Duplicate estimations were carried out, and it was apparent that the method was sufficiently accurate for the purpose, differences between individual sheep being much greater than any errors due to the method of analysis.

The most outstanding feature of these results is that the estimate of clean yield by handling and visual observation may be very misleading. It will be noticed that samples 1 and 2, selected for their light condition, actually gave a lower yield of clean fibre than sample 3, which was selected for its heavy condition. It is also apparent from these figures that the water extract is the most variable constituent.

Wool-buyers and others experienced in estimating the clean yield of raw wool expect to be within 1 or 2 per cent. and admit that they may be 3 per cent. out in their estimate, and we have evidence that this certainly does apply in some instances; but it would appear that in certain cases the appearance and handle of wool may be misleading even to men trained in estimating clean yield. For instance, a sample of wool free from sand and seeds estimated by a wool expert to yield 76 per cent. clean fibre (allowing standard regain) was on analysis found to yield 82 per cent. clean fibre.

The preliminary work described above confirmed our previous opinion that the causes for these important differences in amount and composition of yolk should be investigated. From information available at the time the following possible causes suggested themselves:—

(1) Effect of rain in washing out soluble constituents.
(2) Effect of temperature on yolk-production.
(3) Effect of feeding on yolk-production.
(4) Effect of season on yolk-production.
(5) Relationship of wool-type (character of staple and fibre) with yolk-production.
(6) Relationship of wool-type with yolk-retention.
(7) Individuality of animal, comprising all other factors, including health of the animal.

It is obvious that in farming practice several or all of the above operate together, but for the purpose of research work it is necessary to examine one factor at a time by eliminating as far as possible all other factors. With this end in view, and to make a preliminary investigation of several of the above factors, forty sheep from the Massey College flock of Romneys were selected in June, 1929. Since no special provision had then been made in stocking the farm for material for such work, the experiment had to be designed to make use of the flock as built up by ordinary farming practice. Owing to the impossibility of handling ewes during the lambing season, and since no wethers were available, we were forced to use ewe hoggets. Fortunately, some 300 were available for selection. A large number of individuals to choose from is essential in the Romney breed, since the variations in type are so wide and only a small proportion can be found to conform to any one type.

In biological work in general it is well known that as large a number of individuals as possible should be used, but we were limited by the assistance and apparatus required for the analysis of a large number of samples, without unduly precluding reasonably frequent samplings. Ultimately two even lines of ewe hoggets—twenty in each group—were selected, one group being strong-woolled (44–46's) and the other fine woolled (48–50's).

From the outset it was obviously necessary to find out to what extent sheep run under natural conditions would give reliable information and to what extent rain would wash out soluble constituents. For this reason ten of each of the above groups were provided with light waterproof covers and the remaining ten of each group left uncovered. These sheep were ultimately run together with the rest of the hoggets under normal conditions of management.

From this experiment it was hoped to show the effects of rain, season, and wool-type on the production and retention of yolk, in addition to providing fundamental information on the technique of experiments of this nature. At the same time it was hoped to ascertain the extent to which the number of animals taken would eliminate the individuality factor. This experiment in its original form is still being conducted and will not be concluded for several months, until the complete growth of wool has been examined. Meanwhile the following figures show the type of results being obtained:—

	Ether Extract.				Water Extract.			
	July.	August.	September.	October.	July.	August.	September.	October.
Strong uncovered	6·6	7·2	7·1	7·5	9·9	9·1	11·8	14·0
Strong covered	7·1	7·8	7·9	9·7	10·1	12·3	12·4	14·1
Fine uncovered	7·3	7·6	7·4	8·3	11·0	10·0	11·6	14·5
Fine covered	8·4	8·6	8·7	9·2	11·2	12·3	13·9	14·9

Season.—In the case of the covered animals there is a steady increase in percentage of yolk (both ether extract and water extract) from July to October. In the case of the uncovered sheep the increase, although of the same order over the whole period, is much less regular.

Wool-types.—The fine-woolled sheep have higher values than the strong-woolled sheep throughout when animals receiving similar treatment are compared. This is what one would expect.

Effect of Covering.—As may be expected, higher figures are obtained in all cases under covers than with uncovered sheep. At shearing-time the difference between the wool under cover and the uncovered wool seemed to lie more in the ether extract than in the water extract, in spite of wet weather prior to shearing, when it would have been reasonable to suppose that water-soluble constituents would be washed out of the fleeces of uncovered sheep.

Individuality.—It should be borne in mind that these figures are averages of widely divergent values. For instance, the figure 6·6 for strong-woolled uncovered sheep in the first column is the average of values ranging from 5·5 to 8·0, whereas the figure 7·1 for strong-woolled covered sheep is the average of values lying between 5·2 and 9·3. Similarly, the percentage of water extract for one