Relative wool production of wethers and ewes of different rearing status

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ABSTRACT

A trial was conducted over 2 years in which the comparative wool growth rates of wethers and dry, single and twin-rearing ewes were measured. The sheep were pasture fed according to 3 regimes of either continuous maintenance or alternating 3-monthly periods of either high or low plane and maintenance feeding. At any one time, groups of sheep were either gaining, maintaining or losing live weight.

This paper reports preliminary analyses of the effects on wool growth of year, breed, sheep age and rearing status. Coopworths were consistently heavier than Romneys. As a result of practical constraints associated with the trial design, ewes which reared twins were lighter at the end of the trial than ewes which reared singles which were lighter than wethers and ewes which did not raise any lambs.

Romneys grew more wool than Coopworths with no difference in wool production between wethers and ewes which did not rear a lamb. Overall, the clean wool growth rate of the dry sheep was a minimum of 7.2 g/d in July/August and a maximum of 12.5 g/d in November/December. Wool growth rates of the single and twin rearing ewes relative to the dry sheep (100) were 63 and 55 in July/August and 90 and 82 in November/December respectively. Wool growth rates after weaning did not differ between rearing status groups. The combined effect of these differential wool growth patterns on clean fleece weight of single and twin rearing ewes relative to the dry sheep (100) were 86 and 77 in December and 99 and 97 in May respectively. Despite the apparent large reduction in wool production associated with rearing lambs it is still economic at present prices for most farmers to run breeding ewes rather than dry sheep of the same breed.

Keywords Wool production; Romney; Coopworth; wether; dry ewe; single rearing ewe; twin rearing ewe

INTRODUCTION

The development of computer models to simulate farm systems requires accurate basic production data. A key production parameter for sheep farming is wool growth.

The seasonal pattern of wool growth for crossbred wool type sheep has been documented independently for wethers (Bigham *et al.*, 1978) and breeding ewes (Story and Ross, 1960; Sumner and Wickham, 1969). Feeding in these trials was not controlled. Relationships between wool growth and liveweight gain at different times of the year have also been derived independently for wethers (Sumner, 1979) and breeding ewes from pasture allowance studies (Sumner and Rattray, 1980; Hawker *et al.*, 1984). However, wool growth of wethers and ewes of different rearing status has not been compared under controlled feeding for crossbred wool type sheep.

This paper is a preliminary report of a study to provide data for use in predicting wool production from farming either wethers, dry ewes or breeding ewes under a range of conditions.

EXPERIMENTAL

Trial Design

The trial was conducted over 2 years commencing in June and using different sheep each year. Ewes were randomised in February on live weight to be either joined or not joined. At the same time, a sample of wethers of similar mean live weight was taken from a related wether flock and run with the ewes. After joining in April, the joined ewes were scanned ultrasonically to identify single and twin-bearing ewes. Sufficient numbers of wethers, unmated ewes, ewes scanned with a single lamb and ewes scanned with a twin lamb were taken onto the trial to guarantee at least 60 of each class present at weaning.

The trial was divided into winter, spring, summer and autumn feeding periods. The sheep were pasture-fed according to three regimes of either continuous maintenance, or alternating seasons of either high- or low-plane feeding and maintenance. Gain and loss treatment sheep in one season were fed at maintenance in the

succeeding season to equilibrate live weight for future gain and loss feeding.

Feeding levels were based on green pasture allowances set to ensure similar levels of liveweight change in "dry" and "wet" sheep when run separately in winter and spring. After weaning in early December all sheep within each feeding level group were run together.

Measurements

Pasture mass was estimated by double sampling using pasture cuts and visual assessment (Haydock and Shaw, 1975). Pasture composition (% green) was determined from dissection of hand plucked samples.

All sheep were weighed after an overnight fast and a delineated midside patch was clipped at 4 weekly intervals. At shearing in December and May each year, the greasy fleeces were weighed. Clean fleece weight was calculated from the yield of a full length midside sample. Clean wool growth rate was estimated by partitioning clean fleece weight according to the relative weight of clean wool clipped from the midside patch.

RESULTS AND DISCUSSION

Data from a total of 140 wethers, 146 dry ewes, 131 ewes rearing singles and 176 ewes rearing twins were analysed. Of the total 593 sheep, 290 were Romneys and 303 Coopworths. Data were analysed by regression analysis. Regression models included terms for year, breed, sheep age, rearing status and nutritional treatment. There were several significant 2-and 3-factor interactions. The interactions were, however, inconsistent between months for the wool growth data and their overall size was small compared with the very large main effects. For the sake of simplicity in this report only the main effects of year, breed, sheep age and rearing status will be considered.

Adjusted mean live weight at the start of the trial in May and at the end of the trial the following May are given in Table 2 with the monthly liveweight profile for each of the rearing status groups given in Fig. 1.

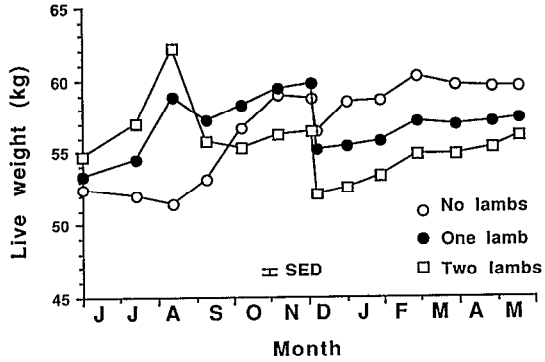

FIG. 1 The liveweight profile for each rearing status group adjusted for year, age and breed. Wethers and dry ewes combined. Ewes lambed last week August. All sheep shorn 1st week December and late May.

The sheep were heavier at the start and gained more weight in the first year than in the second, despite attempts to control feeding so that on average the live weight at the start and end would be similar. Coopworths were consistently heavier than Romneys. Despite randomisation, ewes which subsequently reared twins were heavier at the start reflecting the positive relationship between live weight and the ability to conceive and rear multiples (Rattray *et al.*, 1980). Ewes which raised twins were however lighter at the end of the trials than the other groups which were similar. Despite attempts to restrict intake of the wethers and dry ewes in spring through strict rationing with controlled break feeding, pasture growth was sufficient for these sheep to still show a marked liveweight gain. Practical considerations prevented separating each of the single and twin rearing groups during the winter and spring. Consequently the ewes rearing singles gained more weight during lactation than the twin rearing ewes.

Between year trends in clean fleece weight (Table 1) were not significantly different in December but were greater in May for Year 1 compared with Year 2. As in previously reported trials at Whatawhata (Sumner and Willoughby, 1985; 1988) the Romneys in this trial had heavier fleece weights than the Coopworths. Relative fleece weights for the Romney and Coopworth were 100:90 and 100:92 in December and May respectively. The seasonal pattern of wool growth for the 2 breeds was similar (Fig. 2) with a

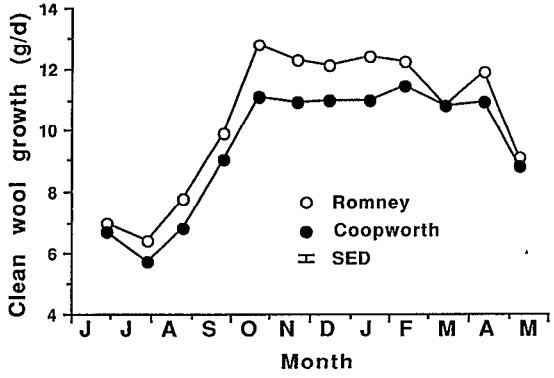

FIG. 2 Seasonal pattern of wool growth for the Romney and Coopworth adjusted for year, age and rearing status.

minimum in July and a maximum between November and February. The relative ranking of the Romney and Coopworth for wool growth in July and between November and February was 100:89 indicating a similar proportional seasonal wool growth pattern for both breeds. The 'epression in the wool growth curve during March ıd April was probably the result of decreased ч uality of green feed.

TABLE 1 Adjusted mean fleece free live weight (kg) at the start and end of the trial in May each year and clean fleece weight (kg) in December and May.

Treatment	Live weight		Clean fleece weight	
	May (Initial)	May (Final)	Dec	May
Year				
1	54.7	58.0	1.74	2.10
2	51.8	53.3	1.78	1.73
SED	0.4	0.4	0.03	0.03
Breed				
Romney	52.1	54.2	1.86	2.00
Coopworth	54.4	57.2	1.67	1.84
SED	0.4	0.4	0.03	0.03
Age				
1 year	46.7	54.3	1.74	1.92
2 year	51.7	58.0	1.80	1.98
3 year	54.2	59.2	1.82	1.98
4 year	56.2	59.5	1.68	1.85
5 year	55.8	56.3	1.61	1.67
SED	0.8	0.8	0.04	0.04
Rearing status				
Wether	52.1	57.6	1.97	1.94
0 lamb	53.0	56.7	1.91	1.93
1 lamb	53.0	55.0	1.67	1.92
2 lambs	54.7	53.8	1.50	1.88
SED	0.5	0.6	0.04	0.04

The effects of age on fleece weight were consistent with other published data (Sumner, 1984) with relativities of 100:103:105:97:92 for 2-tooth, 4-tooth, 6-tooth, 4 year-old and 5 year-old sheep respectively in December and 100:103:103:96:87 in May. The pattern of wool growth was similar for all age groups.

December clean fleece weights of wethers and dry ewes were not significantly different and were greater than that of ewes rearing lambs. The clean fleece weight of a ewe rearing 2 lambs was less than that for a ewe rearing 1 lamb (Table 1). Relative to the mean December clean fleece weight of sheep rearing no lambs (100) the clean fleece weight of ewes rearing either 1 or 2 lambs was 86 and 77 respectively. May clean fleece weight was not significantly different between the rearing status groups (Table 1).

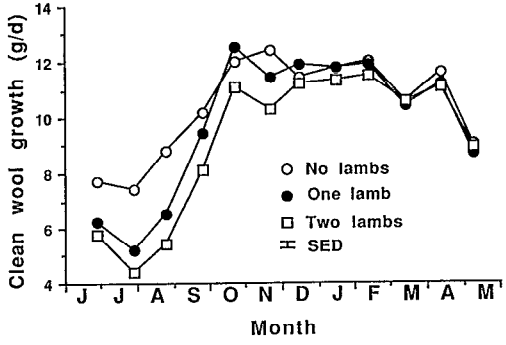

FIG.3 Seasonal pattern of wool growth for each rearing status grouph adjusted for year, age and breed.

Mean wool growth rate for each of the rearing status groups (Fig. 3) showed that pregnant sheep had a greater reduction in wool growth during July than non-pregnant sheep. Relative wool growth rates in July at the time of minimum growth were 100:80:75 for non-pregnant sheep, ewes carrying 1 lamb and ewes carrying 2 lambs respectively.

Voluntary intake by ewes increases substantially after parturition to meet increased nutritional requirements. The efficiency of wool production also decreases in lactating sheep relative to that of non-lactating sheep (Corbett, 1979). In this trial an attempt was made to isolate the effects of nutrition from physiological state by feeding lactating and non-lactating sheep at levels set to maintain overall live weight within each physiological state.

Intake over the winter and spring periods was estimated to average 1.75 and 1.27 kg DM/hd/d for the lactating and non-lactating groups respectively. Thus while the seasonal increase in daily wool growth of the lactating group apparently exceeds that of the non-lactating group, the overall efficiency of daily wool growth of the lactating ewes was approximately 50% of that of the non-lactating group at parturition and approximately 75% at weaning. Given unrestricted feeding, daily wool growth of the non-lactating sheep would exceed that of lactating ewes. Ewes rearing 2 lambs grew consistently less wool than ewes rearing 1 lamb until weaning whereafter wool growth rates of the different rearing status groups were not significantly different. Detailed analyses are proposed to derive response functions between liveweight change and wool growth rate for each rearing status group within each season.

TABLE 2 Effect of lamb rearing on total greasy wool production (kg)

No. of lambs	Fleece weight		Total wool production	
	Ewe (per hd)	Lamb (per hd)	(per ewe)	(per su)
0	5.2	-	5.2	7.4
1	4.9	1.1	6.0	6.0
2	4.6	0.8	6.2	5.2

Relative per annum nutritional requirements for each of the rearing status groups were calculated on the basis of the derived estimates of intake. The estimate for a ewe rearing a single (1.0 stock units (su)) relative to a wether or ewe rearing no lambs was approximately 0.7 su and for a ewe rearing 2 lambs 1.2 su over the winter and spring. This is the period when available feed would limit production of the lactating ewes. Using these derived values, the total wool production of each wether or ewe and their lambs was calculated on a per ewe and a per su basis (Table 2). In comparison with rearing no lambs, there was a 6% reduction in total per head wool production with rearing 1 lamb and a 12% reduction with rearing 2 lambs. This equates to a reduction of 19% per su rearing 1 lamb and 30% per su with rearing 2 lambs. At present wool prices the reduction in wool production per su for ewes rearing lambs is equivalent to approximately $5.50 for a ewe rearing 1 lamb and $8.50 for a ewe rearing 2 lambs. Thus assuming direct costs associated with rearing lambs of approximately $3 - 4/su, it appears more profitable to farm dry rather than wet sheep when the return from a single weaned lamb falls below about $9 or the combined return from twins falls below about $15.50. Few farms have experienced lamb returns this low over the last 2 years, although in some cases dry sheep farming may be an acceptable option.

In switching to a dry sheep policy several management considerations become important. These include managing the effects of feed shortage in winter and controlling a feed surplus in spring with a fixed number of sheep. Farming dry ewes rather than wethers provides greater flexibility in case a return to breeding is contemplated. The choice of breed is also important as shown by these data where a Romney ewe rearing a single lamb grew the same amount of wool as a dry Coopworth.

CONCLUSIONS

Controlled feeding of wethers and ewes of different rearing status has shown the comparative live weight, liveweight change and wool growth of wethers and ewes rearing no lambs to be similar. Ewes rearing 1 lamb grew 6% less wool and ewes rearing 2 lambs 12% less wool than sheep rearing no lambs. Despite the apparent large reduction in wool production associated with rearing lambs combined with the associated added costs and a depressed lamb meat market it is still economic for most farmers to continue to farm breeding ewes rather than dry sheep of the same breed. Other management considerations may suit a shift to a dry sheep farming policy. Associated changes in either breed or wool type may alter the economics of the respective farming ventures.

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