The chemical examination of soils, pastures, and animal organs has shown that Glenhope sheep ailment is caused solely by a deficiency of cobalt, the analyses negativing any suggestion of a dual deficiency of copper and cobalt or of iron and cobalt.

In the Sherry Valley cobaltized licks have enabled breeding-ewes to be maintained with success on pastures which in previous years have been affected with ailment. Over a period of two seasons lambing percentages have been excellent, and the lambs have made very satisfactory live-weight gains.

At Westport very good results have been obtained by the use of cobalt drenches and cobalt licks. Calves affected with bush sickness have been completely cured and restored to normal live-weights by the use of a cobalt drench supplying 40 mg. cobalt (Co) weekly.

All classes of stock grazing the established pastures on the pakihi development have eaten greedily a lick containing equal parts of steamed bone-meal, dairy salt, and Nelson soil plus 16 oz. cobalt chloride per ton of lick. Since the provision of this lick the stock have done extremely well and no case of ailment has developed. During a recorded period of twenty-six weeks, 127 one-year-old steers ate 2,912 lb. of lick. This averages out at the rate of nearly 1 lb. of lick per head per week, giving a weekly cobalt supplement of 50 mg. (Co).

At Morton Mains, Southland, climatic conditions in both the 1937–38 and the 1938–39 seasons were not favourable for the development of typical lamb ailment. The 1937–38 season was unusually dry, resulting in a shortage of feed on the experimental plots. Mainly on this account the live-weights of the lambs at the end of the experimental period were considerably lower than those attained in the previous season. The lambs, however, even on the control plots, remained free from ailment, and the average live-weights of the control lambs compared favourably with those on the cobalt-treated plots. The favourable effect of dry seasons in reducing the incidence of bush sickness has been noted in the early investigations of the Institute at Glenhope, but no satisfactory explanation is yet available of the part played by different factors in producing this result.

Although no sickness developed in any of the experimental lambs in the 1937–38 season, determinations of cobalt in the livers of the experimental lambs showed a pronounced effect from the cobalt top-dressings. In the case of lambs grazing plots top-dressed with ½ lb. to 2 lb. of cobalt sulphate per acre the corresponding livers showed cobalt contents of 0·25 p.p.m. and 0·23 p.p.m. respectively. The livers from the control lambs, on the other hand, gave an average cobalt content of only 0·11 p.p.m.

During the present (1938–39) season the rainfall at Morton Mains was much higher, particularly in the spring and early summer, but there has not been the obvious flush of pasture growth which is usually associated with high incidence of lamb ailment. Up to the present no case of ailment has developed and the lambs on the experimental plots are showing satisfactory live-weight increases. However, the cobalt content of the untreated pasture plots in February was only 0·04 p.p.m., which in other districts has been definitely associated with sheep ailment. The reasons for the non-appearance of lamb ailment under these circumstances are not known, but it is probable that under Morton Mains conditions several factors operate in determining the incidence of ailment. It is possible that in the present season the lambs included in the experiment possessed a greater reserve of cobalt, which, so far, has enabled them to make normal growth.

An interesting feature of the cobalt determinations made on pasture samples from the experimental plots has been the marked increase in cobalt content associated with the use of ground limestone at the rate of 3 tons per acre. This result was contrary to expectation and appears to be due to the fact that the ground limestone was a carrier of cobalt to the extent of 5 p.p.m. A survey of ground limestones in Southland is now being made with a view to ascertaining their effect in increasing the cobalt content of Southland pastures.

General.

During the past year the following papers relating to cobalt investigations at the Institute have been published :—

" Cobaltized Superphosphate," by H. O. Askew, T. Rigg, and D. J. Stanton. *N.Z. Jour. Sci. & Tech., 20*, No. 2A.

" Effect of pH Value on Solubility of Cobalt Phosphate," by H. O. Askew. *N.Z. Jour. Sci. & Tech. 20*, No. 2A.

" Cobalt Deficiency at Glenhope, Nelson," by H. O. Askew. *N.Z. Jour. Sci. & Tech., 20*, No. 5A.

" The Value of Cobalt Supplements for Breeding-ewes at Sherry River, Nelson," by H. O. Askew. *N.Z. Jour. Sci. & Tech., 20*, No. 3A.

" Successful Use of Cobalt Salts for Pasture Top-dressing in the Treatment of Stock Ailment at Glenhope, Nelson," by H. O. Askew. *N.Z. Jour. Sci. & Tech., 20*, No. 5A.

" The Effect of Cobalt Compounds on the Cobalt Content of Supplementary Fodder Crops," by E. B. Kidson and P. W. Maunsell. (In the press.)

In conclusion, mention must be made of the very valuable assistance rendered by all officers associated with the conduct of the cobalt investigations in the South Island. Dr. H. O. Askew has been in charge of all analytical work, and, in addition, has supervised the field-experimental work and pasture surveys in the Nelson district. He has been ably assisted by Misses E. B. Kidson, M.Sc., and P. W. Maunsell, M.Sc., and by Messrs. D. J. Stanton and D. G. Annear. Dr. J. K. Dixon has been in charge of the field programme at Morton Mains, Southland, and has supervised the conduct of the pasture surveys in Southland and in Ashburton County. The field programme has been greatly facilitated by the co-operation and efficient service rendered by Mr. T. Blackmore at Morton Mains, Mr. N. McConochie at Glenhope, and Mr. C. Lemon at Westport.

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