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Lambing Merino ewes at 1 year of age – how productive and profitable for commercial enterprises?

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SUMMARY

The period of time from birth to reproduction in breeding females is non-productive and costly in sheep production systems (Emsen *et al*. 2005). Fogarty *et al*. (2007) suggested that joining ewe lambs in their first year may reduce the cost of ewe replacement by rapidly increasing the size of a breeding flock when replacement ewes are in short supply.

The Maternal Central Progeny Test demonstrated that, with optimal genetics and management, crossbred ewes can be successfully joined in autumn to lamb in their first year and have weaning rates of up to 90% (Fogarty *et al.* 2007). Joining of crossbred ewe lambs is now a common practice among Australian prime lamb producers. In contrast, joining of Merino ewes as lambs is rare and little information exists on the production potential or feasibility of such systems within commercial Merino flocks.

A prerequisite for joining Merino ewe lambs is oestrus activity in all or most ewes before 10–12 months of age (Hawker and Kennedy 1978). Watson and Gamble (1961) suggest that when Merino ewes are joined before 12 months of age, 60–80% may lamb provided that they are well grown and that joining is delayed until February or March.

This study will investigate the productivity of managing Merino ewes to lamb at between 12 and 15 months of age using 3 Merino bloodlines (Leahcim, Multi-Purpose Merino and Bundilla genotypes) across 3 geographically diverse locations. At weaning age, a random selection of ewes (n >50) will be obtained and managed in a 1-year-old lambing system on producer participant sites. Ewes in this system will be managed on pasture and supplements to achieve predetermined liveweight targets before joining, at joining, mid pregnancy and parturition and after weaning. Wool production, ewe pregnancy rate, lamb marking rate, lamb growth and weaning rate will be measured over 2 consecutive breeding seasons.

An economic analysis of the 1-year-old lambing system will be a major part of this study to test the hypothesis that under optimal management, Merino ewes can be lambed profitably at 12 months of age. Ewe liveweight targets will be modelled for a range of locations, soil types and pasture types in south-eastern Australia using Grassgro software to determine the requirements for additional pasture and supplementary feed of 1-year-old lambing systems. The profitability of 1-year-old lambing systems will be determined by comparing observed production levels and associated management costs with conventional 2-year-old lambing systems.

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Merino ewes can be selected to lose less weight during periods of low nutrition

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SUMMARY

The weight of mature ewes in Mediterranean climates varies because of seasonal variation in the supply of pasture and affects farm profit. Ewes that lose more weight during the dry months of summer and autumn give birth to and raise less lambs (Kelly 1992) and require more supplementary feeding (Kopke *et al.* 2008). Despite the importance of weight change, the potential to breed ewes that lose less weight during summer and autumn has not been investigated. The aim of this study was to determine whether this trait is genetic.

Using a research dataset from Western Australia, we investigated change in weight from January to February (WJan–WFeb) and from May to October (WMay–WOct). Pedigree information and weight records from the Katanning base flocks for approximately 2700 adult ewes with on average 2 observations for both weight change traits were used (Greeff and Cox 2006). Variance components were estimated using ASReml. All weights were corrected for conceptus and greasy fleece weight.

The model included fixed effects of year (2000–2005), age (2–7 years) and number of lambs born and reared by each ewe in the year of weight measurement and in the year before the weight measurements (0–3). The first weight measurement from each trait, WJan for WJan–WFeb and WMay for WMay–WOct, and the total weight of lambs born in the year of weight measurement were fitted as covariates. Random effects were used to estimate additive genetic variance (σ^2_a), permanent environmental variance (σ^2_{pe}), maternal effect variance (σ^2_{me}, without pedigree information) and random residual variance (σ^2_e).

Table 1. Means, minimums, maximums, variance components and heritability of weight change traits

Trait	Mean (kg ± s.d.)	Min. (kg)	Max. (kg)	σ^2_a (± s.e.)	σ^2_{ae} (± s.e.)	σ^2_{me} (± s.e.)	σ^2_e (± s.e.)	h^2 (± s.e.)
WJan–WFeb	0.91 ± 5.04	–17.4	17.6	2.58 ± 0.36	0.29 ± 0.39	0.20 ± 0.26	11.0 ± 0.30	0.18 ± 0.02
WMay–WOct	–3.08 ± 7.98	–36.2	24.5	7.20 ± 0.93	1.26 ± 0.92	0.81 ± 0.61	22.4 ± 0.62	0.23 ± 0.03

The phenotypic correlation (± s.e.) between WJan–WFeb and WMay–WOct was –0.39 ± 0.01 and the genotypic correlation was –0.05 ± 0.09. These correlations suggest that ewes that lose more weight between January and February gain more weight during May and October and vice versa. The relevance of these results will become clearer once the relationships between weight change during periods of low nutrition and reproduction and production traits are known. These results could perhaps be further improved by fitting curves to the weights using random regression. This would model variances and heritabilities of weight at any stage during the year as well as the correlations between weights at different times.

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