PERFORMANCE OF LAMBS OF MERINO AND CROSS-BRED EWES IN THE KYBYBOLITE PROGENY TEST

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INTRODUCTION

The LAMBPLAN Central Progeny Tests for Meat sires were set up at three sites: Glen Innes (NSW), Rutherglen (Victoria), and Kybybolite in South Australia. At the Glen Innes and Rutherglen sites the ewes used were Border Leicester-Merino (BLM), and at Kybybolite a mixture of Merino and BLM ewes, reflecting the composition of the ewe flocks used in prime lamb production in those states.

Lamb producers use Merino ewes for potential extra income from wool, the ready availability of replacement ewes, and the greater capacity for switching focus from lamb to wool production and vice versa. However, first-cross lambs (those from Merino dams) are often perceived as second class lambs, and some markets discount first-cross lambs.

The Kybybolite data provides an opportunity to assess maternal genotype effects on lamb production, to quantify differences between first- and second-cross lambs, and to assess the extent of any sire-by-ewe breed interaction.

MATERIALS AND METHODS

The progeny test design has been described elsewhere (Banks, 1994). Note that at Kybybolite, almost all ewes were artificially inseminated and ewes mated naturally were subject to the same hormonal treatment as those put to AI. Thus reproduction rates reflect rates from AI rather than paddock mating. This would tend to increase observed differences in lamb growth rates between first- and second-cross, as the differences in proportions of multiples was less than would be expected under paddock mating.

Lambs from the two genotypes (referred to hereafter as MER - first-cross, and BLM - second-cross) were always run together . However, after the first year, the ewe breeds were separated during feeding prior to lambing because the staff believed that between-genotype competition for feed favoured the cross-bred ewes. Ewes of both genotypes were fed the same amount. At other times ewes and lambs, or lambs alone, were run together in two groups or in sire groups, but not separated on the basis of dam genotype.

The Merino component of both the BLM and Merinos was South Australian, but the actual strains involved were not the same. The Merinos were smaller than the BLM, example average mating weights being 61.2 kg and 51.4 kg for BLM and Merino respectively (1991 mating).

Lambs were weighed at 4 to 6 week intervals and fat scored two or three times during their growth. They were sold/slaughtered when the average carcase weight of lambs from each ewe breed reached 22 kg. There were small discrepancies between final average carcase weights for the ewe genotypes. Carcase weight, GR

tissue depth, and eye muscle depth and width were measured. Eye muscle area was estimated as 0.8*depth*width.

Table 1: Fixed effects fitted in models for analyses of variance

Trait	birth date	sex	dam breed	birth type	rear type	carcase weight
birth wt	√	√	√	√		
weaning wt	√	√	√	√	√	
final live wt	√	√	√	√	√	
GR fat depth		√	√			√
dressing %		√	√			√
eye muscle area		√	√			√

Sire model BLUP EBVs were calculated for each dam genotype separately, using year- and breed-of-dam specific variance components. The correlation between the two sets of EBVs was used as a simple estimate of the extent of sire by dam breed interaction, analogous to the correlation between genotypes.

RESULTS AND DISCUSSION

Lambs born and survival to weaning

There were less multiple births, lower survival rates, and hence lower marking rates, in Merino ewes than in crossbred ewes (Table 2).

Table 2: Lambing, survival, and marking rates for BLM and Merino ewes

Year		1991		1992		1993		1994	
Breed		BLM	MER	BLM	MER	BLM	MER	BLM	MER
Birth type:									
	Singles	.51	.59	.36	.50	.30	.42	.27	.38
	Twins	.41	.37	.52	.39	.54	.44	.67	.55
	>2	.08	.04	.12	.10	.15	.14	.06	.07
Survival rate:									
	Singles	.68	.65	.92	.90	.94	.88	.87	.79
	Twins	.44	.33	.93	.82	.86	.69	.63	.53
	Triplets	.40	.24	.74	.60	.66	.40	.50	.15
Marking rate:		.76	.64	1.56	1.20	1.51	1.22	1.17	.93

Growth rates

Lambs from Merino dams were born lighter and grew more slowly. Two-thirds of the dam breed differences in final live weight were apparent at weaning, or about 50% of final live weight. In spring with plentiful high quality feed available, growth rates of MER lambs approached those of BLM. Because the progeny test end-point was a set average weight, the slower growth of MER lambs resulted in them being retained longer than weight differences indicate, since feed quality deterioration reduced later growth rates.

Table 3 summarises live weights (least squares means) for MER and BLM lambs in each of the four years. Note that between-year differences in weaning weights are affected by differences in average age at weaning: seasonal conditions influenced the decisions on weaning time.

Table 3: Lamb weights at birth, weaning and slaughter for BLM and Merino ewes

Year	1991		1992		1993		1994	
Breed	BLM	MER	BLM	MER	BLM	MER	BLM	MER
Birth wt (kg):	3.7	3.2	4.2	3.4	4.5	3.7	4.3	3.6
Weaning wt (kg):	24.8	20.5	22.9	19.2	24.2	20.0	16.1	13.7
Final live wt (kg):	43.1	37.4	45.2	39.6	45.6	39.8	47.0	40.3

All differences between BLM and MER lambs were significant ($P<0.05$). Lambs from Merino dams were lighter at birth, weaning and slaughter. This effect was consistent regardless of birth type.

Table 4 summarises carcase traits (least squares means) for first- and second-cross lambs in each of the four years.

Table 4: Carcase trait means for lambs from BLM and Merino ewes

Year	1991		1992		1993		1994	
Breed	BLM	MER	BLM	MER	BLM	MER	BLM	MER
GR depth (mm):	12.2	12.3	11.4	10.6	12.1	11.4	11.5	9.5
Dressing %:	.449	.435	.437	.425	.442	.436	.421	.429
Eye muscle area (sq cm):	13.5	12.4	13.4	13.4	13.6	12.9	12.6	11.8

Note that the means in Table 4 are at adjusted for carcase weight, but that the carcase weight means presented are at similar age (the MER lambs were grown slightly longer to reach similar carcase weights as

BLM). Except in 1991, MER lambs were leaner than BLM lambs. At the weights achieved here the difference in GR was about 1 mm but it approached 2 mm in lambs at heavier carcase weights. With price discounts applying to fat score 4 or 5 lambs (GR>15 mm), fewer MER lambs would be discounted than BLM lambs.

Correlations between Sire EBVs for MER and BLM lambs

Table 5: Sire EBV correlations between BLM and MER lambs

Trait	1991	1992	1993	1991-1993
Carcase wt:	0.43	0.77	0.73	0.73
GR tissue depth:	0.52	0.71	0.47	0.61
Eye muscle area:	0.48	0.73	0.79	0.73

Note that sire EBVs had not been calculated for 1994 data at time of writing.

If there were no sire-by-breed of dam interaction, these correlations would all be 1. These results suggest that for all three traits analysed here, there is at least a scale effect on EBVs due to the breed of dam. In all but one case (GR in 1991), the variance of sire EBVs was greater for the BLM data than for the MER data. While the correlation between sire EBVs should be relatively independent of sire variances, there was a tendency for the within-year, within-dam breed variances to increase from year to year. This could be due to a combination of improved experimental precision, some effect of including high genetic merit sires as reference sires in the two later years, and perhaps to increasing pre-test selection of sires by some breeders. Even if the correlation estimates for later years are better because of increased sire variances, it is still the case that the estimates are less than 1, with consequences for both sire ranking's and for sire selection for the two "objectives" first- and second-cross lamb production (Swan and Kinghorn, 1988).

In summary, Merino dams had lower marking rates to artificial breeding, lower lamb growth rates, and their lambs were lighter muscled, than Border Leicester Merino ewes. Their lambs were leaner at the weights examined here. The joint effects of leanness and lighter muscling on carcase price would depend on the degree of objectivity of carcase pricing and the price effects of GR and muscling in each particular market.

Also, there was evidence of a sire-by-dam breed interaction, with correlations between sire EBVs for MER and BLM lambs being less than 1. This observation warrants further investigation as it has important consequences for terminal sire breeding objectives and evaluation procedures.

REFERENCES

Banks, R.G., Shands, C., Stafford, J.E., Kenney, P. (1994): LAMBPLAN Superior Sires - Report of the Central Progeny Testing Project. MRC, Sydney.

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