
THE PROCEEDINGS OF THE
NEW ZEALAND SOCIETY
OF
ANIMAL PRODUCTION
VOLUME 62 2002

Flushing responses of well and poorly reared two-tooth ewes

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ABSTRACT

Well or poorly reared ewes were differentially fed at 1 of 5 pasture allowances for 6 weeks prior to a synchronised mating. Rearing class and flushing treatment significantly affected ovulation rate. The well and poorly reared ewes had mean multiple ovulation rates per ewe cycling of 39 and 19% respectively. Fitting pre-flushing and joining weights as covariates removed rearing and differential feeding effects on those rates. Extrapolation of the data suggests that poorly-reared ewes would ovulate similarly to well reared ewes at similar mating weights.

Facial eczema depressed live-weight gain and had a further detrimental effect on the probability of ewes ovulating.

INTRODUCTION

An elevated live weight (LW) at mating and LW gain prior to mating are associated with an increased ovulation rate and percentage lambs born (Coop, 1966). Rattray *et al.* (1980) showed that per kilogram LW gain prior to mating, thin ewes showed a greater ovulation rate response than fat ewes. Static effects additional to those above can be induced by early rearing (Gunn, 1977; Moore *et al.*, 1978). Differences in the flushing response of well and poorly reared ewes are, however, not known and these were investigated in a season when facial eczema was prevalent.

EXPERIMENTAL

Two-tooth Romney ewes (ex Waihora) had previously (1980) been reared on 1 of 5 feed levels and 3 management systems from weaning to 15 months of age (During *et al.*, 1980). In mid-March 1981 the ewes from the 2 highest and 2 lowest feed levels from all management treatments were differentially fed for 6 weeks prior to a synchronised mating at 1 of 5 pasture allowances.

Each treatment group of approximately 30 ewes was given the appropriate allowance of pasture in breaks lasting 3 to 7 days depending on paddock area and herbage mass. Full and fasted LW was recorded at the beginning and end of the trial as also was pasture mass (kg DM/ha) before and after each grazing. Ovulation rate was measured by laparoscopy and gamma-glutamyl-transferase (GGT, i.u./ml serum) was determined at the end of the trial as pasture spore counts of *Pithomyces chartarum* indicated high facial eczema risk despite precautionary pasture spraying.

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RESULTS AND DISCUSSION

At the start of differential feeding the well and poorly reared ewes had fasted weights of 48.1 and 36.8 kg respectively. These effects were still highly significant at ovulation ($P < 0.001$). Pasture allowance treatment also affected LW at ovulation ($P < 0.001$). Significant covariates ($P < 0.01$) were LW and condition score at trial start and GGT value (-3 ± 0.05 g LW/i.u. GGT). A similar effect has been reported in lambs by Towers and Stratton (1978).

The pasture allowance effects on LW gain are shown in Fig. 1. The greater gain response of the poorly reared ewes ($P < 0.05$) at any given green DM allowance is similar to that of Rattray *et al.* (1980) demonstrating the higher requirements of the heavier well reared ewes for maintenance and gain. When allowance was expressed as a proportion of LW the difference between the 2 lines (Fig. 1) became non-significant indicating that compensatory gain in the poorly reared ewes was small.

The proportion of ewes ovulating (EO) was affected by LW at joining ($P < 0.01$). GGT affected EO over and above its effects on LW (Fig. 2). The equation is

$$\log_n \frac{P}{1-P} = 0.64 + 0.077\ LW_i - 0.0031\ GGT$$

(Logit SE's for the 2 respective coefficients = 0.04 and 0.001). This influence of GGT on EO, over and above its effect on LW has not been reported before and indicates additional unknown metabolic responses are occurring.

The well and poorly reared ewes had mean multiple ovulation rates of 39 and 19% respectively ($P < 0.001$) corresponding to 0.02 eggs/ewe/kg difference in LW at joining. This is similar to results of Knight and Hockey (1982) but only a third of the response observed by Gunn (1977) who found this occurred in adult ewes in a poor environment only.

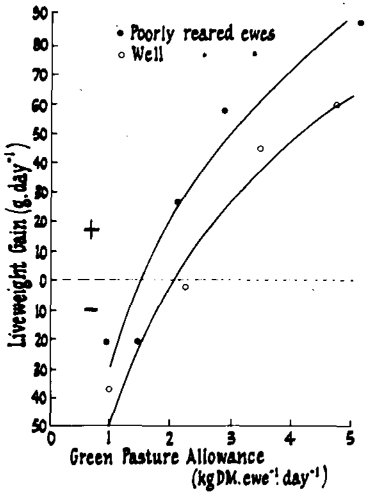

FIG. 1 The influence of green pasture allowance on the live-weight gain of well and poorly reared two-tooths.

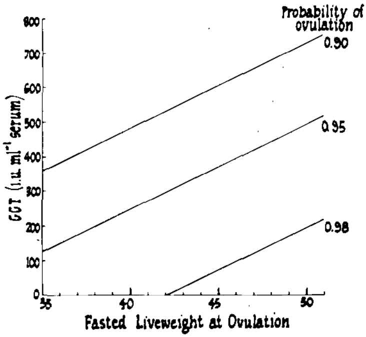

FIG. 2 Model showing the dependence of the probability of ewes ovulating on GGT and live weight at ovulation.

Differential feeding during the trial also affected mean multiple ovulation rates ($P < 0.01$) (Table 1). Fitting pre-flushing (LW_1) and pre-mating (LW_2) weights as covariates made previous rearing and differential feeding effects non-significant. The prediction model incorporating pre-flushing weight and joining weight is shown in Fig. 3. The equation is:

$$\log_n \frac{P}{1-P} = -21.0 + 0.26\,LW_1 + 0.53\,LW_2 - 0.0076\,LW_1.LW_2$$

(Logit SE's for the 3 respective coefficients = 0.16, 0.17, 0.0036). Although LW_1 was significant only if fitted to the model before LW_2 (correlation between the two was 0.92), the prediction equation obtained was very similar to those of Rattray *et al.* (1981). When LW_2 only was fitted the equation became:

$$\log_n \frac{P}{1-P} = -6.4 + 0.12\,LW_2$$

(Logit SE for the coefficient = 0.02).

This model is shown in Fig. 4—both rearing groups lying on the same prediction line.

Condition score had no effect on mean multiple ovulation rates after the LW covariates were fitted—a finding contrasting with Ducker and Boyd (1977) but similar to Knight and Hockey (1982). Similarly, GGT had no effect beyond that above on LW at ovulation. The elimination of rearing effects on ovulation rate after covariance adjustment with

Table 1 Effects of rearing and feeding level during the trial on mean multiple ovulation rate (EOVM).

Approx. allowance kg green DM/ewe/d	0.96	1.34	2.18	3.20	5.0	Main effect
Previous rearing			Probability of EOVM			
high	.25	.34	.40	.44	.52	.39
low	.11	.17	.21	.23	.30	.19
Main effect	.17	.24	.30	.32	.41	

Logit SED, main effects: rearing = 0.27, feeding level = 0.45).

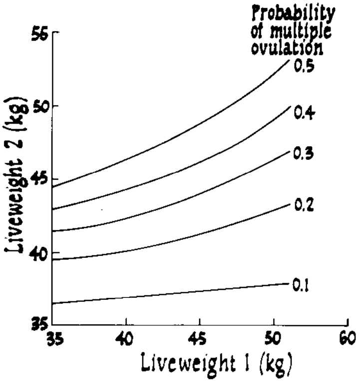

FIG. 3 Model showing the effect of pre-flushing (LW_1) and joining (LW_2) live weights on the probability of a multiple ovulation.

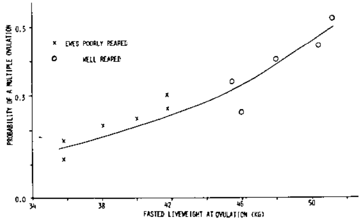

FIG. 4 Model showing the effect of joining live weight on the probability of a multiple ovulation.

LW is similar to Drew *et al.* (1973), but not Moore *et al.* (1978). However, the latter brought previous rearing treatments to similar two-tooth LW. Here, two-tooth LW reflects previous rearing treatments and because of this correlation, previous rearing is not significant after LW correction.

The results demonstrate that although poorly reared ewes are less productive than those well reared this is probably a function of their lower LW. Extrapolation of the data suggests they would have similar ovulation rates at the same joining weight.

ACKNOWLEDGEMENTS

Mr P. Evans for stock work throughout the trial, Dr N. Towers and staff for GGT analyses, Miss R. Winter for records, Dr T. Knight and Messrs P. Lynch and D. Hall and other reproductive section staff for laparoscopy work, nutrition staff for field measurements.

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