

conducted on a farm in Pigeon Valley, where considerable loss from Xanthin calculi was being sustained.

The chemical studies, reported elsewhere, have shown that the Moutere Hills soil is extremely deficient in lime, phosphate, and organic matter. Where great deterioration of pasture has occurred the supply of available soil nitrogen is also low. The chemical analyses of the pastures reported in Bulletin 19, Department of Scientific and Industrial Research, have shown that serious deficiencies of lime, phosphate, nitrogen, and soluble ash occur in untreated natural pasture. These deficiencies are acute in mid-summer and early autumn growth. It is very probable that the feed available for stock during the winter—consisting as it does of mature growth—is of even lower feeding-value. Analyses of a Moutere pasture resown with English grasses and clovers, after preliminary treatment of the land with lime and phosphate, have shown that its composition compares favourably with good pastures in the Waimea County. On this pasture no difficulty has been experienced in maintaining stock in good condition.

FIELD EXPERIMENTS.

With a view to determining the nature of the factors operating in the production of stock-ailment on the Moutere pastures, and with the object of finding some practical remedy for the trouble, field experiments have been conducted on two farms in Pigeon Valley. One farm called "A" in this report was very impoverished, and many deaths of sheep have occurred through calculus formation. The other farm called "B" was not so poor, and no serious loss of stock has been experienced by the owner. Small Xanthin calculi have, however, frequently been found in the kidneys of sheep on this farm. In connection with the field experiments on farm A, a large block of typical hill land has been subdivided into fields varying in size from 5 to 10 acres. These fields have been top-dressed with lime, phosphate, lime and phosphate respectively. Other fields are being utilized to test the value of bone-meal "licks" for sheep on these poor pastures. In every case the fields have been stocked with a uniform line of sheep which have been weighed at frequent intervals. On farm B the value of basic slag for pasture-treatment has been tested. Sheep have grazed treated and untreated blocks on this farm, and weights of the sheep grazing thereon have been recorded at frequent intervals since the inception of the experiments.

The sheep-weights from the experiments on the two farms, and other records which have been obtained on better pastures stocked with the same line of sheep, have revealed important differences in the feeding-value of the pastures. In the case of farm A which is undoubtedly the poorest for stock, live-weight increase in young stock, whether lambs or hoggets, is restricted largely to the spring and early summer periods. In mid-summer and early autumn stock maintain their weight with difficulty, frequently losing condition if droughty weather is experienced. A slight gain in weight generally accompanies grazing during April and May if good rains are experienced in the early autumn.

In winter difficulty is again experienced in maintaining condition of any class of sheep. Ewes, in particular, suffer during the winter period, and frequently sheep drop 7 lb. to 10 lb. in weight.

In case of Farm B somewhat better conditions obtain. Hoggets and lambs increase rapidly in weight during the spring period and continue to do so during the greater part of the summer. Sheep tend to lose weight in the late summer and winter periods, but, owing to more robust development, the sheep are better able to withstand these adverse periods. The gains made by young stock on Moutere pastures, even on the better farms, are much below those made by the same class of stock when removed to top-dressed pastures containing a grass and clover mixture. The following sheep weights illustrate the differences which are characteristic of stock-condition on the different pastures which have been mentioned.

1. *Lambs on Top-dressed Subterranean-clover Mixture.*—Average live weights on 12th October, 1929, 25 lb.; 24th December, 1929, 68.5 lb.; 4th April, 1930, 86.5 lb.

2. *Same Class of Lambs on Farm A (Moutere Pasture).*—Average live weights on 2nd October, 1929, 18.6 lb.; 12th December, 1929, 49.3 lb.; 14th March, 1930, 53.4 lb.; 4th April, 1930, 48.1 lb.; 22nd May, 1930, 50.9 lb.

3. *Ewe Hoggets on Farm A (Moutere Pasture).*—Average live weights on 18th September, 1928, 53.5 lb.; 24th December, 1928, 72 lb.; 12th April, 1929, 75.5 lb.; 24th September, 1929, 66.5 lb.*; 4th April, 1930, 74.3 lb.

4. *Ewe Hoggets on Farm B (Moutere Pasture).*—Average live weights on 11th September, 1928, 57.6 lb.; 24th January, 1929, 86.5 lb.; 19th April, 1929, 83.9 lb.; 16th October, 1929, 73.3 lb.*; 14th March, 1930, 83.1 lb.

In connection with the field experiments which are being conducted on farms A and B considerable information is now available concerning the value of both lime and phosphate treatment of the land in improving the pasture and in securing better returns from stock. Owing to the great deterioration which has taken place in the pastures on farm A, the maximum effect of top-dressing treatment is not likely to be realized for several years. The following notes show, however, that considerable improvement has already been effected.

Farm A (Poor Moutere Pasture).—Block (1) treated with 18 cwt. ground limestone and 4 cwt. basic slag per acre: On this area a very great improvement in flora of the pasture has been effected—white clover and trefoil becoming prominent within six months of treatment. A block of 10 acres carried eighteen hoggets during the summer and autumn. During the winter fifteen ewes (rising two-tooths) were wintered. No deaths in ewes occurred. Ten lambs were born, of which six survived. Five ewes failed to get into lamb. At the conclusion of the winter period one ewe showed symptoms of kidney trouble. Feed was very scarce during the late winter and ewes dropped greatly in condition. If supplementary feed had been available a much higher lambing percentage would have been obtained.

Block (2)—Untreated 10-acre block: This block was stocked with six hoggets during the summer. Eight hoggets, including five ewes (rising two-tooths) were wintered. The sheep did very poorly. Two

* After lambing.