

SEQUENTIAL RELATIONSHIPS OF WEIGHT AND ESTIMATES OF CARCASE PARAMETERS IN FAST GROWING LAMBS

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SUMMARY

Liveweight, C fat depth (45 mm from the mid-line over the 12th rib), GR (total tissue depth 110 mm from the mid-line of the carcase over the 12th rib) and other measurements were obtained on 4 occasions from 2 weeks after weaning until slaughter at an average liveweight of 49 kg on 76 ewe and cryptorchid second cross lambs. At slaughter cryptorchids were 10 kg heavier and leaner by 0.4 mm in C fat depth, 2 mm in GR and 0.4 of a fat score. To slaughter ewes at the same GR or fat score as cryptorchids the ewes would need to be sold 16 to 24 days earlier, when they could be 14 kg lighter. Thus the 2 sexes need to be sold into markets with different specifications for weight and sex. The data demonstrate the wide variation that exists even within a small group of lambs born over 6 weeks and grazed together at all times.

Keywords: lambs, liveweight, GR, fat.

INTRODUCTION

The export and domestic demand for large, lean lamb is gradually increasing (Thatcher 1992). To meet this market, producers need to know when to market their lambs to avoid penalties for fat. However, the information available to producers is not comprehensive because fat levels have usually been only measured at slaughter, if at all. With the availability of real-time ultrasound equipment to measure fat and tissue depths, sequential measurements can now be obtained. This paper reports on liveweight and estimates of carcase parameters of 76 lambs on 4 occasions from weaning until slaughter at an average of 49 kg liveweight.

MATERIALS AND METHODS

Mature Border Leicester x Merino ewes at the Agricultural Research Station, Cowra were joined to 20 Poll Dorset rams. The rams had a range of LAMBPLAN Estimated Breeding Values (EBV's) for weight and leanness. Sixty-six single and 14 twin lambs were born between 9 March and 19 April 1992. Lambs were tagged at birth and weight, sex and birth date recorded. Four lambs died prior to weaning on 24 June 1992. Male lambs were cryptorchidised using rubber rings to remove the scrotum at the end of lambing. The lambs were grazed together on the best pastures available at all times.

Measurements were obtained by the same operator (A.F. Luff) on 7 July, 4 August, 1 and 29 September (days 189, 217, 245 and 273 respectively). Measurements included liveweight, C fat depth (45 mm from the mid-line over the 12th rib) measured by ultrasound (Delphi Backfat Meter Model 1017a), fat score by manual palpation, and GR (total tissue depth 110 mm from the mid-line of the carcase over the 12th rib) and eye muscle depth both measured using real-time ultrasound (Aloka Echo Camera Model SSD-500). Measurements were obtained at a similar time on each occasion, within 1 hour off pasture. After slaughter, carcasses were weighed and GR was measured manually with a GR knife.

Statistical analysis

Variables were analysed on each occasion by analyses of variance with the factors sex, litter size, lamb birth date, the sire group and appropriate interactions included. Regression relationships for each variable were established between liveweight or time from day 189 to slaughter with sex and sex x liveweight or sex x time as factors. Similarly liveweight was related to time and sex with a sex x time interaction. Correlations were obtained for carcase GR with preslaughter GR and C fat depth. All analyses were done using GENSTAT 5.

RESULTS

At the same age cryptorchids were heavier and leaner measured by estimates of C fat depth, GR and fat score but had similar eye muscle depths compared to the ewes (Table 1, Figure 1). Litter size and lamb birth date significantly affected liveweight, C fat depth, GR and fat score on some occasions ($P < 0.05$) but had no significant affect on eye muscle depth. Sire group and interactions never significantly affected any variable. Increases per kg were 0.087 mm for C fat depth, 0.30 mm for GR, 0.07 of a fat score and 0.3 mm for eye muscle depth (Table 2).

Table 1. Mean (\pm se) liveweight (kg), C fat depth (mm, 45 mm from the mid-line over the 12th rib), GR (mm, total tissue depth 110 mm from the mid-line of the carcass over the 12th rib), fat score and eye muscle depth for ewe and cryptorchid lambs on 4 occasions

Variable	Sex	Measurement day			
		7 July	4 August	1 Sept.	29 Sept.
Liveweight	Ewes	29.9 (0.6) ^a	35.0 (0.7) ^a	38.3 (0.8) ^a	44.4 (0.8) ^a
	Cryptorchids	34.2 (0.6) ^b	41.0 (0.7) ^b	46.8 (0.8) ^b	54.5 (0.8) ^b
C fat depth	Ewes	2.60 (0.14) ^a	3.23 (0.14) ^a	3.25 (0.15) ^a	3.95 (0.16) ^a
	Cryptorchids	2.08 (0.14) ^b	2.57 (0.14) ^b	2.72 (0.16) ^b	3.59 (0.16) ^a
GR	Ewes	9.8 (0.4) ^a	13.6 (0.5) ^a	14.8 (0.5) ^a	16.0 (0.5) ^a
	Cryptorchids	7.9 (0.4) ^b	11.3 (0.5) ^b	12.6 (0.5) ^b	13.8 (0.5) ^b
Fat score	Ewes	2.5 (0.1) ^a	3.5 (0.1) ^a	3.7 (0.1) ^a	3.9 (0.1) ^a
	Cryptorchids	2.1 (0.1) ^b	2.9 (0.1) ^b	3.2 (0.1) ^b	3.5 (0.1) ^b
Eye muscle depth	Ewes	22.2 (0.4) ^a	26.0 (0.4) ^a	26.5 (0.4) ^a	28.2 (0.4) ^a
	Cryptorchids	23.1 (0.5) ^a	26.2 (0.4) ^a	26.5 (0.4) ^a	29.4 (0.5) ^a

Within each column, means for each sex with different letters differ significantly ($P < 0.05$).

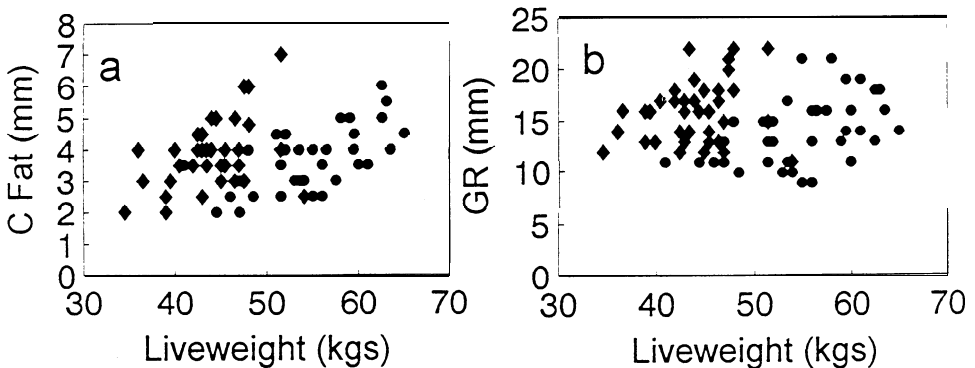


Figure 1. Relationship of final (day 273) liveweight with C fat depth (mm, 45 mm from the mid-line over the 12th rib) (a) and GR (mm, total tissue depth 110 mm from the mid-line of the carcass over the 12th rib) (b) for ewe (diamond) and cryptorchid lambs (circles)

Carcass weight was 26.7 (s.e. ± 0.5) kg for cryptorchids and 22.2 (s.e. ± 0.5) kg for ewes ($P < 0.001$). Carcass GR did not differ between the sexes with 14.4 (± 0.6) mm for cryptorchids and 14.6 (± 0.5) mm for ewes.

Liveweight increased over time at different rates for each sex ($P < 0.001$). The equations were:

Cryptorchid liveweight = $34.5 (\pm 0.8) + 0.237 (\pm 0.014)\text{day}$ Equation 1.

Ewe liveweight = $29.5 (\pm 0.5) + 0.168 (\pm 0.001)\text{day}$ Equation 2.

The regression relationships for each carcass parameter estimate (Table 2) show the factors time and sex, and liveweight and sex, were always significant ($P < 0.01$). The interactions of time x sex or liveweight x sex were non-significant. The equations including time (Table 2) indicate that to slaughter ewes at the same GR or fat score as cryptorchids, the ewes needed to be sold 16 to 24 days earlier (GR, 1.08/0.0689; fat score, 0.39/0.0163). Alternatively, from the equations including liveweight in Table 2, GR and fat score were similar for cryptorchids and ewes when ewes were 14 kg lighter (GR, 4.18/0.3011; and fat score, 0.93/0.0682) than the cryptorchids.

The correlation between preslaughter GR and carcass GR was 0.32 ($P < 0.01$) and the means were similar (Table 1 and text). The correlation of preslaughter C fat depth with carcass GR was 0.64 ($P < 0.01$).

Table 2. Regression equations (\pm se) for the relationships between C fat depth (mm, 45 mm from the mid-line over the 12th rib), GR (mm, total tissue depth 110 mm from the mid-line of the carcass over the 12th rib), fat score and eye muscle depth and either time (days, where 0 = day 189, 2 weeks after weaning) or liveweight (kg) for ewe and cryptorchid lambs

Variable	Constant	Regression coefficient	Coefficient for sex ^A
<i>Time</i>			
C fat depth	2.15 (0.11)	0.0156 (0.0018)	0.39 (0.11)
GR	8.65 (0.34)	0.0689 (0.0055)	1.08 (0.35)
Fat score	2.27 (0.08)	0.0163 (0.0012)	0.39 (0.08)
Eye muscle depth	23.6 (0.3)	0.0675 (0.0050)	-0.72 (0.31)
<i>Liveweight</i>			
C fat depth	-1.08 (0.27)	0.0874 (0.0059)	1.08 (0.10)
GR	-1.83 (0.94)	0.3011 (0.0206)	4.18 (0.36)
Fat score	-0.07 (0.22)	0.0682 (0.0047)	0.93 (0.08)
Eye muscle depth	11.4 (0.72)	0.3380 (0.0160)	1.94 (0.28)

^ATo calculate variable values the sex coefficient is added to the constant for ewes and for cryptorchids the coefficient is zero.

DISCUSSION

For ewes to be sold at the same fat levels, measured by GR or fat score, as cryptorchids the ewes needed to be sold about 3 weeks before the cryptorchids. This result was also supported by the C fat depth measurements. However, at this time the ewes would have been about 14 kg lighter than the cryptorchids depending on the nominated fat level and age of slaughter. The most obvious difference between the sexes was at the actual slaughter occasion when cryptorchids were 10 kg heavier but were leaner by 0.4 mm in C fat depth, 2 mm in GR and 0.4 of a fat score. The GR and carcass weight differences are similar to those of Lee *et al.* (1990).

The figures demonstrate the wide variation that exists even within a small group of lambs, sired by a range of rams from 1 stud, born over 6 weeks and grazed together at all times. This variation is usually allowed for by lamb producers when they sell lambs in “drafts” and our results demonstrate that selling sexes separately will substantially increase the chances of obtaining consistent specifications with each sale lot. To sell the ewes 14 kg lighter than the cryptorchids would normally mean the ewes would be penalized for being too light and thus selling at similar fat levels is not feasible. Consequently the 2 sexes need to be sold into markets with different specifications for weight and sex.

The correlation of live GR with carcass GR was lower than that reported by McEwan *et al.* (1989) and Hopkins *et al.* (1993) and there was no obvious explanation. However, the correlation of C fat depth with carcass GR was higher and above the level of 0.4 of Hopkins *et al.* (1993).

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