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Liveweight variation across annual cycles is lower in high growth rate ewes

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SUMMARY

Resilience of mature ewes to restricted nutrition is important as resilient ewes will be in better condition at mating and throughout pregnancy, which is associated with subsequent reproductive performance (fertility, fecundity and lamb survival). The innate ability of some ewes to maintain liveweight (LW) when nutrition is limited is likely to improve the profitability of sheep enterprises by reducing the cost of maintaining ewes over summer or by enabling higher stocking rates, particularly in environments characterised by large seasonal fluctuations in pasture supply. Adams *et al.* (2002) found that a heavier strain of Merino ewe lost less LW when grazed on dry, poor-quality summer pasture, suggesting that genetic potential for high growth rate may affect LW fluctuation. We hypothesised that the LW of adult ewes with high Australian Sheep Breeding Values (ASBVs) for hogget weight (HWT) will fluctuate less between seasons. Weight data from six Information Nucleus Flock sites for 1079 ewes from the 2007 and 2008 lambing seasons was analysed. All ewes were weighed at intervals throughout their lives, resulting in 10,948 hogget and adult observations. Weights recorded between day 100 of pregnancy and lambing were excluded from the dataset to remove bias due to conceptus weight, and differences between minimum and maximum weights in each reproductive cycle were determined for each ewe. These differences were analysed using a linear mixed-effects model with fixed effects for site, breed (Merino and Border Leicester × Merino) within flock, reproductive cycle (1st or 2nd), covariates for average LW of the reproductive cycle, HWT ASBV, C-site fat depth (HFAT) ASBV and random terms for sire and dam. Fluctuation in ewe LW differed significantly ($P < 0.0001$) between sites and was greatest at Katanning (Fig. 1*a*). HWT was negatively related to LW fluctuation, which decreased by 7.5 kg across the range of HWT ASBVs (–6.0 to 16.0). This was only evident in ewes in their second reproductive cycle (Fig. 1*b*). An increase in HFAT ASBV resulted in a decrease in weight fluctuation at some sites, particularly at the Cowra and Rutherglen sites, where variation decreased by 12 kg across the range of HFAT ASBVs (–4.5 to 4.5).

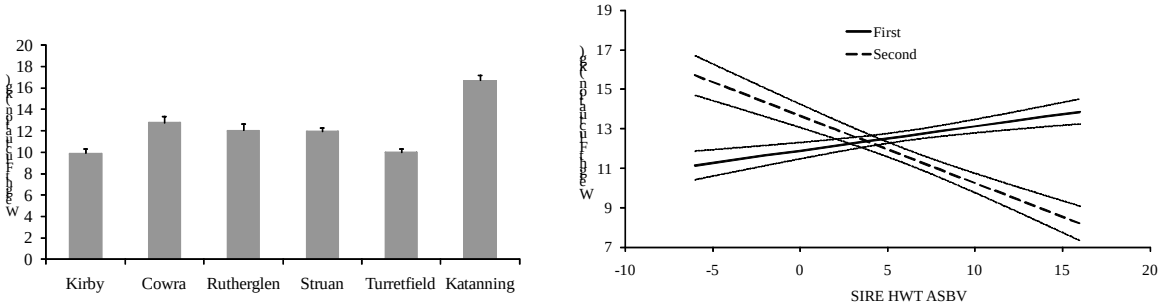

Figure 1. Average LW fluctuation according to (a) site and (b) sire HWT ASBV in the first and second reproductive cycles.

In support of our hypothesis, the amplitude of LW fluctuation was reduced as HWT ASBV increased. The lack of an effect in the first reproductive cycle is most likely because the ewes were still growing, which would have confounded weight fluctuations, particularly in high HWT ewes. Thus, selection for HWT ASBV may improve resilience in adult ewes but this effect is not evident in growing ewes. HFAT ASBV affected LW fluctuations at some sites but not at others. The reason for this is unknown but it may be related to nutrition.

REFERENCE

Adams NR, Briegel JR and Blache D (2002) Feed intake, liveweight and wool growth rate in Merino sheep with different responsiveness to low and high quality feed. *Australian Journal of Experimental Agriculture* **42**, 399–405.