

*Soil-analyses.*

In the examination of the country in the Rotorua district the greatest value has been found from a consideration of the mechanical analysis of the soil. It was found possible to classify the country more easily on the basis of soil-texture rather than on either geological or chemical considerations, and the texture which can be expressed arithmetically will be the guiding principle in determining different classes of soil with regard to its incidence to this disease. Whether this will be found equally useful with malnutrition diseases other than bush sickness remains to be determined.

The examination of soils in the Laboratory has been continued under the supervision of Mr. F. J. Brogan, M.Sc., who has for some years specialized in this class of work.

*Importance of Sampling.*

In the first report for the quarter ending 30th June, 1928, to the Department of Scientific and Industrial Research, and in the annual report for 1929, page 22, on the result of the scheme of research under the Empire Marketing Board's grant, the importance of the work of sampling in the field the pastures to be analysed, and the necessity that this work should be supervised by a skilled assistant, was fully stressed. That the difficulty of obtaining an accurate sample of what the animal is eating is very great in the case of sheep was recognized early in this investigation.

It is doubtful whether a system of mown plots in which all stalky matter is eliminated, and certain species (*e.g.*, the high-lime-containing white clover) are encouraged, while others of lesser lime content are discouraged, although yielding interesting results, will provide representative samples. Artificial conditions are thus introduced and an artificial sample is gathered, and it is hardly possible that such a sample will represent the average herbage that is eaten by sheep on the average hilly sheep-run. Many samples of different types of herbage, either dead or living at the time of plucking, have been separately analysed, and analyses have shown a great disparity in the phosphoric-acid content of the dead compared with that of the living leaves.

In times of scarcity the sheep will eat the dead leaves, but in times of plenty will largely reject them in favour of the closely cropped sward. Sheep, moreover, undoubtedly balance their pasture diet by browsing certain leguminous shrubs, such as gorse and broom, and other plants of shrubby growth. The best method of sampling, therefore, is that recommended by Godden, of the Rowett Institute—*viz.*, plucking the pasture showing signs of having been bitten by the sheep, and thus probably representing, when a large sample (2 lb. green matter) is collected over a large area, the material eaten at that particular time.

It is obvious that without experiments on animals in the field results of mere analyses are unconvincing. During the year, therefore, an endeavour has been made to push the animal experimental side of the investigation. Experiments with various licks, pellets, and other substances have been instituted with both sheep and cattle. Continued great and undoubted success has attended the use of the double citrate of iron and ammonium, so that the complete control of bush sickness in cattle at an early date may be confidently anticipated. The effective use of this compound with cattle has been recognized for several years by the Department of Agriculture and the settlers, but the idea of giving an additional food element is a novel practice and takes years to establish. A pleasing development of recent growth is the endeavour to use the remedy found so successful with cattle to accomplish the continuous grazing of sheep on bush-sick lands. An experiment at Mamaku Farm with a small flock of wethers was entirely successful in bringing the sheep back to health when they had started to become bush sick on unimproved paddocks heavily top-dressed with phosphates, and they were kept in good health for a year subsequently by the use of pellets containing iron. Finally the wethers were sold fat. The difficulties in connection with the automatic administration of the extra food iron to sheep are, the writer is convinced, not insuperable, although difficulties have been encountered in the past year, and losses sustained. Such are unavoidable in any original work where it is sought to impose an entirely new treatment of stock on the farmer.

In connection with this phase of the use of iron remedies, a recent report received states that "it is interesting to note that the five lambs and six ewes mentioned as having survived the hardships necessary to induce them to take the pellets are now in splendid condition and doing exceedingly well. These lambs are the first ever reared to the hogget stage on this farm. The future prospects of rearing one's own lambs to the breeding-ewe stage—which, incidentally, is the ideal aimed at in these experiments—is indeed bright, judging from the results of these few sheep under trial only three brief months."

*Te Kuiti District.*

The work in this area consisted chiefly of animal experiments in the field. These experiments were under the control of Mr. C. M. Wright, Country Analyst. In January Mr. Wright was transferred to the Native Department, and this rather upset the continuity of the field-work, as the results of a number of field experiments laid down and controlled entirely by him had yet to be adequately reported upon.

The laboratory-work in this district has consisted largely in the analysis of soils and some pastures. During the last few months the taking of samples from Mairoa, which offered, for various reasons, difficulty to the samplers, has been improved greatly. Regular and good samples have now been received, and are being as quickly analysed as circumstances permit.