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Report for 1959

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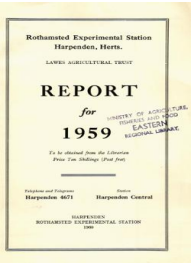
Rothamsted Experimental Station
Harpenden, Herts.

LAWES AGRICULTURAL TRUST

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THE FARMS

J. R. Moffatt

Rothamsted

In welcome contrast to 1958, 1959 favoured farm work. The total hours of sunshine for the year were 251 above normal and the rainfall 1·81 inches below normal. The year opened with land work greatly in arrears, but a fine, early spring soon enabled the leeway to be made good. The hot and generally dry summer favoured the corn crops, and the heavy rainfall in July came just in time to save the root crops, which were by then suffering from drought. These crops were lifted in unusually fine weather in autumn, and winter crops were drilled earlier than usual. Wet, mild weather in December delayed field work, but at the end of the year the position was satisfactory.

The Effect of Weather on Crops

The autumn of 1958 was mainly mild and damp, with persistent mist or fog. This, after heavy rain in the late summer, and compaction during harvest, kept the ground wet and intractable. Very little winter corn could be drilled, and what was drilled went in under bad conditions.

Hard frosts alternating with periods of heavy rain throughout January, prevented much field work, but a fine spell during February, when less than $\frac{1}{10}$ inch of rain fell, enabled over 100 acres to be ploughed. The land turned up " livery ", and seedbeds had to be forced. Drilling started early, and by the end of March field work was up to schedule. April weather was favourable, with no cold, drying winds, and spring sowings were completed by the end of the month.

May and June were both dry and warm, and crops made very satisfactory growth. Conditions for haymaking were excellent, although yields were rather light. As the drought intensified, the corn came into ear early and the growth of root crops slowed. Late-planted potatoes suffered more than those planted early; sugar beet and mangolds wilted badly on hot days.

Heavy storms in early July brought 2·83 inches of rain in 2 days, and the monthly total was 4·51 inches, nearly 2 inches above normal. There was some run-off, but most was quickly absorbed by the dry soil; severe but localised lodging of corn resulted. The root crops benefited considerably, but the rain came too late to help the beans, the leaves of which had mostly wilted and dropped off by the end of the month.

Cereal harvest started about 3 weeks earlier than usual, and continued almost uninterrupted to the end. Moisture contents reached a level where drying was unnecessary, but a thunderstorm then raised them to about 20%, and thereafter most grain needed some drying.

September was very dry, with only 0·16 inch of rain. Potato

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lifting started towards the end of the month and finished 3 weeks later. During much of the time the lifters were working in a cloud of dust such as is seldom seen.

October and November were dry and conditions for pulling mangolds and lifting sugar beet were excellent, but the root yields were small. In September and October ploughing was difficult because the ground was hard and dry, and it was often burst up rather than ploughed. Seedbeds were obtained only by heavy rollings and disc harrowings; Broadbalk was exceptional, in that it ploughed well and worked down easily. Drilling of winter corn and beans started early and was mostly ended before November. Conditions for ploughing improved during November, and excellent progress was made until the end of the month, when, with only about another week's work remaining, wet weather, which lasted throughout December, prevented any further work.

Field Experiments

The 1958–59 programme of field experiments started badly. One experiment on winter corn had to be abandoned, and one was postponed until spring; sowing dates on other experiments were determined by the condition of the land rather than the requirements of the experimenter. Broadbalk wheat field was drilled early in December, except for the plot receiving dung. The onset of thick fog prevented this plot being drilled, and heavy rain then delayed it until early in January.

Despite this bad start, fewer experimental field plots, a good spring and a trouble-free growing season, enabled the remainder of the experimental programme to be carried through without difficulty. The soil on both Barnfield, the classical mangold and sugar-beet area, and Agdell proved very difficult to work down and to get good seedbeds, and had to be rotary cultivated. Most of the cereal plots and all the beans were standing well at harvest; the root crops were harvested under unusually pleasant conditions, and dirt tares were low. Preparations for the 1960 crops did not clash with harvesting those of 1959.

On Broadbalk, the permanent wheat section carrying its eighth successive crop was sprayed with TCB/MCPA and the yields were generally higher than those from the unsprayed section, fallowed in 1956. Exceptions were those unsprayed plots receiving no inorganic nitrogen, where vetches and trefoil were abundant. The plots receiving inorganic nitrogen in two sub-sections after fallow gave low yields; they were water-logged during the winter and were very weedy. On the permanent barley plots of Hoosfield the campaign to eliminate coltsfoot (*Tussilago farfara*) was continued by spraying with the potassium salt of MCPA at 2 lb. a.e./acre in spring and with the ester formulation of 2 : 4-D at 1½ lb. a.e./acre in the autumn. Twitch (*Agropyron repens*) is gaining a hold on a few plots, and the affected areas were sprayed with "Dalapon" after harvest. On both fields wild oats were far fewer than for many years, and the policy of hand pulling, and late sowing of barley, seems to be producing excellent results. Lodging was much less than usual on both Broadbalk and Hoosfield.

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The main development in field technique was to introduce a 40-inch flail-type forage harvester for crops of grass and clover at the silage and hay stage. A standard machine was slightly modified to reduce the air speed, and the grass, after cutting, is diverted by a shield from the delivery chute into an expanded-metal box carried at the rear. This is emptied on to a cloth ready for sampling and weighing. The machine gives a cleaner and closer cut than does the conventional type of mower, and eliminates raking, with its attendant losses. It saved much time and labour. An uneven or stoney surface may contaminate the sample, but no soil is drawn up when the machine works on level ground. The machine is not suitable for lucerne, which is so lacerated that rapid changes and losses are likely to occur in the sample.

The flail harvester was used for the second cut of the Park Grass plots. After the sample cuts had been taken the rest of the field was cut by the machine working as a normal forage harvester. The silage and hay plots on the two Ley–Arable experiments were used to compare the new technique with the old.

Moles were again active in the winter on some of the Park Grass plots, but were controlled with poison bait.

Cropping

Of the 467 acres farmed, 241 were under arable crops, 156 under short-term leys or lucerne–grass mixtures and 65 under permanent grass. The main arable crops were wheat (95 acres), barley (45 acres), beans (24 acres), oats (15 acres), potatoes (28 acres), and mangolds, sugar beet and kale (15 acres).

The cropping system is largely dictated by the requirements of experiments, but is based on a rotation of wheat, spring barley and either roots or beans. The acreage of potatoes is as large as can be handled conveniently, enough kale is grown for the needs of the stock and the sugar-beet area is kept small because our land is unsuitable. Beans are an alternative to the root crops, for they prevent the too-frequent cropping with cereals and the build-up of footrot diseases. Arable fields are rested periodically under grass or lucerne–grass leys, and are usually left down for 4 or more years, depending on the state of the sward.

This system is flexible and represents a compromise between the often conflicting demands of pathological experiments for clean, fertile sites and those of fertiliser experiments for sites likely to show a good response to nitrogen. Cropping is further complicated by restrictions on the use of phosphate and potash on some fields. Several such areas are now in " cold storage " under long-term grass leys.

Crops

Cereals

The summer suited all the cereal crops sown early, as were all spring crops at Rothamsted. They came into ear earlier, had a shorter straw and ripened about 3 weeks earlier than usual. There was some lodging with very high levels of nitrogen. There was less disease than usual. Spring wheat yielded up to 45 cwt./acre, barley

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and oats up to 40 cwt./acre and winter wheat, though more variable, yielded up to 50 cwt./acre. Of two areas of Cappelle wheat sown in early February, one yielded 43 cwt./acre and the other (on a reclaimed orchard) 27 cwt./acre.

Cappelle was the main variety of winter wheat, and Koga II the main spring wheat. Proctor was the only barley variety. The oat area was divided between Blenda and Condor, with some Eagle for special experiments, but in 1960 only Condor will be grown on non-experimental areas.

Hormone herbicides were used on most of the cereals. CMPP and TCB/MCPA were used more than previously because of chickweed (*Stellaria media*), cleavers (*Galium aparine*) and other weeds resistant to MCPA and 2 : 4-D.

Beans

The acreage of winter beans was small, and spring ticks occupied the main area. Most were sown before the end of February, and the plants podded up well despite the drought. As this developed, the leaves wilted and dropped off by late July, and the crop ripened very quickly and early. Mechanical weed control presented no difficulties. A single application of " Metasystox " controlled the bean aphis (*Aphis fabae*) attack, which was severe enough to kill plants on unsprayed plots. Harvesting was by combine-harvester; the yield of the winter crop averaged 28 cwt./acre and the spring ticks 23 cwt./acre. In an experiment winter outyielded spring beans by over 10 cwt./acre.

Preliminary results with new weed-killers on beans are given on p. 177.

Potatoes

Conditions for planting were not ideal, as the ground below the surface was too wet. Growth was satisfactory in the early part of the season, but slowed as the drought developed. Weeds were easily controlled by mechanical cultivations, the necessity for which was well demonstrated by plots on which these were omitted, where yield was lowered by nearly 70%. The heavy rain in July led to secondary growth, which, combined with severe common scab, gave the tubers a bad appearance and made them difficult to sell.

The small area of Arran Pilots were difficult to lift because the ground was so hard; both yield and quality were poor.

There was enough late blight (*Phytophthora infestans*) to warrant a preventive spraying in August, but this probably had no beneficial effect because it was followed by dry weather. Yields were generally satisfactory, averaging 10–12 tons/acre of both Majestic and Ulster Supreme.

Preliminary results with new weed-killers for this crop are described on p. 177.

Kale and Sugar beet

Both crops were sown early and started well, but later wilted in the hot spells. There was no flea-beetle attack, and a threatened attack by the leaf miner (*Pegomyia betae*) to the sugar beet was pre-

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vented by spraying with DDT; a spraying with "Metasystox" against virus yellows was too late to be fully effective. Both crops continued growing well into the autumn; the sugar beet yielded 11½ tons/acre of washed beet with an average sugar content of 18¾%; the kale yield was estimated to be 25 tons/acre.

Grassland

Good growth was made early in spring, and cattle were turned out from the yards in the latter half of April. The larger head of stock carried kept on top of the grass, and as the drought developed grazing became extremely scarce. There was a temporary improvement in July, when growth was rapid, but the grassland remained bare throughout the autumn, and supplementary food had to be given to stock by the middle of October.

Because of the unfortunate experience last year, the area for hay was lessened, and provision was made to dry hay bales, but this was not necessary. About twice as much silage was made this year as last and the quality was much improved; the 40-inch forage harvester greatly facilitated this work and enabled several areas, too small for haymaking operations, to be dealt with profitably.

Hay from the first cut of grass was made and stored in excellent conditions during June, but yields were light, and a second cut from the lucerne–cocksfoot mixtures was carted before the end of July. Some of the early-made hay tended to heat in the stack, perhaps because the outside parts of the plants dried rapidly and gave the impression that the hay was drier than it really was.

Livestock

Cattle

The policy of buying store cattle at about 18 months old and fattening them during the following summer and autumn remained unchanged. Those bought in 1957–58 did not do well on the very lush autumn grass of 1958, and many had to be brought into covered yards for finishing. Sixty-one Hereford and Hereford-cross bullocks were bought in the winter of 1958–59 for outwintering, but the grassland became so badly poached in the wet weather that they had to be moved into an open yard near the farmstead.

Grazing was very scarce throughout the summer and autumn of 1959, and had to be supplemented with grass toppings from fields and grass baulks which were cut by the forage harvester. Kale was fed in mid-October, and the most forward beasts were brought into yards in mid-November for finishing off. Altogether 103 cattle were sold fat during the year. A further 61 dehorned cattle bought in November were run outside while the kale lasted. They have now been brought into the open yard near the farmstead to facilitate the feeding of silage.

Sheep

The new flock of Half-bred gimmers bought in 1958 were crossed with Suffolk rams. Forty-two home-bred Suffolk × Scotch Half-bred tegs, selected from those used on grazing plots during the summer, were kept for breeding. As the whole flock was composed

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of maiden ewes, the lambing percentage was lower than last year; the Half-breds gave 139% and the home-bred sheep 105%. Some trouble was experienced at lambing time, and the ewes seemed rather short of milk. The use of rubber rings for tailing and castration was less satisfactory this year. Most of the lambs are being over-wintered and will be used on grazing plots in 1960.

As grass was scarce, the ewes were flushed on a lucerne–cocksfoot mixture in the autumn and were fed some oats.

Equipment

The concrete-sided silo built in 1958 was doubled in length and provided with a concrete floor and a suitable drainage system. It now holds about 150 tons.

A new 10-foot self-propelled combine-harvester enabled the older of our two machines to go to Woburn, and greatly facilitated harvest.

The platform corn drier was converted for use as a hay-bale drier. The 10-foot-high sides were made of hardboard, and a false floor of weldmesh was laid above the sack gratings. The fan of the radial-flow drying bins alongside was connected to the bale drier because the platform-drier fan provided too little air. About 10 tons of hay can be dealt with at each loading.

The use of a flail-type forage harvester for cutting and collecting the grass from hay and grass plots was studied carefully. It seemed that the method might be satisfactory, and the manufacturer co-operated in preliminary trials, after which minor modifications were made to the machine. Further trials through the season proved the success of the 40-inch-wide machine, both as a normal forage harvester and for plot work.

Buildings

A new general-purpose pitched-roof shed was built to store implements, trailers and timber.

Estate Work

In addition to routine estate maintenance and mechanical hedge cutting, the 8½ acres of derelict orchard in Delafield were cleared and ploughed, so finishing the clearance of land acquired in 1955. Several thousand larch- and spruce-tree stumps were bulldozed from 15½ acres in Claycroft and Longcroft fields, where the timber was felled about 25 years ago, and which have been under grass since. It is hoped to clear the areas and plough in time for cropping in 1960. A small area between Appletree and Park Grass plots is being cleared in a similar manner.

Woburn

Woburn suffered more than Rothamsted from the hot, dry summer, partly because much of the soil is sandy, and partly because there was less rain. From May to September, it averaged about 1 inch per month, about half the normal, and the total for the

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