

of any class of animals at any time during the entire show. This is as it should be at any recognized fair.

The judging is all done the first day, and at the same time in all the breeds. This makes it impossible to follow the work of the judge at the time the work is being done. But there is not much satisfaction in so doing anyway, as where the people are kept on the outside of the ring it is next to impossible to form safe opinions. (At the Royal only the judge and one attendant for each animal was allowed in the ring.) The remainder of the week this can be done in the stalls, where the animals are always to be seen, as they are plainly numbered, and large placards giving the judge's rating are posted in a conspicuous place. At certain specified hours the prizewinning animals are all paraded in front of the grand-stands. They pass around in the regular order of their winnings in the ring. This affords an excellent opportunity of seeing them in motion. A noticeable feature in all the breeds of stock on exhibition was that there was always competition. This was due to the fact that according to the rules of the society any breed which was not represented by three different exhibitors lost its classification the next year. In fact, it was cancelled at the time, and the entry fees returned to the owners who were present. This ruling may work both ways. It is enforced for the purpose of compelling the exhibitors or breeders of any particular breed of stock to see that there is a good representation of the breed on exhibition. Sometimes it happens that a most worthy breed is barred, while some other breed of little or no value is represented, and draws money out of the treasury for prizes won. During the recent show the Cotswold and Border Leicester sheep were excluded by this ruling, while some other breeds with little or nothing to commend them were entitled to show and win premiums. The same ruling also applies to the different classes of any breed. The Angus and Galloway cattle both lost some of the younger classes by this ruling. The judging is all done in the open, as no pavilions or protection of any kind are provided for in case of bad weather. But the judging is all done in a few hours, and bad weather is not likely to entirely prevent the work. All work is done by the single judge system, which aids very much in the dispatch and general satisfaction of the same.

The live-stock exhibits, on the whole, were very good. Perhaps no other show offers such an extensive classification, as in all more than fifty distinct breeds were on exhibition. Nothing but breeding animals are shown. The animals were all in good condition; some were overdone. The latter was true of several of the aged animals, and those in three-year-old classes. The younger things, as a rule, were not so highly fitted as animals of the same age would be at the American shows. For some reason there were a number of animals very bad in their feet and legs. In some instances they might almost be classed as cripples; otherwise these carried their form nicely, and showed little or no indication of patchiness or roughness at the tail or along the back and loin.

The horses made a fairly good showing, being of average quality and not overly numerous. The Clydesdales and hunters were noticeably weak, while the Suffolks and Cleveland Bays made a strong representation. Shires and Hackneys were present in sufficient numbers, and possessed enough quality to make an average appearance. The show would not compare with the exhibits seen at some of America's best fairs.

The cattle department made a much better appearance. In most instances the breeds were well represented, in both points of numbers and individuality. This was especially true of the Shorthorn, Devon, Hereford, Jersey, Guernsey, Kerry, Sussex and Dexter Kerry breeds. The remainder of the breeds, while in some instances lacking in numbers, usually were good in quality.

Sheep are generally strong at the Royal. This year proved to be no exception, as in all some nineteen breeds were represented. The Hampshires and Dorsets were very strong, while Southdowns, Oxford, Shropshires and Suffolks made a good showing. The other breeds were not so numerous, but in many instances good individuals were to be seen.

The swine exhibit consisted of five breeds: The Large Whites, Middle Whites, Tamworths, Berkshires and Large Blacks. The exhibits, while not large, were of fairly good quality. The Berkshires were rather too short in the body to be in keeping with modern ideas. The Tamworths were very nice, being smooth of shoulder and having plenty of length and depth of body. The Large Blacks are rather ungainly looking, and, in the writer's estimation, have not very much to commend them to any people. The Large and Middle Whites made a very good showing. The latter breed is too short and thick to be desirable from a bacon standpoint.

The general agricultural exhibits consisted of the various booths of the different seed firms, which were exceedingly well arranged, butter, cheese, poultry, honey, bees, wool, hops, and the displays prepared by the different agricultural colleges and kindred institutions.

In the machinery department were to be found every kind and description of implement or vehicle which could possibly be used by the agriculturist. American companies were represented, but their implements, being of lighter construction, are not so popular in the eyes of the English farmer as the home manufactured, which are built to wear. In many instances simplicity of operation and general convenience is sacrificed for durability.

W. J. KENNEDY.

London, England, June 29th, 1904.

## FARM.

### Problems of the Soil.—XI: The Legumes in the Rotation.

It is generally held that plants of the pea and clover family are "easy" on the land, and the belief is upheld by the common experience that the ordinary grain crops of the farm do better after a crop of this class of plants—the legumes—than after other crops of the cereal class. This fact leads to the conclusion that the legumes remove little from the land, and this is the common belief in regard to this class of plants. As a matter of fact, as a glance at the table published in paper X. of this series will show, there is no class of plants, with the possible exception of some of the root crops, that contains larger quantities of fertilizing materials. Clover, for instance, contains more fertilizing elements, in the amount usually obtained per acre, than turnips, which is one of the hardest crops on the land, and very much more than wheat; and yet we know that clover "builds up" the land, while wheat and turnips impoverish it. How shall we explain this fact?

As we saw at the beginning of this series, of the three chief elements of fertility, two, potash and phosphoric acid, are found in the rocks of the earth, while the third, nitrogen, is found in large quantities only in the decayed vegetable matter or humus of the soil. When potash and phosphoric acid are removed, more is supplied by the gradual breaking up of the small particles of rock in the soil, a process greatly aided by the ordinary operations of tillage. When the supply of nitrogen is exhausted, as it is by the growth of cereal crops, no such source of supply is available. There is

farm very largely, and the resulting manure returned to the land, contributes very largely to the fertility of the land. Any farmer who made a practice of buying and feeding large quantities of clover hay, and applying the manure thus obtained to his land, would expect, and would get, a very great result in increased fertility. Any farmer, in the same manner, growing and feeding large quantities of clover hay, may expect just as sure results. The nitrogen contained in the clover hay grown on the farm is just as much a gain to the fertility of the farm as it would be were the hay obtained from an outside source, and, since nitrogen is the element of fertility most needed, the total gain in fertility will very nearly equal that obtained by buying and feeding the same quantity of hay. What is true of clover is true in the same way of the other legumes. In the roots and stems left in the soil, and in the manure obtained from feeding these crops, we have the best and cheapest source of nitrogen, the only way in most cases of building up the farm and increasing the soil's fertility.

One other point is worthy of note in regard to the legumes. They are very heavy feeders on phosphoric acid and potash, particularly the latter, which of course they obtain from the soil, not from the air. Hence, while they leave the land richer in nitrogen, they leave it poorer in its mineral constituents. This, however, is a matter of small moment if these crops are fed, as they should be, on the farm. These elements are not subject to loss in the treatment of manure, and practically all of them are returned to the farm in this way. Where, however, these crops are sold off the farm, the loss of potash and phosphoric acid is very great, and may largely offset the gain obtained by growing the crop. Last winter the writer was on a farm where the cattle were largely fed on a mixture of

cut straw, pulped roots and chopped grain, while large quantities of clover hay were sold off the farm. This was exceedingly bad practice. Not only was the best of cattle food being sold for really less than it was worth, but in it large quantities of fertility which should have been retained on the farm were removed. In this case, while the plowing under of the clover stubble was a gain in nitrogen to the farm, the loss in potash and phosphoric acid in the hay sold probably balanced or outweighed the gain. It should be remembered that the legumes are crops to be fed, not sold. We may sell the grain, peas or beans, if the price is right, but the straw of these crops and clover hay should never at ordinary prices be allowed to leave the farm. A still worse practice is that of burning stacks of pea straw, where the peas have been

threshed in the field. This is, unhappily, still followed in certain parts of the country. Of this we can only say that it is a senseless waste, and the farmer who practices it knows nothing of his business.

In the rotation, the legumes are the best means of preparing for the cereals. They leave the land rich in nitrogen, which the cereals particularly need, and the great amount of potash removed is not an injury to the cereals, but may be a benefit. Large quantities of available potash in the soil tend to rankness of straw at the expense of grain. Where cereals follow legumes this danger is avoided. The good supply of nitrogen in the soil produces grain, while the scarcity of potash reduces the growth of straw; thus a heavily-grained crop is obtained, much less likely to lodge than one with a greater amount of straw. In the rotation, the legumes are a necessity, in order to obtain a supply of nitrogen to increase the general fertility of the farm, while they form the best possible preparation for the cereals.

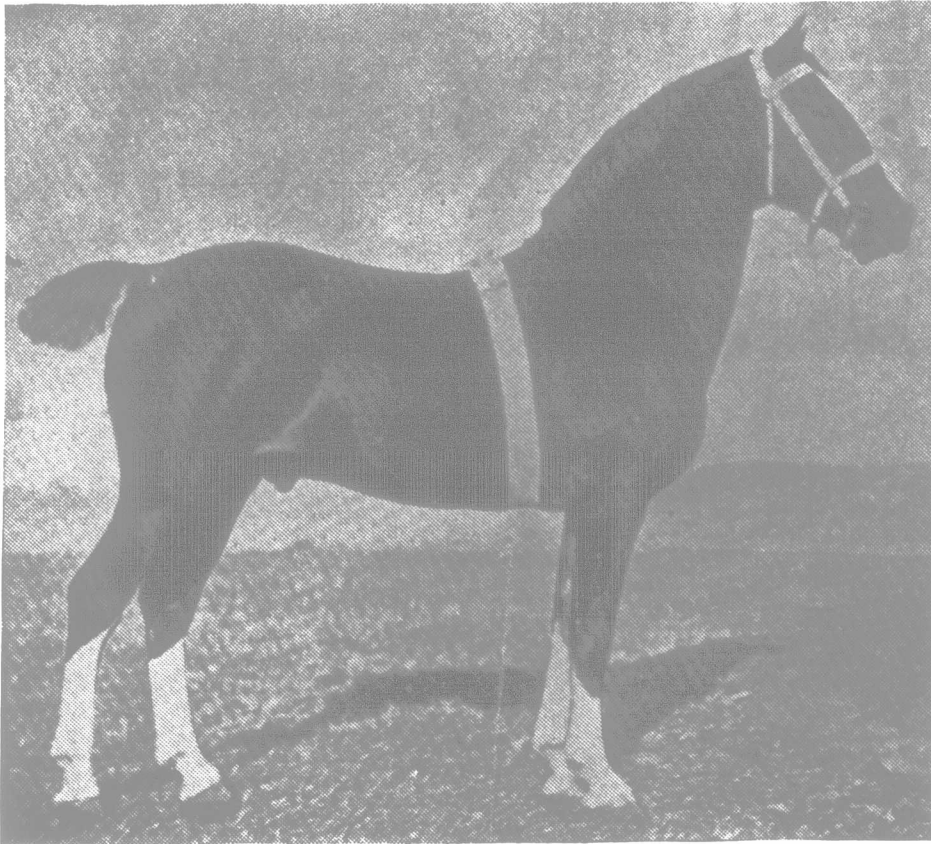
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only one great source, the air, four-fifths of which is the gas nitrogen. But this source is of no use to most plants. There is only one class of agricultural plants which can use this source, and from the air can obtain the supplies of nitrogen necessary to its growth, and leave in the soil, in its decaying roots and leaves, a supply for other plants. This class is the legumes, and it is this characteristic, the ability to draw on the free nitrogen of the air, that gives to this class its great importance, and makes it an absolute necessity in all rotations on ordinary soils. The legumes are the only agricultural plants which can feed from the air, in the sense of obtaining the ordinary elements of fertility from it. They do so only in the matter of the element nitrogen, but since this element is the one in which soils are most likely to fall short, their power in this regard becomes most important, affording a cheap and practical method for maintaining and increasing the fertility of the soil in this regard.

Under proper conditions, the legumes obtain practically all of their nitrogen from the air. This is stored up in the crop that we reap, and in the stems and roots which are left in the ground. With clover, particularly, this last source of soil fertility is very great, a quantity of nitrogen even greater than that removed in the crop being left in the soil in the crop residue, the roots and stems left after the crop is removed. In the case of peas, this source is not so great, but is still very considerable, as is shown by the way in which wheat thrives on a pea stubble. But, besides this source of direct gain to the soil, the nitrogen contained in the crops removed, being fed on the