

MINERAL CONTENTS OF PASTURES INVESTIGATION AT THE CAWTHRON INSTITUTE.—FIRST ANNUAL
REPORT FOR YEAR ENDED 31ST MARCH, 1929.

Introduction.

Early in April, 1928, a detailed scheme for the investigation of the mineral contents of Nelson pastures was submitted to the New Zealand Research Council's committee for pasture investigations. The scheme was approved by the Committee and active work was at once commenced at the Cawthron Institute. Dr. Askew was appointed analyst in charge of the chemical work. Mr. J. A. Bruce, of the Cawthron Institute, was delegated for special work as fields officer in connection with the investigation. Mr. L. Hodgson was appointed as cadet in the laboratory. The work undertaken at the Cawthron Institute in connection with the mineral contents of pastures investigation has included (1) a systematic examination of the mineral status of typical pastures in the Waimea County, Nelson; (2) detailed studies of both stock conditions and pastures in certain localities where serious mortality of stock has frequently occurred; (3) the value of bone-meal "licks" for stock on mineral-deficient pastures; and (4) the influence of season on the mineral contents of selected pastures manured in different ways.

The Waimea County possesses several features of unusual interest in connection with soil and pasture studies. The county has a highly diversified geology, embracing ultra-basic, basic, and acid igneous rocks, besides several older sedimentary and Pleistocene deposits. As might be inferred from the varied geology of the county, striking differences in soil characteristics are encountered. Some soils are exceedingly poor, and deficient in mineral plant-foods; others have earned a local reputation for their high-productive capacity and excellent qualities.

Serious losses in stock have been reported from different parts of the county, while large areas give unsatisfactory returns with stock.

Under these circumstances it was anticipated that a systematic study of the mineral contents of typical pastures in the county would give much valuable information concerning soil and pasture relationships. It was hoped that the chemical analyses of pastures associated with high stock mortality would reveal the causes of loss and of inferior results with stock.

Some results of the investigations concerning the Waimea pastures have been published in the *Journal of Agriculture*, May, 1929, in a paper entitled "Mineral Contents of some Typical Pastures in the Waimea County." Another paper bearing on a widespread occurrence of xanthin calculi in sheep is now in the press.

Some of the more important aspects of, and conclusions derived from, the investigations are set out below.

I. Influence of Soil-type on Pasture.

For the purpose of this study typical pastures located on six soil-types derived from different parent rocks were selected. As far as could be ascertained, no manurial treatment had been given the pastures since their establishment decades ago. The pastures showed great variation both in flora and in carrying-capacity. A similar variation in the percentages of mineral constituents was likewise found, indicating that the nature of the parent rock from which the soils have been derived exercises a profound influence on both quality of pasture and its mineral composition. The following table (Table 1) illustrates the great variation in the composition of typical pastures associated with four soil-types derived from different parent material.

Table 1.—Analyses of General Pasture-samples from Hill-soil Types of Different Geological Origin.

Soil-type (Geological Origin).				Moutere Hills (Pleistocene Gravels).	Orinoco (Hornblende Gneiss).	Kaiteriteri (Granite).	Pikikiruna (Limestone).
CaO	..	..	..	0.61	0.82	0.56	0.98
P ₂ O ₅	..	..	..	0.63	0.94	0.64	0.95
K ₂ O	..	..	..	3.19	4.44	2.93	4.02
Na ₂ O	..	..	..	0.12	0.12	0.19	0.26
Cl	..	..	..	1.07	1.54	1.00	1.03
N	..	..	..	3.43	4.92	3.32	5.02
S	..	..	..	0.33	0.35	0.24	0.35
Fe	..	..	..	0.011	0.045	0.016	0.016
Mn	..	..	..	0.052	0.038	0.042	0.018
Total ash	..	..	..	11.67	12.07	10.63	11.11
Soluble ash	..	..	..	6.15	8.70	5.99	8.25
Insoluble ash	..	..	..	5.52	3.37	4.64	2.86

All determinations expressed as percentages of dry matter.

NOTE.—Pastures on the Orinoco and Pikikiruna soil maintain one and a half sheep per acre; those on the Moutere Hills and Kaiteriteri soils less than half a sheep per acre.

Although the pastures associated with soil-types possessing great variation in properties also vary greatly in their value for stock, the mineral composition of the pasture does not show as great a variation as might have been expected from a consideration of the analytical data obtained by the usual methods of soil-examination. A high deficiency of phosphate in the soil is invariably reflected in a low percentage of phosphate in the pasture. When the percentage of available phosphoric acid