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Nutrition and management of ewes before and after lambing

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ABSTRACT

In Trial 1, ewes were fed high or low nutrition in mid and late pregnancy and post lambing until docking in a 2^3 factorial. Pasture residue levels for the high and low nutrition groups were 1000, 250; 800, 300; 600, 450 kg DM/ha for the 3 periods respectively. The ewes were rotationally grazed before lambing and then set stocked at 12 and 20 ewes/ha. In a second trial, ewes were rotationally grazed until 4 weeks before lambing, stocked at 12 and 20 ewes/ha, and either set stocked immediately or at lambing, until weaning.

There were no effects on lambing percentage or on ewe and lamb survival. Level of GGT in Trial 1 affected live weight (− 0.004 kg live weight/IU of GGT). After the mid pregnancy treatment the ewes weighed 56.3 and 44.1 kg and were still 2.9 kg different at docking. The mid, late pregnancy and post lambing treatments affected ewe live weight as a 3-factor interaction. Mid and late pregnancy nutrition affected birth weight but only mid pregnancy and (mainly) post lambing nutrition affected lamb docking and weaning weight.

In Trial 2, ewes set stocked 4 weeks before lambing had consumed all their pasture (saved by their previous long rotation) by lambing compared with the other management group at 20 ewes/ha only and consequently they were + 3.0, − 1.1 and − 2.6 kg different at lambing, docking and weaning respectively. Management affected lamb weight at 20 ewes/ha only at docking but by weaning, set stocking ewes 4 weeks before lambing gave a main effect disadvantage of 1.9 kg compared to the other group, at both stocking rates.

Keywords Nutrition; pasture residual; ewes; lambs; pregnancy; lambing; live weight; weaning; survival

INTRODUCTION

Allocation of pasture to ewes before and after lambing is critical, especially where there is reliance on using saved pasture for a limited period after lambing before the spring pasture flush commences. Rattray *et al.* (1982 b) showed that medium live weight ewes (55 to 58 kg) respond considerably to feeding during lactation. Ewe live weight, fleece weight and lamb weaning weight all responded almost linearly up to high herbage allowance levels of 8 kg DM/ewe/d or more. Lighter or heavier ewes may have shown a different response.

In late pregnancy, responses to nutrition are smaller. Rattray *et al.* (1982 a) imposed a wide range (0.7 to 4.0 kg DM/ewe/d) of pasture allowances on 54 kg ewes in the last 6 weeks of pregnancy. Although ewe live weight varied by 14 kg between extreme treatments there were no consistent effects on subsequent production except fleece weights, which differed by up to 0.5 kg. These results suggest that given a reserve of pasture in late winter farmers should, if possible, supply this to their ewes after lambing rather than before. Some hill country ewe flocks probably weigh 40 to 45 kg (conceptus-free) just prior to lambing and may not have the buffering capacity of heavier sheep.

This paper describes 2 trials designed to investigate these effects under hill country conditions.

MATERIALS AND METHODS

Trial 1

In a 2^3 factorial, 400 ewes (Romney and Coopworth) in the mid third of pregnancy were randomised into high or low planes of nutrition (residual herbage 1000 and 250 kg DM/ha respectively). Each treatment was then allocated to high or low planes of nutrition (residual herbage 800 and 300 kg/ha respectively) for the last third of pregnancy. At lambing until docking the last factorial treatment was imposed by set stocking the ewes at either 12 or 20 ewes/ha. Average herbage mass levels at docking were 600 and 450 kg DM/ha respectively.

Trial 2

Two average live weights (46.8 and 60.6 kg) were generated in mid pregnancy on 240 Romney ewes. Four weeks prior to lambing the ewes were stocked at 12 or 20 ewes per ha on farmlets of similar herbage

TABLE 1 Mid and late pregnancy and post lambing interaction of nutrition on ewe weights at docking and weaning (kg).

	Treatments[1]								
	HHH	LHH	HHL	LHL	HLH	LLH	HLL	LLL	SED
Ewe live weight:									
at docking	51.6	46.6	43.3	43.2	47.9	44.8	43.5	40.1	0.9
at weaning	54.0	48.4	45.5	44.8	49.2	46.2	46.3	42.1	1.1

[1] High (H) or low (L) level of nutrition in mid pregnancy, late pregnancy and lactation.

mass (750 kg DM/ha) and either set stocked immediately (until weaning) or continued on a 70-day rotation until lambing when they were also set stocked until weaning. Both mid pregnancy treatments were combined with farmlets.

In both trials, ewe live weights, lambing day, lamb weights, rank and lamb survival were recorded. Herbage mass was also measured (Smeaton *et al.*, 1983). Levels of gamma-glutamyltransferase (GGT; IU/l serum) were determined (Towers and Stratton, 1978) at mating time. Analyses of data were carried out by least squares procedures incorporating appropriate covariates and factors with logit transformations of binomial data. Lamb litter sizes were adjusted to 1.5 lambs/ewe throughout.

RESULTS AND DISCUSSION

Trial 1

Lambing percentage, ewe and lamb survival

There were no effects (despite the wide range of live weights generated) on the proportion of ewes lambing, or on ewe and lamb survival—similar to Rattray *et al.* (1982 a).

Ewe live weights

Ewe live weight was affected at all times by GGT level (trial average 135 IU/l). The covariate (approximately $-$ 0.004 $\pm$ 0.002 kg live weight per IU GGT; $P < 0.05$ to 0.001) was similar to Smeaton *et al.* (1982) but was non-significant after initial live weight (25.5.81) was fitted.

At the end of the mid pregnancy treatment there was a 12.2 $\pm$ 0.2 kg difference in live weight ($P < 0.001$) in the ewes (mean weight 50.2 kg). Immediately pre lambing, this effect had reduced to 5.5 $\pm$ 0.35 kg ($P < 0.001$) while the effects of the late pregnancy herbage residual levels had resulted in a 6.8 $\pm$ 0.35 kg difference ($P < 0.001$). Mid and late pregnancy nutrition interacted ($P < 0.05$). Ewes on high nutrition throughout these 2 periods were 5.4 ($\pm$ 0.45) kg heavier at 62.1 kg than those on high-low or low-high nutrition (56.7 kg), while they in turn were 6.9 kg heavier than those on low-low nutrition (49.8 kg). Nutrition before lambing can affect ewe live weight substantially (Rattray *et al.*, 1982 a; Coop, 1950).

At docking, differences of 2.9 and 2.1 $\pm$ 0.43 kg due to mid and late pregnancy nutrition respectively were still present ($P < 0.001$) and this continued to weaning ($P < 0.001$). The two stocking rate treatments post lambing gave a 5.2 $\pm$ 0.43 kg difference ($P < 0.001$) in ewe live weight at docking.

Mid, late pregnancy and post lambing nutrition interacted on live weight at docking ($P < 0.01$, Table 1). At all crossover stages of the trial ewes which had previously been poorly fed always showed greater live weight gain at equal subsequent nutrition levels than those previously well fed, similar to Smeaton *et al.* (1982) and Rattray *et al.* (1980).

Lamb live weight

Low nutrition in mid and late pregnancy depressed litter birth weight by 0.3 $\pm$ 0.12 kg ($P < 0.01$) and 0.47 $\pm$ 0.17 kg ($P < 0.001$) respectively. Rattray *et al.* (1982 a) found no consistent effects of nutrition on lamb birth weight. The response can, however, be affected by birth rank, pre lambing nutrition in extreme circumstances (Clark, 1978; Coop, 1950; Wallace, 1948) or by prolonged underfeeding on an

TABLE 2 Effects of ewe nutrition in mid and late pregnancy and after lambing (up to docking) on lamb docking and weaning weights; treatment main effects (kg).

	Period of nutrition									SED
	Mid pregnancy			Late pregnancy			After pregnancy			
	High		Low	High		Low	High		Low	
Litter docking weight	16.7	***	14.6	16.0	NS	15.3	17.0	***	14.4	0.4
Litter weaning weight	23.3	***	21.2	22.6	NS	21.9	24.2	***	20.2	0.6

annual basis (Suckling, 1975). Average litter birth weight for the trial was 6.22 kg.

Treatment affected litter weights at docking and weaning (Table 2). Nutrition in late pregnancy had no effect (a finding similar to that of Rattray *et al.* (1982 a) and of considerable importance to farmers making decisions about conserved feed in late pregnancy) although in the analyses of the single lambs only, low nutrition in late pregnancy depressed lamb weaning weight by 1.48 ± 0.37 kg ($P < 0.001$). High *v* low nutrition in mid pregnancy affected docking weight by 2.05 ± 0.44 kg ($P < 0.001$) and weaning weight by 2.14 ± 0.63 kg ($P < 0.001$). This effect on subsequent lamb weight was observed by Davis *et al.* (1981) who related it to mid pregnancy nutrition effects on placental development.

Nutrition after lambing had a much bigger effect, as was noted by Coop (1950) and Rattray *et al.* (1982 b). Litters from high nutrition ewes were 2.61 ± 0.44 ($P < 0.001$) and 4.00 ± 0.63 kg ($P < 0.001$) heavier at docking and weaning respectively, than litters from the low nutrition treatment.

agement interacted (in a similar manner to the pasture results) in their effects on ewe live weight (Table 3) at lambing ($P < 0.001$), docking ($P < 0.05$) and at weaning ($P < 0.01$). The management effects generally only occurred at low nutrition/high stocking rate where set stocking 4 weeks before lambing gave an advantage of 3.0 kg at lambing but a 1.1 and 2.6 kg disadvantage at docking and weaning respectively. This effect occurred because those ewes set stocked 4 weeks before lambing had consumed their saved pasture by lambing and compared with the other management treatment were therefore more poorly fed later.

There were no effects on lambing percentage, ewe and lamb survival.

Lamb live weight

As for Trial 1, the extreme nutrition levels used to generate the 2 ewe live weights 4 weeks prior to lambing had a small effect ($P < 0.01$) on litter birth weight (high *v* low: 7.15 *v* 6.67 ± 0.16 kg) and a bigger effect at docking ($P < 0.01$, high *v* low: 18.34 *v* 16.52 ± 0.57 kg). Weaning weight was also affected but as an interaction with the subsequent stocking rate treatment ($P < 0.01$) in a manner similar to Trial 1, in that litters from ewes on low nutrition throughout the trial fared considerably worse than the rest (Table 4).

Management and stocking rate interacted to affect litter weight at docking (Table 3) as in the ewes, but management had become a main effect by weaning ($P < 0.01$); litters from ewes set stocked at lambing weighed 25.0 kg compared with 23.1 ± 0.78 kg for those from ewes set stocked 4 weeks before lambing. These results certainly demonstrated advantages to feeding after, rather than before, lambing.

TABLE 3 Average herbage mass, ewe live weights and litter docking weight in the stocking rate (SR) × management treatments.

Treatment	Herbage mass (kg DM/ha)			Ewe live weights (kg)			Lamb litter weight (docking)
	4 weeks before lambing	At lambing	Docking	At lambing (31.8.81)	Docking (8.10.81)	Weaning (6.11.81)	
High SR (low nutrition):							
SS at lambing (L)	820	820	500	59.2	53.9	54.0	17.8
SS 4 weeks before L	770	310	430	62.2	52.9	51.4	15.0
Low SR (high nutrition):							
SS at L	720	690	1160	62.3	58.1	58.8	18.4
SS 4 weeks before L	700	610	970	62.1	54.9	58.8	18.6
			SED =	0.6	0.7	0.8	0.8

Trial 2

Pasture results

Management and stocking rate affected standing herbage mass on each of the 4 farmlets (Table 3). At lambing, the ewes set stocked 4 weeks previously at 20 ewes/ha had substantially reduced the average herbage mass on their farmlets. At docking, this effect had nearly disappeared as the ewes rotationally grazed up to lambing and then set stocked had consumed the pasture saved by their previous long rotation.

Ewe live weight

At lambing, the 13.8 kg difference generated 4 weeks before lambing had declined to a difference of 7.2 kg ($P < 0.001$). By docking and weaning this difference of 7.2 kg ($P < 0.001$) was reduced to 3.5 ± 0.48 and 2.7 ± 0.56 kg respectively. Stocking rate and man-

CONCLUSIONS AND SUMMARY

The GGT results indicate that the effects of facial

TABLE 4 Litter weight at weaning (kg) effects of nutrition and stocking rate (SR).

	Nutrition 4 weeks before lambing to weaning	
	High (Low SR)	Low (High SR)
Mid pregnancy nutrition:		
High	24.8	25.1
Low	25.6	20.7
SED = 1.1		

eczema on live weight are long-term: at least 8 months.

The treatments in both trials had no effect on lambing percentage or ewe and lamb survival. However, at conceptus-free weights less than 42 kg (the minimum in these trials) farmer experience suggests the results might change sharply. There was a carry-over effect of mid pregnancy nutrition on ewe live weight at weaning. A difference of 12 kg between the groups 50 days before lambing was still worth 2 to 3 kg at weaning and this might have carried through to the following mating (Smeaton *et al.*, 1983). Nutrition in mid or late pregnancy affected subsequent weights of lambs although relative to the effect of nutrition after lambing their influence was much smaller. Low nutrition throughout mid and late pregnancy reduced lamb docking and weaning weights by 2.5 to 3 kg despite subsequent good nutrition. This result indicated that there would be some cost to severely restricting ewes throughout mid and late pregnancy which might not be made up at weaning by high nutrition post lambing—as suggested by Rattray and Trigg (1979) for low live weight ewes.

Given a choice between feeding a reserve of pasture before or after lambing, the results of these and other trials suggest that feeding the reserve after lambing would provide the best results, especially at high stocking rates. Farmers could achieve this by not set stocking any ewes until lamb drop commences. Accurate separation of ewes into lambing periods has been achieved on some farms by the use of mating harnesses at tupping time.

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