

## Breeding to produce high clean fleece weight decreases fat reserves in pregnant and lactating merino ewes and is likely to reduce their reproductive success

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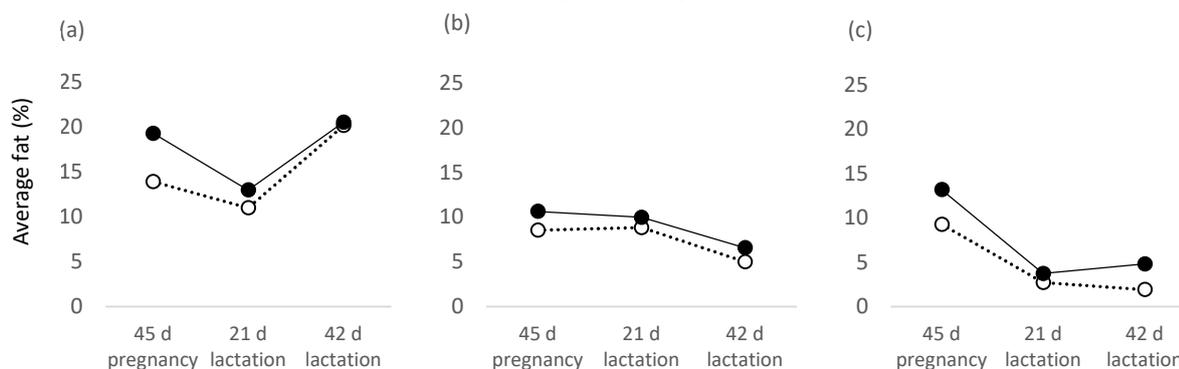
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Breeders of Merino sheep have placed heavy emphasis on the production of a high clean fleece weight (CFW). The trade-off, however, is the negative correlation between high CFW and fat depth (Greeff *et al*, 2008) as well as a negative genetic correlation between high CFW and the number of lambs weaned (Safari *et al*, 2005). A higher CFW means more metabolically active follicles in the skin (Masters and Ferguson, 2019), syphoning energy away from the body reserves. Since ewes with a high CFW are expected to have a higher metabolic demand compared to ewes with a low CFW, it was hypothesised that ewes with a high clean fleece weight would have less fat and higher lean body mass in late pregnancy and throughout lactation compared to ewes with a low CFW.

Dual Energy X-Ray Absorptiometry (DXA) was used to determine the body composition (gram lean tissue mass and % fat) of ewes. N=146 Merino ewes selected based on their extremes in the estimated breeding values (EBVs) for clean fleece weight. Ewes were inseminated with semen from Border Leicester, Merino or Terminal sires at the same time. All ewes had reasonably similar EBVs for hogget body weight and fibre diameter. Dry (n=39), single (n=52) and twin (n=55) bearing ewes were selected from these high (n=84) and low (n=64) clean fleece weight groups and managed in the same group for the duration of the experiment. Ewes, including dry ewes, were weighed and scanned at 75-80 days of pregnancy and at 21 and 42 days of lactation. The DXA outputs were analysed by a repeated measures single ANOVA with ewe number, ewe age, selection group (high or low CFW), lambs (dry, single or twin), sire breed and scanning time set as fixed factors.

High CFW ewes had fewer fat reserves irrespective whether they were dry or pregnant with single or twin lambs. A significant interaction (P=0.026) was found between selection for CFW and scanning time (Figure 1). The pregnant ewes lost fat reserves consistently over the experimental period, with the twin bearing ewes losing more fat while the dry ewes gained fat from 21 days to 42 days.



**Figure 1: Maternal and lactational average fat % in dry (a), single lamb (b) and twin lamb (c) bearing ewes selected for high (open circles) and low (solid circles) CFW.**

The results support the hypothesis that sheep selected to produce a high clean fleece weight have fewer maternal fat reserves throughout both pregnancy and lactation. The results also suggest that breeding programs for increased wool production should also include selection to increase fat reserves as part of the breeding objective. We conclude that high clean fleece weight sheep may also require supplementary feeding during late pregnancy and lactation to fuel increased wool growth and to maintain body condition during pregnancy and lactation to ensure that reproductive success is not compromised.

### References

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Masters DG, Ferguson MB (2019) *Small Ruminant Research*. **170**,62-73.  
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