

METABOLISM OF GLUCOSE AND FREE FATTY ACIDS IN LACTATING EWES
TREATED WITH GROWTH HORMONE

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McDowell et al. (1984) reported that exogenous growth hormone (GH) affected the partition of nutrients in lactating cows. In particular, GH increased mammary uptake of free fatty acids (FFA) and decreased leg muscle uptake of glucose. In the present study, whole body (WB) and individual organ utilisations of glucose and palmitic acid (P) were measured in GH-treated lactating ewes.

Six crossbred ewes, housed in metabolism cages and milked by hand were fed continuously a good quality ration (9.6 MJ ME, 218 g crude protein per kg DM) to requirements. They were surgically prepared to allow study of whole body (WB), leg muscle (L) and mammary tissue (M) metabolism (Oddy et al. 1984, 1985). Measurements were made on the last day of successive 5-d periods when daily subcutaneous injections of saline (S) or GH (0.1 mg/kg liveweight; 1.4 U/mg) were given. Glucose irreversible loss (GIL) was estimated in three of the ewes while palmitate irreversible loss (PIL) was measured in the other three using isotope dilution. The contribution of glucose and P oxidation to CO₂ production was measured in the whole body and in L and M tissue.

	S	GH		S	GH	
Milk production (g/d)	1340	1679***	WB-GIL (μmol/min)	846	872	
Milk fat (g/kg)	68	80	(μmol/min/kg ^{0.75})	36	37	
lactose (g/kg)	55	54	% CO ₂ from glucose	6.2	5.9	
protein (g/kg)	58	54**	L	26	37	
Blood flow (ml/min/kg) L	125	147***	M	20	17	
	M	308	390***	WB-PIL (μmol/min)	132	186**
Blood glucose (μM)	A	2370	2730	(μmol/min/kg ^{0.75})	6.1	8.7**
	A-L	300	290	% CO ₂ from P	1.6	3.4**
	A-M	630	630	WB	0.7	0.6
Plasma FFA (μM)	A	389	594**	L	1.3	4.6*
	A-L	37	87	M		
	A-M	99	195**			

* P < 0.1, ** P < 0.05, *** P < 0.01.

GH treatment had no effect on glucose metabolism indicating that increased blood flow would account for the extra milk lactose produced (17 g/d). Increased arterial FFA, FFA uptake by mammary gland and WB-PIL demonstrate the lipolytic effect of GH, previously noted in cows (McDowell et al. 1984). It is possible that increased oxidation of FFA by the mammary gland may spare glucose for milk lactose synthesis even though more FFA (relative to lipoprotein triglyceride) is being utilized for long chain fatty acid synthesis in the mammary gland (see Niumsup et al. 1985).

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