

A HIGH LEVEL OF NUTRITION DURING LATE PREGNANCY IMPROVES
SUBSEQUENT MATERNAL BEHAVIOUR OF MERINO EWES

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SUMMARY

The effect of nutrition during late pregnancy on subsequent maternal behaviour of Merino ewes was studied using 175 four-tooth pregnant ewes. Six weeks prior to parturition all ewes were allotted randomly into a group fed oaten hay ad libitum + 250 g lupin grain/ewe/day and a group fed hay ad libitum + 1100 g lupin grain/ewe/day. On day 147 of pregnancy all ewes in each group were further allotted into two sub-groups and transferred to the lambing paddocks with sparse and dense pasture conditions. Nutrition during late pregnancy did not affect lamb desertion in the single bearing ewes, but in the twin bearing ewes the low level of nutrition resulted in a higher proportion of permanent desertions of at least one of their twin lambs (19.2%) compared with ewes on a high level of nutrition (4.3%).

(Key words: maternal behaviour, nutrition, late pregnancy, mortality, Merino ewes) .

INTRODUCTION

During the last six weeks of pregnancy in which about 70 percent of foetal growth takes place (Robinson et al. 1977), nutrition is a major factor affecting birth weight and mortality of lambs (Thomson and Thomson 1949; Louca et al. 1974 and Khalaf et al. 1979). Severe undernourishment during late pregnancy depresses development of the udder and production of colostrum for the first 18 hours after birth (Mellor and Murray 1985). It also reduces subsequent milk production (Peart 1967; Treacher 1970). Khalaf et al. (1979) showed that ewes fed a high level of nutrition produced lambs with 23 percent lower mortality than those from ewes fed a low level of nutrition. The high growth rate of the foetus together with a low level of nutrition during late pregnancy also influences mothering ability of the ewes (Thomson and Thomson 1949). However, at present no information is available on the effect of nutrition on maternal behaviour and desertion of lambs by Merino ewes.

The present experiment was designed to study the effect of nutrition during late pregnancy and at lambing on subsequent maternal behaviour in Merino ewes.

MATERIALS AND METHODS

The experiment was carried out in July 1985 at the University of Western Australia's Research Farm "Allandale", 75 km east of Perth.

The experimental animals were 175 multiparous ewes of which 49 were bearing twins. Dates of insemination of each ewe were known. Six weeks prior to parturition ewes were randomly allocated into two treatment groups. The low nutrition group was fed oaten hay ad libitum plus 250 g lupin grain/ewe/day (65 single and 26 twin bearing ewes) and a high nutrition group was fed hay ad libitum plus 1100 g lupin grain/ewe/day (61 single and 23 twin bearing ewes). When the ewes had reached day 147 of pregnancy they were randomly allocated into two sub-groups which lambed in two lambing paddocks with either sparse or dense

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pasture. The paddock was sown with grain oats a few weeks before lambing and forage production was measured every three days using a pasture probe. Pasture production at the beginning of the lambing period was 453.2 kg DM/ha in the low and 1127.8 kg DM/ha in the high paddocks. All ewes were observed 24 hours daily. Two observers were continuously in the paddocks. The flocks were drifted twice daily: at 1730 h from the day to the night paddock and at 0600 h from the night to the day paddock. Drifting was done by moving the ewes without lambs quietly and slowly. The ewes which had lambed were left behind with their lambs. The behaviour of the ewes was observed intensively for the first three hours following parturition and then spot observations were made every 30 minutes. The distance between each ewe and a birth site marker was estimated at each observation. Maternal behaviour of the ewes was classified into permanent desertion, temporary disturbance or normal maternal behaviour (Putu et al. 1986).

The average time spent by the ewes on the birth site was analysed using t-test for comparisons of two sample means (Steel and Torrie 1960). Comparison of proportions were statistically analysed using Fisher's exact probability or by Chi-square with one degree of freedom where the total number of animals exceeded 100 (Freeman and Halton 1951).

RESULTS

The liveweight of the ewes in the low and high groups did not differ at the start of the experiment (40.2 and 40.5 kg). After 6 weeks of treatment the low group only increased its initial liveweight by 3% while the high group increased its mean liveweight by about 22% ($P < 0.001$).

The proportion of single bearing ewes showing normal maternal behaviour was significantly increased by high nutrition during late pregnancy ($\chi^2 = 3.9$, $P = 0.048$). There was also a clear difference between the low and high nutrition groups among twin bearing ewes ($\chi^2 = 6.0$, $P = 0.015$) associated with 15% fewer ewes on a high levels of nutrition permanently deserting at least one of their twin lambs compared to ewes in the low group (Table 1). Pasture conditions at lambing had no significant effect on maternal behaviour of single or twin bearing ewes.

Table 1 Effects of nutrition and pasture condition at lambing on maternal behaviour

Stage of treatment	Litter size	Nutrition level and pasture density	No.	% Ewes in maternal behaviour classes		
				Normal behaviour	Temporary disturbance	Permanent desertion
Late pregnancy	Single	Low	65	71	26	3
		High	61	87	10	3
	Twin	Low	26	50	31	19
		High	23	87	9	4
Pasture at lambing	Single	Sparse	67	78	19	3
		Dense	59	80	15	3
	Twin	Sparse	22	72	18	9
		Dense	27	63	22	15

ns: not significant * : $P < 0.05$ ** : $P < 0.01$ *** : $P < 0.001$

The time spent by the ewes on the birth site (Table 2) was not significantly affected by nutrition during late pregnancy in single and twin bearing ewes. Pasture conditions at lambing had also no significant effect on time spent on the birth site in either single or twin bearing ewes. Pooled data showed that twin bearing ewes remained significantly longer on the birth site than single bearing ewes ($t = 5.1$, $df = 171$, $P < 0.001$).

Table 2 Time spent by the ewes on the birth site

Stage of treatment	Litter size	Nutrition level	No	The amount of time (hours) spent on the birth site (Mean \pm SEM)	
Late pregnancy	Single	Low	65	2.70 \pm 0.25] ns
		High	58	3.45 \pm 0.37	
	Twin	Low	26	4.65 \pm 0.48] ns
		High	23	6.12 \pm 0.68	
Pasture at lambing	Single	Sparse	65	2.70 \pm 0.27] ns
		Dense	59	3.48 \pm 0.35	
	Twin	Sparse	22	4.70 \pm 0.50] ns
		Dense	27	5.80 \pm 0.65	

Mortality in twin lambs born from ewes on low nutrition during late pregnancy was significantly higher than in lambs born from ewes on high nutrition ($X^2=3.5$, $P=0.06$). Pasture conditions at lambing had no significant effect on mortality of twin born lambs. Twelve of the 17 (71%) dead lambs from twin bearing ewes on low nutrition during late pregnancy (Table 3) died as a result of disturbance of maternal behaviour and another 5 (29%) of death were due to weak vigour and exposure. Mortality of single born lambs was not significantly different between the low and high nutrition groups during late pregnancy or at lambing. Pooled data showed that mortality rate of twin born lambs was significantly higher than those of single lambs ($X^2=18.3$, $P<0.005$).

Table 3 Lamb mortality within 48 hours of parturition

Stage of treatment	Litter size	Nutrition level	Number of lambs born	Percentage of lambs dead	
Late pregnancy	Single	Low	65	6] ns
		High	61	2	
	Twin	Low	52	33] *
		High	46	15	
Pasture at lambing	Single	Sparse	67	3] ns
		Dense	59	5	
	Twin	Sparse	44	25] ns
		Dense	54	24	

DISCUSSION

Poor nutrition during late pregnancy adversely affects the proportions of ewes showing normal maternal behaviour at lambing whether or not they have single or twin lambs, but the effect is greater in twin bearing ewes. This result is in agreement with the finding of Thomson and Thomson (1949) that restriction of protein in the diet during the last half of pregnancy impaired maternal instinct in ewes and caused weakness after parturition. A low body weight gain of the ewes fed low level of nutrition during late pregnancy together with a high demand of nutrition especially in twin bearing ewes depressed the behaviour of the ewes at lambing. Pooled data show that 3 % of single bearing ewes deserting their lambs permanently compared to 12% in twin bearing ewes. High proportions of multiple bearing Merino ewes that desert their twin lambs were previously reported by Alexander et al. (1983) and Stevens

et al. (1984). It is however known that at least some of that desertion may be overcome by good nutrition at late pregnancy (Thomson and Thomson 1949).

The amount of time spent at the birth site by the ewes which lambed under dense pasture conditions was relatively longer compared with those ewes which lambed on sparse pasture conditions. This evidence was related to the availability of nutrition around the birth site. At the first few hours following parturition, the ewes grazed within 10 metres of the birth site and then they returned to the lambs.

In this study, pasture at lambing did not affect subsequent maternal behaviour but ewes were only on these pastures for a very short time. The ewes had only a short time in the lambing paddock because they were introduced on day 147 of pregnancy and then 48 hours after lambing they were drifted to a communal paddock. In any case the pasture production between low and high paddocks, though different, was probably not enough to affect the behaviour of the ewes at parturition since lambing took place in winter when all paddocks were green.

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