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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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