



## Sheep CRC Conference Proceedings

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## Skin and muscle protein metabolism in Merinos differing in EBVs for wool growth

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In the Australian sheep industry, Estimated Breeding Values (EBVs) are being increasingly used to select Merino sheep for excellence in traits such as high clean fleece weight (CFW), low fibre diameter (FD) and high yearling live weight (YLW). It has been proposed that genetic differences in CFW may be related to skin protein metabolism and that it is sensitive to the level of nutrition (Williams and Morley 1994; Liu *et al.* 1998). The underlying physiological responses to EBV and plane of nutrition are not well understood.

We selected 20 wethers from a commercial flock (18 month-old weighing about 33.3 kg) with similar EBV for FD and YLW, but 10 wethers had high EBV for CFW (F+), and 10 had low EBV for CFW (F-). We used a 2 x 2 experiment (F+ and F- wethers at two levels of intake, i.e. 0.8 and 1.8 x maintenance of commercial pellets) and determined CFW and protein synthesis rates (FSR) in their skin and muscle pools using the flooding dose technique (Rocha *et al.* 1993, i.e. i/v injection of deuterium-labelled [L-ring-D<sup>3</sup>] phenylalanine). The commercial pellets contained 13.3% crude protein, 20% crude fibre, 9.5 MJ/kg ME. Results are given in Table 1.

**Table 1.** CFW and FSR in muscle and in the different layers of skin of Merino wethers selected for high (F+, n = 10) and low (F-, n = 10) EBVs for clean fleece weight when they were offered 2 levels of feed intake

|                               | 0.8 M |      | 1.8 M |       | s.e.m. | Intake | P values  |       |
|-------------------------------|-------|------|-------|-------|--------|--------|-----------|-------|
|                               | F +   | F -  | F +   | F -   |        |        | Phenotype | I × P |
| CFW (g/100cm <sup>2</sup> /d) | 0.09  | 0.07 | 0.12  | 0.10  | 0.005  | <0.001 | 0.013     | 0.819 |
| FSR in skin (%/d)             | 9.81  | 9.78 | 13.53 | 10.37 | 0.503  | 0.008  | 0.040     | 0.043 |
| FSR in muscle (%/d)           | 1.47  | 1.46 | 2.15  | 1.43  | 0.085  | 0.015  | 0.007     | 0.009 |

The feeding level (0.8 × M and 1.8 × M) and phenotype significantly affected the growth of clean wool (CFW), FSR of skin and muscle protein. There were also significant interactions between phenotype and feeding level for the FSR in the whole skin and muscle. These interactions indicated that F+ was more sensitive than F- to the high feeding level in whole skin and muscle. There is no trade-off in protein metabolism between wool growth and meat production. CWP is significantly correlated with dermal protein synthesis rate (Clean wool growth = 0.0043 (±0.001) \* Dermal FSR + 0.0448 (±0.013) (n = 20, r = 0.68, P < 0.001).

The results obtained from the study can be used as markers for genetic differences between bloodlines to more rapidly improve the wool and meat production which will increase profitability of the industry.

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