VARIATION AMONG MATERNAL SIRES FOR LAMB AND WOOL GROSS MARGIN PERFORMANCE OF THEIR CROSSBRED DAUGHTERS

N.M. Fogarty[1], V. Ingham[1], L. McLeod[1], G. Gaunt[2] and L. Cummins[3]
[1]NSW Department of Primary Industries, The Australian Sheep Industry CRC, Orange, NSW 2800
[2]Department of Primary Industries, Primary Industries Research Victoria, Rutherglen, Vic. 3685
[3]Department of Primary Industries, Primary Industries Research Victoria, Hamilton, Vic. 3300

SUMMARY
The Maternal Sire Central Progeny Test evaluated 91 maternal sires from several breeds at 3 sites over 3 years with genetic links. The 2846 1stX ewe progeny were joined to terminal sire rams for 3 years and their 8878 2ndX progeny slaughtered. The annual $ gross margin for individual ewes comprised income from lamb carcases, with carcase discounts, lamb skins and ewe wool production and the costs for management of ewes and lambs and marketing. There was a range of $19 gross margin/ewe/year among sire breeds of the 1stX ewes, with a range of over $40 gross margin/ewe/year within the 18 Border Leicester sire groups, and considerable overlap of the sire breeds. Lamb turnoff rate was the major profit driver with lamb growth rate and carcase fat levels also contributing. There was some variation in ranking of sire breeds (and sires) with the production system and environment.
Keywords: ewe performance, lambing rate, growth rate, carcase fat, Border Leicester

INTRODUCTION
Productivity of the ewe flock has a major impact on lamb enterprise profitability and stocking rate. Income is from the sale of lambs (determined by number produced, carcase weight and fat level), skins and ewe wool (weight and fibre diameter). Potential productivity of the ewes for these traits is determined by their genetic merit. The current low sheep population in Australia with high demand for sheep meat is a further imperative to lift productivity of ewe flocks. Crossbreeding is used effectively to maximise heterosis among commercial flocks of crossbred ewes that predominate in the specialist lamb sector. Genetic improvement can further raise the productivity of crossbred flocks with a wide range of genotypes and genetic technology now available to achieve more rapid genetic improvement. The Maternal Sire Central Progeny Test (MCPT) has evaluated sires from several maternal breeds for the performance of their 1stX (slaughter wethers and breeding ewes) and 2ndX progeny (Fogarty *et al.* 2001). The between breed and sire within breed variation in gross margin performance for the lamb production of the 1stX daughters of the sires in MCPT is presented.

MATERIALS AND METHODS
MCPT design. Maternal sires were entered by breeders and mated generally to Merino ewes to produce 1stX progeny. The 1stX wethers were slaughtered and the 1stX ewes retained and mated to terminal sire rams to produce 2ndX slaughter lambs. Lamb production (lambing rate, 2ndX lamb growth and carcase) and wool production (fleece weight and fibre diameter) from the 1stX ewe daughters were measured over 3 years. A total of 91 maternal sires, including 3 link sires, were mated at 3 sites over 3 years (Cowra, NSW and Hamilton, Vic, Feb/Mar 1997-1999; Struan, SA, Jan 1998-2000), with 1stX ewes born at Struan, evaluated at Rutherglen, Vic. The matings aimed to produce >25 1stX ewes per sire. The sires were from the Border Leicester (BL), East Friesian (EF), Finnsheep

(Fi), Coopworth (Cp), White Suffolk (WS), Corriedale (Cr) and Booroola Leicester (BoL), as well as other breeds, with the number of sires and 1stX ewe progeny evaluated shown in Table 1. Further details of the MCPT and LAMBPLAN estimated breeding values (EBVs) of the sires are reported by Fogarty *et al.* (2005). The production systems for evaluation of the 1stX ewes were: Cowra - ewes split to autumn and spring joining, with first joining at 7 and 14 months of age respectively; Hamilton - joined in autumn, with first at 7 months of age; Rutherglen - joined in spring, with first at 17 months. In each year lambs were weaned at 3 months and slaughtered as a group at a target average carcase weight of 22kg. Greasy weight and bin line for fleeces from the 1stX ewes were recorded, with yield and fibre diameter measured at the hogget shearing.

Table 1. Number of sires, 1stX and 2ndX progeny

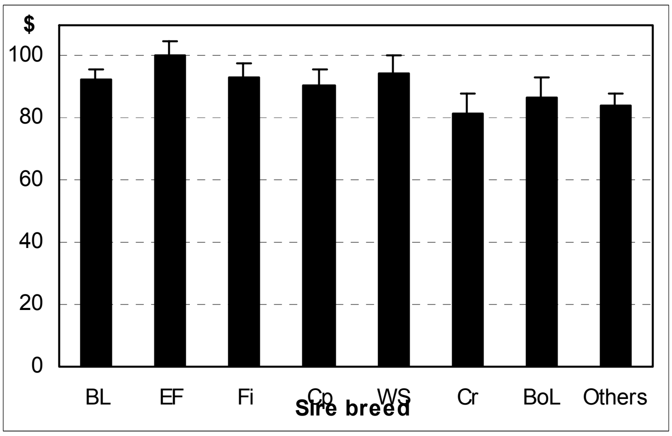
Breed	Sires	1stX ewes	2ndX lambs
Border Leicester	18	615	1933
East Friesian	12	236	759
Finnsheep	12	565	1954
Coopworth	9	428	1345
White Suffolk	7	179	550
Corriedale	6	162	406
Booroola Leicester	6	174	521
Others	21	487	1410
Total	91	2846	8878

$ gross margin. Income was calculated for individual ewes from the 2ndX carcases (and skins) turned off and the wool produced each year. Australian 5-year average prices (2000-04) for 2ndX lamb carcases and skins were used, with discounts on a price grid for lambs outside specification (=>20 kg carcase weight and fat score 2-4). The base price was $3.35/kg, with discounts for low weight (-1.50 $/kg, <16kg) and fat score (–0.75 $/kg, score 1; -0.50 $/kg, score 5). Trade weight carcases (16-20kg) had a small discount (-0.20 $/kg). Average skin prices were $11.00, $13.50 and $14.00 for <=20, 20.1-24 and >24 kg carcases respectively. Ten year average (1995-2004) wool prices for the various micron categories were used to calculate wool returns (x 0.9 to account for the lower price of skirtings). Gross margins were calculated using 1stX ewe costs of $6.24/ewe and 7.25% of wool returns and 2ndX lamb costs of $3.72/lamb slaughtered and 4.5% of lamb carcase and skin value (updated from Webster 1998).

Statistical analysis. The annual $ gross margin was analysed by mixed linear models using ASReml (Gilmour *et al.* 2002). The fixed effects included season of joining, site, ewe joining parity, sire breed and significant 2 and 3 way interactions. Sire and ewe were included as random effects and sire breed was tested with the between sire variance. The link sires allowed BLUP sire means to be predicted.

RESULTS AND DISCUSSION

There was a range in annual $ gross margin among the sire breeds of the 1stX ewes of almost $19/ ewe (Corriedale $81.22, East Friesian $100.03, Figure 1). However there was a considerably greater range among the sires within the breeds. For example, among the 18 Border Leicester sires there was a range of $41 gross margin/ewe/year for the sire progeny means which ranged from $67 for BL35 to $108 for BL2. There was considerable overlap between the Border Leicester and East Friesian sires (Figure 2) as well as most other breeds. This range in gross margins means a $20,000 higher annual profit for a 1000 ewe enterprise that has 1stX ewes sired by top rather than average maternal breed rams.



The lamb turnoff rate was the major driver for the $ gross margin with over 80% of income from lamb sales and less than 20% from ewe wool. While the number of lambs turned off (combines lambs born /ewe joined and lamb survival) was the major profit driver, lamb growth rate and fat level (which affect carcase weight and price) also affected profit. Lamb carcase price was determined by carcase weight and fat level which affected the proportion of lambs meeting the market specifications.

Figure 1. Annual gross margin ($) – 1stX ewes

Figure 2. Annual gross margin ($) – Border Leicester and East Friesian sires of 1stX ewes

The ranking of the sire breeds (and some sires) varied with the production system and environment in which their 1stX daughters were evaluated. In particular, the 1stX daughters of the Finnsheep and Booroola Leicester sires had a relatively higher ranking from the spring than the autumn joining (Figure 3). These 1stX ewes had high lambing rates with a high proportion of higher order births. Lamb survival tended to be low for these from the autumn joining (lambing in late winter), whereas the out of season spring joining, resulted in fewer higher order births and lambing occurred in autumn with better weather conditions and higher lamb survival. The annual $ gross margin increased with age of the ewes from autumn ($45, $93, $102) and spring ($81, $104, $118) joinings. It almost doubled from the first autumn joining where the ewes were lambing at 12 months of age compared to the second. The differences between the autumn and spring joinings were due to both the season and age of ewe effects which are confounded, at least for the first and second joinings.

There were differences in performance of the 1stX ewes at the sites over the 3 joinings. The first joining at Hamilton was low mainly due to very low lambing results from the joining at 7 months of age. These ewes did not grow out to sufficiently heavy weights prior to joining so that only a small proportion of ewes reached puberty and subsequently lambed. There were also some small but significant interactions that resulted in differences between the sire breeds in their relative performance from autumn and spring joinings and the age of ewe effects. The East Friesian sired 1stX ewes had higher performance than the other ewes at the first autumn joining indicating that a high proportion reached puberty at 7 months. They also had relatively lower performance at spring than autumn joinings indicating poorer out of season breeding ability. The Finnsheep 1stX ewes had relatively higher performance at spring than autumn joinings as discussed above.

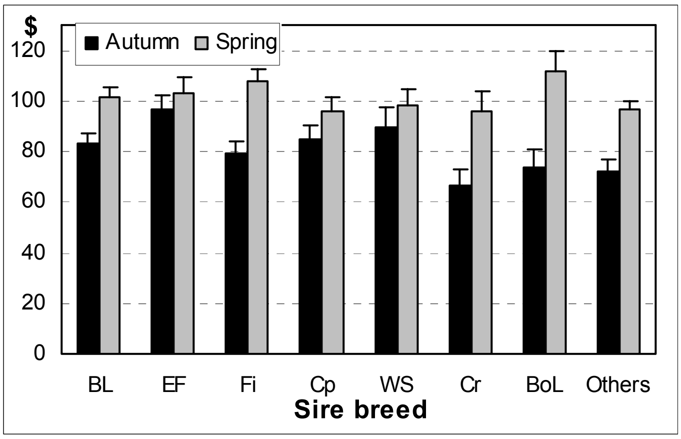


Figure 3. Annual $ gross margin x joining season – 1stX ewes

The results clearly demonstrate the considerable genetic variation among maternal genotypes that can be exploited to improve productivity and profitability of lamb enterprises. While there were some significant differences between the maternal sire breeds in performance of their progeny, the variation among individual sires within the breeds was far greater for most production traits. Lamb producers need to breed or purchase crossbred ewes that are by rams with high LAMBPLAN EBVs for the traits that match the lamb enterprise and ensure they are bred from high performing base ewe flocks.

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