

NUTRIENT METABOLISM OF SHEEP FED A DIET SUPPLEMENTED WITH LUPIN GRAIN

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The aim of this work was to study the metabolism of volatile fatty acids and glucose by the gut, liver and muscle in sheep fed a maintenance ration of lucerne cubes compared to a similar diet supplemented with lupin grain.

Merino ewes aged 3-5 yr with body weight 39-46 kg were prepared with indwelling cannulae to study net splanchnic and muscle metabolism using the arterio venous difference technique (Katz & Bergman 1969; Oddy *et al.* 1981). The daily ration was either 700 g of lucerne cubes (maintenance, 6.2MJ ME/d) or 700 g of lucerne cubes plus 700 g of lupin seed (lupin supplemented, 14.5MJ ME/d). Both rations were fed semicontinuously. The full intake of lupin was achieved for at least 3d before experimentation. Glucose irreversible loss (glucose IRL) was measured using a continuous infusion of [U-¹⁴C]glucose. The following results were obtained.

	Maintenance ¹	Lupin Supplemented
Glucose IRL (mmol/h)	21.7±0.6 (7)	67.7±4.1* (7)
Hepatic BF (l/min)	1.9±0.1 (11)	2.1±0.1 (6)
Muscle BF (ml/min/kg)	81±3 (6)	101±6* (5)
Hepatic glucose release (mmol/h)	16.9±2.2 (7)	22.2±2.8* (6)
Muscle glucose uptake (mmol/h/kg)	1.1±0.2 (6)	1.5±0.3* (5)
Gut release of major fermentation products (mmol C/h) ²	382±77 (5)	732±134* (5)

¹ Results are shown as means.e.m., () no. animals, BF Blood Flow

² Sum of acetate, propionate, butyrate, D-3-OHbutyrate and CO₂.
* significantly different to maintenance, p<0.05.

Lupin supplementation was associated with a 3 fold increase in the glucose IRL. However most of this glucose was not available to the extra splanchnic tissues since the hepatic release of glucose increased by only 31%. Consistent with this was a 31% increase in the rate of glucose uptake by muscle. The 1.9 fold increase in the appearance of fermentation products in response to a 2.3 times increase in ME suggests that the methodology reliably detected changes in nutrient flux. Possible explanations include simultaneous uptake and release of glucose by the gut and/or liver.

Katz, M.L. & Bergman, E.N. (1969). *Am. J. Vet. Res.* 30: 655.

Oddy, V.H., Brown, B.W. and Jones, A.W. (1981). *Aust. J. Biol. Sci.* 34:419.

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