

lime-super mixture has effected a striking improvement on the clover and cocksfoot content of pastures, particularly on the sloping ground. The paddock top-dressed has been used as a hospital paddock, and has carried cull sheep very well. The experience of these farmers who have written letters appreciative of the value of the 5-2 lime-super mixture indicates that it is proving efficacious for dealing with the deficiency problems at Mairoa.

Although calcium is undoubtedly the element the deficiency of which is responsible for the Mairoa malnutrition in sheep, it would appear that the amount of lime needed, where it is used alone, may be too large to be practicable in general sheep-farming. Where a small quantity of phosphate is mixed with the lime it will probably stimulate the root action of pasture plants and enable them to range over a greater area and so absorb more calcium. That a mixture which contains such a preponderating amount of calcium as 12 parts calcium to 1 part phosphorus, as in the 5 cwt. lime to 2 cwt. super mixture, is found to give excellent results in combating the malnutrition is evidence of the importance of the addition of phosphate.

On carefully reading Mr. Wright's report it will be readily seen that neither phosphate by itself nor lime by itself will give the optimum results on Mairoa pastures.

When phosphates are liberally applied, and on a portion of the top-dressed land lime is also applied, the stock will generally be found grazing on the limed area. On the other hand, when the area is limed and a portion of the limed area top-dressed with phosphates, stock will forsake the portion which has been limed only in favour of that both phosphated and limed.

Wairarapa Phosphate Deficiency.

Work on this area has been continued during the year, and the results already obtained have been confirmed, that the poorer pastures of this district are among the lowest in phosphorus content that have been encountered in the course of this research, a fact especially notorious when it is considered that they are cow-pastures. The farming public and the agricultural officials in that district have been warned that the deficiency is serious. The content of manganese is in some pastures unusually high, approaching 0.1 per cent Mn_3O_4 on the dried sample. Pastures which have been top-dressed with superphosphate compared with the non-phosphated land on the same farm show great superiority in phosphorus content.

Thus at Mauriceville the pasture on non-phosphated areas averaged 0.43 per cent. phosphoric acid, and on the phosphated fields it was 0.62 per cent. phosphoric acid. At Hamua it was 0.48 per cent. phosphoric acid, as against 0.61 per cent. phosphoric acid. At Hukanui the non-phosphated land gave pasture which varied from 0.2 per cent. to 0.48 per cent. phosphoric acid, as against 0.7 per cent. phosphoric acid for the phosphated land. At Masterton the non-phosphated pasture yielded 0.38 per cent. phosphoric acid, and the phosphated land 0.62 per cent. phosphoric acid.

As bearing on the incidence of disease and low phosphate content of the pastures, it will be noted that at Te Parae, Masterton, there was as little as 0.27 per cent. of phosphoric acid in the non-phosphated pasture, and that "sleepy" sickness in ewes occurs here.

The non-phosphated pastures on a farm at Hukanui where "Waihi disease" occurs in cows had only 0.2 per cent. of phosphoric acid.

It will be noted that the amount of calcium of these pastures was much higher in every case than that of the phosphoric acid; and there is apparently no great deficiency of this element in the pastures that one may complain of as having any adverse influence in the health of stock. This is as one would expect from the high clover content of most of the pasture.

Hamua.

Six soil-samples from this district show distinctly the low content of phosphoric acid, except where phosphate applications have recently formed part of farm practice.

Samples of soils and pastures from the following localities in the Wairarapa district have been analysed: Hukanui, Eketahuna, Kaituna, Dalefield, Greytown, Belvedere, Featherston, Masterton, Mangamahoe, and Mauriceville. Marked phosphate deficiency is common throughout these samples, and in some cases lime also is lacking. The botanical composition of the pastures also shows striking differences in so far as the clover content is concerned. Bone-malnutrition and temporary sterility of cows are associated with these deficiencies throughout the district.

Summary.

A review of the year's work shows that work has gone steadily forward in several directions, where the conditions are extremely diverse, the following practical results being achieved:—

In the "bush sickness" (iron deficiency) in sheep and cattle experiments the entrance of a new factor—the ingestion of a poisonous plant, ragwort (*Senecio jacobaea*) by the cattle—is likely to prove an interfering element in the work with cattle, rendering them unresponsive to the accepted curative treatment.

The successful use of the Rowett Institute method of pellet-feeding deficient minerals to bush-sick sheep is a distinct step forward into unknown territory—the treatment of a species which has hitherto not been possible to attempt with the accepted remedy for cattle. The method is practicable and comparatively inexpensive.

In regard to "dopiness" (calcium starvation) in sheep, the experiments have reached a stage in which the paramount importance of calcium in the treatment of pastures on which the disease develops is generally accepted by farmers and officials.

In the areas of the Wellington Provincial District the cattle-pasture of which showed it to be highly deficient in phosphorus the analysis of a further series of samples has confirmed the correctness of the former opinion, that certain areas are so deficient in phosphorus that stock are suffering. For dairying pastures the phosphorus content is the lowest yet met with in New Zealand, and advice to manure liberally with phosphates has been given.