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# The effects of lamb breed, slaughter age and sex on carcass fat depth and export grade

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## ABSTRACT

Crossbred lambs involving specialist meat breeds (Expt. A) or long-woolled breeds (Expt. B) were slaughtered at ages ranging from 12 to 30 weeks. Carcasses were classified retrospectively into current export grades according to their weight and fat measurement GR.

In both experiments measurement GR was related to carcass weight ( $r=0.57$  to  $0.83$ ) and increased, on average, by just over 1 mm per kg carcass weight increase. Proportions of carcasses grading 'trimmer' or 'overfat' increased at carcass weights above 15 kg or at slaughter ages greater than 18 weeks. In Expt. A, 4% of carcasses graded 'overfat' at the 12 week slaughter age and 81% at 30 weeks. There was little difference in the grade distribution of carcasses among sire breeds in Expt. A (Southdown, Suffolk and Dorset Down) but in Expt. B lambs reared by Corriedale ewes showed higher proportions of 'trimmer' (25%) and 'overfat' (18%) carcasses compared with those reared by Romneys (10% and 2% respectively). It is suggested that the higher carcass fat of lambs from Corriedale ewes is due partly to greater milk consumption compared with those suckled by Romneys.

**Keywords** Meat breeds; carcass grades; slaughter ages; measurement GR

## INTRODUCTION

The requirement by world markets for lamb carcasses with less fat has prompted the New Zealand Meat Producers Board this season to tighten grading standards. The maximum carcass fat depth, indicated by measurement GR (Rich, 1976), has been lowered to 15 mm, above which carcasses are graded 'overfat' with severe penalties on financial returns to farmers. In addition, a 'warning signal' grade, known as 'trimmer' (13 to 15 mm fat depth), has been introduced pending further reductions in the limit for 'overfats' in future seasons and possible variation in price according to the degree of overfatness.

There is no published information on the effects of lamb breed, slaughter age or sex on the distribution of carcasses among the new export grades. This paper provides such information from 2 experiments with carcasses classified retrospectively into the new grades based on their carcass weight and fat measurement GR.

## MATERIALS AND METHODS

In Expt. A (1977-78 and 1978-79) Southdown (Sd), Suffolk (Sf) and Dorset Down (DD) rams were mated with crossbred ewes as outlined by Geenty and Clarke (1977). In Expt. B (1979-80, 1980-81 and 1981-82)

rams of the Booroola (Bo), Poll Dorset (D) and Border Leicester (BL) breeds were single-sire mated each year with Romney (R) or Corriedale (C) ewes giving BoR, DR, DC and BLC crosses. In each season there were approximately 200 ewe and wether lambs representing each sire breed in Expt. A and approximately 60 wether lambs of each breed-cross in Expt. B.

Following lambing, ewes and lambs grazed ryegrass-white clover pastures and lambs were weaned at 12 weeks of age. Balanced groups of lambs representing each breed-cross were allocated for slaughter at 12, 18, 24 or 30 weeks (Expt. A) or 12 or 24 weeks of age (Expt. B). They were weighed 1 to 4 h off pasture and slaughtered the next day at a local freezing works where cold carcass weight and measurement GR were recorded. Proportions of carcasses which would have been classified 'trimmer' or 'overfat', using current export lamb grades issued in June 1983 by the New Zealand Meat Producers Board, were derived from these data.

## RESULTS AND DISCUSSION

### Live weights

Average pre-slaughter live weights are illustrated in Fig. 1. There was little difference in weights of Sf, DD and D sired lambs but those sired by Bo or Sd rams,

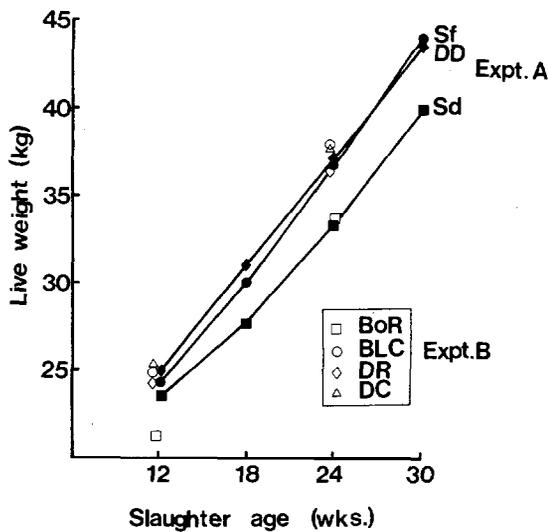


FIG. 1 Mean pre-slaughter live weights of lambs at various slaughter ages.

with the exception of Sd at 12 weeks, were 2 to 3 kg lighter at all slaughter ages. Except for Bo lambs, for which there are little comparative breed data, sire breed differences were similar to those previously reported by Carter *et al.* (1974) and Geenty and Clarke (1977).

#### Dressing out percentage

Relationships between carcass weight (Y) and pre-slaughter live weight (X) showed little variation between breeds or years within each experiment and are represented by the following pooled regression equations:

$$\text{Expt. A (n=1192)} \quad Y = 0.458X - 1.462$$

$$r = 0.97 \quad \text{RSD} = 1.05$$

$$\text{Expt. B (n=651)} \quad Y = 0.416X - 0.034$$

$$r = 0.95 \quad \text{RSD} = 1.09$$

Dressing out percentages ([cold carcass weight/pre-slaughter live weight]  $\times$  100), calculated from these equations at carcass weights of 11 and 15.5 kg (i.e. at slaughter ages of approximately 12 and 24 weeks of age respectively), were 42.8% and 44.3% respectively in Expt. A and 41.5% for both weights in Expt. B. The relatively lower percentage in Expt. B is probably associated with greater wool weights of the predominantly long woolled breeds compared with the specialist meat-breed crosses in Expt. A.

#### Carcass fat depth

Regression parameters for relationships between carcass weight and fat depth (GR), and estimated values for GR, are given in Tables 1 and 2. In Expt. A Sd sired lambs had a higher regression coefficient ( $P < 0.05$ ) than Sf and DD; their GR estimates increased by 12.2 mm between carcass weights of 11 and 20 kg compared with 10 mm for Sf and DD. Coefficients generally declined with increasing slaughter age and were slightly greater for female compared with male lambs. Results for wether lambs in Expt. B also showed lower regression coefficients at the later slaughter age (24 weeks). There were generally higher coefficients (NS) for lambs reared by Corriedale compared with Romney ewes. Calculated GR values increased between carcass weights of 11 and 15.5 kg by 3.4, 3.8, 5.4 and 4.1 mm, respectively, for BoR, DR, DC and BLC lambs.

Correlation coefficients showed that around 50 to 70% of the variation in measurement GR was due to variation in carcass weight, a finding similar to that of Kirton and Johnson (1979). Calculated average increases in measurement GR of 0.75 mm (BoR) to 1.4 mm (Sd) for each kg increase in carcass weight were similar in magnitude to those reported by Rich

TABLE 1 Regression parameters for relationships between carcass weight (X) and measurement GR (Y) and estimated values for GR at various carcass weights (Expt. A).

	n	b	a	r	RSD	Estimated values for GR (mm) at various carcass weights (kg)			
						11.0	13.5	15.5	20.0
Sire breed									
Sd	426	1.35	-7.25	0.73	2.705	7.6	11.0	13.7	19.8
Sf	404	1.07	-4.93	0.70	2.889	6.8	9.5	11.7	16.5
DD	362	1.16	-6.54	0.70	2.693	6.2	9.1	11.4	16.7
Age (wks.)									
12	259	1.40	-8.84	0.83	2.265	6.6			
18	295	1.37	-10.36	0.82	2.207		8.1		
24	313	0.92	-1.78	0.57	3.108			12.5	
30	325	1.10	-2.56	0.65	3.074				19.4
Lamb sex									
Female	594	1.23	-6.09	0.70	2.872	7.4	10.5	13.0	18.5
Male	598	1.14	-6.15	0.71	2.673	6.4	9.2	11.5	16.7

(1976) in a survey of Canterbury lambs but were lower than the value of 1.7 reported for Sd sired lambs in the North Island (Kirton *et al.*, 1978; Kirton and Johnson, 1979).

**Export grades**

Average distributions of carcasses across export grades are given for both experiments in Table 3. In Expt. A there were only small differences among sire breeds for the data pooled across slaughter ages; 11 to 14% of carcasses were classified as 'trimmer' and 29 to 33% as 'overfat'. Proportions classified 'trimmer' and

'overfat' increased progressively between 12 and 30 week slaughter ages but there was little difference according to sex of lamb. Breed differences in GR category were more apparent in Expt. B where higher proportions of lambs reared by Corriedales were classified 'trimmer' or 'overfat' (average of 25% and 18% respectively) compared with those reared by Romneys (average of 10% and 2% respectively).

The lack of sire breed differences in GR but increased carcass fatness of lambs reared by Corriedale compared with Romney ewes in the present experiments is in agreement with the results of a previous industry survey (Davison, 1977). In the survey, average

**TABLE 2** Regression parameters for relationships between carcass weight (X) and measurement GR (Y) and estimated values for GR at two carcass weights (Expt.B).

Age	Breed -cross	n	b	a	r	RSD	Estimated values for GR (mm) at 2 carcass weights (kg)	
							11.0	15.5
12 weeks	BoR	78	1.02	-4.71	0.79	1.498	6.5	
	DR	75	1.13	-6.71	0.80	2.436	5.7	
	DC	74	1.34	-9.05	0.76	2.114	5.7	
	BLC	93	1.36	-8.55	0.82	2.316	6.4	
24 weeks	BoR	85	0.96	-4.99	0.73	1.858		9.9
	DR	66	0.82	-3.20	0.64	2.493		9.5
	DC	84	0.98	-4.08	0.68	2.262		11.1
	BLC	96	1.24	-8.74	0.75	2.305		10.5

**TABLE 3** Mean percentage distributions of carcasses in export grades according to weight and measurement GR.

	A	YL	PL	TL	FL	Export grade							
						YM	PM	TM	FM	PX	PH	TH	FH
<b>Experiment A</b>													
Sire breed													
Sd	4.6	14.5	15.3	0.9	0.2	2.8	14.4	7.9	5.9	1.4	—	5.2	27.7
Sf	5.5	15.2	9.5	0.8	0.3	4.5	17.4	3.0	1.8	7.0	0.7	7.8	26.9
DD	3.1	12.5	6.3	—	—	8.6	16.6	3.3	3.3	7.8	—	8.7	30.0
Age (weeks)													
12	17.4	34.2	25.2	1.2	—	3.2	10.5	4.2	3.0	—	—	0.6	0.6
18	2.3	26.4	13.9	0.3	—	14.3	27.1	3.4	0.3	5.5	—	3.4	3.4
24	1.0	2.0	5.8	0.7	0.3	3.0	25.3	9.0	4.0	12.1	1.0	12.5	22.9
30	—	—	—	0.4	—	0.4	2.1	2.4	2.3	3.5	—	10.6	78.4
Lamb sex													
Ewe	4.1	13.4	13.0	0.6	—	3.2	16.2	5.7	4.5	3.2	0.3	7.5	28.2
Wether	5.5	14.5	8.2	0.3	0.3	6.6	15.7	4.1	3.1	6.6	0.3	7.4	27.6
<b>Experiment B</b>													
Breed Age													
-cross	(wk)												
BoR	12	46.3	30.4	20.0	—	—	1.1	1.1	1.1	—	—	—	—
	24	1.9	17.8	17.6	—	—	16.7	36.3	1.2	—	5.3	—	2.9
DR	12	17.5	44.4	14.1	—	—	6.0	12.0	0.9	3.2	0.9	—	0.9
	24	—	8.7	1.8	—	—	13.8	27.6	3.4	1.8	30.7	—	10.9
DC	12	3.3	53.6	20.1	—	—	3.3	13.5	1.2	1.2	—	—	2.5
	24	—	1.0	5.9	—	—	5.9	31.5	6.0	1.0	22.8	—	9.9
BLC	12	14.9	37.6	19.7	—	—	2.6	13.4	8.2	2.4	—	—	0.8
	24	—	5.7	3.1	1.2	—	8.2	27.9	1.2	1.2	17.7	—	20.5

percentages of carcasses graded 'overfat' for lambs of Sd, Sf and DD sire breeds were 1.66, 1.35 and 1.95 respectively; respective percentages for Romney and Corriedale dam breeds were 0.46 and 2.75. Absolute percentages of 'overfats' were considerably lower than in the present experiments due to different grading criteria.

The higher fatness of lambs reared by Corriedale compared with Romney ewes is associated with faster growth rates and is probably due in part to the higher milk production of Corriedales (Geenty, 1979a) and positive association between lamb milk intake and rate of fat deposition (Munro *et al.*, 1984). Body composition studies have also shown that Corriedales are slightly fatter than Romneys (Geenty *et al.*, 1979).

### Conclusions

The results show that the occurrences of 'trimmer' and 'overfat' carcasses increase rapidly at carcass weights around 15 kg or greater or when lambs are over 18 weeks of age at slaughter. Considering GR measurement alone, it appears that dam breed has more influence on carcass fatness than does sire breed although breeds were of different carcass weight when assessed at the standard slaughter ages chosen. The results suggest that to prevent overfatness problems with medium or heavy weight lamb production it is important to consider choice of dam breed and/or lamb weaning age (Geenty, 1980) with respect to the milk supply available to the lamb. In addition, selection of individual sires within breeds (Bennett and Clarke, 1984), although not covered here, should be considered.

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