

Irrigation commenced on 8th January, 1947, and by 21st March 11 irrigations had been completed. Production is gauged by taking mower cuts in the plots, calculating the weight of dry matter per plot, and grazing off with a calculated number of sheep. Adjustments of sheep numbers are made to ensure uniform grazing, and then sheep hours per plot are used as the final indicator. Over the period 8th January, 1947, to 1st February, 1947, the  $\frac{1}{2}$  in. plots have shown three times the production of the unirrigated, and the 1 in. plots five times. A marked improvement of the pastures also occurred. Soil-moisture tests were taken each time the plots were grazed.

*Experiments on Peat Soil.*—In December "sighter" experiments, which included more than 300 plots and covered a wide range of fertilizer and chemical treatments, were commenced on a portion of the Rukuhia peat swamp. The outstanding result was the greenness and marked increase in growth on all plots receiving nitrogenous fertilizers applied either as ammonium nitrate, ammonium sulphate, or sodium nitrate. The responses to 1 cwt. and 5 cwt. of ammonium nitrate per acre had largely worn off after six weeks and four months respectively, whereas the plots receiving 20 cwt. were still conspicuously green after four months. The latter dressing had the effect of suppressing clovers and considerably stimulating the ryegrass in the sward, which was predominantly Yorkshire fog on untreated areas. Combinations of lime, serpentine-superphosphates, and muriate of potash when applied as cross-treatments considerably enhanced the response to nitrogen, but when applied without nitrogen these fertilizers have not had much effect in the short time the experiments have been laid down. There was some evidence that oxidizing agents—*e.g.*, potassium permanganate—when incorporated with the top few inches of peat before sowing improved the establishment of the new pasture. A number of treatments—for example, heavy liming to reduce the extreme acidity of the peat (which is pH 3.5 to 4.0 on untreated areas)—have so far not given noticeable responses. It is too soon to pass judgment on such treatments, which may give responses at a later stage.

*Studies with Nitrogen Fertilizers.*—A study of the nitrogen cycle in grassland soils, with particular reference to the use of nitrogenous fertilizers for increasing production of pasture during the winter, was commenced during the period under review. Applications of ammonium nitrate, ammonium sulphate, sodium nitrate, and dried blood were made in May to replicated pasture plots on Te Kowhai soils. The applications, which each contained the nitrogen equivalent to 1 cwt. of ammonium sulphate, were repeated in July and September.

The percentage nitrogen in the pasture on the untreated plots rose to a maximum of 5.92 in July and dropped to 3.91 in December. The figures for the treated plots were slightly higher for two to four weeks after each application of fertilizer. Fluctuations within the seasonal trend were inversely related to the height of the pasture. During May–August the percentage nitrogen in the pasture was extraordinarily high and was never less than 5 per cent. on any plot. The figure of 6.4 per cent. which was obtained from the ammonium sulphate plot in July was the highest average for the four replicated plots from any one treatment. This is probably the highest recorded figure for New Zealand pastures, which give, in general, higher figures than those overseas.

Soil analyses indicated that none of the ammonia or nitrate-nitrogen added in the fertilizers could be recovered from the soil later than two or three weeks after the application. There was no evidence of leaching, and the recovery of added nitrogen from the pasture in that period was less than