

in the soil rises above a certain level comparatively little variation in the phosphate content of the grass-samples have been found. The lime content of the pastures has shown but little relationship to the lime requirement of the soils as determined by laboratory methods.

II. Nelson Pastures giving Good Results with Stock.

A number of selected pastures on different soil-types have been analysed. These pastures in many cases have been treated with lime and phosphate or are located on soils known to be rich in mineral constituents. Farmers speak highly of them, and praise their milk-producing or fattening qualities.

In Table 2 the average chemical composition of eight good pastures in the Nelson District is compared with average data published by Godden* for English cultivated pastures.

Table 2.—Pastures giving Good Results with Stock.

				Nelson Pastures (Average of Eight Samples).	English Cultivated Pastures (Average—Godden).
CaO	..	..	..	0.83	1.00
P ₂ O ₅	..	..	..	1.06	0.74
K ₂ O	..	..	..	3.96	3.18
Na ₂ O	..	..	..	0.49	0.25
Cl	..	..	..	1.45	0.95
N	..	..	..	5.34	2.83
S	..	..	..	0.43	..
Fe	..	..	..	0.038	..
Mn	..	..	..	0.017	..
Total ash	..	..	..	11.69	9.79
Soluble ash	..	..	..	9.10	6.64
Insoluble ash	..	..	..	2.59	3.15

All determinations expressed as percentages of dry matter.

The analytical data presented in Table 2 show that Nelson pastures considered good by stockmen differ in many respects from the English cultivated pastures analysed by Godden. In the Nelson pastures the average phosphoric acid content is considerably higher than that of the lime, a reverse order to that found by Godden. The figures for potash, chlorine, nitrogen, total ash, and soluble ash are greater than Godden's average figures. The most striking result is the very high percentage of crude protein found in these New Zealand pastures. This far outstrips any of the available English figures, in one sample analysed the remarkably high figure of 36 per cent. was attained. The main constituents of the Nelson pastures have been perennial rye and white clover, a mixture considered to be ideal for pastures.

III. Pastures giving Poor or Indifferent Results with Stock.

A number of districts in the Waimea County are characterized by their poor results with stock. It is probable that a number of factors are operating as will be seen from a consideration of the data set out below.

(a) Suspected "Bush-sick" Pastures at Glenhope.—In the case of certain pastures located on granite soils in the vicinity of the Hope and Sherry Rivers serious losses in stock have occurred whenever the grazing has been restricted to particular areas. Owners of properties located on these soils state that symptoms of ill health are apparent within three weeks if sheep are grazed exclusively on affected pastures. Death of the animals frequently ensues within six to nine months from the commencement of grazing. The symptoms of affected sheep correspond closely to those noted by B. C. Aston in connection with the "bush sickness" of the Rotorua District.

Chemical analyses of pasture samples taken from affected areas reveal a great deficiency of iron. This is well illustrated by the data presented in Table 3, comparing analyses of healthy and affected pastures.

Table 3.—Analyses of Pasture-samples from Suspected Bush-sick Area, Glenhope.

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CaO	..	..	..	0.62	..	..
P ₂ O ₅	..	..	..	0.71	..	..
Fe	..	..	..	0.013	0.013	0.04
Mn	..	..	..	0.033	0.026	0.02

The percentage of iron in the pastures of adjoining country known to be healthy for stock is three times greater than that in the affected pastures.

The low percentage of iron and the lack of improvement affected by liming or top-dressing with phosphates supports strongly the theory of bush-sickness as enunciated by B. C. Aston† from observations in the Rotorua District.

* Jour. Agric. Sci., 1926, Vol. xvi, Pt. 1, p. 81.
† Jour. N.Z. Dept. Agric., Vol. 29, p. 87.