Seasonal determinations of iron and manganese have also been made on a typical Moutere Hills pasture at Pigeon Valley where xanthin calculi formation has occurred in the past. A seasonal average for an untreated pasture was found to be 0·009 per cent. Fe on the dry basis, and treatment with lime and super on an adjoining field made no difference to the iron figures which were determined.

A considerable number of samples of individual species of legumes and grasses collected from different pastures has been analysed, with the following results:—

Species.	Number of Samples.	Average Iron.	Average Manganese.
		Per Cent.	Per Cent.
White clover	6	0·012	0·008
Red clover	6	0·009	0·011
Alsike	3	0·009	0·014
Lotus major	3	0·009	0·009
Lucerne..	4	0·014	0·006
Perennial rye-grass	4	0·017	0·009
Cocksfoot	3	0·010	0·025
Yorkshire fog	4	0·009	0·025
Wheat	4	0·010	0·006
Oats	1	0·009	0·007

Results on dry basis.

It is noteworthy that the figures obtained in the above determinations of iron over a range of pasture plants show in every case comparatively low figures for iron, despite the fact that the samples have been obtained from a variety of soils, all of which are free from bush sickness. White clover and perennial rye appear to have a somewhat higher iron content than other pasture species, confirming earlier observations of the Institute on this point. The low figures for iron which have been obtained in this investigation again suggest that the percentage of iron elaborated by pasture plants on different soils does not vary greatly, and indicate the operation of other factors in the incidence of bush sickness. Some observations have been made concerning the effect of maturity of pasture growth on its iron content. The determinations which have been made show that growth cut at the ensilage stage has a slightly lower iron content than that of young leaf growth, and when the hay stage is reached a further considerable drop in the iron percentage occurs.

Effect of Fertilizers on Pasture Production.

Two trials mentioned in previous reports have been continued concerning the effect of fertilizer treatment on (*a*) an old-established pasture which had greatly deteriorated at the commencement of the experiment, and on (*b*) a new-sown pasture containing pedigree lines of cocksfoot and white clover.

In connection with the trials on the old-established pasture using the alternate mowing and grazing method as recommended by Mr. A. W. Hudson, pasture production has slightly exceeded that on the more recently established pasture under similar manurial treatment. Although white clover and a certain proportion of perennial rye is now making free growth on the treated areas of this old-established pasture, nevertheless agrostis species and other so-called inferior grasses are very prominent. The result of this experiment suggests that care should be taken, particularly at the present time, in ploughing up old pastures which by suitable manurial treatment can be so improved in pasture production. In one series of experiments the effect of superphosphate in small, as against large applications has been studied. The results show that under Nelson conditions the use of 1½ cwt. of superphosphate per acre gave on the soil in question, the remarkable increase of 1,200 lb. of dry matter per acre per annum. By increasing the application of super to 3 cwt. per acre an additional increase of approximately 300 lb. of dry matter was obtained. The soil in question is one which is known to be deficient in phosphate, and it is a matter of great interest that the use of 1½ cwt. of super per acre should result in such a large increase and that the effect of still further increasing the application of super should be relatively small.

Another point which is being studied is the effect of dividing the super application in two equal instalments applied in July and December. In the Waikato this procedure has been frequently recommended, and apparently has given satisfactory results. Under Nelson conditions little benefit has been obtained by the application of super in two instalments as compared with the use of the same total quantity in one application during July. Ammonium sulphate has continued to exert a marked influence on pasture growth during the early spring period when applied towards the end of July. An increase of 200 lb. of dry matter per acre has been obtained by the use of 1½ cwt. of ammonium sulphate, but it has been found that after the first season a slumping of production occurs in the mid-summer period, resulting in a slight reduction in total pasture production for the whole season when compared with that of plots treated solely with superphosphate.

The use of potash in these trials has not shown to advantage, and the improvement in yield has not been statistically significant.

Ammonium sulphate used at the rate of 1½ cwt. per acre with superphosphate in the case of the recently established pasture has given a marked increase over the control plots without fertilizers, but the yield so obtained is slightly inferior to that resulting from the application of 1½ cwt. of superphosphate, and the tendency is for rapid falling-off in production with the continued use of the ammonium-sulphate treatment.