

CHEMISTRY SECTION.

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STAFF.

The Staff at Ruakura concerned with facial-eczema investigations has been strengthened by the stationing there of Dr. R. J. McIlroy on his return from post-graduate studies in England and by the appointment of additional assistants.

Mr. R. J. Lancaster has been stationed at Lincoln College to undertake part of the chemical work on Canterbury pastures in connection with lamb-mortality research.

Towards the end of the year it was decided to transfer the majority of the Chemistry Section staff to the Animal Research Division at Ruakura. Plans for the new laboratory buildings are being drafted.

In this, the final report of the Section, I desire to express my appreciation of the notable spirit of co-operation and enthusiasm shown by all members of the staff. Long hours have voluntarily been worked and holidays sacrificed to secure continuity and success in the heavy programme of chemical investigations undertaken.

ANIMAL HEALTH AND NUTRITION.

Cobalt Deficiency.—Over 550 pasture samples, 135 animal organs, and various soils, limonites, limestones, and cobaltized superphosphates have been analysed.

Pastures.—A number of pastures submitted for analysis in cases of suspected cobalt deficiency gave low cobalt figures and were diagnosed as cobalt deficient (below 0.08 p.p.m. cobalt in the spring and summer months). Further extension of the cobalt survey of North Island pastures has been made, and special attention has been devoted to seasonal variation in the cobalt content of pastures. Pasture cobalt tends to be at a minimum in late spring and early summer and at a maximum in winter or after prolonged drought.

Analyses of pastures from cobaltized superphosphate topdressing experiments have shown a high initial uptake of cobalt but later a rapid fall, especially during the period of flush growth. The experiments themselves, however, have been outstandingly successful, and further demonstrate the efficacy and practicability of this method of treatment for the cure and prevention of bush sickness.

Soils, &c.—Analyses of several New Zealand ultrabasic magnesian rocks gave figures from 67 to 115 p.p.m. cobalt. Some North Auckland lateritic soils associated with cobalt-deficient pastures show figures as high as 10 p.p.m. for total cobalt, but the cobalt present appears to be relatively insoluble, even in strong acid. Owing to the occurrence of cobalt deficiency in the Wairarapa on a paddock built up of a fine limestone wash, analyses of typical limestones were carried out. Some low figures were obtained, the amounts ranging from 0.2 to 5.1 p.p.m. cobalt.

Animal Organs.—The average cobalt content of the livers of bush-sick sheep is about 0.04 p.p.m. cobalt or less, but for healthy animals more than 0.10 p.p.m. For cattle beasts a similar difference has been observed. There is no evidence of copper deficiency associated with bush sickness in the North Island.

Facial Eczema.—During the extensive outbreak of facial eczema in the Waikato in April arrangements were made for collecting large samples of pasture from fields believed to be still active in causing the disease. Unfortunately, it proved very difficult in practice to secure samples fulfilling this condition. The best of the material secured was treated according to Rimington's method for the separation of icterogenin, which it was suspected might be the active factor causing liver derangement. The results showed that icterogenin was not present in amounts capable of detection by the method employed. Among the conclusions that may be drawn, those of importance to the chemist include (1) the pasture may have passed its active phase when collected; (2) an icterogenic substance, but not icterogenin itself or necessarily related chemically to that compound, may be present; (3) toxin may be formed after the pasture has been eaten by the animal.

Progress could not be anticipated unless pasture, rumen contents, or other material of ascertained icterogenic activity were available. As, however, a number of large-scale carefully controlled animal-stocking experiments were being instituted at Ruakura Farm and at Gore's farm, it was decided to follow up resultant changes in animal health (if any), changes in botanical composition, and changes in growth stage, growth rate, succulence, &c., with chemical analyses of the pastures at frequent intervals. The objects were generally to provide as complete data as possible to assist in the interpretation of the results of the animal experiments, and particularly, should facial eczema occur in any of the groups, to help in furnishing a clue as to the most promising avenue for further specific chemical work.

About sixteen paddocks have now been sampled regularly each fortnight for over six months, variations being made from time to time to fit in with changes in the stocking or pasture-management. At the close of the first season's work the whole of the data will be assembled and considered in relation to planning further experiments. The routine chemical determinations include dry matter, phosphate, lime, non-protein and total nitrogen, sugars, cellulose, lignin, chlorophyll, and carotene.

Containers and supplies of alcohol have been distributed to Veterinarians in districts where an outbreak of facial eczema seemed possible this autumn. Some large samples of suspected toxic grass preserved in alcohol have already been received from the Gisborne district and are being subjected to fractionation preparatory to feeding experiments at Wallaceville. Rumen and abomasum and intestinal contents of affected sheep have also been received for resolution into alcohol-soluble and alcohol-insoluble fractions for toxicity experiments by the Veterinary Laboratory.