

(d) Thyroid glands of sheep and lambs have been obtained from animals of known history, and analysed for iodine content, in order to determine the occurrence of iodine-deficient areas in New Zealand. In association with this, experiments have been continued with rabbits to ascertain which minerals affected iodine metabolism in such a way as to produce goitre. Results indicate that if the animal is not receiving sufficient iodine owing to its being on an iodine-deficiency diet, or owing to the presence of minerals exercising a depressing effect, the total amount of iodine in the thyroid glands tends to be depleted.

An experiment on cows indicated that the amount of iodine in the blood was dependent upon the amount fed by way of licks, and upon the time which elapsed between dosing and sampling. The blood content of the iodine showed a very sudden rise to the maximum, with a more gradual fall subsequently to normal.

## II. FOURTH ANNUAL REPORT, CAWTHRON INSTITUTE.

Mr. T. Rigg, Director of Research.

During the period under review the work has embraced the following principal investigations: (1) Bush sickness; (2) influence of fertilizers on the yield and chemical composition of typical Nelson dairying-pastures; (3) the relationships between soil-fertility and the chemical composition of pastures. The more important features arising out of these investigations are summarized below.

### I. BUSH SICKNESS.

Investigations at Glenhope, Waimea County, Nelson, have shown that a stock ailment, particularly associated with sheep-farming on certain granite soils in the Sherry and Hope Valleys, has all the symptoms of typical bush sickness described by Aston in connection with certain volcanic soils of the North Island. The investigations have shown that the chemical characteristics of three soil-types in the Glenhope locality—two of which are healthy and one unhealthy for stock—present no outstanding differences other than a low iron content in the unhealthy soil. The iron soluble in dilute oxalic acid is much lower in the unhealthy soil than in the others.

Analyses of pasture-samples collected from three types in the Glenhope locality did not show lower iron figures for the unhealthy pasture than was the case with the Moutere Hills pasture, which is not associated with bush sickness.

The chemical examination of a wide range of soil-samples collected from the volcanic districts of the North Island revealed a somewhat similar result. Two soil-types, named Kaharoa and Taupo, which are associated with bush sickness were found to contain a lower content of total iron than was the case with healthy volcanic soils. When extraction of the soils was made with 5 per cent. oxalic acid the amounts of iron found in the unhealthy soils were very much lower than proved to be the case with soils known to be healthy. The low "available" iron content of all the soils known to be affected with bush sickness supports an hypothesis that this ailment is caused by a deficiency of iron. The occurrence or non-occurrence of bush sickness on pastures which, like those of the Glenhope pastures, contain similar amounts of iron in plant-tissue appears to be dependent on the amount of and of the quality of the soil eaten by stock when grazing pasture.

The greater the facilities presented for soil-contamination of pasture and the higher the content of available iron in the soil, the greater should be the freedom of stock from bush sickness or similar ailments. Data have been presented showing that in the case of pastures located on (a) the unhealthy granite soil of Glenhope and on (b) the healthy Moutere Hills soils an amount of soil-contamination of pasture as low as 0.4 per cent. of the green material eaten by stock would make a great difference in the iron intake of stock.

Experiments conducted by Gilruth and Aston in New Zealand and by Orr in East Africa give considerable support to the hypothesis that soil iron is a very important factor in determining the incidence of bush sickness.

## II. INFLUENCE OF SEASON AND FERTILIZERS ON THE YIELD AND CHEMICAL COMPOSITION OF TYPICAL NELSON DAIRYING-PASTURES.

Careful studies have been made of the effect of both season and fertilizers on the yield and chemical composition of two typical Nelson pastures.

One important aspect of these investigations is the influence of season and fertilizers on the percentage of dry matter contained in mixed pasture. Determinations made over a large number of samples taken throughout the year showed that the dry-matter content of pasture was very high during periods of drought, and also in the winter, when growth was very slow. Low figures for dry-matter content were found in the spring and early summer periods when optimum growth was being made. The seasonal average for dry-matter content taken over a series of sixteen plots representing eight different manurial treatments was 21.35 per cent. The lowest average percentage of dry matter was 16.7, and the highest was 33.6.

The percentage of dry matter in the mown pasture was but little affected by the manurial treatment of the plots. A small depression in the percentage of dry matter occurred on those plots which were treated with ammonium sulphate.

The type of flora and the nature of the sward did not materially affect the percentage of dry matter when pastures at the same growth stage were compared.