RURAL AND SUBURBAN

HOW PLANTS FEED AND GROW.

One of the main sources, if not the most important source, of revenue on the farm is the revenue derived from the product of the fields, the fruits of the various forms of plant life that are grown on the farm. On the plant life of the farm all the animal life depends for its supply of food. Every farmer, then, realizes that the success of his entire farming operations depends in a large measure on the growth and development of the various forms of plant life which he has under his care. If by his care and skill in the cultivation of the soil and the management of the various farm operations, he is enabled to develop a strong and vigorous plant growth on his farm, his efforts are well repaid by the increased revenue which he derives from the product of his fields.

The object of this paper is an attempt to explain the means by which the plant takes the crude, inorganic foods from the soil and air and combines them into a form which will serve as a food both for man and beast. It is a wonderful fact that this power of converting unorganized foods into an organized form that can be utilized by the various forms of animal life is alone possessed by the plant. In order, then, that one may more fully understand the various forces which are at work in the wonderful development, one must study the nature of the plant in relation to its surroundings, and the nature and function of each part which goes to constitute the entire organism called a plant.

We all know that before one can have a fully developed plant, one must first sow the seed. Were we to examine one of these seeds we would find lying wrapped up within the seed a miniature plantlet, together with a supply of food for its maintenance until it can derive its food from other sources.

Before one can coax this little plantlet forth from its snug place within the seed, we must have a suitable environment as regards stem. Place the seed whatever way one will within the soil, and it will be found that the different parts of the germinating seed will develop into a particular organ to serve a particular function in the development of the perfect plant.

When suitable conditions are present, we find that those parts of the newly-developed plantlet rapidly increase in size and become changed in form. From the part that goes advanced in the soil, and which we call the root, we notice branches arising. Were we to closely observe the manner in which these small secondary roots originated, we would find that they had evidently come from the interior of the older root, forcing their way through the outer tissues, and appearing on the outside as small secondary roots or root branches. As the development of the upper part of the plant proceeds, we notice that this branching of roots goes on with corresponding rapidity. On older plants one finds that the roots have become very much branched and form a compact system made up of large main roots, and branching or secondary roots of varying sizes, while near the tips of the smaller secondary roots we find small branches proceed, we will find that theses mall microscopic rootlets serve a most important function in the plant's development.

As in the root, we find that the part of the plantlet that comes upward to form the stem of microscopic size called root hairs. As we proceed, we will find that these small microscopic rootlets serve a most important function in the plant's development.

As in the root, we find that the part of the plantlet that comes upward to form the stem rapidly elongates, the part of the stem elongating most rapidly being a short section just back of the tip or terminal bud. As the stem increases in length, we notice buds being developed laterally along the sides of the stem. From these buds originate the leaves, and later the branches of the fully developed stem. The secondary branches of the stem differs from that of the root, in that the branches of the stem originate at the outside of the older stem, while those of the roots originate from within.

The function of the stem, together with its branches, of course, is the bearing of the leaves and of the flowers and fruit. These organs serve most important functions in the development of the plant. The leaves may be regarded as the lungs or breathing organs of the plant, for it is in them that the various foods that the plant requires are built up. Consequently, it is important that plants be supplied with abundant foilage or leaf surface in order that the various processes that are so essential to the plant's welfare be kept up. Were we to strip a growing plant of its leaves and prevent the development of these organs, we would find that the plant would soon die of starvation.

One characteristic of leaves and many parts of stems that we, no doubt, have noticed, is the presence of a bright green color which is caused by the presence of a pigment within the tissues of the leaves. It is owing to this coloring that the plant is enabled to intercept certain rays of light and store up within its own tissues the energy necessary to manufacture food.

The growing plant derives its food from two sources—the soil and the air. The various elements which are derived from these different sources are brought together within the tissues of the leaf, and there transformed into foods that may be used in the production of new parts or the enlargement of parts already produced.

The growing plant requires quite a variety of foods in its growth. Many of these it obtains from the soil, where they may be stored up in a variety of forms, some in a form that is difficult for the plant to secure conveniently. Before these foods can be absorbed by the plant, they must by some means be rendered available. This change in the condition of plant foods within the soil many be brought about by careful and intelligent cultivation. Among the more important foods which the plant derives from the soil are nitrogen, phosphorus and potassium. These foods are of special interest on account of the fact that the soil may become impoverished of all the available supply, and a new supply must be returned in the form of manures of some description. The carbon which forms such a large percentage of the dry matter of plants is obtained almost wholly from the air. Besides containing abundance of food, the soil must also be warm and moist, and in such a condition as to allow of a free circulation of air before the various foods can be taken up by the plant. All the foods that are taken in by the plant from the soil are absorbed in solution. Where we to examine carefully the root system of a rapidly growing plant, we would find that the small root and root hairs were very closely associated with the small particles constituting the soil mass, and in pulling up the plant we would find that numerous small particles of soil still adhere to these fine hairs, showing that the association between the two is very close. It is by means of this close association of the root with the soil that the plant is enabled to absorb its supplies of food.

Were we to closely examine a soil that was in an ideal condition for plant growth, we would find that surrounding each of the small particles that constituted the soil mass was a thin film of water. In this film of soil water surrounding the soil particles are dissolved the various elements of plant food that the plant absorbs in its process of growth. In order, then, to ensure rapid absorption, which is so essential to rapid growth, we must see to it that our soil is in the proper condition to stimulate the development of an extensive root system. This may be done by keeping the soil warm, moderately moist, and in such a condition that the air will freely circulate through all parts of it.

As this soil water is absorbed by the plant, the plant foods are carried along with it in solution into the interior of the root, thence through the stem to the leaves of the plant. In the leaves of the plant the wonderful changes necessary to the building up of plant food takes place.

The various elements absorbed from the soil by the roots are united in the leaves with the elements obtained from the air and converted into a form that the plant can use. The means by which this wonderful change is brought about is not very clearly understood, but at least three conditions must be present before the change will take place. There must be light, sufficient heat, and abundance of the green coloring matter present in the leaves.

As the food is manufactured into leaves during the day, it is broken down and carried to the ground parts of the root and stem during the night, and so the manufacturing process goes on. Consequently, during those seasons of the year when the most rapid absorption and the most rapid manufacture of food are taking place, we find that the plant is most rapidly increasing in size. As the season advances, and the maximum of growth is reached, we find that the plant begins storing up a supply of food for the next season's growth. In annual plants this superfluous food is stored up in the seed, while in plants that live for a longer period of time, it may be stored up in various parts or in special organs which the plant produces for that purpose.

TUBEROSES.

These deliciously fragrant and exceedingly useful flowers are much more easily grown than is generally supposed, and will well repay the little trouble that is necessary to have them in perfection. For early forcing pot singly into five or six-inch pots, as early in the season as the bulbs can be obtained, and plunge in a good moist heat, witholding water till the foliage makes its appearance, when water way be given abundantly till the flower buds are formed, when they may be removed to the greenhouse or conservatory and less water given. For Autumn blooming, pot singly into five or six-inch pots in March or April, using a light rich compost, and plunge the pots about six inches above their rims in cocoanut fibre, coal ashes, or any light material under the stage of a greenhouse or in a cool pit or frame; when the foilage of these makes its appearance they should be removed and plunged under a south wall, removing them to the greenhouse or indoors as the flower bulbs are formed. Dry roots may also be planted in sheltered places in the open ground, from the middle of April to the latter part of May, and will produce beautiful flowers in autumn if taken up and potted when coming into flower, and will furnish a supply of valuable bloom in the greenhouse almost up to Christmas.

FRENZIED FERN BALLS.

During the winter and early spring fern balls are offered for sale in the florists' shops. These will give more satisfaction if purchased when in a fresh condition, because as this ball is nothing but a mass of fern roots wound tightly around a central mass of moss, it dries out rapidly when exposed to the air. They come in all sorts of odd and fantastic shapes.

To start the fern ball into growth it must be first plunged into a pail of water and left there long enough to have the water thoroughly penetrate to the moss inside. After removing the ball and before putting it in the window, hang it up over a sink or other receptacle that the superfluous moisture may drain off and be caught. With conscientious syringes given regularly every day and an occasional thorough soaking, this ball will be a mass of feathery green ferns all winter. It is a sort of resurrection plant and dies down completely during the hot weather.

HARDY PRIMROSES.

A beautiful free-flowering class of hardy plants, which has been highly improved of late years, invaluable for spring gardening. The hybrid varieties vary in color from the palest and most delicate sulphur yellow through all the soft shades of rose and purple to the most intense and brilliant crimson. In a mild season many of the varieties will commence blooming in the autumn and continue through the winter, but from the beginning of April to the middle of May they are generally in full bloom and present a most lovely appearance. A partially shaded border, with a westerly aspect, will grow them to prefection in almost any moderately rich soil.

SCIENCE AND PRACTICE OF ECONOMICAL FEEDING

To many farmers, articles on the science of feeding, embracing such terms as "balanced rations," "protein," and "carbohydrates," seem hopelessly technical and complex; yet, when one comes to read up a little, he is surprised to find how few formidable terms there are, and how easy these few are to understand. It is true the feeding of animals is a complex study—more complex than some laboratory chemists and classroom professors have realized. It must be complex, because it has to do with the wonderful phenomena of life and natural law. There is far more in feeding than ever was learned in a laboratory, although the chemist has been of immense assistance in working out the science of feeding; and when we find a man who combines knowledge of animal chemistry with practical experience as a stockman, we have the making of the genuine feeding expert.

Without attempting, in this limited space, to enumerate all the important factors of animal nutrition, it may be pointed out that the first thing a beginner has to take in is the fact that there are four distinct elements which should be present in approximately definite proportions in all classes of feeds. These are (1) protein, (2) carbohydrates, (3) ether extract (consisting of various vegetable fats and oils), and (4) ash or mineral matter. Each of these has its own particular function to fill in the animal economy. Protein, the most important element of all, and the one deficient in most kinds of ordinary farm roughage, is chiefly concerned in the production of muscle, skin, horn, and the vital fluids of the body. It is especially demanded by young, growing animals, and by cows yielding milk. Carbohydrates (sugars, starches, cellulose, and the like) are employed in producing animal fat and heat, and ether extract is devoted to similar purposes. Ether extract has more than twice the heat-yielding capacity of carbohydrates, hence it is customary in estimating the heat and fat producing value of a food, to group the carbohydrates and ether extract together, multiplying pounds of ether extract by 2.3, adding the product to the pounds of carbohydrates, and expressing the sum in terms of protein to carbohydrates. When the proportion of protein to carbohydrates and fat in a daily ration is in the relation which experiment has determined to be the best for any specific purpose, it is called a "balanced ration." In considering the "balance" of a ration, the amount of ash is not taken into consideration as there is usually enough of this in an ordinary ration to serve all necessary purposes. An occasional exception occurs in the case of young animals, which need an extra amount of ash for bone-building purposes, and, in feeding these, care should be taken to supply a reasonable quantity of such feeds as bran, which contains a generous percentage of ash for bone-building, as well as of protein for muscle-making.

In the past, one of the chief aims of scientific investigation has been to establish what proportion of protein to carbohydrates and ether extract would constitute "balanced rations" for various purposes. The first standards formulated were the German standards, which called for rations with a considerable percentage of protein. Later, American researches have established that good use can be made of rations containing considerably larger relative percentages of carbohydrates than were formerly considered admissible. As rations rich in carbohydrates are usually more economical to raise, and generally cheaper to purchase than those rich in protein, this is an important saving.

The reader must not run away, however, with the idea that a ration is all right so long as it is "balanced." While an approximately "balanced" ration is generally the most profitable, precise balance is not necessary, because, to a certain extent, an excess of carbohydrates may often be utilized to advantage, even though the percentage of protein be somewhat below that required for an ideal ration. Besides, numerous practical considerations, such as digestibility, palatability, wholesomeness, bulk and economy (which varies with localities and the range of prices) must all be given due weight. Meantime, we advise those who wish to post themselves on the important subject of feeding to select one or more of the following excellent standard books: "Feeds and Feeding," by Henry; "The Feeding of Animals," by Jordan, or Prof. Shaw's new work, "Feeding Farm Animals." Every farmer needs such an authoritative treatise on this subject, giving tables of the percentage of digestible nutrients in all the staple feeds, and time spent in perusing it during the winter evenings will be amply repaid, not only in interest, but in dollars and cents.—Farmers' Advocate.

TREATMENT FOR BLOODY AND DISCOLORED MILK

When blood is drawn from the udder it generally makes its appearance toward the end of the milking, that is, it comes with the strippings.

The cause is weakness of the capiliary vessels, which ramify through the udder. Normally these vessels have very thin walls, and readily exude their contents—indeed, it is part of their function to do so, in order to supply nutrition to the parts. These cases are often very difficult to deal with, owing to the necessity for clean stripping at each milking period precluding any possibility of rest.

Further, the trouble often reappears again and again in the same animal after it has been cured, or has ceased spontaneously. In many cases cows that give bloody milk are "stale," that is, they have been too long in milk and need drying off. Any cow whose near approach to calving, or long period in milk, suggests this origin of the trouble, should be promptly dried off, and the bother of treatment saved. It is generally found that after the usual period of rest there is no trouble at the next calving.

When the cow giving discolored or bloody milk has yet a long time to run, something must, of course, be tried to remedy the defect. The food supply, though rarely in any way responsible, should be overhauled, and such changes made in the diet as the result of the investigation suggests to be desirable.

Treatment

As to treatment, local bathing with cold water, after clean stripping, is sometimes recommended as calculated to give tone to the weak blood-vessels, but where this is practiced the udder should afterwards be very carefully dried with a soft cloth, and then gently massaged or rubbed with a little camphorated oil to prevent the animal taking cold in the gland. The best results are obtained in cases of bloody milk from treatment which includes the prolonged administration of tonic medicine containing iron.

A laxative drench of Epsom of Glauber's salts should be given, and followed twice a day with one ounce or one-sixteenth part, of a mixture of four ounces each of carbonate of iron, common salt and powdered aniseed and gentian. This powder should be stored in a covered tin and given in the food, as a drench in a quart of ale or thin gruel. In cases of discolored milk it is often useful to give a drench of: Nitrate of potash, one ounce; powdered ginger, half ounce; Epsom salts, twelve ounces; ale, one quart, and followed it twice a day with one ounce of hyposulphate of soda, dissolved in a quart of warm water. The milk from the quarters, the product of which is normal, should be kept separate, and the discolored and bloody milk received into a different vessel. There is a superstition among cowmen that any abnormal milk should be stripped on to the ground. This certainly secures that it shall not be used for human consumption, or spoil the bulk, but milk so distributed taints the premises and furnishes a breeding-ground for germs that cause putrefaction and decay, if not for pathogenic organisms.

Generally there is no risk whatever in giving bloody milk or discolored milk to pigs. They appreciate it none the less on account of its appearance; but, in any case, it is better received into a vessel, even if eventually thrown down the drain, than milked on the floor of the cowshed.

In those cases where blood, as blood, comes with the strippings, the milking should be conducted as gently as possible; but clean stripping must not be omitted because the milk is bloody, or there may be worse trouble in the shape of mammary inflammation from retention of the milk, or the cow will go dry.

THE ART OF MILKING

"The chief trouble with a large herd of dairy cattle," says the Rural World, "is in getting them milked properly. Hands who can milk are plentiful enough, no doubt, but few of them are experts at the work; there are others, again, whose services are perhaps not so fully appreciated as they should be. The two main points in milking are gentleness and quickness. Of the two, quickness is the most essential, for a quick milker can seldom be a bad one. Few milkers are cruel, but a great number are slow. Experiments have been made regarding this matter of quick vs. slow milking which prove that dilatory milking has sometimes the effect of reducing the butter fat in the milk to the extent of 11 per cent, besides showing a decided diminution in the quantity of the milk.

"Scientists tell us that the formation of the milk largely takes place after the process of milking has begun. The distended vessel, or udder, contains but a small proportion of milk actually in a secreted or perfected condition. Professor Stewart, a leading American authority on the dairy cow, compares the secretion of milk to the secretion of tears; the latter only flow when there is a mental excitement of a painful nature, while milk secretion requires mental excitement of a pleasurable character—or it may be compared to the sudden development of saliva in the mouth of a hungry man when he encounters the smell of roast beef. We do not yet know all about the secretion of the milk in the udder, but we know this much, that when milked by a slow hand, the cow becomes a dawdler also. And we know, further, that if the practice of slow milking be pursued for a length of time, the cow will soon go dry. A cow may be fed ever so well, obtaining the best of everything she can eat, but if she is not properly milked, much of the food and kind treatment bestowed upon her are wasted, for she only converts such attentions into beef, instead of into milk. On the other hand, no one need imagine that quick milking alone will cause a cow to give more milk, but it will certainly stimulate the secretion if accompanied with gentleness and good treatment in other respects."

DAIRY NOTES

It is not possible to tell what a cow is as a milker till after her second calf.

Begin churning with a slow motion and gradually increase the movement as you progress.

Every intelligent man can make dairying pay because intelligent methods always win.

Keep the cow in a comfortable position, if you will save feed, and the milk pail will show a gain.

Neat pound prints, wrapped in parchment paper, will command the best prices from the buyers of butter.

The man who looks on a cow as a machine, and treats her as he would a machine, will get from her ground-out results, and nothing more.

The "book-farmer" who puts his learning into practice will make dairying pay where the other fellow, who derides so-called "book-farming," will fail.

Good plan to sift the salt you use in the butter. Sometimes there will be little chunks in it and these are apt to get into the butter whole. Sifting breaks these all up fine.

In some cases, where cows have been milking for a long time, there is some difficulty in churning. The addition of one or two fresh cows in the milking herd will often overcome the difficulty.

The cow that you think the most of may be the very one you ought to get rid of. Find out about that. Test all your cows. Don't be satisfied with once; keep at it till you know. Then do something about it.

A PROPOSED DEAD MEAT INDUSTRY

Mention of a proposal that hes been made to the Dominion government, to establish a great dead meat industry in Canada, was made by Dr. J. G. Rutherford, of Ottawa, Dominion Live Stock Commissioner, recently, while addressing the members of the Dominion Swine Breeders' Association.

"My department," said Dr. Rutherford, "has been endeavoring to find the real cause of the decreased production of hogs. While the decrease has not been as great as has been reported, we have found that it is serious. The department has officials in all of the packing establishments of the country, and thus we are able to keep pretty close track of the number of hogs being slaughtered. The packers have advised us to conduct experiments to demonstrate to our farmers what it costs to produce hogs. We have not cared to undertake work of this nature, as we have felt that our farmers are pretty well informed on this point. My impression is that our packers are in a measure to blame for the shortage of hogs, inasmuch as they have taken advantage of the situation, when hogs have been plentiful, to pay the farmers a low price in order that they might earn large dividends for themselves instead of using these extra profits to pay better prices when hogs were scarce.

"The people in our Western provinces are great people to blow because they have found that the more they blow the more they grow, and therefore the more they grow the more they blow. Last year they came to the government and wanted to have their bonds guaranteed for $8,000,000 in order that they could establish a great dead meat industry. We went into their proposition with them carefully, and finally got them to consent to reduce their request to a basis of $1,750,000, and as yet the government has not accepted the proposition as amended. While this scheme may not be practical, it has the germ of a great idea. If we could establish a dead meat industry covering the Eastern as well as the Western provinces and guaranteeing a reasonable profit to our producers as well as fair prices for their products, it would be of enormous benefit to the country. The success of agriculture depends upon our live stock industry, as otherwise the fertility of the soil could not be maintained."—Farm and Dairy.

FARM NOTES

Let your farm do your bragging.

Keep the land strong and productive.

Plenty of good clover hay saves mill feed.

You can't afford to spread manure with a fork.

If you know what, how and when to feed you know it all.

Do all the farm work "on time." This is one of the secrets of success.

The farmer who never has to lend machinery is the farmer who has none to lend.

Better select your seed potatoes as you did the crop. You can get the best results this way.

If it pays to feed a cow for milk at all, the more feed she will turn into milk, the better it will pay.

The dairy cow must have good digestion and assimilation. It is not so much how much she eats, as how much she assimilates.

While the milk is warmer than the surrounding air, it should be left uncovered, but when colder it may be covered to an advantage.

Acidity in milk is incipient decomposition, and it is the more delicate flavored oils which suffer first of all among the fats of whch butter is composed.