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## Annual Report for 1914 With the Supplements to the Guide to the Experimental Plots Containing the Yields per Acre, Etc.



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### The New Farm

#### Rothamsted Research

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feature here was that ordinary dung gave almost the same results as cake fed dung, no advantage accruing from the cake.

### THE NEW FARM.

Up till recently the Rothamsted Experimental Station had only five fields, and as these were fully occupied with the classical experiments no land was available for new work. In 1911, however, an additional 230 acres were taken on a long lease and were gradually got into order; they are farmed largely without stock, manures being purchased and everything sold off, this method having certain advantages when experiments are to be undertaken. There being no buildings available, some were erected—stables, stalls for six bullocks, a covered manure yard, and the usual chaffing room, granary, store for artificial fertilisers, etc. In addition, a large Dutch barn has been built, with stout wooden posts set in concrete and affording 8,550 cubic yards capacity, the cost of which was only £127.

Much of this land is farmed in the ordinary way, but from time to time additional areas are brought into experiment; this is done in a definite systematic manner to test some method or principle devised in the laboratory. The usual course is that the laboratory investigations clear up some point in soil fertility or in plant nutrition, and suggest some way in which the growth of the plant might be increased. The method is carefully tested by pot experiments carried out under carefully controlled conditions in the pot culture house, and the laboratory experiments are revised in the light of the results obtained. Thus the *principle* of the method is established. It does not follow, however, that the method will work in the field: the weather, the subsoil, the difficulties of manipulation and other causes may all operate against it and reduce or nullify its effects. Field experiments are therefore made, first on a small scale, and then if need be on a larger one.

Broadly speaking, there are two ways in which soil fertility investigations may be applied to agriculture: they may lead to increases in crop or they may enable the farmer to obtain the same crop at lower cost. There are limits set by the climate to the possibilities of increasing the crop: but there is no limit to the farmer's desire to lower the cost of production.

Another guiding principle is that so far as possible old methods are utilised and developed instead of seeking to bring out quite new ones. The old methods have many advantages: they are effective or they would not have survived, they can be worked on the farm, and they are capable of improvement.

In laying out new experiments at Rothamsted it is unnecessary to conduct simple manurial trials except with new fertilisers. The old plot experiments admirably demonstrate the properties of the artificial manures and their effects on the crop and the soil: our newer experiments, therefore, start out from the basis thus acquired.

One of them is directed to the study of problems revealed by the periodical surveys of the plots, one of which is now in progress. The manures applied in certain cases contain 80 to 200 lb. of nitrogen, but we only recover some 50 or 60 lb. in the crop and the

remainder is lost. How can we recover more and thus secure a better return for our outlay? Part of the loss cannot yet be explained, and is under investigation in the laboratory, but part is due to the failure of the plant to take up all the food given to it. A proper balancing of the manure enables the difficulty to be got over to some extent; in the following two instances the same amount of nitrogen is given in each case, but in one the manure is well balanced while in the other it is not.

	Broadbalk Wheat		Amount of Nitrate running away in drainage water, per million	Barnfield Mangolds	
	Grain, bushels per acre	Straw, cwt. per acre		Roots, tons per acre	Nitrogen recovered, lb. per acre
Badly balanced manure ...	16.0	14.0	17.8	24.7	134
Well balanced manure ...	26.7	30.8	8.5	29.3	172

Laboratory experiments were made to see if any stimulant could be administered to the crop to get it to utilise the food materials better, and manganese salts appeared to have this effect, but trials in the field have not yet proved successful.

The crops are not abnormally large and the varieties used are capable of better growth; something is clearly standing in the way. Inspection of the soil at once shows that it is too heavy to give the best results; the soil type therefore is one limiting factor.

Now this difficulty is an old one and has long since been met by an old device. Chalk lies below the surface of the land in Hertfordshire and the old practice was to dig down for it and apply it to the land at the rate of 80 or 100 tons per acre. The treatment was effective, but it is costly. More recently economy has been effected by using smaller dressings or by substituting lime, but however the process is modified it has to be adopted in some form or other. Seeing, therefore, that we must have recourse to chalking and liming, a series of laboratory and field experiments was undertaken to see just what the lime and the chalk do in the soil and how much—or rather how little—is needed to effect improvement. These have already been discussed on p. 8. While the laboratory investigations were in progress a field experiment was started. The land was divided into three parts, one receiving, at a cost of £3 6s. 8d. per acre, a dressing of 20 tons of small chalk obtained in the excavation of a sewage filter bed; one was chalked on the old Hertfordshire method by the men who make a speciality of this kind of work, approximately 50 tons being given at a cost of £3 7s. 10d. per acre; and the third was left untreated. This was done during the winter of 1912-13. The effect of the chalk on the physical texture of the soil was manifested in a few months. Cultivation became and has remained easier: the ploughman found his work facilitated, the board running cleaner than on the unchalked land. A considerable proportion of the outlay was recovered in the 1913 crop; in 1914, however, neither oats nor barley showed any benefit.