Wool growth in autumn and spring lambing ewes

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ABSTRACT

Seasonal wool growth pattern and fleece characteristics of Dorset x Romney ewes lambing in either autumn or spring and rearing 0, 1 or 2 lambs were measured over 2 years. The ewes were shorn twice-yearly in March and October.

Season of lambing influenced the seasonal pattern of wool growth. Autumn lambing ewes did not show as marked a seasonal decline in wool growth during the winter. March shorn fleeces were coarser (2.5μm), stronger (20 N/ktex), and yellower (1.1 Y-Z units) than October shorn fleeces. Fleece characteristics of March shorn wool were unaffected by season of lambing. Fleeces of October shorn autumn lambing ewes were heavier (0.2 kg clean), coarser (1.7μm), stronger (1.7 N/ktex), brighter (1.8 Y units) and less yellow (1.0 Y-Z units) than fleeces of October shorn spring lambing ewes. On the basis of price trends over the last 5 years, net wool returns from autumn lambing ewes would exceed those from spring lambing ewes by approximately 80c/ewe/year.

Keywords Dorset x Romney, wool growth, fleece characteristics, autumn lambing, spring lambing.

INTRODUCTION

As part of a programme in Northland to produce lambs over an extended part of the year, a flock of autumn lambing Dorset x Romney ewes were established by selection for early lambing between 1978 and 1986 (McQueen and Reid, 1988). From 1985 the flock was maintained at Kamo Agricultural Centre with a comparable spring lambing flock as a control.

Comparative differences in live weight and lamb production between the 2 flocks in 1986 and 1987 have been reported previously (Reid *et al.*, 1988). Autumn lambing ewes had a higher annual wool production than spring lambing ewes. Preliminary wool growth data indicated that the rate of wool growth in winter was higher in lactating autumn lambing ewes than in their pregnant spring lambing counterparts. Peak wool growth rate in late spring was higher in non-pregnant ewes than in lactating spring ambing ewes.

This paper reports results of a more detailed analysis of 2 years data on the effects of parity and season of lambing on wool growth rate and objectively measured fleece characteristics of commercial significance.

EXPERIMENTAL

Management

Grazing and mating management have been described in detail by Reid *et al.* (1988) (Fig. 1). In summary, ewes were rotationally grazed throughout the year. Both lambing groups (autumn lambing n = ~300, spring lambing n = ~150) were run as one mob from late November to March and from late July to mid August when neither group had lambs at foot. At other times of the year, ewes with lambs at foot were preferentially fed.

All ewes were shorn twice-yearly in early March, prior to autumn lambing, and again in late October, after spring lambing.

Wool Measurements

Individual fleeces were weighed at each shearing between October 1986 and October 1989. Mid-side fleece samples were collected at both shearings in 1987 and 1988. Fleece samples from 72 ewes selected by restricted randomisation within a factorial design were used to assess the effect of season of lambing, ewe age

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TABLE 1 Pooled least square means for fleece characteristics of the dry control ewes in both time of lambing groups shorn in March and October over 2 years.

Time of shearing	Number of ewes	Clean fleece weight (kg)	Staple length (mm)	Fibre diameter (μm)	Staple strength (N/ktex)	Brightness (CIE Y units)	Yellowness (CIE Y-Z units)
March	24	1.0	48	37.8	48	56.2	4.4
October	24	1.6	75	35.3	28	57.0	3.3
SD		0.1	2	0.3	2	0.7	0.3
Time of shear effect		***	***	***	***	NS	***

and rearing either 0, 1, or 2 lambs within each calendar year on fleece characteristics of commercial significance. Mean staple length, washing yield, mean fibre diameter (Lynch and Michie, 1976), staple strength (Heuer, 1979) and brightness and yellowness (Hammersley and Thompson, 1974) were measured.

The effect of season of lambing, ewe age and parity status on seasonal wool growth was measured by clipping a mid-side area from a total of 60 ewes in both season of lambing flocks approximately every 6 weeks over 2 years. The ewes were balanced for age and parity status. The group of ewes rearing no lambs were selected at random in October 1986 to be retained throughout the trial and withheld from the ram during subsequent joinings of their respective flocks. A different group of ewes rearing lambs were used each year due to changes in their rearing status. A total of 12 ewes died or were culled during the trial. Clean wool growth rate was calculated by partitioning clean fleece weight, derived from greasy fleece weight and the yield of the mid-side fleece sample taken at shearing, according to the relative weight of clean wool clipped from the mid-side patch at each clipping.

RESULTS AND DISCUSSION

Seasonal Wool Growth

Mean live weight at each clipping for the ewes rearing no lambs in each season of lambing group over 2 years are shown in Figure 2. These data reflect the relative feed allowance on offer to the season of lambing groups each year. With increasing pasture growth rates, pasture availability was greater in late spring and early summer, than in late autumn and winter.

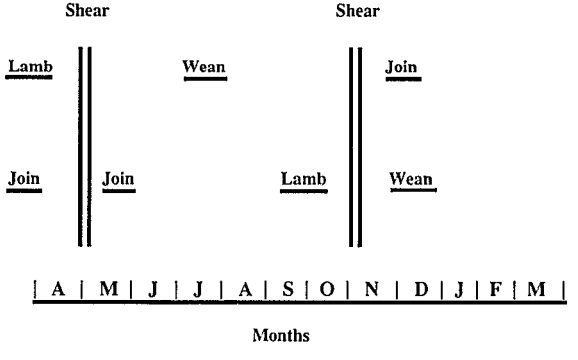

FIG 1 Trial design.

The seasonal pattern of wool growth for ewes rearing no lambs, adjusted for live weight to remove effects of differential feeding and pooled over season of lambing groups, is shown in Figure 3. These seasonal wool growth curves which were similar between years, are typical of those for crossbred wool type sheep with the wool growth values for the Dorset x Romney ewe being approximately two-thirds of those measured for Romney and Coopworth sheep (Sumner and McCall, 1989).

TABLE 2 Pooled least square means for fleece characteristics of ewes shorn in October over 2 years.

Time of lambing	Number of lambs reared	Number of ewes	Clean fleece weight (kg)	Staple length (mm)	Fibre diameter (μm)	Staple strength (N/Ktex)	Brightness (CIE Y units)	Yellowness (CIE Y-Z units)
Autumn	0	12	1.6	75	35.6	32	58.5	3.1
	1	12	1.6	72	36.2	31	58.3	3.5
	2	12	1.6	70	35.5	29	57.1	3.0
Spring	0	12	1.6	76	35.0	24	55.5	3.5
	1	12	1.2	60	33.6	12	55.9	4.5
	2	12	1.6	75	34.7	14	55.9	4.0
SED			0.1	0.7	1.0	5	0.8	0.4
Time of lambing effect			NS	NS	*	***	***	*
Parity effect			NS	NS	NS	†	NS	NS
Interaction			*	NS	NS	NS	NS	NS

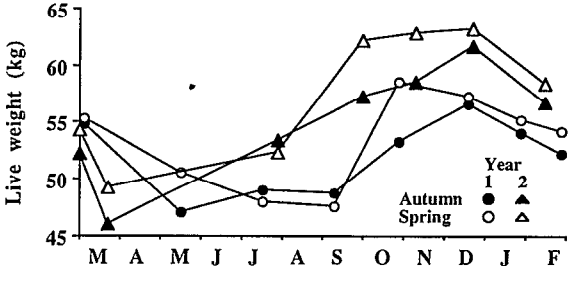

FIG 2 Live weight profile of control ewes rearing no lambs in the autumn and spring lambing groups clipped for wool growth measurement. Average SED for season of birth within year = 2.4.

As a measure of the effect of rearing a different number of lambs within each of the season of lambing flocks, the group rearing no lambs in each flock has been treated as a control. Wool growth of single and twin rearing ewes in each season of lambing group has been expressed as a proportion of the wool growth rate of the respective group rearing no lambs (Fig. 4). On average the parity means were not significantly different. However the observed trends were consistent with those reported elsewhere (Sumner and McCall, 1989).

Wool growth rate was increasingly depressed during late pregnancy and lactation as the number of lambs reared increased. The period of depressed wool growth occurred between July and October for the spring lambing ewes and between February and June for the autumn lambing ewes. This depression in relative wool growth rate appeared to be greater in ewes lambing in spring than in ewes lambing in autumn.

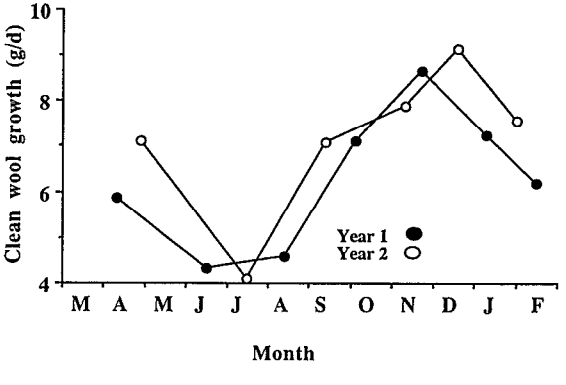

FIG 3 Pooled wool growth profile, adjusted for live weight, of the control ewes rearing no lambs in both time of lambing groups. Average SEM = 0.1.

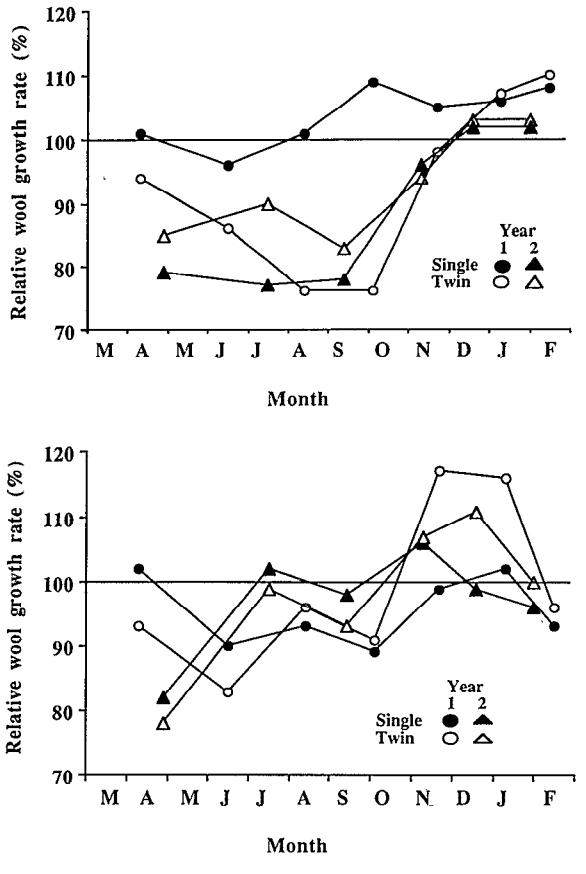

FIG 4 Wool growth rate of (a) spring lambing and (b) autumn lambing ewes rearing either 1 or 2 lambs expressed relative to their respective control ewes rearing no lambs (100). Average SED for parity within year for each season of birth = 12.

Fleece Characteristics

Fleece characteristic measurements were analysed by analysis of variance to test the effects of year, time of shearing, ewe age, season of lambing and number of lambs reared. Year and ewe age effects were not significant for any characteristic and will not be considered further.

In view of the confounding between time of shearing and the physiological status of the ewe inherent in the trial design, the time of shearing effect was analysed for data from the groups of ewes rearing no lambs only (Table 1). Fleece weight of the October shorn wool was heavier and the staple length longer than for the March shorn wool due to the longer growing period of the October shorn wool. Although the growth periods were 8 and 4 months respectively, the difference in fleece weight and staple length was a reflection of the seasonal pattern of wool growth for these sheep (Fig. 3). Winter grown wool was also finer, and as a consequence of lower tensile strength, than summer grown wool. The winter grown wool was also less yellow as it grew during the cooler and less humid time of the year. Brightness was unaffected by time of shearing.

March shorn wool from the groups of ewes rearing lambs grew during pregnancy in the autumn lambing group, and mainly after weaning in the spring lambing group. Season of lambing and parity effects were not significant for any characteristic. Thus the nutrient demands of early and mid-pregnancy during the summer were apparently insufficient to affect individual fleece characteristics.

Pooled least square means for the fleece characteristics of wool shorn in October are given in Table 2. The measured sample of twin rearing spring lambing ewes were up to 10% heavier than the other groups and grew more wool reflecting the positive correlation between live weight, fecundity and wool growth (Rattray *et al.*, 1980; Sumner and Rattray, 1980). A similar trend was also evident for spring lambing ewes for staple length and fibre diameter but did not attain statistical significance.

Wool from spring lambing ewes was finer, had a markedly lower tensile strength, was less bright and more yellow than the wool of autumn lambing ewes. A reduction in staple strength is generally associated with a short term reduction in fibre diameter. While changes in fibre diameter were not measured for the clipped samples, wool growth rate data suggest a marked reduction in fibre diameter occurred for the ewes rearing lambs in the spring lambing group in August and September. Staple strength data for the spring lambing group were more variable than for the other characteristics, possibly due to the method of measurement. As a result of the timing of shearing one of the jaws holding the wool in the staple strength tester was close to the position where the staple broke. This may have resulted in artificially high values for some samples.

This trial has enabled the effect of season of lambing on wool charactertistics to be quantified to assess the possible effect on wool returns. With no effect of season of lambing or parity for March shorn wool, wools returns from both season of lambing groups at this time would be expected to be similar. However for wool shorn in October with an assumed base price of 550c/kg clean, a recently derived estimate of the relative economic value for yellowness of -8c/Y-Z unit/ clean kg (Maddever, 1991) and indicative estimates over 5 years for staple length of 0.5c/mm/clean kg and for staple strength of 0.5/N/ktex/clean kg, there would be an advantage of approximately 80c per ewe per year in net wool returns to autumn lambing ewes compared with spring lambing ewes. This differential reflects the reduced level of processing fault in the wools from the autumn lambing ewes. While not a large margin, it is additive to any premium that may be offered for out-of-season lambs by meat processors. It is the size of this premium, rather than any beneficial effects on wool production, that will be the deciding factor as to whether autumn lambing is adopted as a common farming practice in Northland.

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REFERENCES

Hammersley, M.J.; Thompson, B. 1974. Wool colour measurement. *WRONZ Communication No. 24.*

Heuer, P.A. 1979. Staple strength - measurement equipment. *Proceedings of the Seminar on Staple Length and Staple Strength of Greasy Wool.* CSIRO Division of Textile Physics. pp 63-78.

Lynch, L.J.; Michie, N.A. 1976. An instrument for the rapid automatic measurement of fiber fineness distribution. *Textile Research Journal 46*: 653-660.

McQueen, I.P.M.; Reid, T.C. 1988. The development of an autumn lambing flock of Dorset x Romney ewes without the use of hormones. *Proceedings of the New Zealand Society of Animal Production 48*: 87-90.

Maddever, D.C. 1991. Relative economic values of wool processing parameters. *Proceedings of the New Zealand Society of Animal Production 51:* 333-338.

Rattray, P.V.; Jagusch, K.T.; Smith, J.F.; Winn, G.W.; MacLean, K.S. 1980. Flushing responses from heavy and light ewes. *Proceedings of the New Zealand Society of Animal Production 40*: 34-37.

Reid, T.C.; Sumner, R.M.W.; Wilson, L.D. 1988. Performance parameters in an autumn lambing ewe flock. *Proceedings of the New Zealand Society of Animal Production 48*: 91-94.

Sumner, R.M.W.; McCall, D.G. 1989. Relative wool production of wethers and ewes of different rearing status. *Proceedings of the New Zealand Society of Animal Production 49*: 209-213.

Sumner, R.M.W.; Rattray, P.V. 1980. Effects of short-term differential feeding in the autumn on liveweight gains and wool growth of ewes. *Proceedings of the New Zealand Society of Animal Production 40*: 209-214.