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Ovulation rates in Marshall Romney and Romney ewes: effects of body size and condition score

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ABSTRACT

Marshall Romney ewes had higher ovulation rates and percentage multiple births than control Romney ewes. These differences were accounted for by the higher live weights of Marshall Romney ewes. Differential grazing in 1979 produced ewes with different condition scores and live weight but the same body size. Ovulation rates were higher in the heavier ewes with the higher condition score. Body size and condition score contributed approximately equally to the variation in the live weight and both accounted for a significant proportion of variation in ovulation rate. However live weight accounted for more of the variation in ovulation rate than body size and/or condition score.

INTRODUCTION

The mean pre-joining live weight and percentage multiple births over 6 years for Marshall Romney (MR) and Romney ewes selected for hogget live weight in a trial at the Whatawhata Research Station were 49 kg, 12% and 45 kg, 17% respectively (Hight, 1973/9). This suggests that in the formation of the MR strain (Anderson and Marshall, 1967) there may have been selection against twin lambs, which is likely to be associated with a reduced ovulation rate (Kelly and Knight, 1979).

The higher live weight of MR ewes could be due to a larger body size (BS) and/or a higher condition score (CS). There is disagreement about which of these components of live weight has the most influence on ovulation rates (Gunn, 1977; Ducker and Boyd, 1977).

The relationship between live weight and ovulation rate was determined in 1979 for MR and a group of control Romney (CR) ewes. BS and CS were also measured and their relative contribution to the variation in ovulation rate determined. Additional data on ovulation rates and percentage multiple births for MR and CR ewes were obtained in 1980.

MATERIALS AND METHODS

In December 1978, 209 mature MR and 345 mature CR ewes were randomly divided into 3 groups and differentially grazed until April 1979, on low (L), medium (M) and high (H) pasture allowances.

CR ewes consisted of commercial Romney ewes plus their progeny sired by Waihora bred rams.

The ewes were shorn on 14 March and weighed after a 24 h fast (Wt 1), CS and BS were determined the next day. CS were estimated using the criteria of Jefferies (1961) in which 0 was the lowest and 5 the highest body condition. In a sample of 34 ewes measured twice on the same day, the repeatability of the measurements to calculate BS using Ducker and Boyd's (1977) method were: body length 0.83; width at hips 0.71; ribs 0.81 and shoulder 0.25; chest depth 0.65. Because of the low repeatability of the shoulder and chest measurements, BS was calculated as: ½(width at hips + ribs) x length.

Teaser rams fitted with harnesses and crayons were joined on 16 March with the ewes in their 3 grazing groups. Marked ewes were recorded every 3 to 4 days for 19 days and laparoscoped to determine ovulation rates. A second fasted live weight (Wt 2) was taken after laparoscopy. The ewes were joined with fertile rams at the end of the experimental period (4 April).

In 1980 the mature MR and CR flocks were grazed together and joined on 14 April with harnessed entire rams. Marked ewes were recorded daily for 21 days and laparoscoped every 7 days to determine ovulation rates. The ewes were weighed at laparoscopy but no BS or CS data were collected.

The number of lambs born to each ewe was recorded in both years. The statistical analysis of live weights, BS and CS was done by analysis of variance and multiple regression while ovulation rates and percentage multiple births were analysed by using logit models.

RESULTS AND DISCUSSION

The grazing treatments in 1979 produced significant differences in live weight, CS and ovulation rate ($P<0.001$) but not BS (Table 1). MR ewes were heavier ($P<0.05$) than the CR ewes, with a 9% larger BS ($P<0.05$) and higher CS ($P<0.01$) and ovulation

TABLE 1 The effects of grazing treatments and strain of Romney on live weight, body size (BS), condition score (CS) and ovulation rate per ewe in 1979.

	Grazing treatments						
	L	M	H		MR	CR	
Wt 1 (kg)	43.5	45.0	50.2	***	49.0	42.3	*
Wt 2 (kg)	43.9	46.7	51.9	***	50.3	43.5	*
BS (cm^2)	1554	1511	1583	NS	1640	1498	
CS	3.6	4.0	4.6	***	4.4	3.7	**
Ovulation rate	1.27	1.34	1.58	***	1.49	1.30	***

rate ($P<0.001$) (Table 1). All differences in ovulation rate were removed when corrected for live weight (Wt 2). The regression between Wt 2 (X) and ovulation rate (Y) calculated from 6 treatment x strain means was:

$$Y = -0.196 + 0.033X. \; r = 0.96$$

This regression coefficient is similar to those obtained by Knight and Kelly (1980) for between-farm comparisons and by D. C. Smeaton (unpublished) for between-treatment comparisons.

The percentage of multiple births in MR ewes was 31.2%, which although not significantly higher than the 22.1% in CR ewes, is the difference expected for a 6 to 7 kg difference in live weight (Coop, 1966).

In 1980 MR ewes again had higher live weights ($P<0.05$) (57 kg *v* 49 kg), ovulation rates ($P<0.05$) (1.53 *v* 1.40) and percentage multiple births (40 *v* 30) than CR ewes. The ovulation rate difference was removed by correcting for live weight.

The percentage multiple births in MR ewes in both 1979 and 1980 was higher than had been recorded by Hight (1973/9) throughout the 6 years these ewes had been in his Romney selection trial, despite similar live weights. While there is no explanation for this disparity in results, the present experiments indicate that MR ewes can have high ovulation rates and percentage multiple births.

In 1979 the BS and CS were relatively independent of each other and they contributed approximately equally to the variation in live weight (Fig. 1a). Both BS and CS accounted for significant ($P<0.01$) proportions of the variation in ovulation rate (Fig. 1b). Neither BS nor CS, independently or together, accounted for as much of the variation in ovulation rate as live weight nor did they significantly improve the predictive value of live weight (Fig. 1b).

The present results contrast with those of Ducker and Boyd (1977) who found in Greyface ewes selected for extremes of BS, that ewes with similar CS had similar ovulation rates despite differences in BS and live weight. Conversely Gunn *et al.* (1972), comparing Scottish Blackface ewes from 2 sources, found that the higher live weight group had the higher ovulation despite the same CS. He subsequently demonstrated that rearing to 12 months of age affected adult BS and ovulation rate despite the ewes being brought to the same CS (Gunn, 1977). It is not possible in the present experiment to determine the proportion of the variation in BS due to rearing or to genotype but most of the difference in CS was caused by recent grazing treatments.

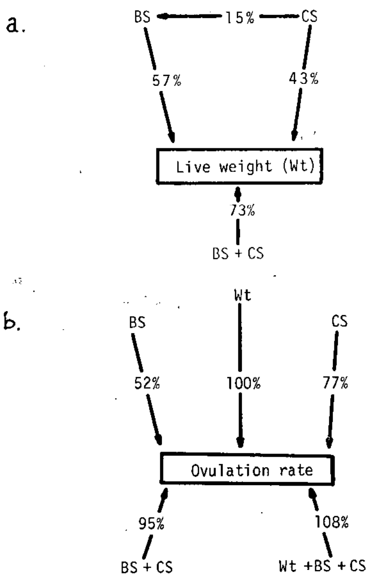

FIG. 1 The proportion of the variation in live weight (Wt 1), and ovulation rate, accounted for by BS, CS and Wt 1 in 1979. In Fig. 1a the % of variation accounted for by each factor is calculated from the correlation coefficients. In Fig. 1b the chi-square value for the relationship between Wt 1 and ovulation rate is considered to be 100% and the chi-square values for the other comparisons are relative to this.

CONCLUSION

MR ewes have larger BS and live weights than CR but at the same live weight the ovulation rates and percentage multiple births were similar.

Ovulation rate is influenced by both BS and CS but neither BS and/or CS are as good at predicting ovulation rate as live weight.

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