

RESPONSES OF DAIRY COWS TO GROWTH HORMONE: EFFECT OF NUTRIENT INTAKE

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It is known that exogenous bovine growth hormone (GH), whether of pituitary origin or produced by recombinant DNA techniques (reGH), increases milk production in well-fed, lactating cows (see McCutcheon and Bauman 1985; Johnsson and Hart 1986) by altering nutrient partition/utilisation (McDowell et al. 1987). Surprisingly, there are no data on effects of nutrient intake on responses to GH. The present study was conducted to assess effects of reGH in lactating cows fed different amounts of a common diet.

Three lactating Friesian cows, with similar liveweights and milk yields and c. 10 weeks post partum, were surgically prepared to allow measurements of arterio-venous differences of metabolites across hind limb muscle (A-LV) and mammary tissue (A-MV) and metabolites or hormones in arterial (A) blood - see McDowell et al. (1987). Cows were kept in tie-stalls and fed continuously cracked barley and chopped lucerne in the ratio of 60:40 plus 1 kg/d long pasture hay (fed in four equal portions). Initially, feed intake was adjusted to meet requirements for maintenance of milk yield and liveweight (REQU). Thereafter, cows were fed either 0.7, 1.0 or 1.2 X REQU, over periods of 15 d in a latin square schedule. Within each period of 15 d measurements were made between days 6-10 when cows were injected subcutaneously (s/c) with xicipient (CON, bicarbonate buffer, pH 9.5), then between days 11-15 when cows were injected s/c with 0.1 mg/kg liveweight reGH (a gift from Cyanamid Australia Pty Limited). Mean values for parameters measured are shown in the Table.

		0.7 X REQU		1.0 X REQU		1.2 X REQU	
		CON	reGH	CON	reGH	CON	reGH
milk yield - actual	(kg/d)	15.0	15.8	16.2	18.7	17.9	20.6**
- corrected†	(kg/d)	16.9	18.4	17.5	22.0*	19.2	24.3**
milk fat content	(g/kg)	49.0	51.3	44.8	52.2**	44.9	52.2**
milk fat yield	(g/d)	726	800	734	940*	800	1070**
	A	3.60	4.29	3.61	4.26	4.05	4.17
plasma glucose (mM)	A-LV	0.07	0.15	0.24	0.08	0.29	0.18
	A-MV	0.58	0.86	0.60	0.60	0.73	0.78
	A	384	429	245	268	243	342
plasma NEFA (µM)	A-LV	25	-85	32	24	17	-22
	A-MV	105	140	44	50	42	97

† corrected to standard 40 g/kg; CON v reGH - *P<0.10; **P<0.05

It is apparent that reGH increased milk yield and both content and yield of milk fat when cows were fed 1.0 X and 1.2 X REQU. When fed intake was restricted, reGH tended to increase yields of milk as well as yield and content of milk fat. Data for plasma glucose and non-esterified fatty acids (NEFA) are consistent with reGH affecting nutrient partition/utilisation. The results indicate that the response to exogenous GH is affected by nutrient intake with responses increasing as nutrient status improves. Results for cows fed 0.7 X REQU raise the possibility that chronically-underfed cows will not respond to exogenous GH, thereby questioning the efficacy of using exogenous GH in many grazing situations.

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