The effect of sward height during pregnancy on wool grown by ewes rearing twins or triplets

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ABSTRACT

Previous work estimating the impact of rearing lambs on wool growth and processing characteristics has been done primarily with single and twin-bearing ewes. The effect of bearing/rearing triplets on wool growth has been largely extrapolated from these data. The aim of this study was to compare the wool growth and quality of twin- and triplet-bearing/rearing ewes offered different sward height allowances. After pregnancy scanning, 94 Romney ewes (including 68 twin- and 26 triplet-bearing ewes) with 6 weeks wool growth, were randomly allocated to four different sward heights (2, 4, 6 and 8 cm). Within the first 24 hours of parturition ewes were transferred to one of two sward heights (4 and 8 cm). Ewes were shorn 87 days after parturition, the fleece was weighed and a sample was taken from the midside for measurement of fleece characteristics. There were no interactions between nutritional treatment and litter size for any wool measurements. Fleeces from twin-bearing/rearing ewes tended to be heavier ($P<0.1$; 2.0 kg vs 1.9 kg) than those from triplet-bearing/rearing ewes. There was no effect of litter size on any other wool characteristic. Ewes offered 2 cm during the last half of pregnancy had lighter (1.6 vs 2.2 kg, $P<0.05$) and finer (39.0 vs 41.8 μm, $P<0.05$) fleeces than those offered 4 cm but there was no increase in weight or fineness for those offered more than 4 cm. Nutritional treatments post parturition had no significant effects on wool characteristics. There seems to be little benefit, in terms of wool growth and wool processing characteristics, of offering twin- or triplet-bearing ewes a sward height of more than 4 cm.

Keywords: feeding; nutrition; wool growth; wool characteristics.

INTRODUCTION

The increase in the relative value of sheep meat to wool over the last decade (MWES 2001) has lead to increased lambing percentages, with the national average lambing percentage increasing to over 120% (MWIES 2002). Previous work (Amer *et al.,* 1999) has shown that the proportion of triplets in flocks lambing at over 150% will increase at the expense of single-born lambs. Therefore the incidence of ewes bearing and rearing triplets is likely to increase further. Previous work estimating the impact of rearing lambs on wool growth and processing characteristics has been undertaken primarily with single- and twin-bearing ewes (Butler 1982; Hatfield *et al.,* 1995; Hawker & Thompson 1987; Parker & McCutcheon 1992; Parker *et al.,* 1991; Sumner & McCall 1989). The effect of bearing/rearing triplets on ewe wool growth has been largely extrapolated from these data. Wool production is still an important source of income for many crossbred sheep farmers and is determined both by the quantity and quality of wool grown. Increasing the number of ewes rearing triplets may decrease the value of the ewe wool produced and this should ideally be included in the real cost of increasing fecundity.

The aim of this study was to compare the wool growth and characteristics of twin- and triplet-bearing/rearing ewes offered different sward height allowances from mid-pregnancy until weaning.

MATERIALS AND METHODS

Experimental design and animals

After pregnancy scanning, 64 days after the mid-point of the mating period (P64), 186 Romney ewes (including 96 twin- and 90 triplet-bearing ewes) with 6 weeks wool growth, were randomly allocated to four different sward heights (2, 4, 6 and 8 cm), each replicated twice and balanced for both ewe age (2-tooth *vs*. mixed-age) and pregnancy rank. Within the first 24 hours of parturition ewes were transferred to one of two sward heights (4 and 8 cm). Grazing management of the sward has been described previously by Morris *et al*. (2003). Ewes were shorn 87 days after parturition, the fleece was weighed and a sample was taken from the midside for measurement of staple length, mean fibre diameter (MFD), colour, bulk and washing yield. At shearing only 68 of the ewes, pregnancy scanned with twins, and only 26 of the ewes, scanned with triplets, were rearing full litter sets. Only these 94 ewes were included in the analysis of fleece characteristics. Lamb survival results have been previously described by (Morris *et al.,* 2003)

Staple length was measured as the average length of ten staples from each midside sample. Samples were aqueous scoured in a four-bowl mini scour to obtain a washing yield. The sample was then carded in preparation for the measurement of loose wool bulk using a WRONZ Loose-Wool Bulkometer (Bedford *et al.,* 1977). Clean wool colour was measured on a Hunterlab spectrophotometer (Hunterlab, Colour Quest

45°/0° LAV, Hunter Assoc Laboratory VA, USA) according to SANZ (1984). The sample was then cored by hand using a 2 mm trocar and used to measure mean fibre diameter, the coefficient of variation of fibre diameter (cvMFD) and fibre curvature using an Optical Fibre Diameter Analyser, (IWTO 1998).

The trial was undertaken with the approval of the Massey University Animal Ethics committee.

Data analysis

Comparative least-squares means between groups were estimated for measured follicle and wool parameters using the Generalised Linear Model procedure of the statistical package 'MINITAB' (Minitab 2003). The main effects of birth/rearing rank, pregnancy sward surface height and lactation sward surface height were fitted. Dam age and the interactions between the main effects were found to be not significant and were therefore not included in the model.

RESULTS

There were no significant differences between ewes that reared twins and those that reared triplets for any parameters measured (Tables 1 and 2), although the greasy fleece weights (GFW) of twin-rearing ewes tended to be 100 g heavier than those from triplet-rearing ewes (P=0.09) (Table 1).

TABLE 1: The effect of litter size and sward height on the greasy fleece weight (GFW) of ewes and their fibre diameter characteristics (least-squares means ±SEM). Means within the sward height treatment that do not have superscripts in common are different (P<0.05).

	(n)	GFW **(kg)**	Yield **(%)**	Mean Fibre Diameter (MFD) (μm)	Coefficient of variation of MFD **(%)**
Litter size					
Twin	68	2.0 ± 0.05	78 ± 1	40.7 ± 0.3	24.0 ± 0.3
Triplet	26	1.9 ± 0.07	76 ± 1	40.0 ± 0.5	24.0 ± 0.5
signif.		P=0.09	NS	NS	NS
Pregnancy					
Sward height[1]					
2 cm	19	1.6 ± 0.09[a]	77 ± 1	39.0 ± 0.6[a]	25.4 ± 0.6[a]
4 cm	26	2.2 ± 0.07[b]	78 ± 1	41.8 ± 0.5[b]	23.3 ± 0.5[b]
6 cm	26	1.9 ± 0.08[ac]	75 ± 1	39.8 ± 0.6[a]	23.3 ± 0.5[b]
8 cm	23	2.1 ± 0.08[bc]	77 ± 1	40.8 ± 0.6[ab]	23.7 ± 0.5[ab]
Signif.		**	NS	**	*
Lactation					
Sward height[2]					
4 cm	44	2.0 ± 0.06	77 ± 1	40.4 ± 0.4	23.7 ± 0.4
8 cm	50	1.9 ± 0.06	78 ± 1	40.3 ± 0.4	24.1 ± 0.4
signif.		NS	NS	NS	NS

[1]Sward height offered from pregnancy scanning to birth.
[2]Sward height offered from birth to weaning.

TABLE 2: The effect of litter size and sward height on ewe wool characteristics (least-squares means ±SEM).

	(n)	Staple Length **(mm)**	Colour **(Y-Z)**	Bulk **(cm^3/g)**	Fibre Curvature **(deg./mm)**
Litter size					
Twin	68	86 ± 1	2.8 ± 0.3	20.0 ± 0.3	37.4 ± 0.6
Triplet	26	84 ± 2	3.3 ± 0.5	20.7 ± 0.4	39.2 ± 1.0
signif.		NS	NS	NS	NS
Pregnancy					
Sward height[1]					
2cm	19	81 ± 2	3.2 ± 0.6	20.4 ± 0.5	40.0 ± 1.2
4cm	26	87 ± 2	3.9 ± 0.5	20.0 ± 0.4	37.3 ± 1.0
6cm	26	85 ± 2	2.7 ± 0.5	20.9 ± 0.4	39.2 ± 1.0
8cm	23	88 ± 2	2.4 ± 0.5	20.1 ± 0.5	36.6 ± 1.0
signif.		NS	NS	NS	P=0.08
Lactation					
Sward height[2]					
4cm	44	87 ± 2	3.1 ± 0.4	20.2 ± 0.4	37.6 ± 0.8
8cm	50	84 ± 1	2.9 ± 0.3	20.4 ± 0.3	38.9 ± 0.7
signif.		NS	NS	NS	NS

[1]Sward height offered from pregnancy scanning to birth.
[2]Sward height offered from birth to weaning.

Sward surface height (SSH) during pregnancy was important in determining GFW, MFD and cvMFD and tended to influence fibre curvature (P=0.08). Ewes offered a SSH of 4 cm had heavier GFW and a thicker MFD than those offered either 2 or 6 cm, but the differences were not significant when compared to ewes offered a SSH of 8 cm during pregnancy. Ewes offered a SSH of 2 cm during pregnancy had a significantly higher cvMFD (~2 %) than those offered 4 or 6 cm, but the difference was not significant (P=0.14) at 8 cm.

SSH during lactation did not have a significant effect on any of the parameters measured.

DISCUSSION

Within this study the key questions of interest were; should triplet-rearing ewes be managed separately from their twin-rearing counterparts to optimise wool production and, is there a cost, in terms of ewe wool production, associated with increasing the proportion triplet-bearing ewes? While interpreting the results of this study, it is important to recognise that the statistical power was limited by the small number of ewes that successfully managed to rear triplet lambs to weaning.

Given that there were no significant interactions between litter size and SSH during either pregnancy or lactation, the current study provides no evidence to suggest that twin and triplet bearing ewes should be offered differing feeding levels from a wool quantity and quality perspective. Morris *et al.* (2003) reached similar conclusions based on the ewe and lamb liveweight and lamb survival data from the same animals.

The only difference in wool production between the twin- and triplet-rearing ewes, was a tendency for triplet-rearing ewes to have 100 g (5%) lighter fleece weights than their twin-rearing counterparts, although no differences in staple length or fibre diameter were observed. In comparison the marginal cost of rearing a twin compared to a single lamb on ewe fleece weight over a similar period was estimated at 10% by Sumner & McCall (1989). This implies that the extra cost, in wool production terms, of rearing triplets rather than twins is minor.

It is accepted that increasing pasture allowance normally increases wool growth (Hawker *et al.,* 1984). In the current study, ewes that grazed the 2 cm swards during pregnancy grew less wool than those grazing 4 or 8 cm. However increasing SSH above 4 cm did not increase wool production either during pregnancy or lactation. In fact, increasing SSH from 4 to 6 cm during mid to late pregnancy, decreased ewe wool production. It is possible this was due to decreased quality of the autumn-saved pasture (not measured) used to provide the higher sward heights. However pasture intake measurements (unpublished data) indicated that ewes offered a SSH of more than 4 cm did not increase dry matter intake, suggesting they were not willing or able to eat more at the higher sward heights. There were no live weight differences in ewes fed 4, 6 or 8 cm during pregnancy and all three groups increased ewe live weight between mid-pregnancy and lambing (Morris *et al.,* 2003), suggesting that they were fed above requirements.

CONCLUSION

The current study found no significant costs, in terms of wool production, of ewes rearing triplets versus ewes rearing twins. There was no benefit from offering ewes rearing either twins or triplets a SSH of more than 4 cm during late pregnancy and lactation.

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