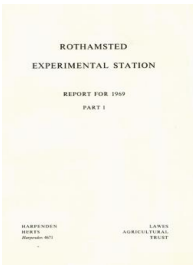
ROTHAMSTED RESEARCH

Report for 1969 - Part 1

Full Table of Content



The Farms : Woburn

J. R. Moffatt

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They fattened readily on the ample grass during summer and autumn, gaining about 2 lb/day. Altogether 107 cattle were fattened, of which 37 were from Woburn and finished at Rothamsted.

One hundred and twenty-six yearling Hereford Cross bullocks were bought. In November 22 of the most forward were brought into covered yards to be sold as they became ready. Of the remainder, 29 were yarded in December 1969 for fattening, and 90 are out-wintering and feeding on hay, silage, potatoes and barley straw.

All the young stock were treated in autumn with an organo-phosphorus insecticide against warble fly; all bought cattle were dosed against liver fluke.

Sheep. In October 1968, 264 ewes, mainly Scotch Half-breds but including 50 Half-bred and home-bred gimmers, were mated, after flushing on seeds, to Suffolk rams. Hay was fed from when snow fell on 24 December and concentrates from the end of the year, as the ewes were in rather poor condition. Lambing started on 6 March and proved disappointing. The ewes were affected by the very wet weather and many lambs were born dead or died soon after birth. Only 312 lambs were alive in early May, giving a lambing percentage of only 118; the lambs grew well but were slow to finish. The first were sold on 2 June and about half were sold fat, the remainder as stores at autumn sales.

The ewes were injected before lambing with a combined vaccine to protect them and their lambs against clostridial diseases. Ewes and lambs were sprayed against sheep maggot fly, and lambs were dosed regularly against worms. Despite this several lambs died from lung-worm infection, and as there is no clean pasture it seems impossible to maintain them in a satisfactory state of health. The need for the ewe flock no longer exists as lambs are not now used in grazing experiments, so as it adds greatly to labour problems, the ewes were sold in the autumn.

Buildings

An insulated potato store was built with fan and central surface duct with laterals for ventilation. Thermistors placed at different points in the heap record temperatures on dials.

A new timber-framed barn, isolated from the main block of buildings, was built to store baled hay. A fan and metal surface ducting was installed in part so that up to 140 tons of hay with a moisture content of up to 30% can be dried in four batches by cold air, using the Dutch system.

WOBURN

At Woburn crops were less satisfactory than at Rothamsted. After a late start they grew rapidly at first but later suffered from lack of rain, especially those on the light soils; some potato and bean yields were particularly disappointing. Rain was less than average in each of the 5 months June to October, giving a deficit of 5·3 in. Hay yields were small but quality was

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good; cereals gave about average yields. The dry weather facilitated stubble cleaning, and all were cultivated or sprayed. Most of the winter wheat was drilled early; germination was very slow and irregular but the plant evened out by the end of the year. Most land work was finished by the end of the year though some areas will be ploughed again if soil conditions permit.

The effect of weather on crops

January was generally mild and wet; rain fell on 22 days and gave a total of nearly 3 in., and the mean air temperature was almost 5°F more than average. Little land work was done. In contrast, the mean air temperature of February was 5°F less than average and there were 21 ground frosts and two falls of snow, each of about 3 in. Some dung carting, chalk spreading and ploughing were done but most of the time the ground was too wet or too hard to work.

The weather improved early in March and a few experimental areas were drilled. Then, in a very wet, cold spell, many of the heavy fields became covered by water, there was severe erosion on slopes and the areas drilled early became badly panned. Near the end of the month winds dried the land and drilling started again. There were 13 wet days and rainfall was 0·56 in. more than average; there were 16 frosts and the mean air temperature was 4°F less than average.

Spring cereals and beans were mostly drilled early in April. Of the barley drilled early, one area had to be redrilled and another patched. Sugar beet was drilled in mid-April. Rain fell on 14 days but was less than average.

Potato planting, started in April, finished in early May, then weather became dull and wet; rain was 0·8 in. more than average and, falling on 17 days, interfered with corn spraying and beet singling. Hours of sunshine were 43 fewer than average. Grass grew rapidly.

June was mainly dry and sunny; rain was 0·82 in. less than average and sunshine hours 52 more. The mean air temperature was 2°F less than average and there were five frosts. All crops grew well. Hay was made under ideal conditions and all was baled without rain falling.

July was mainly dry, hot and sunny; rain fell on 7 days and gave 0·7 in. less than average. The mean air temperature was 2°F above average and hours of sunshine 36 above. The long dry spell affected all crops. The barley and beans turned colour early and the lower leaves dropped off the bean plants. The potatoes lost vigour by mid-July and the sugar beet wilted badly in the hot weather.

The early part of August was warm and dry but then became unsettled. Rain fell on most days in the second half of the month and brought the total almost to the average. The mean air temperature was 1·3°F more than average but hours of sunshine were 55 fewer. Cereal harvest lasted from 6 to 29 August.

Rain fell on only 9 days in September and total was 1·6 in. less than average, but sunshine hours were 30 fewer. Bean harvest finished about mid-September. Most of the stubbles were rotavated, and potato lifting started.

https://doi.org/10.23637/ERADOC-1-124

October was exceptionally dry and warm; rain fell on only 4 days and the total was 2 in. less than average. The mean air temperature was 5·3°F more than average but sunshine hours were only five more. The ground became very hard and dry but the potatoes were all lifted. On the light land stubbles were rotavated, and winter wheat and rye was sown, but the heavy land was too hard to work. After beans and potatoes seedbeds were good.

The long dry spell lasted well into November but then much rain brought the total to more than average. Air temperature was below average and there were 16 frosts. The sugar beet was harvested; the roots were clean and the sugar content large. The last of the winter wheat was sown and some arable land was cultivated.

In December rain was less than average but it fell on 18 days and kept the ground wet. The germination of the wheat crops sown early was very slow and irregular, and it was not until late December that the plant was sufficiently even to be sure there was no need to re-sow.

Field experiments

There were 2094 field plots, 432 more than in 1968. The biggest increase was in root plots, from 600 to 1026. All spring experiments were sown rather later than usual. There was no lodging, and all cereals and root crops were harvested under good conditions. Bird damage was less than usual.

Most crops of wheat and barley had loose smut (*Ustilago nuda*), but there was little mildew. The average yield of Zephyr barley on five experiments was 36·8 cwt/acre and of Maris Badger was 32·6 from four experiments; in 1968 the Maris Badger averaged 26·6 cwt/acre. In a variety experiment Zephyr, Julia and Sultan all yielded more than 43 cwt/acre and Maris Badger 35 cwt. All varieties gave an increase of about 1 cwt/acre from the use of a fungicide to control mildew. Cappelle wheat gave an average yield of 31·4 cwt/acre from three experiments, equalling the 1968 yields. Joss Cambier gave a mean yield of 36·2 cwt/acre from three experiments. In a variety trial Cappelle and Joss Cambier gave about the same yield but Maris Beacon, with a yield of nearly 44 cwt/acre, gave about 6 cwt more. The last of a series of experiments with wheat and barley, comparing two amounts of fertiliser broadcast or injected 3 in. deep, and 4 in. and 7 in. row spacing, showed only small differences.

Beans yielded less than usual. Three experiments with Maris Bead gave 22 cwt/acre, compared with 30 cwt/acre in 1968 from Tarvin. In an experiment comparing row spacings of 5½ and 21 in., and fertiliser either broadcast or injected at 3 in., the only result was a small increase from injected fertiliser. An experiment comparing different *Rhizobium* strains again showed no advantage from inoculation. This will not be repeated. There was no chocolate spot or leaf blotch.

Potato experiments caused no difficulties. Yields were about average; in two experiments, King Edward, Majestic and Maris Piper gave a mean yield of 18 tons/acre. Pentland Crown yielded 21 tons, and its tubers

https://doi.org/10.23637/ERADOC-1-124 *pp 4*

were bright and almost free from scab. Pentland Dell in one experiment yielded nearly 17 tons/acre.

Sugar beet, sown on 11 April, germinated well. 'Betanal' successfully controlled all weeds except mayweeds, which were checked. The crop grew well during May and June, was sprayed with 'Metasystox', and the mean yield in two experiments exceeded 17 tons/acre of washed beet; the Organic Manuring experiment gave only 13 tons/acre. The sugar content ranged from 17·3 to 19·8%, much more than usual.

The Ley-Arable experiment is being phased out and its future main use will be to study the reasons for potato yields ranging widely. The rotation of crops will be maintained and the effect of the residues of treatments will be measured in some crops. Yields were taken of the first barley test crop, the rye and potatoes. Grazing was restricted to the third year grazed leys, the other ley plots being cut but not weighed. The Maris Piper potatoes benefitted greatly from treating the ground with 'Temik' or chloropicrin; the arable rotation with a root crop gave several tons less than any other rotation. The mean yield was 19 tons/acre and mean barley yield was 35 cwt/acre.

Cropping

Of the 172 acres farmed 13 carried wheat, 31 barley, 19 potatoes, 25 beans and 3 sugar beet. There were small areas of sainfoin, carrots and rye. Temporary grass occupied 26 acres and permanent pasture 16 acres. There were 33 acres of fallow.

The light land is worked on a six-course rotation, and the heavy land on a four-course, to provide different intensities of soil-borne pathogens of cereals and to prevent those of potato and sugar beet reaching dangerous populations. 'Break' crops are potatoes, beans, ley or fallow.

Most of the stubbles were either rotavated, deep-tine cultivated or sprayed with paraquat, or had a combination of these treatments to control weed grasses and kill volunteer corn.

Magnesian limestone was used to lime the light soil, and ground carbonate the heavy land.

Crops

Wheat. The small acreage of wheat was sown to Joss Cambier, but Cappelle was grown in some experiments. One experiment was sown in October but most of the crop was sown in November. The wheat grew well throughout the year. A small area of Kolibri spring wheat was sown in late March. None of the wheat lodged and yields were above average.

Barley. Zephyr was the main barley variety, but Maris Badger was retained in several experiments as elsewhere, most of the crop had loose smut (*Ustilago nuda*). There was little lodging, and yields were better than average.

Beans. Maris Bead was grown on most areas but Tarvin in two experiments. Sowing was done at the end of March and early April. Simazine

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failed to control weeds on the heavy land, probably because of the depth from which the seeds germinated; these areas were tractor hoed twice. Bean aphids (*Aphis fabae*) were controlled by a 'Metasystox' spray. Lack of water gave short plants and poor yields.

Potatoes. King Edward was the main variety but Maris Piper, Majestic, Pentland Dell and Pentland Crown were also grown. Chitted once-grown seed from Rothamsted was used. Weeds were controlled by a linuron/paraquat spray and earthing up was by a rotoridger. Preventive sprayings were done against potato blight and none occurred; 'Metasystox' was included in one spray to kill aphids which were prevalent on some areas. Growth was good in June but later the plants lacked vigour and began to die early. On some areas the haulm was destroyed mechanically, on others by B.O.V., and a few died naturally. Yields from the light land were poor and the tubers very small; many had growth cracks or secondary growth and on some areas the percentage ware was only about 25%. There was less scab than usual but much wet rot at lifting which made the sound tubers wet in store. Wart disease (*Synchytrium endobioticum*) was found on a few tubers in one field, and only varieties immune to wart will be grown at Woburn in future. Most of the non-experimental crops were harvested mechanically. Yields differed greatly in different fields.

Grassland. A high-nitrogen compound fertiliser was applied at 3–4 cwt/acre in March and 'Nitro-Chalk' later in the season. Growth was slow during spring but fast later. Hay was made quickly and the quality was good, but yields were less than average. Grazing was plentiful throughout the summer.

Livestock

Cattle. The larger bullocks were yarded in December 1968 and fed on stockfeed potatoes, hay and a home-grown concentrate ration. Twenty-two were transferred to Rothamsted in spring; some were sold immediately and the others during summer off the grass. As there was ample grass, 30 Hereford-cross yearling steers were bought in August.

Sheep. The few sheep used to graze the grass plots on the Ley-Arable experiment were gimmers bred at Rothamsted.

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