in the rumen of sheep was completed, but as certain limitations arose in the interpretation of the results further studies were made. A start was made on determining the metabolism of nitrate in the rumen of sheep, and methods of analysis are being perfected.

*Dairy Cattle.*—A small group of identical twins is being assembled for experimental purposes.

## SOIL FERTILITY INVESTIGATIONS

Mr. H. D. Orchiston

This was the first season in which cultivation treatments were applied. All rotation cultivation and fertilizer treatments were established, and the smooth operation of plot technique developed.

*Pastures.*—Both the good and the poor first-year pastures established well, and were about equally grazed. The differences between good and poor were most marked when suffering from drought: the good pastures showed superior red clover, greater grass potential, and less bare ground. The second-year pastures showed very little difference, except for a greater grass potential in the good pasture plots when suffering from drought.

*Spring Crops.*—Cross 7 wheat had an unsatisfactory season, through initial bird damage and a dry period of growth. Only straw weights were recorded, and these were less than a third for those of autumn wheat (with fertilizers). Partridge peas and Research barley plots gave yields appreciably higher than in the previous season.

*Autumn Wheat.*—Both with and without fertilizers the autumn wheat had uniform growth; bird damage was recorded and accounted for. Yields were good—60 bushels of grain and 5,000 lb. of straw per acre—despite a total of 12·4 in. of rain from sowing to harvesting, and almost twice this evaporation (free water surface).

*Results of Analysis.*—Replication I showed significantly lower green yields for spring wheat of the first-year crops (1 per cent. level) and for autumn wheat of the second-year and fourth-year crops (5 per cent. level) than Replication II. Rotations were significantly different (1 per cent. level) for the second-year crops, autumn wheat after peas being greater than after spring wheat. Significant differences (5 per cent. level) were obtained for barley in the third-year crops. Of the fertilizers, only lime gave a significantly higher yield than the control, but this may have been caused by replication differences. In no cases did cultivation treatments, or "a and b ½ blocks," give significant differences.

*Methodology for Soil Properties.*—A soil-sampling procedure was established. Both physical and chemical determinations were made to standardize the method and to determine the number of samples to be taken to make up a composite representative sample.

## ENTOMOLOGY

Mr. L. Morrison

*Hessian Fly.*—In the seasonal observations on the infestation of wheat and barley by Hessian fly, the numbers of barley samples obtained were far too few and from too restricted an area to supply reliable results. Hessian-fly material was sent to Rothamsted to determine whether the fly occurring on wheat is the same variety as that on barley.

*Insect Fauna of Red Clover.*—An investigation was started with the main object of determining the effect of insect pests of red clover on the seed yield, and more especially of the effect of thrips (erroneously termed "red mite").

*Porina Investigation.*—Considerable progress was made in determining the effect of different degrees of temperature and percentages of humidity on the period of incubation and percentage hatch of eggs of *Porina* moths.