A comparison of unbred and once-bred lamb production

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ABSTRACT

The once-bred lamb (OBL) production system involves mating ewe lambs at 8 months of age to be slaughtered at approximately 15 months of age after rearing a lamb. This study compared the performance of bred ewe lambs ("Bred-15") v. unbred ewe lambs ("Unbred-15") at a fixed age (15 months) v. unbred ewe lambs ("Unbred-13") at the maximum age for export lamb (approximately 13 months). From the end of mating till set stocking (pre-lambing) the liveweights (LW) of those animals in the Bred-15 group were greater ($P<0.001$) than the LW of the Unbred-13 and Unbred-15 groups. The Bred-15 animals did not gain in LW from set stocking to weaning and as a result they were lighter than the Unbred-15 group at weaning and slaughter ($P<0.001$). Wool growth rates were lower for the Bred-15 animals from the end of mating to set stocking ($P<0.001$) and from set stocking to weaning ($P<0.05$), than for the Unbred-13 and Unbred-15 animals during the corresponding periods. Mean fibre diameter was lower ($P<0.05$) for Bred-15 than Unbred-15 during the latter period. The Unbred-15 group had heavier ($P<0.001$) carcasses (25.8 ± 0.5 kg) than either the Unbred-13 (21.3 ± 0.5 kg) or the Bred-15 (19.4 ± 0.5 kg) groups. Once data were adjusted to a constant carcass weight, Bred-15 animals had lower ($P<0.001$) dressing-out percentages than Unbred-15 (44.7 ± 0.4, 45.4 ± 0.4, 46.3 ± 0.5 % for Bred-15, Unbred-13 and Unbred-15 respectively, $P<0.001$) and lower GR measurements (12.6 ± 0.9, 18.3 ± 0.6, 18.7 ± 0.1 mm respectively, $P<0.001$) than all their unbred counterparts. Results are discussed in the context of production from unbred and OBL ewe lambs.

Keywords: Once-bred lambs; export lamb; lamb growth; carcass characteristics; wool quality.

INTRODUCTION

A once-bred lamb (OBL) production system, modelled on the once-bred heifer beef production system (Morris, 1992), may have the potential to increase farmer returns via ewe lambs producing both an export carcass and a lamb. This system would involve mating ewe lambs at 8 months of age and their slaughter (at 15 months of age) after rearing a lamb. However, the current New Zealand Meat Producers Board grade standards specify "lamb" as coming from a "young sheep, under 12 months of age, or which does not have any permanent incisor teeth in wear" (NZMPB, 1992). Under this system OBL carcasses would be graded as hogget or mutton and fetch a lower price than their unbred counterparts slaughtered at the maximum age for export lambs. The effects of pregnancy and lactation on carcass weights of OBL could also limit the potential benefits of OBL relative to other systems. Hence this study compared the performance of bred ewe lambs v. unbred ewe lambs at the maximum age for export lamb (approximately 13 months) v. unbred ewe lambs at a fixed age (15 months).

MATERIALS AND METHODS

Coopworth ewe lambs were randomly allocated to three treatment groups prior to mating of one group on 7 April 1994. "Bred-15" (n=80) were bred to a Suffolk sire and those that reared a lamb were slaughtered on 20 December 1994. "Unbred-13" (n=40) and "Unbred-15" (n=40) were not bred and were slaughtered on 11 October 1994 and 20 December 1994 respectively. Actual numbers of animals slaughtered are given in Table 3.

Liveweights (within 1h off pasture) were recorded at the start (7 April) and end (20 May) of mating, set stocking (7 September), docking (25 October), weaning (5 December) and slaughter. Lambing began on 7 September (midpoint 29 September). Lamb birth weight, rank and sex were recorded within 24 hours of birth, as well as a lamb weaning weight (mean age 67 days). Individuals in the Bred-15 group that failed to lamb or to rear a lamb (to weaning) (n = 48) were excluded from the data set.

The Bred-15 group was grazed separately during mating (i.e. for 43 days) and recombined with the Unbred-15 and Unbred-13 groups at the time of ram removal. The animals were then returned to a slow rotation so that intakes could be restricted. Prior to lambing, all animals were set stocked. Average pasture cover was kept above 1200 kg DM/ha for the duration of the trial.

Midside wool growth and mean fibre diameter (MFD) were measured at both set stocking and weaning (midside patch sites first cleared of wool on 20 May). The animals were mouthed every two weeks from pre-lambing until the day prior to slaughter. The presence of the first permanent incisors was recorded.

After slaughter, cold carcass weight, body length and GR (11cm from the midline) were recorded for each carcass. Grade distributions on both the "mutton" and "lamb" grading systems were determined for the Bred-15 and Unbred-15 animals based on carcass weight and GR measurements. The value for each grade was obtained from the AFFCO schedule for the week beginning 18 December 1994. It was assumed that the progeny of the Bred-15 group were sold on the store market. Their average value

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was calculated using liveweight at weaning and the price (¢/kg liveweight) prevailing at the time. The total value of meat (animal alone or animal plus progeny) was calculated for simulated situations in which the Bred-15 and Unbred-15 animals graded as "mutton" (the situation prevailing in late 1994), and as "lamb" (the situation which might prevail given a change in the definition of "lamb").

Data relating to animal liveweights, midside wool growth, fibre diameter and carcass characteristics were analysed using univariate analysis of variance to test the effect of treatment at each sampling time (Bred-15 versus Unbred-13 versus Unbred-15). Results were expressed in terms of means (± SEM). All statistical analyses were performed using the Statistical Analysis System computer package (SAS 1985).

RESULTS AND DISCUSSION

Bred-15 animals gained weight from the start of mating to set stocking and then maintained that liveweight until weaning. They were on average 7.7 kg lighter than the Unbred-15 animals at weaning ($P<0.001$).

The Bred-15 group had significantly ($P<0.005$) lower wool growth rates than the Unbred-13 and Unbred-15 groups during the periods from the end of mating to set stocking, and from set stocking to weaning, in the Bred-15 group (Table 2). Fibre diameter was not different during the first of these periods, but was significantly reduced in the Bred-15 group during the period from set stocking to weaning (Table 2).

The proportions of Bred-15 and Unbred-15 animals with two permanent incisors in wear were virtually identical at docking, indicating that pregnancy did not delay tooth eruption. Lactation did appear to delay tooth eruption as only 48% of Bred-15 animals, compared to 78% of Unbred-15 animals, had two permanent incisors in wear at weaning. This difference in the proportion of animals in each group with two permanent teeth in wear had decreased to only 5% by the time of slaughter.

The Bred-15 group had the lowest average liveweight at slaughter and thus carcass weight, with the Unbred-15 group being heaviest (Table 3). Those in the Bred-15 group were also leaner than their unbred counterparts with significantly lower GR measurements both before and after the data were adjusted for carcass weight.

Average dressing-out percentage of Bred-15 animals was lower than that of Unbred animals ($P<0.001$). Differences in carcass length between the three treatments were all significant ($P<0.001$), Unbred-13 carcasses being shortest and Unbred-15 longest. When adjusted to the same carcass weight there were still significant ($P<0.001$) differences between the treatments with respect to GR and carcass length but dressing-out percentage differed only between Unbred-13 and the other two groups (Table 3).

Price estimates were generated for two scenarios, one being that the animals were graded as "lamb", the other as "mutton". The average Bred-15 animal produced progeny to the value of $23.90 (at the time the Bred-15 and Unbred-15 groups were slaughtered). The total average per head values (product of average carcass weight and value per kg, plus value of progeny) of the animals in each treatment were, according to whether the animals were graded on the "lamb" or "mutton" schedule: $42.93 (Unbred-13 graded as "lamb"); $62.30 (Bred-15 "lamb"); $28.19 (Unbred-15 "lamb"); $45.65 (Bred-15 "mutton"); and $19.57 (Unbred-15 "mutton"). The decline in value of Unbred-15 v. Unbred-13 "lamb" reflected the excessive levels of fat cover in the former group.

Bearing and rearing a lamb was associated with a significant penalty in liveweight, carcass weight and wool growth in the Bred-15 animals compared with their Unbred-13 or Unbred-15 counterparts. This is consistent with the

TABLE 1: Effect of treatment (Bred-15, Unbred-13 and Unbred-15) on liveweight (Mean ± SEM).

Date	Event	Bred-15	Unbred-13	Unbred-15
07.04.94	Start of mating	34.0 ± 0.6	32.7 ± 0.5	32.2 ± 0.5
20.05.94	End of mating	38.5 ± 0.6^{b}	34.3 ± 0.5^{a}	34.0 ± 0.5^{a}
07.09.94	Set stocking	49.4 ± 0.8^{b}	41.9 ± 0.7^{a}	41.8 ± 0.7^{a}
11.10.94	Unbred-13 slaughter		47.3 ± 0.7	47.1 ± 0.7
25.10.94	Docking	50.3 ± 0.8		50.4 ± 0.7
05.12.94	Weaning	48.8 ± 1.0^{a}		55.1 ± 0.9^{b}
19.12.94	Slaughter	45.7 ± 0.8^{a}		53.4 ± 0.7^{b}

^{ab}Means within rows having different superscripts are significantly different ($P<0.001$).

TABLE 2: Effect of treatment (Bred-15, Unbred-13 and Unbred-15) on midside wool growth and mean fibre diameter (MFD) during periods from the end of mating to set stocking (Period 1) and set stocking to weaning (Period 2) in the Bred-15 group (Mean ± SEM).

	Period 1		Period 2	
	Wool growth (μg/cm^2/d)	MFD (μm)	Wool growth (μg/cm^2/d)	MFD (μm)
Bred-15	1103.2 ± 53.3^{a}	39.1 ± 0.5	1279.0 ± 61.8^{a}	42.0 ± 0.5^{a}
Unbred-13	1468.3 ± 50.0^{b}	39.3 ± 0.5		
Unbred-15	1433.9 ± 47.8^{b}	40.0 ± 0.4	1548.5 ± 63.8^{b}	43.8 ± 0.4^{b}

^{ab}Means within columns having different superscripts are significantly different ($P<0.005$).

TABLE 3: Effect of treatment (Bred-15, Unbred-13 and Unbred-15) on liveweight, carcass weight, dressing out percentage, GR and carcass length at slaughter (Mean ± SEM).

	Bred-15	Unbred-13	Unbred-15
Carcass Characteristics			
Number of animals	32	37	36
Liveweight (kg)	45.3 ± 0.8[a]	47.5 ± 0.7[b]	53.4 ± 0.7[c]
Carcass weight (kg)	19.4 ± 0.5[a]	21.3 ± 0.5[b]	25.8 ± 0.5[c]
Dressing out %	42.8 ± 0.4[a]	44.6 ± 0.4[b]	48.2 ± 0.4[c]
GR (mm)	8.5 ± 1.0[a]	16.5 ± 1.0[b]	24.9 ± 1.0[c]
Length (mm)	1074.0 ± 5.0[b]	1060.4 ± 4.6[a]	1099.7 ± 4.7[c]
Adjusted to a constant carcass weight			
Dressing out %	44.7 ± 0.4[a]	45.4 ± 0.3[ab]	46.3 ± 0.5[b]
GR (mm)	12.6 ± 0.9[a]	18.3 ± 0.6[b]	18.7 ± 1.0[b]
Length (mm)	1097.3 ± 6.0[b]	1066.2 ± 4.1[a]	1090.7 ± 6.6[b]

[abc]Means within rows having different superscripts are significantly different (P<0.001).

results of previous studies which examined the breeding of lambs, though not in the context of OBL systems (Southam *et al.*, 1971; Baker *et al.*, 1978; Bigham 1986). However, no attempt was made in this study to compensate the Bred-15 animals for the stress of pregnancy/lactation and these effects could be minimised by nutritional management (but with a reduction in stocking rate). Conversely, the lower GR of Bred-15 animals (in absolute terms or adjusted to a common carcass weight), which presumably also reflects the nutritional demand of pregnancy/lactation, could be considered an advantage. Thus at similar carcass weights (but obviously different ages), Bred-15 animals had only half the fat cover of the Unbred-13 group.

The penalty of rearing a lamb was, however, overcome to some extent by the value of that lamb. Thus even when the Bred-15 animals were graded as "mutton", their total product value ($45.65) was similar to that of Unbred-13 animals ($42.93), although this ignores the greater feed and other input costs required to get them to 15 months of age. However, were the Bred-15 ewe lambs to have graded as "lamb", they would have been valued at $62.30. The question that remains, then, is whether, in terms of meat quality, extension of the NZMPB definition to include a 15-month old "lamb" which has herself reared a lamb could be justified. This question is presently being examined.

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