# A COMMERCIAL COMPARISON OF EWE BREEDS FOR REPRODUCTION, WOOL AND LAMB GROWTH

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## SUMMARY

Sheep farmers are actively seeking unbiased information on the performance of sheep breeds and bloodlines within breeds to help improve their overall profitability. To help answer this question the Elmore Field Days Inc ran a comparison to determine the merit of five ewe genotypes for prime lamb and wool production from 2009 to 2014. Each of the five genotypes were represented by 42 ewes randomly selected from three properties. The ewes were joined annually to terminal sires for prime lamb production and run together as one mob except at lambing; there were six opportunities to lamb, the first as ewe lambs. Ewe genotypes compared were the Border Leicester x Merino cross (BL x Mo), local Merinos from northern Victoria and three dual purpose Merinos, Centre Plus Merinos, the Dohne Merino and the South African Meat Merino (SAMM). The local Merinos produced the heaviest fleeces and Centre Plus Merinos the finest. The BL x Mo and SAMMs had the highest reproduction but lighter and coarser fleeces.

## INTRODUCTION

What is the best ewe genotype to use for a combination of prime lamb and wool production? To help answer this question the Elmore Field Days Inc ran a trial from 2009 to 2014 to compare the merit of five alternative sheep genotypes in the northern Victorian environment at Elmore. This paper reports covers the results of five adult years of ewe and lamb body weights, condition scores, reproduction data and key wool measurements. Additional data for other traits were available for some years and are also reported.

## MATERIALS AND METHODS

Ewes were run on the Elmore Field Days site 3 km east of Elmore in northern Victoria from January 2009 to October 2014. The rain at the locality is winter dominant with a long term average of 466mm per year. Sheep grazed on annual pastures growing between late autumn and spring and dry pasture residues and crop stubbles over the summer. Summer storms in some years provided extra green feed from dryland lucerne and green summer weeds.

Five ewe genotypes were each represented by 42 ewes. Each genotype group was randomly selected from three properties, with 14 ewe lambs per property after an allowance for culling. The ewe lambs were fed a high-quality diet to reach a joining weight in late February 2009, when they were joined to White Suffolk rams with a further five annual joinings to either White Suffolk or Poll Dorset rams.

The ewe genotypes were (i) BL x Mo. - Border Leicester x Merino cross ewes, the most common prime lamb mother in northern Victoria. (ii) Merino LV - Loddon Valley Merinos, the second most common prime lamb mother in northern Victoria; based on Peppin bloodlines with some influence from South Australian bloodlines and typical of many medium Merinos. These local ewes were compared to three dual purpose Merinos that have been recently introduced to the district. (iii) CP Merino - Centre Plus Merino, from Central West NSW. (iv) Dohne - The Dohne Merino is a dual-purpose breed developed in South Africa. In 2008 the Dohne breed was in the early stages of introduction to Australia from South Africa. Two properties supplied $F_2$ ewe lambs while the third property supplied $F_3$ ewes. (v) SAMM - The South African Meat Merino is a

dual-purpose sheep originally bred in South Africa. In 2008 the SAMM breed was in the early stages of introduction to Australia. Two properties supplied $F_3$ ewe lambs while the third supplied a mix of $F_2$s and $F_3$s. This report covers the five adult years of body weights, condition scores, reproduction data and key wool measurements. Additional data were available for some years.

Lambing time varied from year to year, from April (autumn) to August (late winter) as ram introduction varied from 1 November and 26 February. Ewes were pregnancy scanned about 90 days after the rams were introduced and assigned as 'dry' or carrying a single or twin. They were divided into their breed groups immediately prior to lambing and run together again from lamb marking. Ewes were inspected twice daily during lambing and assistance was only given when needed. Individual lambs were not identified with their dam at lambing. Instead ewe udders were inspected at lamb marking and weaning and each ewe was classed as 'wet' or 'dry' or 'lambed and lost' when linked to scan information.

Shearing was in early October year and wool mid-side samples for wool quality characters were taken about 3 weeks before shearing. Ewes were scored using standard industry guidelines by two experienced operators for greasy wool colour in two years and for wrinkle (neck and body) once at three years of age. Fleece rot was scored before shearing after a normal season in September 2010 and in April and September 2011, after the wettest summer on record with 611 mm of rain over 5 months. Lamb growth was assessed by live weights before sales and the proportion that would go to slaughter in the first draft. Lambs were weaned at 12 to 14 weeks and sold when a commercial draft reached a minimum live weight of 46 kg; except in the poor spring of 2013 when the weight was reduced to 42 kg. The average age of the first batch at marketing was 21 weeks. Carcase measurements were available for 4 slaughter batches of lambs totalling 460 lambs over three years. Underweight lambs were carried over the summer in two years.

Wool and lamb returns per ewe were calculated each year using average prices over the previous 12 months. Wool prices differences reflected fibre diameter. Lamb returns per ewe were calculated from lambing percentage, lamb live weight, dressing percentage and skin value.

**Statistical analyses.** A linear mixed model was fitted to reproduction, wool, body weight and condition score traits. Fixed effects fitted within the model included year (confounded with ewe age), ewe genotype and the interaction between year and ewe genotype (which was almost never significant). For ewe body weight and condition score whether or not they lambed at 12 months was included and also the interaction between 12-month-lambing and year. Random effects included property of origin, the interaction between property and year, and ewe to account for repeated measures across years. For wool traits the year by property interactions were not significant and removed from the model. For traits recorded only once (e.g. broken mouths at the end of the trial) the model only included the fixed effect of ewe genotype. For lamb carcass traits, the model included fixed effects of year of birth, sex (ewe, wether) and ewe genotype. Interactions between fixed effects were not significant and removed from the model. Least significant differences (LSD) are shown where appropriate.

## RESULTS AND DISCUSSION

**Wool and ewe body weight.** The local Merino produced the heaviest fleeces and the SAMM the lowest. The Centre Plus Merino had the finest wool, with local Merinos similar to Dohne, SAMM being coarser and the BL x Mo the coarsest (Table 1). SAMM and BL x Mo ewes maintained greater condition than the others, with the local Merino the lowest.

**Reproduction and lamb performance.** There were no breed differences in fertility (ewes pregnant per ewe joined) but there were substantial differences in fecundity (litter size) and so lambs weaned (Table 2). BL x Mo and SAMM were highest, Centre Plus intermediate and local Merino and Dohne lowest. The 36% difference in lambs marked between the SAMMs and Australian Merinos in this study contrasted with a South African study where the difference was

12% between SAMMs and wool focused Merinos (Cloete 2003). The differences between Dohnes and wool focused merinos were similar in both studies. Heterosis may have had a small effect on the $F_2$ and $F_3$ SAMM and Dohne results as maternal heterosis between Australian Merino strains averaged 8% lambs marked in a study of $F_1$s by Mortimer *et al* (1997).

These analyses clearly show the trial had sufficient numbers to validly test sheep reproduction, weights and wool production with the limited resources of farmer research organisations and a team of dedicated volunteers with professional help. They are a reliable guide to the reproductive performance of the flocks of origin as the property of origin variance was very small and several studies including Allden (1979) and Gunn *et al* (1995) have indicated the nutrition of the young ewe, from a foetus to weaning, has zero or small long term effects on subsequent reproduction under commercial farm conditions.

Lambs from SAMM ewes were the heaviest, then BL x Mo, Centre Plus and Dohne intermediate and the local Merino lowest (Table 3). There were no differences in the GR fat measure after adjustments for carcase weight.

**Table 1. Ewe live weight and condition score at joining for the five adult lambings from 2010 to 2014 and wool productions for the five adult shearings from 2010 to 2014.**

| Ewe Breed | Ewe weight, fleece free at joining (kg) | Condition score at joining (score 1-5) | Greasy fleece weight (kg) | Clean fleece weight (kg) | Fibre diameter mean (μm) | Fibre diam. Coefficient of variation (%) | Greasy wool colour (score 1-5) |
|---|---|---|---|---|---|---|---|
| BL x Mo | 79.6$^{b}$ | 4.34$^{d}$ | 5.5$^{bc}$ | 3.9$^{bc}$ | 30.3$^{d}$ | 20.3$^{c}$ | 3.4$^{c}$ |
| Merino LV | 63.6$^{a}$ | 3.55$^{a}$ | 6.6$^{d}$ | 4.8$^{d}$ | 20.9$^{b}$ | 18.6$^{b}$ | 2.4$^{a}$ |
| CP Merino | 70.7$^{a}$ | 3.77$^{b}$ | 6.0$^{c}$ | 4.1$^{c}$ | 19.0$^{a}$ | 16.1$^{a}$ | 2.4$^{a}$ |
| Dohne | 70.6$^{a}$ | 4.05$^{c}$ | 5.1$^{b}$ | 3.5$^{b}$ | 20.8$^{b}$ | 17.8$^{ab}$ | 2.9$^{b}$ |
| SAMM | 79.7$^{b}$ | 4.38$^{d}$ | 4.1$^{a}$ | 2.6$^{a}$ | 24.4$^{c}$ | 17.0$^{ab}$ | 3.3$^{c}$ |
| LSD | 8.1 | 0.17 | 0.5 | 0.4 | 1.3 | 1.1 | 0.2 |

$^{abc}$ *Ewe breed means within columns with different superscripts differ significantly (P<0.05).*

**Table 2. Ewe reproduction characters for the five adult lambings from 2010 to 2014.**

| Ewe breed | Scanned in lamb | Fetuses scanned per pregnant ewe | Fetuses scanned per ewe joined | Lambed & lost per ewe lambing | Lambs born per ewe joined | Lambs marked per ewe joined |
|---|---|---|---|---|---|---|
| BL x Mo | 0.94 | 1.67$^{b}$ | 1.58$^{b}$ | 0.04$^{a}$ | 1.50$^{c}$ | 1.32$^{c}$ |
| Merino LV | 0.91 | 1.42$^{ab}$ | 1.29$^{a}$ | 0.11$^{b}$ | 1.16$^{a}$ | 0.96$^{a}$ |
| CP Merino | 0.93 | 1.59$^{b}$ | 1.48$^{b}$ | 0.07$^{a}$ | 1.38$^{b}$ | 1.16$^{b}$ |
| Dohne | 0.90 | 1.40$^{a}$ | 1.26$^{a}$ | 0.15$^{b}$ | 1.20$^{a}$ | 0.96$^{a}$ |
| SAMM | 0.97 | 1.65$^{b}$ | 1.61$^{b}$ | 0.05$^{a}$ | 1.56$^{c}$ | 1.32$^{c}$ |
| LSD | 0.08 | 0.18 | 0.18 | 0.07 | 0.09 | 0.06 |

$^{abc}$ *Ewe breed means within columns with different superscripts differ significantly (P<0.05).*

**Industry application.** Reproduction, lamb growth, wool and easy care characters are all highly relevant to improving profitability, but no single genotype exceled in all compartments. The estimated returns from wool and lamb are shown in Table 4. The local Merino and Centre Plus had the greatest wool returns whereas BL x Mo and SAMM had the greatest lamb returns.

When wool and meat were combined the SAMM and Centre Plus were equivalent and the BL x Mo was close. However, returns per hectare from the BL x Mo and SAMM would be reduced when accounting for their higher feed intake, due to higher number of lambs reared and heavier ewes. However indications are that dual purpose Merinos with good wool, reproduction and lamb growth are likely to be the most profitable alternative in this Elmore environment. Systems analyses using bio-economic models such as GrassGro are needed to fully investigate whole farm profitability.

**Table 3. Lamb live weights, growth rates and dressing percentage.**

| Ewe Breed | Weight at Marking (kg) | Weight in spring, before any sales (kg) | Weight gain, Winter-Spring (g/day) | Percent in 1st slaughter batch | Weight gain over Summer (g/day) | Dressing percent |
|---|---|---|---|---|---|---|
| BL x Mo | 19.4$^{c}$ | 47.7$^{c}$ | 261$^{d}$ | 67.4$^{c}$ | 156$^{d}$ | 47.2$^{bc}$ |
| Merino LV | 18.2$^{a}$ | 44.3$^{a}$ | 241$^{a}$ | 45.3$^{a}$ | 142$^{b}$ | 46.4$^{a}$ |
| CP Merino | 18.1$^{a}$ | 46.1$^{b}$ | 258$^{c}$ | 55.8$^{b}$ | 150$^{cd}$ | 46.7$^{a}$ |
| Dohne | 18.7$^{b}$ | 46.3$^{b}$ | 255$^{b}$ | 58.4$^{b}$ | 133$^{a}$ | 47.1$^{b}$ |
| SAMM | 18.8$^{b}$ | 48.5$^{d}$ | 274$^{e}$ | 72.0$^{d}$ | 146$^{bc}$ | 47.4$^{c}$ |
| LSD | 0.4 | 0.5 | 3 | 4.0 | 7 | 0.3 |

$^{abc}$ *Ewe breed means within columns with different superscripts differ significantly (P<0.05).*

**Table 4. Scores for skin wrinkle and fleece rot and the financial returns from wool and lambs.**

| Ewe Breed | Wrinkle, neck and body (score 1-5) | Fleece rot 8Sept2010 (score 1-5) | Fleece rot 18Apr2011 (score 1-5) | Fleece rot 6Sept2011 (score 1-5) | Wool returns per ewe ($/ewe) | Lamb returns per ewe ($/ewe) | Total wool and lamb returns per ewe ($/ewe) |
|---|---|---|---|---|---|---|---|
| BL x Mo | 1.2$^{a}$ | 1.5 | 1.6$^{a}$ | 2.0$^{a}$ | $19.94 | $154.54 | $174.48 |
| Merino LV | 2.5$^{c}$ | 1.3 | 2.4$^{bc}$ | 3.2$^{b}$ | $52.96 | $102.32 | $155.28 |
| CP Merino | 2.3$^{c}$ | 1.2 | 2.3$^{b}$ | 2.7$^{b}$ | $49.67 | $130.04 | $179.71 |
| Dohne | 1.6$^{b}$ | 1.4 | 2.9$^{c}$ | 3.0$^{b}$ | $38.70 | $108.68 | $147.39 |
| SAMM | 1.1$^{a}$ | 1.6 | 2.2$^{ab}$ | 2.6$^{ab}$ | $23.17 | $157.08 | $180.25 |
| LSD | 0.2 | 0.6 | 0.6 | 0.6 | | | |

$^{abc}$ Ewe breed means within columns with different superscripts differ significantly (P<0.05).

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