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

Spring-summer grazing management on hill country: effects on ewe performance

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ABSTRACT

Earlier trials indicated that pasture quality (% green DM in the sward) and pasture accessibility (green DM/ha) can be more limiting to ewe live-weight gain prior to mating than pasture allowance. Two trials investigated the effects of summer grazing management on subsequent pasture quality.

From weaning to the start of flushing ewes were grazed lax (residual > 2000 kg DM/ha) or hard (residual < 1500 kg DM/ha). A live-weight difference of 4 kg occurred at the start of flushing and reduced to 2.5 kg at mating. Main effect results showed that at similar green allowances, ewes flushed on pasture which had previously been hard grazed had live-weight gains 20 to 30 g/d more than ewes on lax grazed pasture. There were no differences in ovulation rate but the live-weight results suggest that there would on average be an advantage to flushing on hard grazed pasture. Wool production was affected similarly to live weight. Management implications are discussed.

Keywords Ewe; ovulation rate; wool production; live weight; grazing management; summer; hill country; flushing; herbage allowance; herbage quality

INTRODUCTION

Early trials at Whatawhata (Smeaton *et al.*, 1981) indicated that pasture quality (% green DM in the sward) and pasture accessibility (green DM/ha) can be more limiting to ewe live-weight gain (LWG) over the flushing period than pasture allowance. Smeaton (1983) showed that a wide range in flushing LWG can occur at any given pasture allowance as a result of variation in these other factors.

Two trials investigated the possibility that pasture quality on hill country in late summer could be manipulated by grazing management over the spring-summer period. They compared the following objectives.

(1) Feed ewes well in early summer while pasture quality is high, thereby losing control of the pasture surplus over the whole farm and hence potentially having poor quality feed at flushing.
(2) Feed ewes less well in early summer to maintain control of the pasture surplus and pasture quality over part of the farm and hence having some high quality feed at flushing.

MATERIALS AND METHODS

Both trials were 2^3 factorial designs in which 400 to 450 Romney (Trial 1) and Coopworth (Trial 2) ewes were grazed either lax or hard (Table 1) from weaning (mid November) until the start of flushing (mid February). This produced heavy or light ewes and lax- or hard-grazed pastures (Table 1). The 2 ewe types were then flushed on the 2 pasture types at high or low pasture allowances for 6 weeks until mating started in early April. Trial 2 was also run on 2 classes of hill country; summer wet and summer dry.

The ewes were rotationally grazed and live weights, pasture information and grazing breaks were determined (Smeaton *et al.*, 1983). Synchronised ovulation rate was measured at the end of the trials by laparoscopy.

RESULTS AND DISCUSSION

Effects on Pastures, Live Weight and Ovulation Rate

The lax-grazed ewes at the start of flushing (mid February) were 3.4 ± 0.2 and 4.8 ± 0.2 kg heavier than the hard-grazed ewes in Trials 1 and 2 respectively (Table 1). These differences reflected the live weight 'cost' of maintaining the 2 levels of pasture control. By mating, the differences had been reduced to 1.6 and 0.6 kg in favour of the lax-grazed ewes.

The hard grazing treatments generated 6 to 8% units more green DM in the sward for the flushing period (Table 2). In Trial 2 the lax-grazed pasture had 400 kg

TABLE 1 Pasture allowance and residual herbage levels generating the 2 pasture types and subsequent ewe live weights before flushing.

Trial	Grazing treatment	Pasture allowance (kg DM/ewe/d)	Residual herbage (kg DM/ha)	Mid-Feb LW[3] (kg)	LWG: weaning to Feb (kg)
1	Hard	1.5[1]	1450	47.6	−2.1
	Lax	3.7	2500	51.0	+1.3
2	Hard	1.5[2]	900	50.3	−1.0
	Lax	5.0	2300	55.1	+3.8

[1] 85% green DM.
[2] 86% green DM.
[3] Full weights; SED's approx. 0.24 kg.

green DM/ha more mass than the hard pasture ($P<0.1$). These effects of management on the pastures were similar but smaller than those reported in a similar trial on high producing pasture at Palmerston North (Korte, 1982).

There was a small live-weight advantage to flushing ewes on hard-grazed pasture (Table 2). Generally, flushing LWG on the lax-grazed pasture was 20 to 30 g/d less than on the hard grazed pastures although this was variable. There was no effect on ovulation rate but given the live-weight differences, an increase in ovulation rate of 2 to 4% on the hard-grazed pasture could be expected (Morley *et al.*, 1978).

However, the results in Table 3 show that the advantage of flushing on the hard-grazed pasture was counteracted by the live-weight cost to the ewes of preparing that pasture—Treatments (1) *v* (4). This cost was partially maintained through to mating. Hence, in both trials, ewes preparing hard-grazed pasture and then flushed on that pasture had similar ovulation rates to ewes preparing lax-grazed pasture and flushed on it.

The various main treatment effects on flushing LWG and mating performance are shown in Table 4. In terms of relative impact these effects ranked in these trials as follows: flushing feed level (high *v* low) > ewe type (heavy *v* light) > hill country type (summer wet *v* dry) > pasture type (lax *v* hard). Apparently (in these trials and in these years—1981 and 1982) grazing management effects on pasture quality at flushing had a relatively small impact on ewe performance compared with the other effects (although the size of some of these can obviously be manipulated). The small size of the management effect is consistent with other summer-management manipulations reported by Sheath *et al.* (1984).

Effects on Fleece Weight (May Shearing)

Second-shear fleece weights (Tables 3 and 4) followed a similar pattern to the live-weight responses. The 2 responses were highly correlated ($r>0.9$). The similarity of wool and mating weight responses has been a regular feature of flushing and summer-feeding type trials (e.g., Sumner and Smeaton, 1981).

Ewes flushed on hard-grazed pasture had fleeces 0.1 kg heavier than those on lax-grazed pasture. The fleece-weight cost of producing hard-grazed pasture (heavy *v* light ewes, Table 4) was however about 0.3 kg. Table 3 shows that the net loss—Treatments (1) *v* (4)—was about 0.2 kg. Fleece weight does not respond in a static and dynamic fashion to flushing as does ovulation rate (Rattray *et al.*, 1981). Hence, flushing did not make up the fleece weight cost of

TABLE 2 Effect of summer grazing management on pastures during flushing and ewe responses.

Trial	Pasture type	Green DM allowance (kg/ewe/d)	Green DM (% of total)	Total DM pre-graze (kg DM/ha)	Residual DM (kg/ha)	Flushing LWG (g/ewe/d)	Mating LW (kg)	Ovulation rate (eggs/ewe)
1	Hard	2.2	47	2150	1470	+44	52.0	1.68
		0.8	47	2380	1000	+25	51.0	1.57
	Lax	2.1	41	2480	1480	+44	52.0	1.74
		0.8	41	2410	950	−35	47.9	1.41
2	Hard	3.1	59	2250	1410	+83	56.1	1.66
		0.8	64	2330	620	−51	50.6	1.43
	Lax	3.2	55	3490	2100	+76	55.8	1.66
		0.7	52	2990	820	−78	49.5	1.44
Approx.	SED	0.1	6	300	200	—	0.45	0.3†

† Logit value.

TABLE 3 The effects of pasture preparation on ewe live weight and subsequent response at flushing and mating.

No.	Treatment Ewes	Pasture	Flushing LWG (g/day)	Mating LW	(kg)	Ovulation rate (kg)	Fleece wt May (eggs/ewe)
Trial 1							
1	Heavy	Lax	+21		2.53	52.3	1.59
2	Heavy	Hard	+19		2.66	52.2[2]	1.61
3	Light	Lax	−12		2.29	47.6	1.53
4	Light	Hard	+48		2.37	50.7	1.61
		SED			0.05	0.45	0.33[1]
Trial 2 (Interaction NS)							
1	Heavy	Lax	−20		2.88	54.3	1.63
2	Heavy	Hard	−2		2.97	55.0	1.57
3	Light	Lax	+17		2.59	51.0	1.48
4	Light	Hard	+34		2.68	51.7	1.53
		SED			0.05	0.44	0.3[1]

[1] Logit value

[2] High allowance ewes failed to gain weight.

pasture preparation in the previous weaning to mid-February period.

Contrasting the main effects in Table 4 shows the same order of relative impact as occurred for mating weight and ovulation rate.

CONCLUSIONS

These results show that *in toto*, pasture management (as contrasted in these trials) from weaning to mating had little overall impact on ewe ovulation rate and some effect on fleece weight. The cost of preparing hard-grazed pasture was at least compensated for by the subsequent slightly superior live-weight gain on that pasture in terms of ovulation rate but wool production suffered by 0.2 kg/ewe.

It is possible that the hard-grazed swards were grazed harder than required to keep them in a vegetative state, thereby penalising ewe live weight more than necessary. Sheath *et al.* (1984) subsequently suggested that pastures could be kept in a controlled state if they were maintained in a herbage mass band

TABLE 4 Influence of main effects of flushing response (Trial 2).

Contrast	Pasture allowance (kg green DM/ewe/d)	Flushing LWG (g/day)	Mating LW (kg)	Ovulation rate (eggs/ewe)	Fleece wt May (kg)
Hill country type					
summer wet	1.9	+15	54.2	1.58	2.87
	†		***		***
summer dry	2.0	0	51.8	1.52	2.69
Ewe type					
heavy	1.95	−12	54.6	1.60	2.92
			***	*	***
light	1.94	+27	51.4	1.50	2.63
Flushing feed level					
high	3.14	+80	56.0	1.67	2.91
	***		***	***	***
low	0.75	−66	50.0	1.43	2.64
Pasture type					
hard	1.94	+17	53.4	1.56	2.82
			*		*
lax	1.95	−2	52.6	1.55	2.74
SED	0.09	—	0.3	0.2[1]	0.03

† $P<0.1$.

[1] Logit value.

of 1500 to 1800 kg DM/ha. This is higher than the residual herbage levels in these trials.

Given the improvement in performance that can be achieved at flushing time on the controlled swards it would be advantageous to produce these swards provided the ewe live weight cost could be avoided e.g., by using cattle to clean up behind the ewes. Cattle appear to clean up spring-summer pastures more readily than do sheep, probably due to differences in grazing habit (Arnold, 1980). Observations at Whatawhata indicate that where cattle are available for this purpose, the above live-weight cost to the ewes in preparing controlled feed is avoided.

Control of spring-summer pasture surpluses has been advocated by Sheath and Bircham (1983) who observed greater subsequent pasture growth rates. There was little immediate effect on animal performance in their farmlet comparisons but there were important carryover effects on subsequent pasture production which appeared as an animal response as late as the following spring.

In summary, spring-summer grazing management, as practised in this study, and in the 2 years in this environment, had little effect on ewe performance. The presence of other stock classes to assist with pasture 'clean-out' may have altered this result. Careful integration of ewes with these other stock classes on hill country is therefore indicated and further studies are urgently required in this area.

ACKNOWLEDGEMENTS

The authors acknowledge the efforts of staff of the Whatawhata Nutrition Section for field measurements and data collection; Dr T. W. Knight, Messrs P. R. Lynch, D. R. H. Hall and other staff of the Reproductive Section for laparoscopy measurements; and Mrs S. Luttrell and Biometrics staff, Ruakura for data processing and analyses.

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