

(b) *Occurrence of Xanthin Calculi in Sheep*.—During the course of our investigations numerous instances of calculi in the kidneys of sheep grazing on the Moutere Hills type of soil were brought to our notice. The calculi were not confined to sheep on any one property, but cases from several parts of the district within the limits of the extensive area of Moutere Hills country were observed. On one farm alone as many as twelve sheep which had died or had been killed for post-mortem examination during a period of six months were found to have greatly enlarged kidneys, containing a large quantity of stones, gravel, and powder. On examination, the stones proved in every case to be xanthin—a very rare form of urinary calculus.

The occurrence of xanthin calculi, although many inquiries have been made, has not been reported in sheep grazing on other soil pasture associations in the Waimea County. The fact that the Moutere Hills soil is of very low fertility, and that various stock ailments are common among sheep and cattle grazing the poor pastures on this soil-type, suggest that xanthin-calculus formation may be caused by deficiencies in the Moutere Hills pastures.

Chemical analysis of the Moutere Hills soil has shown that it is highly deficient in nitrogen, lime, and phosphate. Field experiments with many crops have already shown the great importance of both lime and phosphate in securing optimum crop-production.

The pastures on the Moutere Hills soil have greatly deteriorated on many farms. The English grasses and clovers have long ago disappeared, being replaced by *Danthonia*, sweet vernal, and *Agrostis* sp.

Analyses of pasture-samples collected from farms where calculus-formation frequently occurs show that great deficiencies of mineral constituents and protein occur in the pastures. This is well illustrated by reference to Table 4, comparing analyses of Moutere Hills pastures with the average for good Nelson pastures.

Table 4.—Analysis of Moutere Hills Pastures.

			Moutere Hills, Autumn Growth (Average of Five Samples).	Moutere Hills, Spring Growth.*	Good Nelson Pastures, Autumn Growth (Average).
CaO	..	..	0.61	0.49	0.80
P ₂ O ₅	..	..	0.63	0.56	1.06
K ₂ O	..	..	3.19	1.64	3.81
Na ₂ O	..	..	0.12	0.31	0.49
Cl	..	..	1.07	0.42	1.45
N ..	..	..	3.43	2.01	5.23
S ..	..	..	0.33	0.22	0.42
Fe ..	..	..	0.011	0.03	0.026
Mn..	..	..	0.052	0.016	0.019
Total ash	..	..	11.67	10.40	11.51
Soluble ash	..	..	6.15	3.81	9.02
Insoluble ash	..	..	5.52	6.59	2.49

All determinations expressed as percentages of dry matter.

The outstanding features of the analytical data are the low content of (1) nitrogen, (2) soluble ash, (3) lime, and (4) phosphate in all samples from the Moutere Hills. Despite the fact that samples of pasture were collected at the same stage of growth-development in both cases, the percentages of lime and phosphate in the spring samples from the Moutere Hills are little more than 50 per cent. of those in the good Nelson pastures. In the case of nitrogen the percentage in the Moutere Hills pastures falls as low as 38 per cent. of that in the good pastures.

The analyses of Moutere Hills soil and pasture suggest that a lack of minerals is responsible for the poor results frequently obtained by farmers with stock on extensive areas of this country. Confirmation of this is afforded by the fact that on a number of farms bone-meal "lick" is taken eagerly by stock, with beneficial results. There is, however, not sufficient information available to explain the occurrence of xanthin calculi in sheep on this country. The whole matter is now being carefully investigated with a view to determining what factors operate in calculus-formation and how the difficulty can be overcome.

(c) *Other Abnormal Pastures in the Waimea County*.—Certain pastures located on fine sandy soils in the Motueka Valley give very poor growth, and even with light stocking are not able to maintain stock in a healthy condition. The soils are derived mainly from the detritus of serpentine and peridotite rocks in the watershed of the Motueka River. Analyses of pasture-samples show that they have a very low percentage (0.23) of lime. The percentages of magnesia and silica are considerably higher than those found in good pastures. It appears likely that the low percentage of lime in the pasture, combined, possibly, with a rather high percentage of magnesia, is responsible for the poor results with stock on these pastures.

Other pastures located on the Tahuna sands are associated with "pica" and poor stock results, unless top-dressing of pastures is undertaken. These pastures are deficient in lime and phosphate, the percentage of lime being particularly low.

* Collected from a farm where many calculi have been found.