The growth of lambs throughout the year in the Waikato

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ABSTRACT

Groups of Coopworth ewes were mated to Polled Dorset rams at 2 monthly intervals for 12 months following induced ovulation and synchronised oestrus. The ram lambs were made cryptorchid and grown to a target slaughter liveweight of 40 kg. The influence of birthdate on birthweight, pre- and post-weaning growth rate, time from birth to slaughter and carcass leanness was studied.

The major influence on lamb performance was the timing of lambing in relation to spring pasture growth and the subsequent summer period, characterised by low pasture growth and quality. When late gestation was during summer lamb birth weight was lower (3.5 and 3.6 kg for January and March born lambs respectively) than for other periods (4.3, 4.4, 4.8 and 4.5 kg for May, July, September and November born lambs respectively). Similarly, pre- and post- weaning growth rates were higher during spring (pre-weaning maximum, 276 g/d for lambs born in July; post-weaning maximum 223 g/d for lambs born in May) and lowest during summer (pre-weaning minimum 150 g/d for lambs born in November, post-weaning minimum 123 g/d for lambs born in September).

Age at slaughter was lowest for lambs born in May and July and highest for lambs born in September and November. When corrected to an average liveweight of 42 kg the average age was 230, 208, 176, 175, 245 and 236 days for lambs born in January, March, May, July, September and November respectively.

These data suggest that lamb growth to these comparatively high slaughter weights was optimal when lambs were born in May and July. If premiums are offered for out-of-season production of heavy carcasses to supply the chilled meat trade, May appears to be the optimal time for lambing as the average slaughter date for this group was 27.10.87, compared to 12.01.88 for lambs born in July.

Keywords Lambs; growth; out-of-season; Waikato; carcass

INTRODUCTION

There is considerable interest in out-of-season production of relatively heavy lambs to supply the demand of the chilled meat trade. Widespread adoption of this practice is presently restricted by the high cost of hormonal treatment to induce ewes to breed out-of-season. Whereas there are seasonal differences in the response of ewes to hormonal treatment (Smith *et al.*, 1988) the effect of season of birth and lamb growth is largely unknown. There is considerable demand for heavy (>18 kg) carcasses to be produced in the mid-October to mid-December period. The most efficient method of supplying this demand, in terms of feed utilisation, is to grow lambs continuously to reach the required carcass characteristics at the critical demand period. The optimimum date of birth is not known at present and will vary between regions. In the Waikato there is a comparatively high availability of pasture throughout the year and satisfactory lamb growth can be achieved irrespective of when lambs are born. In this experiment ram lambs born at 2-monthly intervals (see Smith *et al.*, 1988) were grown to a target slaughter weight of 40 kg and the effects of season of birth on production parameters studied.

MATERIALS AND METHODS

Animals

Details of mating and lambing performance were given by Smith *et al*, (1988). The average birth dates were 17/11/86, 16/01/87, 11/03/87, 04/05/87, 16/07/87 and 23/09/87. Only ram lambs were used in this study and these were made crytorchid, weaned at approximately 10 weeks of age and grown continuously to a target slaughter weight of 40 kg, when they were drafted and killed at the Ruakura abbattoir.

Grazing Management

Pasture was maintained at a high quality and in

TABLE 1 Number of lambs per treatment (n), and mean (± SEM) birth weight (BW; kg) and liveweight gain (LWG; g/d) pre- and post-weaning of lambs born at 2 monthly intervals. Within columns, means with different superscripts differ significantly ($P<0.05$)

Birth month	n	BW	LWG	
			Pre-Weaning	Post-Weaning
November 86	43	4.5 ± 0.11[a]	150 ± 6.7[a]	157 ± 3.1[a]
January 87	22	3.5 ± 0.21[b]	182 ± 13.0[b]	162 ± 3.5[a]
March 87	21	3.6 ± 0.18[b]	186 ± 9.8[bc]	188 ± 5.5[b]
May 87	21	4.3 ± 0.15[a]	213 ± 12.8[cd]	223 ± 6.3[c]
July 87	28	4.4 ± 0.18[a]	276 ± 4.3[e]	194 ± 11.0[b]
September 87	102	4.8 ± 0.10[a]	230 ± 4.8[d]	123 ± 2.4[d]

the vegetative state. Pasture was offered at liberal DM allowances (approx 6 kg/lamb/day) and lambs were shifted at 2-3 day intervals. Pasture was sprayed with fungicide (Benlate) as required to prevent facial eczema.

Observations

Lambs were weighed at birth, weaning and at 2 weeks intervals thereafter. Hot carcass weight and fat cover (GR) were measured post-slaughter. Results were analysed by student's t-test and regression analysis.

RESULTS AND DISCUSSION

There was a marked seasonal variation in lamb performance (Table 1). Lambs born in January and March were lighter at birth (3.5 and 3.6 kg, respectively) than those born in May, July, September and November (4.3 - 4.8 kg: $P<0.05$).

There were large seasonal differences in pre-weaning growth rate, with a minimum of 150 g/d for lambs born in November, increasing to a maximum of 276 g/d for lambs born in July (Table 1). Thus, the lowest growth rates occurred during November, December and January while the higher occurred during July, August and September. Similarly, post-weaning growth rates varied markedly with season, being lowest for lambs born in September and highest for lambs born in May. These minima and maxima correspond to a grazing period from December to May and August to October respectively.

The reason for these seasonal changes in performance is unclear, particularly since pasture availability and visual quality was maintained at high levels throughout the experiments. It appears likely that changes in performance were caused by endocrine changes and/or changes in the nutritive value of the pasture on offer. There are numerous data supporting the role of changing daylength on lamb growth rate, whereby lambs grow faster when exposed to increasing daylength (Forbes *et al.*, 1975; Schonbacher and Course, 1980). The mechanisms involved in this effect are not fully understood but are likely to be mediated via melatonin secretion and subsequent increases in growth hormone and/or prolactin secretion during increasing daylength (Barenton *et al.*, 1988).

There are limited data on the influence of season on the nutritive value of pasture in New Zealand (Reid, 1986), but in the UK it has been well established that large differences occur between spring and autumn pasture of similar digestibility. (Corbett *et al.*, 1966; Beever *et al.*, 1978). It is reasonable to expect a similar phenomenon in New Zealand. Part of the seasonal change in growth rate may be explained by the seasonal growth habit of white clover. Increasing the proportion of white clover in the sward has been shown to influence growth rate (Jagusch *et al*, 1981; Gibb & Treacher, 1984; Askin *et al.*, 1987). However, white clover would be at a minimum during winter and the poorest performance was observed during summer in this experiment, when white clover was still present in the sward.

TABLE 2 Average slaughter date, slaughter weight and slaughter age of lambs born at 2 monthly intervals and the corrected age at 42 kg live weight, along with hot carcass weight (HCW; kg) and fat c over (GR; mm), with correction to an average HCW of 19 kg. Within columns, means with different superscripts differ significantly ($P<0.05$)

Birth	Slaughter date	Slaughter age	weight	Corrected age	HCW	GR	Corrected GR
November 86	12/07/87	252 [a]	43.5	236[ab]	19.7 [a]	11.7 [a]	11.6[a]
January 87	04/09/87	232 [b]	42.3	230 [b]	19.5 [a]	11.9 [a]	11.8 [a]
March 87	29/09/87	202 [c]	40.9	208 [c]	18.6 [b]	09.4 [b]	09.8 [b]
May 87	27/10/87	172 [d]	41.1	176 [d]	18.5 [b]	09.2 [b]	09.6 [b]
July 87	12/01/88	178 [d]	42.6	175 [d]	18.8 [b]	09.3 [b]	09.5 [b]
September 87	26/05/88	243[ab]	41.8	245 [a]	18.2 [b]	08.7 [b]	09.6 [b]

The seasonal variation in performance is reflected in the age of slaughter (Table 2), with the shortest time for lambs born in May (172 days) and the longest time for lambs born in November (252 days). Correction to the average age at 42 kg, assuming average post-weaning growth rates, shows the superior performance of lambs born in May and July (176 and 175 days respectively), an advantage of 10 weeks over lambs born in September.

Carcass weight was higher for lambs born in November and January, reflecting the higher average slaughter weight (Table 2). Associated with this was a higher GR measurement which was still evident following linear regression analysis and correction of GR to a standardised carcass weight of 19 kg. The reason for the apparent increase in GR of lambs born in November and January is unclear. It does not appear to be due to post-weaning growth rate which, although low for these lambs, was higher than for lambs born in September. Similarly, the average slaughter date of lambs born in January was only 25 days earlier than for lambs born in March, which had a GR of 2 mm less than that of September born lambs.

A combination of low growth rates over the winter period may have been responsible for an increase in GR. However, this contradicts the observation of Bray and Taylor, (1987) that lambs slaughtered in September were leaner (at a common carcass weight) that lambs slaughtered in April. Also, Thorrold *et al.*, (1988) observed no change in GR, in relation to hot carcass weight, following weight gain over winter. Although these latter experiments studied lambs born at the same time of year, there does not appear to be any evidence of an increase in GR over the winter period. The apparent increase in GR of lambs born in November and January in the present experiment may, however, have been influenced by the higher carcass weight of these lambs. The narrow weight range of lambs precluded detailed analysis of the relationship between GR and carcass weight and a linear relationship was assumed although more complex regression analysis may have slightly modified the result (Kirton *et al.*, 1985).

From these data it is obvious that season of birth has a pronounced influence on lamb performance although the endocrine and/or nutritional reasons are unclear. The conclusion that the optimum birth date to supply the chilled lamb trade is May must be considered in conjunction with the poorer reproductive performance of ewes lambing at this time of the year. The development of cheaper mating regimes with or without the selection of ewes with the ability to breed naturally out-of-season would greatly enhance the economic basis for out-of-season lambing.

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