

area of last year. Hoggets were again used as experimental animals. The sheep were drafted into groups on 18th September, 1941. All did relatively well until the middle of January, after which the control group became almost stationary in weight at about 92 lb. per head. The 2 oz. and 4 oz. cobalt sulphate equivalent groups continued to increase in weight and at 21st March, 1942, averaged 104 lb. On the cobaltized superphosphate area the sheep have again done very well and now average 122 lb.

Throughout both seasons samples of pasture from the four areas have been regularly taken. Chemical examination has shown that in the 1940–41 season the high-cobalt limestone for a time slightly increased the cobalt content of the pasture, while the low-cobalt limestone actually caused a slight decrease in cobalt content. The use of cobaltized superphosphate greatly increased the cobalt content of the pasture for the two seasons after application. The 2 oz. and 4 oz. cobalt sulphate equivalent applications gave marked increases in cobalt content of the respective pastures for at least six months after application.

II. Cobalt in Milk.

A trial with cobaltized salt licks with dairy cows at Sherry River carried out several seasons ago did not indicate that any certain increase in milk yield followed the use of a cobaltized lick as against salt alone. Cobaltized salt lick was made available on 1st November, 1938, but no milk sample was taken until 8th March, 1939. The cobalt content on the dry basis at this date was 0.02 p.p.m. for milk from the cobalt-treated cows, compared with 0.01 p.p.m. for control cows. From this date the groups of cows were changed over—that is, the control group now became the cobalt-treated group. Further samples taken on 14th April gave 0.022 p.p.m. and 0.015 p.p.m. for milks from the cobalt-treated and control groups respectively.

III. Use of Cobaltized Fertilizers on Pasture.

(a) *Cobaltized Superphosphate.*—Samples of pasture have now been obtained for three seasons from plots at Sherry River which were treated on 10th August, 1939, with cobaltized superphosphate at rates varying from 2 oz. to 16 oz. cobalt sulphate equivalent per acre. In succeeding seasons superphosphate only was used. The 2 oz. and 4 oz. applications appeared to lose their effectiveness in raising the cobalt content of the pasture by the end of March, 1940. The long-continued sampling has, however, indicated that in the following spring these plots again showed an enhanced cobalt content in the pasture. A dressing of 4 oz. cobalt sulphate given in March, 1940, was effective into the winter, and in the following spring gave analytical figures very similar to the 4 oz. application made in the previous spring. With the 8 oz. application the effects in later seasons were no more marked than with the 4 oz. applications. With the 16 oz. application, however, a marked effect can still be seen two years after the dressing was given, the treated pasture giving two or three times the cobalt content of the untreated pasture.

(b) *Use of Different Cobalt Compounds with Lime as Carrier.*—In December, 1941, an experiment was set out at Sherry River to test the efficacy of the following cobalt salts as suppliers of cobalt: Cobalt sulphate, cobalt carbonate, cobalt hydroxide, and cobalt phosphate. The quantities employed, with ground limestone at 1 ton per acre, provided the equivalent of 5 oz. and 10 oz. cobalt sulphate per acre. Samples obtained to date show that a large increase in the cobalt content of the pasture followed the use of each cobalt compound and that in general the larger application has given a distinctly higher figure than the smaller application. At the end of February, two and a half months after application, the cobalt content of treated plots was about 0.08 p.p.m. and of the control area 0.03 p.p.m.

(c) *Serpentine-derived Soil for Pasture Top-dressing.*—The plots treated with a Nelson soil carrying about 350 p.p.m. of cobalt on 2nd February, 1940, at 5 cwt. and 10 cwt. per acre have been sampled regularly since then. For the first three months a large increase in the cobalt content of the treated pastures occurred, the effects being at least as good as those from a dressing of approximately 8 oz. cobalt sulphate per acre. Later on the cobalt content of the soil-treated areas has been consistently double or treble the content of the untreated area. This effect is still apparent two years after the application of the soil, and appears to be at least as persistent as the effect from 8 oz. cobalt sulphate.

B. MAGNESIUM INVESTIGATIONS.

I. Mowing Trial of Pasture Plots.

Further applications of fertilizer, except ground limestone, were made in early spring on the Sherry River plots. Very marked responses to potassium sulphate have again been noted, especially where magnesium compounds were used in the fertilizer mixture. The following data illustrate the increases in yield for the two seasons 1940–41 and 1941–42, the corresponding treated plot in the absence of potash being taken as 100 :—

Basic superphosphate	..	122	Magnesium carbonate* and basic	
Basic cobaltized superphosphate	131		superphosphate	 127
Serpentine-superphosphate	..	131	Magnesium sulphate* and basic	
			superphosphate	 144

II. Hay Trial.

On a hay-field at Sherry River applications of sulphate of ammonia and superphosphate with or without potash and magnesium were made. When potash was omitted the growth was relatively poor, but when potash was added there was a great encouragement of clovers, especially the red clover. Magnesium carbonate still further increased the growth of hay. While no symptoms that could be associated with magnesium deficiency were seen, very definite symptoms of potash deficiency were visible on clovers on the no-potash plots, especially on the lighter soil. It was on this section of the field where the most outstanding responses were obtained from the fertilizer applications.

* Supplying magnesia equivalent to that in the serpentine-superphosphate.