

## EXOGENOUS GROWTH HORMONE ALLEVIATES THE LOW MILK FAT SYNDROME IN EWES

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The "low milk fat syndrome" occurring in lactating ruminants is associated with raised levels of plasma glucose. It has been shown that this stimulates insulin secretion which reduces the supply of precursors of milk fat to the mammary gland (see Annison 1985). Since exogenous growth hormone increases the milk fat content and yield, the effects of exogenous growth hormone (GH) on milk fat were examined in lactating sheep with the low milk syndrome induced by intravenous (i/v) infusion of glucose.

Six crossbred ewes were fed a good quality ration (8.8 MJ ME, 176 g crude protein per kg dry matter) to meet requirements for maintenance plus milk production. They were fitted with indwelling polyvinyl catheters in both jugular veins; one for glucose infusion and the other for blood sampling. The experiment was carried out over 4 consecutive periods as follows: (1) a daily subcutaneous (s/c) injection of saline, 5 days; (2) as in period (1) plus a continuous i/v infusion of glucose at 37.5% of estimated irreversible loss, 5 days; (3) glucose infusion plus daily s/c injection of GH (0.1 mg/kg liveweight), 4 days; and (4) a daily s/c injection of saline, 4 days. Results are summarised below.

	Period			
	1	2	3	4
Milk yield (g/d)	1610±107 <sup>a</sup>	1640±126 <sup>a</sup>	1940±141 <sup>b</sup>	1640±171 <sup>a</sup>
Milk fat-content (g/kg)	58±3.0 <sup>a</sup>	48±3.1 <sup>b</sup>	52±3.6 <sup>c</sup>	56±3.2 <sup>a</sup>
-yield (g/d)	95±10.7 <sup>abd</sup>	81±11.0 <sup>c</sup>	103±15.2 <sup>ab</sup>	94±15.5 <sup>cd</sup>
Plasma VLDL (mg/100 ml)	3.8±1.19 <sup>a</sup>	3.1±0.23 <sup>bc</sup>	2.7±0.13 <sup>b</sup>	3.8±0.15 <sup>ac</sup>
Plasma NEFA (µM)	251±36.9 <sup>a</sup>	179±15.2 <sup>bc</sup>	233±39.8 <sup>a</sup>	272±65.0 <sup>ac</sup>
Plasma acetate (mM)	1.8±0.19 <sup>a</sup>	1.3±0.09 <sup>b</sup>	1.4±0.08 <sup>b</sup>	1.4±0.10 <sup>b</sup>
Plasma glucose (mM)	3.4±0.10	3.6±0.09	3.4±0.31	3.1±0.09
Plasma insulin (µU/l)	8.7±1.96 <sup>a</sup>	11.6±1.96 <sup>b</sup>	19.2±4.77 <sup>b</sup>	6.8±1.74 <sup>c</sup>
Plasma GH (µg/l)	1.8±0.19 <sup>a</sup>	1.9±0.11 <sup>a</sup>	3.8±0.10 <sup>b</sup>	1.7±0.16 <sup>a</sup>

VLDL = very low density lipoprotein-triglyceride; NEFA = non-esterified fatty acids. Values are means ± sem; values for individual parameters with different superscripts are significantly different (P<0.05).

Glucose infusion caused a decrease in the circulating levels of VLDL, NEFA and acetate compared to the control periods. Since these are important precursors of milk fat, it is not surprising that the amount of milk fat decreased during glucose infusion. Administration of GH during glucose infusion alleviated the low milk fat syndrome with values for milk fat approaching those during control periods. Concentrations of NEFA, but not VLDL or acetate, returned to control levels. These findings are in agreement with earlier results which showed that GH increased plasma NEFA and blood flow to the mammary gland (Leenanuruksa et al. 1985) thereby maintaining supplies of milk fat precursors.

ANNISON, E.F. (1985). In 'Recent Advances in Animal Nutrition in Australia', ed. R.B. Cumming. Paper 29. (University of New England: Armidale).  
LEENANURUKSA, D., SMITHARD, R., McDOWELL, G.H., GOODEN, J.M., JOIS, M. and NIUMSUP, P. (1985). Proc. Nutr. Soc. Aust. 10: 152.