

CHEMISTRY SECTION.

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MINERAL CONTENT OF PASTURES.

The investigation of the mineral content of pastures, under the Empire Marketing Board's scheme of research, as outlined in my last annual report, has occupied the greater part of the time of this Section during the past year. The work has necessitated the employment of several temporary analysts and assistants, and increased accommodation became essential. The transference of the soil work to the Fairlie Terrace Laboratory, and the fitting-up of an extra room in the Public Works Department's building, Sydney Street, has relieved the congestion in the main laboratory, and permitted the pasture work to proceed without undue delay. Special equipment for drying and grinding pasture-samples for analysis has been installed.

Dr. Orr, Director of the Rowett Research Institute, visited the Dominion in May, 1928, and was accompanied by me during his North Island tour. Various aspects of the pasture research work were discussed with Dr. Orr, and an exchange of workers between the Rowett Institute and this Laboratory was arranged. This has since been carried out.

A large number (331) of pasture-samples, in addition to soil and animal specimens, has been collected during the year from the various areas under investigation, and these have been analysed or are in process of analysis.

The principal areas at present being investigated in accordance with the scheme of research are as follows:—

Rotorua pumice lands: The investigation of iron starvation or "bush sickness" is still in progress. A grass-garden has been established on the Kaharoa coarse pumice soil for the purpose of studying the composition of the various grass species under known conditions. Experiments with pellets containing iron-ammonium citrate have been commenced with sheep, with encouraging results, while a lick containing spathic iron-ore, or siderite (ferrous carbonate), and salt has given excellent results with cattle. The experiments are being extended. The demand for iron-ammonium citrate by settlers in the affected areas continues, and the Department has been able to reduce the price of the crystals to 2s. 6d. per pound. Articles embodying the experiences of users of this remedy for iron starvation appeared in the *New Zealand Journal of Agriculture* for May and June, 1928.

Waitomo County: Two distinct types of malnutrition in sheep are in course of investigation. At Mairoa, near Te Kuiti, on a volcanic loam soil, exists an area of country on which sheep fail to thrive, and on which the usual remedy of phosphatic manuring alone has not cured the trouble. Analyses of the soils and pastures are in progress, and on the results so far obtained has been based a series of field experiments with sheep on pasture top-dressed with lime (both as carbonate and sulphate) and phosphate. Trials of the pellet method of administering mineral supplements to the natural ration are also being carried out. A preliminary article on the Mairoa soils and pastures appeared in the *Journal* for September, 1928. At Kopaki, south of Te Kuiti, on a pumice sandy silt, the occurrence of a malnutrition disease in sheep, resembling iron starvation, is under investigation, and a series of top dressing and pellet-feeding experiments is in progress. The use of pellets containing iron-ammonium citrate has given very encouraging results with sheep on this area. The experimental sheep are weighed at monthly intervals, to determine the exact influence of the treatment as shown by the live weights.

Wairarapa: In the upper Wairarapa district inquiries into the existence of several deficiency diseases in stock, and the collection of samples for analysis, resulted in the discovery that the soils and pastures on certain areas were deficient to a previously unsuspected degree in phosphoric acid, some of the pastures containing less phosphate than any New Zealand samples previously examined. A low nitrogen content was also an indication of poor nutritive value of the pasture. The investigation is being continued, and an interim report, embodying suggestions for top-dressing, was published in the *Journal* for October, 1928.

Canterbury: Inquiry was made into a considerable mortality in lambs and hoggets in various parts of the Canterbury Plains. It was found that mortality was greatest in sheep brought down from the higher country for the winter, and that due to an abnormally warm wet season, there had been a rank autumn growth of grass, which was dry and innutritious when the sheep were put on to it. Analysis of the pasture showed that the dry growth was low in protein and mineral matter, and specially deficient in phosphorus and chlorine.

Other stock troubles attributable to malnutrition are being studied, including one in sheep on certain parts of the back country of Poverty Bay, and the occurrence of temporary sterility and eclampsia in dairy cows in relation to the protein content of the pasture (see *Journal*, February, 1929).

Reference has been made to the use of feeding pellets for correcting deficiencies in the diet of animals. Several varieties of pellets are being made, using a phosphorized pollard mixing-machine for the preparation. A full account of the methods of manufacture and use appeared in the *Journal* for January, 1929.

SOILS.

The soil investigational work of the Section has now been transferred to the laboratory at Fairlie Terrace, lately occupied by the biological sections of the Fields Division, and the building has been renovated and equipped for the chemical and physical examination of soils.

The reconnaissance soil survey of Rotorua County has been completed, and the subsoil maps are in hand for publication at an early date. Further samples have been collected in areas where only a few samples had previously been taken, and the survey will next be extended to the adjacent Taupo pumice lands.

In connection with the investigation of malnutrition in stock at Mairoa, Waitomo County, further samples of soil have been collected and are now being analysed. A preliminary report appeared in the *Journal* for September, 1928.