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REPRODUCTIVE DIFFERENCES BETWEEN BORDER LEICESTER \times ROMNEY AND ROMNEY TWO-TOOTH EWES

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SUMMARY

Romney and Border Leicester \times Romney (F_1) two-tooth ewes were studied to determine differences in ovulation rate, and uterine capacity, after transfer of three fertilized ova, between breeds. The crossbred ewes had a higher ovulation rate than the Romney ewes. Distribution of litter size in ewes receiving three fertilized ova was independent of breed of recipient ewe. In both breed groups, mean litter size after transfer was significantly greater than potential litter size determined by ovulation rate. Capacity of the uterus did not seem to be a major factor limiting reproductive performance in either breed. It was concluded that low ovulation rate severely limits fecundity in young Romney ewes.

WITHIN the New Zealand sheep industry, an increasing number of Border Leicester \times Romney (BL \times) ewes, are being utilized as dams for fat lamb production. The superior reproductive performance of the crossbred ewe, as opposed to her Romney counterpart, has been a major factor influencing this.

Differences in reproductive performance between breeds could arise from differences in numbers of eggs shed, in the number fertilized, or in the proportion of fertilized eggs which develop to full term. An advantage in terms of the number of eggs shed for BL \times ewes (F_1), when compared with Romney sheep, has been established in hoggets (Lang and Hight, 1967) and mature ewes (Allison, 1968). Recent work (Moore, 1968) has suggested that differences in uterine capacity, defined as the ability of a ewe to support multiple numbers of embryos through to term, might also contribute to observed differences between breeds, in the number of lambs born.

This paper presents observations made on BL \times and Romney ewes, to determine differences in numbers of eggs shed, and to study the survival and development of fertilized eggs transferred reciprocally between the two breeds.

EXPERIMENTAL

The animals (recipient ewes) used were an unselected group of 158, eighteen-month-old Romney and BL× (F_1) ewes of mean bodyweights 40.6 ± 0.6 and 46.5 ± 0.5 kg, respectively. All ewes had been run together since birth and were of similar origin, having been derived from a randomly bred flock, maintained at Massey University since 1944.

A further group of Romney ewes, mated to either Romney or Border Leicester sires, served as donors of fertilized ova. All sheep were grazed on predominantly ryegrass-white clover pasture throughout the experiment.

To induce and synchronize oestrous cycles of donor and recipient ewes, 15-day treatments with intra-vaginal sponges (40 mg methyl-acetoxy-progesterone) were effected from March 4 to 23.

From April 6 to June 20, fertilized eggs (8 cell) were transferred reciprocally between breeds, at rates of one or three eggs per recipient ewe. Transfers of ova were made to the uteri of 140 ewes, first observed in oestrus within ± 12 hours of their respective donors. The technique was as described by Hunter *et al.* (1955).

RESULTS AND DISCUSSION

1. OVULATION RATE

Table 1 records number of corpora lutea observed at laparotomy.

TABLE 1: NUMBERS OF CORPORA LUTEA RECORDED AT LAPAROTOMY

Breed	No. of Corpora Lutea			Ovulation Rate
	1	2	Total	
Romney	79	9	88	1.10
Border Leicester				
× Romney	46	24	70	1.34

Analysis of the data showed that the difference in ovulation rate between breeds was highly significant ($\chi^2 = 12.21$; $P < 0.001$). This result for two-tooth ewes is in accord with differences in ovulation rate observed in hoggets (Lang and Hight, 1967) and mature ewes (Allison, 1968) of the same two breeds.

Of the 80 ewes receiving one egg, 53 (66%) became pregnant, while 54 (90%) of 60 ewes transferred with three ova subsequently lambled. The following results apply only to ewes receiving three ova at transfer.

2. LITTER SIZE IN EWES RECEIVING THREE EGGS

The distribution of litter size in ewes receiving three eggs is shown in Table 2.

TABLE 2: NUMBERS OF LAMBS BORN IN EWES EACH RECEIVING THREE FERTILIZED OVA

<i>Breed</i>	<i>Litter Size</i>			<i>Total Ewes</i>
	<i>1</i>	<i>2</i>	<i>3</i>	
Romney	10	13	6	29
Border Leicester × Romney	3	16	6	25

Preliminary analysis of data showed distribution of litter size to be independent of breed of egg transferred. Subsequent analysis of pooled data failed to show a significant association between breed of recipient, and litter size distribution. This result is in contrast to that of Moore (1968) who found, in ewes receiving three eggs, Border Leicester ewes had more triplet and fewer single pregnancies than Merino ewes, irrespective of breed of egg transferred. However, the latter study was made between two breeds differing widely in mean body weight, body size, wool characteristics and fecundity.

In recent unpublished work at Cambridge University, L. E. A. Rowson and R. A. S. Lawson found, after transferring 5 eggs each into mature Romney Marsh ewes (as well as Suffolk and Finnish Landrace ewes), that, at litter sizes of three or less, performance of the Romney Marsh ewe did not seem to be hampered by any limitation imposed by the uterus.

TABLE 3: OVULATION RATE RECORDED AT LAPAROTOMY AND LITTER SIZE IN EWES EACH RECEIVING THREE EGGS

<i>Breed</i>	<i>Mean Natural Ovulation Rate</i>	<i>Mean Litter Size</i>
Romney	1.06	1.86
Border Leicester × Romney	1.40	2.12

In relation to the present work which applies to two-tooth ewes, at litter sizes which might be acceptable in practice (2-3), capacity of the uterus did not seem to be a factor *limiting* reproductive performance in either breed studied, as shown in Table 3. Analysis of these data showed that, in both breed groups, litter size after transfer of three eggs was significantly greater than the potential litter size determined by natural ovulation rate. However, the difference was of greater magnitude ($\chi^2 = 21.9$; $P < 0.001$) in the Romney as opposed to the BL \times breed ($\chi^2 = 12.4$; $P < 0.01$).

While there were indications from this study that breed differences in uterine capacity might exist, the results show potential reproductive performance to be limited by the number of ova shed. In the case of a breed with a low ovulation rate, such as the Romney, this result has important practical implications. We conclude that fecundity in these young Romney sheep is severely limited by low ovulation rate.

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