

## GLUCOSE PRODUCTION IN MERINO EWES SELECTED FOR HIGH FLEECE WEIGHT

*E.N. BERMINGHAM<sup>A</sup>, S.M. LIU<sup>A</sup>, J.R. BRIEGEL<sup>A</sup>, J.C. GREEFF<sup>B</sup> and N.R. ADAMS<sup>A</sup>*

<sup>A</sup>. CSIRO Livestock Industries, Private Bag 5, Wembley, WA 6913

<sup>B</sup>. Australian Sheep CRC and the Department of Agriculture WA, Katanning, WA 6317

Selection for high clean fleece weight (CFW) in Merino ewes was associated with decreased plasma glucose and insulin concentrations (Briegel *et al.* 2004). The cause of this difference is not clear, however, it is likely that differences in substrate availability or metabolic pathways for gluconeogenesis will be responsible. The aim of this study was to investigate the effects of selecting for increased fleece weight on glucose production in the Merino ewe.

Two lines of Merino ewes were selected based on estimated breeding value for high (H) or low (L) CFW (4.18 v. 3.10 (SED 0.13) kg CFW;  $P < 0.001$ ). A catheter was inserted into each jugular vein 24 h prior to the start of the experiment. Twelve ewes (6H and 6L) were fasted for 12 h prior to a primed infusion of [6, 6- $D_2$ ]-glucose (99 atoms percent, Cambridge Isotope Laboratories, Andover, MA, USA; 1.1 mmol/h) into the left jugular vein. Blood samples (10 mL) were taken from the right jugular vein at 0, 30, 60, 90, 120, 150 and 180 minutes after the start of the infusion period, and glucose concentration and enrichment in plasma were determined. The concentration of glucose in plasma was determined using a glucose kit (Sigma Diagnostics, St Louis, MO, USA) on a COBAS Mira Clinical Analyser. To determine  $D_2$ -glucose enrichment in plasma, the method described by Kury and Keller (1991) was used. Glucose production (mmol/h) was calculated by dividing the  $D_2$ -glucose infusion rate by the isotopic enrichment of  $D_2$ -glucose using samples taken 150 and 180 minutes after the start of infusion.

Body weight, fibre diameter and plasma glucose concentrations were similar between the CFW selection lines ( $P > 0.05$ ). Despite this, selection for increased CFW reduced glucose production by 28% (23.3 v. 29.9 (SED 2.8) mmol/h ( $P < 0.05$ ) in H and L ewes, respectively).

Selection for increased CFW in Merino ewes places additional demands on the sheep for amino acids for protein synthesis by the skin for wool growth. This may mean that there may be less amino acids available for other purposes such as gluconeogenesis. Therefore, the reduction in glucose production in the high CFW ewes may be due to less amino acids being available to the sheep for gluconeogenesis, and may explain the reduced plasma glucose concentrations observed in this selection line by Briegel *et al.* (2004).

BRIEGEL, J.R., ADAMS, N.R. and GREEFF, J.C. (2004). *Anim. Prod. Aust.* **25**, (This Proceedings).

KÜRY, D. and KELLER, U. (1991). *J. Chromat.* **572**, 301-306.

Email: Emma.Bermingham@csiro.au