Australian sheep breeding values for carcass traits may alter muscle distribution in lamb carcasses

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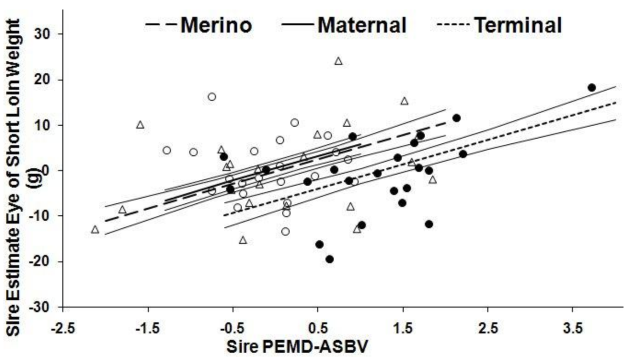
SUMMARY
The financial value of a carcass is determined by lean meat yield, which is in turn determined by weight and composition. Carcass composition is greatly affected by fatness, which poses a significant processing cost (Jones *et al.* 2002). Australian lamb producers select livestock indirectly for lean meat yield percentage via three Australian sheep breeding values (ASBVs) that are determined on the live animal: post weaning weight (PWWT), C-site fat depth (PFAT) and eye muscle depth (PEMD). The authors of a previous study hypothesised that an increase in PWWT and PEMD and a decrease in PFAT will increase lean meat yield percentage (Gardner, G. E. unpubl. data). They used data from an Information Nucleus Flock that consisted of lambs from sires with extreme ASBVs for several production traits. The carcasses of approximately 2000 lambs from the 2007 cohort were assessed after slaughter at a target weight of 21.5 kg, 352 of which underwent computed tomography (CT) scanning to determine proportions of bone, muscle and fat. The results only partially supported the original hypothesis, in that a decrease in PFAT ASBV increased CT lean percentage and increased CT fat percentage. An increase in PWWT ASBV increased carcass weight but did not alter CT lean percentage. Likewise, an increase in PEMD ASBV did not alter CT lean percentage but increased the weight of the loin (Figure 1), the site at which PEMD is measured on the live animal. Therefore, we hypothesise that a high sire PEMD ASBV is associated with redistribution of muscle tissue to the loin and away from other muscle depots without changing whole carcass lean percentage. As the carcasses were scanned after dissection into fore, mid, and hind sections, future analyses of these carcasses will compare the distribution of bone, muscle and fat between these sections using a log:log form of the allometric equation y = ax^b. This will be analysed as a linear function log, $y = a + b\log x$, where y = tissue (e.g., muscle) weight within a section and x = total weight of the tissue type within the carcass. The term a is the proportionality coefficient and b is the growth rate of y relative to x. Localised changes in muscle tissue distribution may alter carcass value despite the absence of a change in lean meat yield given that an increase in loin weight adds mass to the most expensive cut in the carcass. The weights of the topside, loin and round were recorded at slaughter, which may enable ASBVs to be developed for selection for increased lean percentage in the more valuable hindquarter cuts. Concern remains that selection for leanness may affect eating quality, and therefore correlations between CT lean percentage and traits such as intramuscular fat percentage, muscle metabolic type and mineral content (Fe, Zn) will be determined.

Figure 1. Relationship between sire estimate for weight of eye of short loin (g) and sire PEMD-ASBV for Merino (Δ) maternal (○) and terminal (●) sires. Lines are LS means ± S.E. (Gardner *et al.* unpubl. data)



REFERENCES
Jones H.E., Simm G., Young R.M. (2002) The use of X-ray computer tomography for measuring the muscularity of live sheep. *Animal Science* **75**, 387-399.