Another important aspect of the pasture studies has dealt with the effect of season and fertilizers on the chemical composition of pasture. Droughty soil conditions not only greatly reduced pasture-yield, but very adversely affected the content of soluble ash, nitrogen, potash, and phosphoric acid. The lime content, however, did not follow the curves for the other constituents. The highest percentage of lime occurred during the drought period, when the lowest percentages of the other constituents were found.

The effect of fertilizers in increasing the content of phosphoric acid or potash was clearly marked in the case of the plots receiving superphosphate and sulphate of potash respectively. One of the most striking fertilizer effects on chemical composition was the great reduction in lime content which accompanied the frequent use of ammonium sulphate. The widest difference in the lime percentages occurred during the drought period of March, when the following percentages were obtained on the different plots :—

Plot No.	Treatment.	Lime (CaO).
		Per Cent.
6B and D	Untreated	1·97
6	Five applications of ammonium sulphate at rate of 1 cwt. per acre ..	1·62
4 and 5	Complete manure plus five applications of ammonium sulphate at rate of 1 cwt. per acre	1·37
4 and 5	Complete manure with 2 cwt. of ammonium sulphate per acre ..	1·26

Another aspect of the detailed studies on the chemical composition of pastures is that connected with the effect of season and nitrogenous manures on the inorganic and organic sulphur contents of perennial rye, white clover, and mixed-pasture samples. The results of this investigation showed that the highest percentages of inorganic and organic sulphur were obtained in the spring and early summer when optimum moisture conditions prevailed. During periods of drought the sulphur figures fell to a much lower level.

The influence of ammonium sulphate was particularly marked on the inorganic-sulphur content of both rye and mixed pasture.

A relatively great increase in the inorganic-sulphur content occurred in these cases as a result of the treatment. The effect of ammonium sulphate on the organic-sulphur content of rye and mixed pasture was much less marked, the average figures for the season being approximately the same as those obtained on the control samples.

In the case of white clover, ammonium sulphate exerted only a small effect on either the inorganic or organic sulphur content. The average figures for organic sulphur were, however, consistently higher with ammonium sulphate than was the case with the control samples.

No close correlation was found in this investigation between protein content and that of organic sulphur.

III. Soil-fertility and Pasture Composition.

The investigations have shown that in a number of cases where marked deficiencies of lime and phosphate occurred in the pasture soil-analyses using the conventional methods adopted by agricultural chemists have brought out striking differences in the lime and phosphate status of soils, provided soil-sampling was done to a depth of 3 in., and not 9 in., which has been used hitherto in soil studies. Even in cases of less-marked deficiencies of lime and phosphate, provided sampling was done to a depth of 3 in., the soil-analyses generally revealed a much smaller content of these constituents than was the case with soil-samples from adjoining treated pastures.

General.

During the year under review the following papers have been published or have been prepared for publication.

Published—

No. 10 : "Influence of Fertilizer and Crop on the Plant-food Status of the Soil," by T. Rigg, H. O. Askew, and L. Bishop.

No. 11 : "Note on Effect of feeding Titanium Oxide to Sheep," by H. O. Askew.

No. 12 : "Occurrence of Bush Sickness at Glenhope," by H. O. Askew and T. Rigg.

No. 13 : "Occurrence of Bush Sickness on the Volcanic Soils of the North Island : Part II — The Mechanical and Chemical Characteristics of Bush-sick Soils," by T. Rigg, assisted by L. Hodgson.

No. 14 : "Soil Iron in Relation to the Incidence of Bush Sickness," by T. Rigg and H. O. Askew.

No. 15 : "The Importance of the Depth of Soil-sampling in Studies relating to the Mineral Content of Pastures," by H. O. Askew and T. Rigg, assisted by L. Bishop and O. Barton.

No. 16 : "The Effect of Season and Fertilizers on the Dry-matter Content of a Nelson Dairying-pasture," by T. Rigg and H. O. Askew, assisted by L. Bishop and L. Hodgson.

Prepared for publication—

No. 17 : "Influence of Season and Nitrogenous Fertilizers on the Inorganic and Organic Sulphur Contents of Perennial Rye, White Clover, and Mixed Pasture," by H. O. Askew and L. Bishop.