Experiments containing different types of rye-grass were laid down alongside the above trials, and while they provide convincing evidence of the superiority of the good perennial types, it is apparent that the Canterbury rye-grass fields in the grazing trials contain strains infinitely better than the more common Canterbury types.

(3) Observational Top-dressing Experiments.

About two hundred and fifty experiments are in existence throughout New Zealand in pursuance of surveying grasslands from point of view of their response to lime, phosphate, potash, and nitrogen. The extension of this type of experiment has been limited on account of financial stringency. It is considered that something like two thousand of these experiments will be necessary before a reasonably efficient survey will be completed.

A survey of Canterbury was made in 1928–30 on these lines, and the importance of lime in conjunction with superphosphate on grasslands in Canterbury was clearly demonstrated.

In parts of Taranaki a number of these trials have indicated that potash is having a marked effect on production, and in order to define the limits of the potash-deficient area it is desirable to lay down a large number of trials in this district as rapidly as possible.

Other observational manuring experiments, numbering approximately one hundred and forty, are being carried out chiefly with the object of trying out various phosphatic, potassic, or nitrogenous manures under varying climatic conditions. Demonstrations of manuring with different types of phosphate and with lime, phosphate, potash, and nitrogen are laid down on nine areas adjacent to rye-grass and clover strain demonstrations referred to below.

(4) Demonstrations and Trials of Rye-grass and Clover Strains (in Collaboration with the Agrostologist).

A total of thirty-four trials to determine the relative merits of grass species and strains in various districts have been in existence over the past three years. The purposes of these trials have now been served, apart from their value as demonstrations to farmers, and many will shortly be abandoned. Further trials which combine demonstration with investigation are being laid down in districts other than those in which the above are situated. Nine of these have already been laid down.

C. EXPERIMENTS ON ANNUAL CROPS CARRIED OUT BY FIELD OFFICERS.

(1) Wheat.

(*a*) wheat manuring.

The programme of wheat-manuring experiments was maintained during the past year. Twenty-one trials were laid down in the Canterbury District and six in the Otago–Southland District.

The 1931–32 season was a disastrous one for the wheat-grower in many districts owing to the severe summer drought. Four of the trials could not be harvested on account of extremely poor crops.

The dry conditions were unfavourable to response from the use of nitrogen. The general average increase from 1 cwt. nitrate of soda was 0·8 bushel per acre. In the previous season this increase worked out at 2·6 bushels per acre, and even this represented the lowest seasonal average for some years.

The use of superphosphate at 1 cwt. per acre has again proved a sound proposition, the average increase from 1 cwt. super being 5·2 bushels per acre.

Up to the season under review the average increase from the use of 1 cwt. super in ninety-one experiments conducted over eight seasons was 4·1 bushels per acre, so that the increase due to super 1 cwt. in the 1931–32 season was above the general average. On the other hand, increasing the quantity of superphosphate to 2 cwt. gave no appreciable general increase over super 1 cwt., and it would appear as though 1 cwt. per acre just about meets the requirements of the crop, except on some of the heavier class of wheat land.

(*b*) trials of different forms of nitrogen at different times of application.

The results of three trials carried out in the 1930–31 season in which nitrate of soda and sulphate of ammonia were applied at different times were published in the *Journal of Agriculture*, July, 1931.

The trials were repeated in the 1931–32 season. The use of sulphate of ammonia with the seed, a treatment introduced as a modification of previous trials, gave good promise and should be further investigated. As previously stated, however, the use of nitrogen did not in general give good results, nor were the differences between times of application as marked as in the season 1929–30.

(*c*) rate of seeding trials with wheat.

This investigation has been continued and three trials were carried out with rates of seeding varying from 80 lb. to 120 lb. per acre with each of three varieties. The results confirm those of the previous years, and point to the conclusion that a sowing of 20 lb. or 30 lb. of seed in excess of the optimum will not affect the yield. If, however, the rate of seeding is 10 lb. or 20 lb. below the optimum a considerable reduction in yield may result.

(*d*) wheat variety trials.

Thirteen variety trials were laid down in collaboration with and on behalf of the Wheat Research Institute. Solid-straw Tuscan again proved to be the best-yielding variety under trial, except in one or two districts. Its popularity, in Canterbury at least, is based on its high-yielding and wind-resisting properties, and at the present time there is no incentive for farmers to grow quality wheats in favour of Solid-straw Tuscan.

As far as finances will permit the programme of variety trial work is being maintained, the main project for the ensuing year being the comparison of new crossbred wheats with Solid-straw Tuscan.

(2) Oats.

Manuring.—One trial to determine the effect of fertilizers on the yield of chaff was conducted at the Gore Experimental Farm.

(3) Barley.

Manuring.—One experiment was conducted in Canterbury: 1 cwt. of superphosphate increased the yield by 2·4 bushels per acre. Muriate of potash again depressed the yield. Nitrate of soda gave a slight increase, but this was not significant.

Malting tests of grain from the different treatments are being carried out by Mr. C. H. Hewlett of the Canterbury Seed Co.