

Table III shows the live-weight increases for a selected number of the drench treatments.

TABLE III.—EFFECT OF COBALT AND OTHER DRENCHES ON LIVE-WEIGHT INCREASES, MORTON MAINS, SOUTHLAND.
(Average pounds increase per sheep.)

Date.	Control.	Cobalt.	Bluff Soil Suspension.	Bluff Soil Acid Extract (1).	Bluff Soil Acid Extract (2).
19th December, 1935	5.75	6.95	5.45	6.50	5.75
2nd January, 1936	9.75	16.35	12.30	13.50	12.35
16th January, 1936	14.80	22.40	17.35	19.10	18.40
30th January, 1936	15.85	26.00	21.70	21.65	20.20
13th February, 1936	16.25	27.40	21.90	22.65	22.90
27th February, 1936	16.50	29.50	24.70	24.70	27.45
13th March, 1936	17.05	30.55	25.35	27.30	27.95
26th March, 1936	19.15	35.95	29.15	33.10	34.15
9th April, 1936	19.65	37.00	29.55	34.20	34.65

Control = no drench.
Cobalt drench = two doses per week each of 4 mg. cobalt (Co).
Bluff soil suspension = two doses per week each of 100 c.c. soil suspension.
Bluff soil extract (1) = two doses per week each of 50 c.c. of a hydrochloric-acid extract of the soil.
Bluff soil extract (2) = two doses per week each of 50 c.c. of a hydrochloric-acid extract of Bluff soil, freed from iron and organic matter.

The increases in live-weights for the control group show that during the past season climatic conditions were not so favourable for the development of the ailment. The control sheep gained during the period of the test an average weight of 19.6 lb. per head. The cobalt group, on the other hand, gained 37 lb. per head during the same period. The Bluff soil suspension, and the two acid extracts of Bluff soil, while not giving such spectacular increases in the early part of the season as was the case with the cobalt drench, yet showed steady gains, and at the conclusion of the season were only slightly inferior to the lambs of the cobalt group. The results obtained with the acid extract of Bluff soil, from which iron and organic matter was removed, indicate clearly that iron is not the potent element in connection with the ailment at Morton Mains, Southland. The results from other drenches not tabulated in this report indicated clearly that as long as the acid extract contained cobalt successful results were obtained. Where cobalt was removed from the acid extract failure in effectiveness resulted.

Supplementary experiments later in the season conducted on lambs which were obviously affected with ailment showed likewise a rapid improvement in condition as soon as cobalt was supplied in drench form.

Analytical data in regard to the cobalt content of drench materials used at Morton Mains, both in the experiments of the past and previous seasons, confirm the association of comparatively high cobalt content with effectiveness of the drench materials in overcoming lamb ailment at Morton Mains.

It can therefore be said that the experiments of the past season at Morton Mains have demonstrated very definitely that minute doses of cobalt are completely effective, both as a preventive and a cure of lamb ailment.

DOSE OF COBALT FOR SOUTHLAND AILMENT.

One of the striking features of the drench experiments was the exceedingly small supplement of cobalt which has been required during the past season to overcome the incidence of the ailment. In the case of the Bluff soil extract the weekly dose was as low as 0.4 mg. cobalt (Co). A drench supplying as small a quantity as 0.29 mg. cobalt per week was effective in improving stock health, but drenches supplying less than this amount per week showed inferior results. Although no statement can be made concerning the optimum amount of cobalt which is required in an average season to overcome ailment, the data which have been obtained suggest that the amount required will not be less than 0.4 mg. cobalt per week.

COBALT SURVEY OF NEW ZEALAND SOILS.

The spectacular results obtained in the drench experiments at Glenhope and at Morton Mains suggested the desirability of a survey of cobalt in New Zealand soils, fertilizers, and drench materials, and this work has been put in hand.

In the case of drench materials the analytical data have shown that all substances which have proved effective at Glenhope and Morton Mains contain comparatively large amounts of cobalt. Materials which have not proved successful contain comparatively low amounts.

The survey of cobalt in New Zealand soils has not proceeded far enough for any definite statement to be made concerning the value of the analytical work in demarcating areas where cobalt supplements are required. Concentrated hydrochloric acid has been used for the extraction of soils. In this extract the amount of cobalt for bush-sick soils of the North Island has been found to be lower than two parts per million. In the case of the Glenhope soil the amount was 0.4 parts per million.

Certain areas of New Zealand are associated with comparatively high cobalt content of soils. In Taranaki soils amounts varying between 9 and 13 parts per million have been found. The clay soils at Hamilton likewise contain high amounts of cobalt, the figures varying from 12 to 22 parts per million.

Although the low cobalt content of bush-sick soils of the North Island indicates the desirability of testing the value of cobalt supplements, it must be stated that certain other soils which so far have been regarded as being free from bush sickness likewise have a low cobalt content. At the present time no statement concerning these anomalies can be made. It seems possible, however, that availability of cobalt in the soil may be an important factor, and that the use of more dilute acids for the extraction of cobalt may give a clearer picture of the cobalt status of New Zealand soils.