammonia, and then set by in a warm place ; this at a considerable interval, often many weeks, but sometimes less, produces a second crop of crystals, and afterwards a third crop. The remaining molasses is, by the great manufacturers, fermented and distilled into spirit, and the wash or slop which results from the still is evaporated and burned into potash ; but, on a small scale, the farmer will not do anything more than take the first crop of crystals, or possibly the second as well, and the remaining molasses he will feed to his cattle and pigs. It is a most fattening thing when used *in very small quantities*, and mixed with other food. In this case, the potash and salts at once passes to the manure heap, and adds greatly to the fertility of the farm.

For farmers or small manufacturers, the turbine is thus made : A wire cage, with an iron frame constructed on an iron spindle, stands upright. The lower journal is a pointed steel toe ; the upper a well turned journal. The cage is open at top, but the bottom and sides are covered with the fine wire gauze, on a small scale, or with finely perforated copper, on a large scale. This spindle and cage, set in a proper frame, is made to revolve very rapidly with a multiplying power, either by cog wheels or drums, and its speed is urged until the required effect is produced, and the molasses are ejected from the sugar ; the speed required is very great.

Below is a cut of such a machine as might be made by an ordinary mechanic and used, by the farmer or small manufacturer; but on a large scale, the turbine must be obtained from a machine shop. They can be obtained ready to erect from Europe, or from H. I. Booth & Co., Union Iron Works, San Francisco, California, which enterprising firm have constructed several Beet Sugar works in California, which are meeting with great success ; they make all the

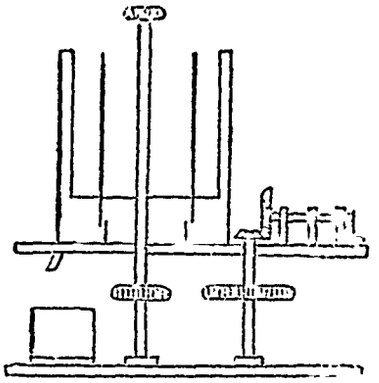
machinery. Where they can be had, these turbines are also used instead of presses for separating the pulp from the juice of the grated root; and where the diffusion plan is used, the sliced roots are, as before stated, dried with it. It is a most valuable machine, and the manufacture of sugar, in a useable shape, from the beet could not be carried on without it.

For a detailed description and plate of the turbine made on a manufacturing scale, I must refer the reader to a more elaborate work on beet sugar than the present.

The Farmers' Turbine.

Procure a wooden tub, about inches diameter, and inches high The hoops should be driven on from the top, but there should not be much flare to the tub. Standing in the centre of this vessel is a pipe, or cylinder, made of galvanized iron, strong, and tight, and this cylinder is passed through a hole in the bottom of the tub, and is well secured to it by a flange nailed on to the outside of the bottom, so as to be tight. This tub is to contain the molases, and all joints about it must be very tight, for molasses will leak out where water will not. This tub is fixed to a strong bench, or table, which must be well stayed to the floor, or building, as the motion of the turbine is very powerful. Underneath the bench, or table, on which the tub stands, there is a bridge tree fixed for the toe of the spindle to work in.

The spindle, and basket of the turbine may be constructed of wood, although iron would, of course, be much better. If of wood, the spindle must be turned, and of about three inches diameter, well feruled on each end. In the lower end is driven a steel blunt point, which works in a tallow box on the bridge tree. The upper end must have a turned, or well filed iron pin inserted. This is to bear against the upper bar, which is fixed above the tub. On the spindle fits a small iron wheel, well secured with points, or rivets, which passes down through the cylinder in the tub, and rests on the bridge tree; into this a large iron wheel is made to work, driven from below the bench, and which wheel is turned by a winch. There should be a fly-wheel attached in this case; also belts, and pulleys may be used instead of cog wheels. The following is a sketch of the concern.



The cylinder through the bottom must be large enough to allow the small wheel by which the machine is driven to pass freely through it, and the tub must be of sufficient diameter to allow of the basket and spindle of the turbine to be freely lifted in and out of it, so that when a charge is done, the basket and spindle may be lifted out, and the sugar emptied out of it, and be replaced ready for another charge, without jamming in the cylinder and against the sides of the tub.

There must also be a metal sleeve fixed to the bottom of the basket, which covers and comes down below the top of the cylinder. This is for the purpose of preventing leakage or dripping of the molasses through the cylinder, and this sleeve must be made large enough to allow the basket and spindle to be lifted freely in and out when it is required to be moved to empty out the charge.

I have purposely omitted all lengths and sizes in the foregoing description. The size of the turbine will entirely depend upon the amount of business to be done, and any ingenious person can get one constructed with the instructions here given. Belts and drums can be used as well as cog wheels, and in some cases are more advisable.

Beet sugar is finally reduced into refined loaf sugar by repeated filterings through large cylinders of bone black, and by several other processes of filtration and purification. I do not pretend to give such instructions as will enable any person to refine sugar on a great scale, and should not have alluded to the subject at all if I could have avoided it.

The refining of sugar has always been one of the "monster businesses," doing an immense amount of work, and requiring an enormous capital.

Working Dried Beet Roots.

One great advantage of the new process of diffusion is the power it gives of using dried beet root, and thus enabling small factories to work the whole year, instead of working only during the beet season. All practical people know that a factory out of work decays and destroys far faster than whilst it is in full operation. The great argument in favor of monster factories has always been, "You must have them so large as to work up your whole crop in five months," and therefore everything must be on a great scale. The consequence has been that the factory ceased working for seven months, to the great loss of all concerned. No manufacturing business can work profitably by fits and starts. To do things in the best possible way they must be done continuously.

Beets are dried by being cut into slices, and then exposed to air and heat, so as to get the surface moisture off as soon as possible. Those who can dry apples can dry beets without instruction. Those who have or can construct a drying kiln will, of course, use it. Everybody understands the use of a kiln, and so I shall not describe it. The roots will, in all cases where possible, be cut up by machinery—an ordinary root-cutting machine will answer all purposes.

Those who have neither kiln nor machine may proceed in the following manner, but the kiln and machine is best. Cut the roots up in slices across, taking care to cut up the whole of the bottom of the root, and be very careful of the lower and small slices, for they afford not only the most but the best sugar.

Provide some strong iron wire. Cut some sticks of any common wood across into sections of about two inches in diameter and a quarter of an inch thick. Cut the wire into lengths of from two feet six inches to three feet, and sharpen one end of the pieces on a grindstone. Fit on one of the sections of wood to each wire, and bend the end, so as to prevent its slipping off. Separate the large slices of beet root from the small pieces, have one parcel to the right and the other to the left. Set your wires upright on a bench, having made little cleats to hold them in a vertical position. Now take a small piece of the root in one hand, string it on to the wire until it touches the bottom, then string on a large piece, then a small one, and so on until the wire is nearly full. Then bend over the upper end in an open curve, so that you can hang the string of roots on a stick. Proceed with the rest, doing the work as quickly as possible, and hang up the wires as fast as done in an open, airy place—where the sun shines, if possible—at any rate, out of the damp, and rain. The roots thus prepared will dry, and shrivel up very quickly, and completely, and as there are no two extended surfaces lying together, no change in the roots will take place. When you have enough done, you should have a small building heated with a stove, and pipes, and finish drying the roots in that. You must be careful that the cut roots always get plenty of air, to prevent mould, or rotting. Persons will soon learn expertness in the foregoing process, and will operate with both hands, and thus prepare a very large amount of roots in a day. The roots, when dry, should be thoroughly dry, so as to crush, or grind, if necessary. The crooked ends of the wires may then be straightened, the dried pieces run off, and the wires used again. In selling dried roots you can always insist on getting paid according to quality. Those best done will bring the highest price. Roots thus prepared either with the wires, or kiln, will dry into about one-tenth of their original weight, and thus save carriage, and hauling. The value of such dried roots, if well done, will be from forty to fifty dollars per ton, or a greater value than barley, and, of course, can be carried to market as great a distance as that grain.

The dried roots can be used by the diffusion process, and leached with water in the same manner as with green roots, or, if leached with strong spirit, as is done by the "Schutzenbach" method, the result is a purified, refined sugar, of the first quality, entirely free from salts. As the spirit will not dissolve the salts, although it does dissolve the sugar This is, however, a process that requires great capital and extensive premises. Schutzenbach, of Gallicia, in Europe, employs this method. In his factories he works up some millions of tons of roots annually, and employs many thousands of hands.

Those who prepare dried roots, should feed the upper third of their roots to the cattle, and reserve for drying the lower portions, they will thus be sure of the best results.

In an address on the agriculture of the Old World, lately delivered by the Hon. J. R. Dodge, before the Rural Club of New York, he says, speaking of agricultural progress in Austria:—

"The beet sugar interest is prominent, having "now 199 factories in operation," (these, it must be recollected are of immense size and capacity) "of which 126 are in Bohemia. The average price "of dry beets is four florins and eighty kreutzers "per centner, or about $2.40 for 136 lbs." (Equal to $35.40 per ton of 2000 lbs., but this price will, of course, be governed in a great measure by the state of dryness in which the sliced roots are brought to market).

"The industry gives employment to 31,858 men "and 18,939 women; the wages of the former rang-"ing from 18 to 80 cents per day, and of the latter from 13 to 75 cents."

It will, therefore, be seen that the preparation of beet roots by drying is now a recognized institution in one of the principal centres of the beet sugar industry.

Sucrate of Lime Process.

There is another process in the beet sugar manufacture, which is too important to be passed over in silence. The writer gives it in the language of others, merely remarking that there seems some uncertainty about it, and that although, in his own case, he has repeatedly succeeded in the process, so much so as to lead to every hope of success, with absolute certainty; yet in other cases he has failed, without being able to find a reason for a failure. He would also say, that others must have found the same difficulties, or, most assuredly, the "Sucrate of Lime process" would have, by this time, displaced all others—so simple is it, and so effectual when it is successful. The writer recommends all who may enter on the manufacture of beet sugar to try it on every opportunity; and, if possible to bring it to perfection, and establish the process as a certainty. When this is done, they will need no other.

The following description is abridged from the Report of the Commissioner of Agriculture of the United States:—

The mode of forming the "sucrate" is as follows:—After the ordinary juice is obtained by any of the foregoing processes, and has been properly defecated with lime, it is evaporated until it attains a gravity of from 30 to 32° Baumé (*i. e.* about as thick as ordinary maple molasses), it is left to cool. It is upon this *cold* juice that sucratation is effected, for as the sucrate of lime dissolves in a hot liquid it is necessary to act on the syrup cold. The sucrating vessel is of cast iron, circular, furnished with a lid traversed by a pinion or arbor, with spokes or pallets, and a hopper, worked by rack work, to allow the lime to fall in scattered shape and in proper quantity, into the syrup, while the latter is agitated with the pallets. This hastens the combination of the lime with the sugar. The quicklime has been slacked with a small quantity of water beforehand, so as to bring it into the shape of a fine dry powder. By the agitation, crystals form and agglutinate, and the mass heats somewhat, the grains of sucrate, increase in size, become more dense, and by constant stirring, fall to the bottom in masses; and if the agitation is continued long enough, the whole liquid would become a solid mass; before however this point is reached, and when only half of the liquid is sucrated in the vessel, the sucrate formed is removed, is placed on a sieve and drained and dried, the other half of the liquid which remains in the vessel is strengthened by adding new and cold syrup of 30° to 32° Baumé, and half sucratation is again effected as above; this is repeated up to the last batch of the days work. When the last batch is sucrated completely—as this last operation contains all the saline matters of the whole liquids united—it is set aside as impure sugar, and treated separately.

The sucrate thus obtained may be dried still further in the air, until it loses from twenty-seven to thirty per cent. of its weight, when it will be found to contain, in one hundred parts, seventy parts of sugar, twenty of lime and ten of water. This substance may be washed in cold water, and thus be greatly purified, and it may then be put up in boxes or bags, without fear of its undergoing any change. It is neither affected by time or insects, and for all practical purposes, is imperishable.

The apparatus necessary for a manufactory of this kind (in addition to the ordinary machinery for rasping or diffusion), and which will work up nine to fourteen millions of pounds of beet root, is two large defecating vessels of sheet iron, two evaporating basins, and the sucrating vessel as described, with the necessary sieves and strainers.

This sucrate of lime may be made in the winter and stored by for summer employment. When it is to be reduced into sugar, it is dissolved in hot water and carbonated; the lime, as a carbonate and inert, now settles out of the purified syrup, and is removed by filtration and the ordinary filter presses.

This process of Rousseau promises to produce a revolution in the manufacture of sugar from the beet. Rousseau has also invented a new animal black, to be used in the place of bone black. He says that he proved to his own satisfaction that the decol-

orizing property of bone black lies entirely in the nitrogenized portions of the bones, and that bone charcoal made without these nitrogenized portions will not decolor. (In this, however, most authorities differ from him.) In his new black he replaced the phosphate of the bones with clay, which he calcined with twenty-five per cent. of horse manure, or even with night-soil—although this, of course, would never be used in practice—and thus obtained a most energetic and concentrated "animal black," and this at so cheap a rate that it is cheaper and easier to make new black than to restore the used black by reburning. The spent black forms most valuable manure. By the use of this new black the filtrations are reduced one-half, and the expense of this part of the process is greatly lessened, which is a most important point.

If he is correct in his statements, the best and cheapest animal matter to mix with the clay would be the "graves," or refuse of the soap and candle manufacturer, or scraps and trimmings of hides from the tanner. Whatever animal substance is used is, of course, thoroughly purified and deodorized by the burning at a red heat with clay.

Toronto, Canada,
1st Nov., 1873.

Short-horn Sales.

The "Green Grove" sale, at Edmonton, of the Short-horns, Cotswolds and Berkshires, the property of Mr. J. R. Craig, took place on the 11th. ult. as announced. A large crowd of people, including a number of prominent American breeders, were present, and the sale, under the management of Mr. Page, passed off very satisfactorily. The following is the summary:—

Cows and Heifers.

Dairymaid, imported, red and white, Col R. H. Austin Sycamore, Ill..	$725
Dairymaid II, roan, 15 months, Gen. S. Meredith & Son, Cambridge, Ind	650
Finetta, roan, C. C Parks, Waukegan Ill,.... .	300
Fidelity, roan, 15 months, R. H Austin, .	500
Flora, roan, and calf 2 months, B Sumner Woodstock, Conn	375
Prince Imperial's Gem, red, 16 mos. R. Austin	250
Maid of Thornhill, imported, S. Meredith & Son..	675
Ruby II, R. H. Austin, ...	200
Lady Solway, roan, 5 years, C C Parks, ...	200
Gertrude, red, 3 years, B. Sumner,.	275
Sultana, roan, 3 months, B. Sumner,....	150
Ruberta, red, 1 year, S. Meredith, & Son, ...	325
Lady Bourbon II, red, 3 years, R H Austin,.	350
Gentle Annie II, roan 1 year, C C Parks,.. .. .	300
Evangeline, roan, 1 year, B Sumner, .	100
Imperial rose, roan, 6 months, B. Sumner, .	275

Bulls.

Prince Imperial, roan, 6 years, R. H. Austin,	250
Reliance, red, 2 years, J. Snell	175
Emperor, roan, 16 months, R. H. Austin,.... .	500
Proud Prince, red, 1 year, R H. Austin, .	100
Baron of Green Grove, red and white, 3 months, R. H. Austin,.....	100
Heir of Edmonton, roan, 3 months, R. H. Austin,	85

Summary.

16 females, average,	$390.30	Total, ...	$6,245
6 bulls,	do. 185 00	do.	1,110
22 head, average,...	$319 74—Total,	....	$7,355

The sheep brought excellent figures, the 51 sold averaging nearly $33. The entire proceeds amounted to $10,600.

Mr. Beattie's Sale.

Mr. Beattie's sale took place on Thursday, the 12th ult., at Markham village, and was attended by a large number of stockmen and Short-horn breeders, including many of those present at Mr. Craig's sale, on the preceeding day. Mr. Page acted as auctioneer. *Maid of Honor*, a handsome and well-bred show-heifer, was first offered, and in a very few minutes was knocked down to Mr. George Murray, Racine, Wis., at $2,600. *Lady Gunter*, a three-year-old heifer, red, with mixed pedigree, ran up to $2,000, at which figure she became the property of Mr. Murray. *Lady Knowlmere*, a four-months roan calf, was knocked down to Mr. Elias Stillson, Racine, Wis., at $725. *Ruberta*, an imported roan cow, of mixed pedigree, fell to Gen. S. Meredith, Cambridge, Ind., at $1,275. *Malmsley*, roan, calved April 1st, 1870, moderately well bred, reached the handsome figure of $3,100, at which she was knocked down to Mr. C. C. Parks, Waukegan, Ill. *Royal Booth*, roan, four months old, of short pedigree, was also purchased by the same gentleman, at $700. The remaining animals in this class were disposed off as follows: *Rose of Racine*, a well-bred Bates cow, three last crosses by *Duchess* bulls, knocked down to Gen. Meredith, at $3,420. *Anna Leslie*, roan, of good Kentucky pedigree, to B. Sumner, Conn., $375. *5th Duchess of Springwood*, pure *Bates*, but unfortunately white, to Gen. Meredith, $550. *Her Highness*, pure *Booth*, roan, aged five years, to B. Sumner, $400. *Jessie*, roan, aged, to B. Sumner, $275.

Only four bulls were offered. The first, *Royal Duke*, red, aged two years, went to C. C. Parks, at $550. *Royal George*, aged 16 months, and *Tweedside*, roan, aged 17 months, were also knocked down to the same gentleman, the former at $100, and the latter at $225. The fourth *Burnside*, went to Mr. D Brown, Pickering, at $205.

Summary

12 cows and heifers, average,	$1,201 75	Total,	$14,420
4 bulls,	" 250 00		1,000
16	"	$953.75—Total,	$15,500

The Clydesdale horses were next sold. Emperor, an imported two year old stallion, by imported Rob Roy, was offered at an upset price of $1,400, but was withdrawn, and subsequently sold for $1,500 by private sale. Emily May, an imported Clyde filly, three years old, was knocked down to Geo. Murray, for $1,200. The celebrated Clydesdale stallion, Donald Dinnie, was knocked down to Geo. Murray, Racine, Wis., for $5,000. The sheep, which were of the Cotswold breed and from choice folds, had been well selected, and sold well, 50 ewes and 5 rams realizing the handsome sum of $3,618, one pair selling for $320.

The Apiary.

A few Seasonable Hints.

It is advisable to disturb bees as little as possible during their long imprisonment in winter quarters. Under the most favorable circumstances, it is a long and dreary confinement for them, and everything should be done to mitigate its severity as much as is practicable. If kept perfectly quiet, in a dark place, of the proper temperature, they get into a sort *of semi-torpid condition*. When in this state, they consume very little food, and consequently escape that distension which results from long retention of fœces. Bees void their excrement during the active season when on the wing, and keep their hives scrupulously neat and clean. In the winter, when imprisoned in the hive, there is a partial excrementation *of dry particles, but the liquid fœces* are retained Bees will endure this condition of things a long period in a state of quietude, but if made restless by disturbance or by being kept too warm, they eat more honey, and become so uncomfortably distended, that they must have relief or perish in the attempt. Hence the persistent efforts they make to get out of the *smallest apertures in the hive, and hence too, the loss* of many, consequent upon their becoming so chilled that they are unable to return to the hive.

But while bees are to be disturbed as little as possible during their long winter confinement, they must not be wholly neglected. A little attention will sometimes preserve a stock from being lost. For example, if wintered out of doors, a course pursued still by many good bee-keepers, there is danger of the entrances being stopped up by dead bees, waste matter, snow, sleet and ice. This can only be guarded against by inspection at those changes of the weather which are liable to create difficulty. When wintered in-doors, bees should be examined now and then. *Usually it will be sufficient to listen for signs of restlessness* and uneasiness. If there is any roaring, it is a fair inference that they are too warm. It is of course possible to go to the other extreme, and keep them so cool that the stillness of death is brought about. Both extremes must be guarded against. Toward the close of winter, a careful examination of stocks should be instituted, in order to ascertain if they are in a healthy condition. Usually this may be accomplished without disturbing and exciting them very much. *Hives on out-door stands may be gently* loosened from their bottom-boards and tipped up a little, so that the surface of the bottom-boards can be seen. The state of the colony may be judged pretty nearly by the appearance of the waste that has accumulated. It should consist of brown particles of dry dirt, dead bees, and possibly dead larvæ. If the bees have been in a state of quietude for several weeks and all is right and well with them, there will be several ridges or streaks of brown dirt, a few dead bees, and if breeding has commenced here and there a dead larvæ, which by some means or other, has dropped out of its cell. In such a case, it is safe to decide without further inspection, that the colony is in a strong and healthy condition, and will probably remain so for some little time to come, provided there is a sufficient quantity of food, which can generally be determined by the weight of the hive. Many hives have tight bottom boards, and their welfare can only be ascertained by removing the honey-board which covers the frames on top. But a pretty good guess can be made as to their condition without seeing the ridges of which mention has been made. Generally, the bees cluster near the tops of the frames, near enough at any rate to enable the bee-keeper to get a good look at the outsiders. If they are dry and clean, and seem to be congregated pretty numerously between seven or eight frames, it may be safely inferred that they are doing well. Whether the examination be made from below or from above, if it is found that the bees have discharged liquid fœces, and fouled their hive, it is evidence that they are more or less diseased, have caught cold, and are infected with dysentery. On the other hand, if the hive is reeking with moisture, and there is drainage going on, it is proof that they are too warm, and are sweating. In the first instance, the hive should be cleansed of dead bees and filth, and something done to increase the supply of warmth. It is a good plan, sometimes, to bring a chilled hive into a warm room for a short time, to restore warmth and render the bees comfortable again. It is however, very difficult to save a hive that has once been chilled. It is like restoring a frozen apple or potato. In this, as in many other cases, prevention is better than cure. When the presence of superabundant moisture shows that a hive is *too warm*, a little more ventilation must be given. Caution must be used however, lest this be done too suddenly, or too much.

In most seasons, a warm day early in March, will afford the bees opportunity for a discharging flight. The bee-keeper should not fail to take advantage of this, as it greatly helps the prosperity of a hive. Bees that are wintered in-doors should be brought out into the open air, on such a day as that now referred to, and if the weather becomes cold again, returned to their winter quarters until spring comes in earnest. When bees are allowed to take a flight, it will be observed that the snow, (if it be still on the ground,) *will be specked with yellow spots* for a considerable distance around the hives. These are made by the fœces that have been discharged. A few bees will be lost by alighting on the snow, but generally these are aged and infirm ones, of which it is as well to be rid, since they will not live to gather any honey, and are only a tax on the resources of the hive. If a few, young, healthy bees are lost, the gain in the general condition of the hive, and the promotion of early breeding, will more than make up for them. Some bee-keepers give their bees a flight in mid-winter, in an artificially heated room. We do not see why this plan should not work, though, never having tried it, we cannot speak of it from personal experience.

It is very desirable to stimulate early breeding so as to have strong stocks by the time fruit blossoms come. As already hinted, a cleansing flight has this effect; so also has feeding. This is the case even if there is a sufficient store of honey in the hive. Any appearance of food-gathering is an indication to the queen that the time has come for her to lay. Hence a little syrup daily given, will tend to increase the strength of a stock, and there is no one thing on which successful bee-keeping so hinges, as maintaining colonies in a strong condition, from the beginning to the end of the working season.

A Person who has familiarized himself to bees, can by means of the passion of fear impressed upon them, and by that dexterity in the management of them, which can only be acquired by practice, manage bees as he pleases.—*Wildman.*

Miscellaneous.

What Varieties Come True from seed.

An intelligent correspondent from Burlington says: "An apple-seed produces an apple-tree, but it will not always produce an apple-tree of the same kind. Wheat of any variety produces the same; seed of a scarlet variety of Verbena will not always produce its like Why this anomaly?" The "why" of the matter can not be told, but a few general rules may be useful. Seeds of plants found in the wild state, in their native habitats, almost invariably produce a progeny identical with the parent, and many species, even after they have been subjected to long years of cultivation, never appear to change seemingly in the slightest degree. Other species under cultivation quickly develop varieties entirely different from the original, and become what is technically termed "broken" Thus the original species of our well-known Verbena is indigenous to South America having a comparatively small scarlet flower. From this, and probably some other species hybridized with it, we have the gorgeous and varied coloring of the variety of to-day. But it took many years to produce these, for we can well remember in our early gardening days there was no white, and the furore that took place in the floricultural world when *Verbena teucroide*, the first white, appeared. It was far from being an attractive plant, but the color was novel, and single plants were sold by the florists of that time at a price that would now buy a hundred. The Verbena, then, is one genus whose species have given us innumerable varieties. The Chrysanthemum, Dahlia, Fuschsia, Geranium, Pansy, Petunia, the Rose, and many others, are also familiar examples where the original species has "broken" from what may be termed its primary condition into ever-changing variety. Thus changed, it is probable that their seeds will never produce two individual plants exactly alike, any more than two identical human faces or forms are produced. It is probable that all species of animals and vegetables, under long years of domestication and cultivation, would ultimately "break" from the original type, though we know that in some species this tendency sooner develops than in others. It is not to be wondered at that the amateur horticulturist is puzzled at what looks like inconsistency in nature— why she refuses to produce always again his Apple or his Peach, his Striped Petunia or his Double Carnation, yet gives him back seemingly identical with the parent his Wheat, his Cabbage, or in flowers his Mignonette or Alyssum. I say seemingly, for it may be doubted if they are identical, only that the variation is so slightly marked that it escapes notice Many whose experience in such matters should have taught them better are always confounding plants raised from cuttings or slips with those raised from seeds, and can not see why the plant raised from a slip or root of a white Dahlia, or a tree raised from the graft of an Apple, should be always identical with the plant or tree from which they are taken, while the seeds taken from either would not produce the same. Any cutting from a root or a branch, whether rooted itself or engrafted on another stock (except in rare cases of sports), will be identical with that of the original form from which it was taken; in fact, it is only a separated part of the same plant, while the plant raised from seed is a distinct individual.—*Peter Henderson.*

Hydraulic Rams.

Last spring I saw in your columns an advertisement of "Improved Hydraulic Rams," by Gawthrop & Son, Wilmington, Delaware. I sent for a circular, and have been well repaid. The pond from which I raised water by an ordinary ram receives the wash of a long clay road, and after a heavy rain is very much discolored for several days, making the water objectionable for house use. This is very simply overcome by Gawthrop's double-acting ram, which uses the pond water for power, but elevates water from a spring about thirty feet from the ram.

I will describe it for the benefit of those who may be similarly situated. When in action the impulse is expended upon the under side of an india rubber diaphragm about eight or ten inches diameter. The water from the spring is conveyed to an upright pipe a foot or more in height, and above the diaphragm. A valve at the foot of this pipe prevents the backward flow of the water to the spring when the diaphragm is lifted, consequently the pressure simultaneously opens the valve in the air chamber, and now the water is with every stroke passing up the delivery pipe as in the ordinary ram. The amount of water delivered is as great as in the single ram. The motion of the diaphragm is so slight that I think it will last for many years. The valves in the upright pipe, and air chamber, are simple clapper valves, which can be quickly renewed when worn, and as all the parts are keyed together, a hammer is the only tool needed in taking apart or putting together. Mr. G. deserves great credit for simplifying the ram so that it can be easily taken care of. The piston, or outlet valve of the Gawthrop rams (one of the most important parts of the ram) is made with more care, and a better adjustment than that of any ram I have ever seen, and I believe I have seen all the different makes in use. They work with a perfection that seems to leave no room for improvement.

They also manufacture a regulator—a small, simple device, which is attached to the upper end of the feed pipe. It will stop and start the ram as the water falls or rises in the box into which the spring flows. This is very useful where the supply of water is small, or when the spring is affected by drought. With a regulator a ram will raise a greater per centage of water, as it may be set to work with a long, healthy stroke, and will not be so liable to stop. The regulator can be adjusted to run from one, to ten minutes, as desired, and then it will stop the ram without wasting any water, and as soon as the water rises again in the box it will open the valve, and thus alternately stop and start from one week's end to another.—*Cor. Country Gentleman.*

Does the Sap Freeze?—A remarkable paper has recently been contributed to a German magazine by Professor Mohr, showing not only that the sap does not freeze in trees and plants which live through hard winters, but also the reason why it does not freeze. He says that although it is true water, as we generally see and understand it, freezes at thirty-two degrees, it does not do so when its particles are finely divided. Tropical plants have large cells, and these are the ones in which the sap freezes; but in plants with very small cells in which the liquid particles are finely divided, there is no freezing of the liquids until after the structure has received injury of some sort. This is true, he says, of insects and insect pupæ. They never freeze; but cut one apart, soon after the humors solidify, and on thawing life dies.—*Ex.*

Selling by Weight.—Cannot some means be adopted whereby eggs and apples shall be sold by weight? A farmer in Madison carried eggs to market last week which weighed 28 oz. per doz; another person sold at the same store eggs which weighed 17 oz. per doz. Price paid to each was 30 cents per dozen.

If 1 doz. weighing 17 oz, are worth 30 cents, how much is 1 doz worth which weighs 28 oz?

As 17 : 30 : 28.....49 7-17 cts.
As 28 : 30 :: 17.....18 6-23

Again—

160 doz large eggs, at 49 7-17.....$49,41
100 ....small..... 30.....30,00

$19,41

Advertisements.

CONTENTS OF THIS NUMBER.

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