

Management of poor quality pastures for maximum animal performance during summer

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Abstract

A trial was carried out near Greymouth on the west coast of the South Island in 1987 and 1988 to determine production responses of thin and fat ewes to two feeding treatments from weaning to mating. At weaning in early January, 192 three-year-old **Perendale** ewes were individually condition scored and allocated **into two equal-sized groups** of thin (mean condition score = 2.7, mean liveweight = 41.4 kg) and fat (mean condition score = 3.3, mean liveweight = 46.8 kg) ewes. From weaning to the start of mating in mid-April, each thin and fat ewe group were split evenly and grazed in a leader and follower system. The leader group was preferentially fed by having **first** choice while the follower group had the second choice of pasture. The pasture was of low nutritive value because of a low content of **ryegrass** and white clover and a high content of unimproved grasses, dead material and weeds. Preferential feeding resulted in significant increases in liveweight (**+4.5** kg for thin ewes, **+5.1** kg for fat ewes) and condition (**+0.26** condition score units for **thin** and fat ewes) compared with follow-up feeding. Increases in ovulation rate at the start of mating from preferential compared with follow-up feeding were higher for thin (1.35 **vs** 1.01) compared with fat (1.44 **vs** 1.21) ewes. There was little difference in the response in wool production to preferential feeding for thin (1.01 **vs** 0.82 kg/ewe) compared with fat (1.11 **vs** 0.91 kg/ewe). Preferential feeding of thin ewes and the use of fat ewes to follow-up and clean out pastures from weaning to mating reduced the range of ewe liveweight at mating (42-54 kg) compared with grazing thin and fat ewes in a follow-up role (36-60 kg). This would help standardise individual ewe feed requirements and allow ewes to be grazed in one mob during autumn and winter. Preferential feeding of thin ewes from weaning to mating was tested on two commercial sheep farms and resulted in similar changes in ewe liveweight and condition as found in this reported trial.

Keywords preferential, follow-up, feeding, ewes, liveweight, condition, ovulation rate, wool production

Introduction

On the west coast of the South Island, the high annual rainfall (1700-4000 mm) ensures reliable summer pasture growth and allows some recovery of ewe liveweight from weaning to mating which affects both ovulation rate (Ratray *et al.* 1980) and wool growth (Hawker *et al.* 1982). Since pasture growth rates (50-60 kg DM/ha/day) exceed ewe and lamb feed requirements during summer, pasture can become rank and be of low digestibility. Lack of ryegrass and white clover also results in pasture of low nutritive value. This is caused by sub-optimal applications of lime and fertiliser on recently developed soils of low natural fertility. At weaning, there is a wide range of individual ewe liveweight in any flock depending on frame size and the number and size of lambs reared during lactation. Ewe body condition (Russell *et al.* 1969) at weaning could be a more effective measure of the ability of the ewe to respond to feeding from weaning to mating than liveweight since body condition is independent of frame size. Most of the previous research carried out in New Zealand on ewe recovery from weaning to mating has been on light and heavy ewes selected on the basis of liveweight (Kelly *et al.* 1983; Thompson *et al.* 1983).

The trial described in this paper compared the effect of preferential and follow-up feeding on the productive performance of thin and fat ewes grazing pasture with a low content of improved species over the period from weaning to mating.

Methods

The trial was conducted at Coal Creek Farm Settlement, a former Landcorp development block near Greymouth on the west coast of the South Island in 1987 and 1988. The mean annual rainfall for these two years was 2500 mm.

At weaning on 6 January, 192 3-year-old Perendale ewes were taken from a commercial flock and individually condition scored according to Russell (1984). The ewes were divided equally into groups of thin (condition score 3 and below) and fat (condition score 3 and above) ewes. Half of each of the groups of thin and fat ewes was randomly allocated to one of two equal-sized feeding treatments. The two feeding treatments consisted of a

leader group which was preferentially fed by having **first** choice of pasture and a follow-up group which was offered the second restricted choice of pasture.

The four treatment groups were:

- 1 **Thin** ewes, preferentially fed from weaning to mating.
- 2 **Thin** ewes, follow-up feeding from weaning to mating.
- 3 Fat ewes, preferentially fed from weaning to mating.
- 4 Fat ewes, follow-up feeding from weaning to mating.

From weaning to the start of mating in mid-April the four groups were rotationally grazed around 12 paddocks (averaging 1.4 ha in area) and shifted weekly with the thin and fat follow-up groups grazing the paddocks initially grazed by the respective thin and fat preferential feeding groups during the previous week. Pre- and post-grazing pasture mass for each treatment is shown in Table 1. For each 6 week rotation, the same paddock was alternately grazed by thin and fat ewes. The 5 year old pasture was of low nutritive value due to a low percentage of **ryegrass** and legumes (mainly white clover) and a high percentage of weeds (mainly *Juncus* spp) and unimproved grasses (Figure 1). Unimproved grasses consisted of browntop, Yorkshire Fog, *Poa* species, sweet vernal, goose grass (*Bromus mollis*) and chewings fescue.

Table 1 Pre- and post-grazing pasture mass for each treatment (kg DM/ha) • mean of 1987 and 1988.

Treatment		Pasture mass (kg DM/ha)	
Ewe condition at weaning	Feeding from weaning to mating	Pre-grazing	Post-grazing
Thin	Preferential	2220	1710
Thin	Follow-up	1710	1245
Fat	Preferential	2180	1770
Fat	Follow-up	1770	1235

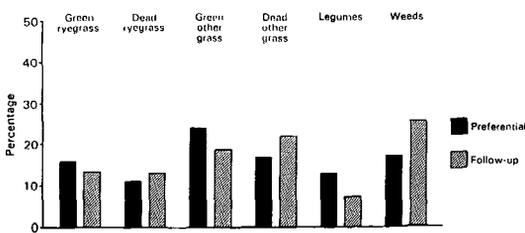


Figure 1 Composition of pasture grazed by preferential and follow-up ewes (averaged for ewe condition)

Pasture mass was assessed weekly from 50 capacitance probe readings per paddock corrected by cutting three 0.1 m² pasture **quadrats** about the paddock mean to ground level and measuring actual pasture dry matter mass. The ewes were weighed after a 16-hour **fast and** condition scored by palpating the ewe on and around the backbone in the loin area (Russell 1984) monthly. Wool was clipped from a 0.01 m² patch **on** the mid side on 27 ewes per treatment group at weaning and the start of mating to measure greasy wool production. This measurement was adjusted using **covariate** analysis according to wool production measured during the pre-rival period. **At** the start of mating (15 April, 1987 and 1988) each ewe was **laparoscoped** and the number of **corpora lutea** per ewe ovulating counted to measure ovulation rate after **CIDR's** had been used to **synchronise** the onset of oestrus.

During mating (mid-April to the end of May), the preferentially fed **thin** and fat ewes were combined into one group and the follow-up thin and fat ewes combined into another group and the feeding treatments continued.

For the period from the end of mating in 1987 to **weaning in 1988 the ewes were grazed in one mob. It was** not feasible to measure the lambing performance of the ewes because a commercial farming operation was **being carried** out on the site.

The data for ewe condition, liveweight, ovulation rate and wool production were subjected to analysis of variance **according** to a 2 x 2 factorial design.

Results

Although the apparent daily pasture intake of both the preferential and follow-up ewes was similar (Table 1), the follow-up ewes grazed pasture with less green grass and legume and more weeds and dead material (Figure 1) to a lower post-grazing pasture mass (Table 1) than the preferentially fed ewes. Hence the preferentially fed **thin** and fat ewes gained significantly (**P<0.05**) more liveweight and condition respectively during the trial period than the follow-up thin and fat ewes (Table 2). This better feeding and liveweight gain allowed the preferentially fed **thin** and fat ewes to have a significantly (**P<0.05**) higher ovulation rate at the start of mating and wool production from weaning to mating compared with the follow-up thin and fat ewes respectively (Table 3). There was no significant difference (**P<0.05**) in liveweight gain or wool production between preferentially fed thin and fat and follow-up thin and fat ewes. Preferential feeding of thin compared to fat ewes and follow-up, **feeding** of thin compared to fat ewes resulted in a significantly greater (**P<0.05**) gain in condition score. Ovulation rate at the start of mating was significantly higher (**P<0.05**) for follow-up fat than fol-

low-up thin ewes. There was no significant difference ($P < 0.05$) in ovulation rate between preferential thin and preferential fat ewes.

Table 2: Effect of ewe condition and feeding on change in ewe liveweight (kg) and condition score from weaning to mating - mean of 1987 and 1988.

Ewe condition at weaning	Treatment Feeding from weaning to mating	Change In	
		Liveweight	Condition score
Thin	Preferential	5.7	0.51
Thin	Follow-up	1.2	0.25
Fat	Preferential	5.2	0.28
Fat	Follow-up	0.1	0.02
LSD (5%)		2.9	0.17

Note:

1 Initial ewe liveweight at weaning = 41.4 kg for thin ewes and 46.8 kg for fat ewes

2 Initial condition score at weaning = 2.7 for thin ewes and 3.3 for fat ewes

Table 3: Effect of ewe condition and feeding on ewe ovulation rate at the start of mating and wool production (kg/ewe) from weaning to mating - mean of 1987 and 1988.

Ewe condition weaning	Treatment Feeding from weaning to mating	Ovulation rate	Wool production
			(kg/ewe)
Thin	Preferential	1.35	1.01
Thin	Follow-up	1.01	0.82
Fat	Preferential	1.44	1.11
Fat	Follow-up	1.21	0.91
LSD (5%)		0.20	0.19

Discussion

Ewe condition at weaning

In any flock, ewe condition at weaning is a function of condition at lambing, the level of feeding during lactation and the number and growth rate of lambs reared. Hence **there** is usually a wide range of ewe condition at weaning that differs from the distribution of liveweight because of the different frame size of individual ewes. At weaning ewes will range in liveweight from light to heavy (depending on both frame size and condition) **and** in condition from thin to fat (depending on loss of condition during lactation). The interaction of ewe liveweight and condition will create four broad categories of ewes: heavy/fat, heavy/thin, light/fat and **light/thin**. Probably, the heavy/thin ewes would lose most

condition during lactation owing to the rearing of twins or heavier lambs and therefore require higher levels of feeding from weaning to mating to recover **this** condition. Kelly *et al.* (1983) argued that it was worthwhile to preferentially feed only well grown ewes of high potential performance (heavy/thin) before mating rather **than** thin ewes that were light due to inferior genetic quality or Poor rearing (light/thin). In this trial the thin ewe groups **were a mixture** of heavy/thin and light/thin ewes. Unless genetically superior or well grown ewes can be identified at weaning according to frame size or high performance as measured by the number or weight of lambs reared, it is not possible to select the animals that will give the best response to extra feed from weaning to mating.

Summer grazing management

In pastures where there is a lack of improved pasture species (ryegrass and white clover) the trial results indicate that ewes can recover liveweight if they have **first** choice of the pasture at a high allowance (4-5 kg DM/ewe/day). Similar ewe liveweight gains to those measured in this trial (5-6 kg) have been reported by Thompson *et al.* (1990) at a similar pasture allowance. This type of lenient grazing results in a high **post**-grazing pasture mass dominated by less digestible pasture components (dead material and weeds). If pasture of adequate digestibility is to be maintained to achieve liveweight gain through several grazings, the residual pasture has to be hard grazed by another mob of stock. Such grazing results in maintenance of liveweight only as shown by the follow-up groups of trial ewes. Although the post-grazing pasture mass for these ewes was still high (1740 kg DM/ha) most of the pasture consisted of dead material, grass stem and rushes with a high dry matter content but low digestibility.

Ewe liveweight at mating

In a commercial flock, ewe liveweight at mating is considered to be a more meaningful indicator of reproductive performance than ewe condition (Kelly *et al.* 1983). since it includes both condition and frame size. In this trial Preferential and follow-up feeding of both thin and fat ewes from weaning to mating resulted in a similar liveweight gain. Other workers (Kelly *et al.* 1983; **Thompson et al.** 1983) reported little difference in liveweight gain for light and heavy ewes at a similar pasture allowance to the preferentially fed group. Despite the similarity in liveweight gain between weaning and mating, fat ewes were still heavier at the start of mating than thin ewes under both feeding treatments because of higher initial liveweight at weaning.

Although preferential feeding **increased** ewe liveweight at the start of mating to a similar degree (**+4-5 kg**) for both thin and fat ewes, the response in ovulation rate to better feeding was higher for thin (1.35 vs 1.01) than fat (1.44 vs 1.21) ewes. This result was in contrast to that found by Kelly *et al.* (1983), who found that the increase in ovulation rate to a generous feed allowance was **similar** for light and heavy ewes that gained 6-8 kg of liveweight for 6 weeks before the start of mating. In contrast to ovulation rate, wool production responses to preferential feeding were similar for both thin and fat ewes. This result was in agreement with that found by Kelly *et al.* (1983) for light and heavy ewes.

Preferentially feeding thin rather than fat ewes and using fat rather than thin ewes to follow-up also has the advantage of reducing the variation in ewe liveweight at the start of mating. In this trial, preferential feeding of thin ewes and using fat ewes to follow-up resulted in a narrower range of individual ewe liveweight at mating (42-54 kg) compared with using both thin and fat ewes in a follow-up role (36-60 kg). Ewe liveweight at weaning ranged from 33 to 62 kg. **A narrow range of ewe liveweight** at the start of mating would be desirable since it simplifies management through having relatively uniform individual ewe feed requirements during autumn and winter.

Condition scoring technique

The relationship between condition scoring and liveweight showed that each condition score represented 11.5 kg of liveweight on average in this trial. This is in line with the relationship reported by Russell *et al.* (1984) but higher than that reported by Kelly *et al.* (1983). **In this trial, change in condition score in relation to liveweight change was underestimated for the fat, preferentially fed ewes.** It was more difficult to maintain consistency of condition scoring in ewes at scores above 3.5 compared with lower scores.

The practical operation of separating thin ewes at weaning involves working around a condition score cut off point and does not require accurate assessment of each ewe. For this trial, the cut off condition score **was** 3 to ensure that there was an equal number of ewes in the thin and fat treatment groups. In practice this cut off point would vary with overall ewe condition and the proportion of the flock that was considered appropriate for a preferential feeding group.

On-farm testing

Before the start of the reported trial, the concept of preferentially feeding thin ewes was tested on mobs of 1005 and 1995 Perendale ewes on two **West Coast sheep**

farms. Since the ewes on both farms were in poorer condition than the trial ewes, the cut off point used at weaning was a condition score of 2.25. This resulted in groups of 405 and 555 thin ewes respectively at each **farm** with an average initial condition score of 1.9 (average ewe liveweight = 42.8 kg). The remaining fatter ewes had an average initial condition score of 2.7 (average ewe liveweight = 47.2 kg). The thin ewes were selected by individually condition scoring each ewe as described for the trial and marking those below the cut off point

From weaning (mid-January) to the start of mating (mid-April), the preferentially fed ewes were given first choice of pasture or second choice behind a mob of lambs. During this period these ewes gained 8.1 kg of liveweight (1.2 condition score units) to average 50.9 kg at the start of mating. The fat ewes were grazed as a **follow-up mob** behind the preferentially fed thin ewes or lambs. From weaning to the start of mating these ewes gained 6.7 kg liveweight (0.5 condition score units) to average 53.9 kg at the start of mating. In these on-farm situations, the follow-up ewes performed better than the trial follow-up ewes because the pasture had a higher content of **ryegrass** and white clover.

Practical application

From the trial results, a broad analysis can be made to compare the likely benefits from preferential feeding of thin ewes and using fat ewes to follow-up **with** using both thin and fat ewes as follow-up animals as is the general practice on sheep farms. This analysis assumes that there is sufficient pasture available of a type suitable for preferentially feeding thin ewes with the **first** choice of pasture. The analysis can be carried out by comparing the average ovulation rate and wool production from the preferential thin and follow-up fat groups with the average from the follow-up fat and thin groups. Although this comparison indicates that there is a substantial benefit from preferentially feeding thin ewes, it is based on several assumptions that could not be tested in the trial. **These** include the lack of actual lambing performance results from the different treatment groups and the assumption that combining treatment groups would result in similar ewe performance to that obtained from grazing thin and fat ewes in separate groups. The inclusion of a control group of mixed thin and fat ewes would have allowed a more valid comparison to be made. However Kelly *et al.* (1983) reported similar performance from light and heavy ewes grazed separately or mixed in one mob for 6 weeks before the start of mating. There would also be some extra costs from implementing the strategy. These include time and possibly **labour** in individually condition scoring each

ewe at weaning and **shifting** an extra mob of sheep. In order to have pasture suitable for preferential grazing of thin ewes, it may also be necessary to dispose of lambs or other priority stock that would normally *graze this* pasture at an earlier date. However, even after taking these factors into consideration, it is considered that there would be worthwhile benefits from the preferential feeding of thin ewes from weaning to mating.

Conclusions

- 1 Preferentially fed ewes that leniently grazed summer pasture with a low **ryegrass** and white clover and a high unimproved grass, dead material and weed content gamed 5-6 kg of liveweight from weaning to mating.
- 2 To maintain pasture quality for future *grazings*, it was necessary to carry out a follow-up grazing to control less desirable pasture species and weeds. Ewes used in this role maintained **liveweight** only from weaning to mating.
- 3 Separating thin ewes at weaning and preferentially feeding them from weaning to mating resulted in a greater ovulation rate at the start of mating compared with the use of thin ewes in a follow-up grazing role (1.35 vs 1.01). The comparative difference in ovulation rate for preferentially fed and follow-up fat ewes was lower (1.44 vs 1.21).
- 4 The response in wool production from weaning to mating was similar for preferentially fed and follow-up thin ewes (1.01 vs 0.82 kg/ewe) compared with preferentially fed and follow-up fat ewes (1.11 vs 0.91 kg/ewe).
- 5 preferentially feeding thin ewes from weaning to mating and using fat ewes to follow-up reduced the range in individual ewe liveweight at the start of mating (42-54 kg) compared with using both thin and fat ewes in a follow-up role (36-60 kg). This narrower range of liveweight would allow more appropriate feeding of individual ewes during the following autumn and winter if grazed in one mob.

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