

Long-term effects (5 days) of œstradiol, T3 or insulin injections on plasma concentrations and estimated hepatic balance of metabolites in energy-deprived preruminant calves

Y Chilliard ¹, D Durand ², C Audigier ¹, S Auboiron ², D Bauchart ²

¹ INRA, laboratoire Sous-Nutrition des ruminants, Theix;

² INRA, laboratoire de Croissance et Métabolismes des herbivores, Theix, 63122 Saint-Genès, Champanelle, France

Long-term effects of hormone injections on the hepatic metabolism were studied in calves surgically prepared and fed as indicated by Chilliard *et al* (1993) and compared with short-term effects observed by the latter authors.

After 5 d energy restriction, calves received hormone infusions on d 6 (see Chilliard *et al*, 1993) and injections (I) on d 7, 8, 9 and 10: 17 β -œstradiol (0,10 mg), triiodothyronin (T3, 0.7 mg) during the morning meal, or slow-release insulin (2 injections of 0.9 units/kg body weight) during the morning and the evening meals. Metabolite concentrations were determined on d 10, 7 h after morning feeding, in the mesenteric artery, portal vein and hepatic vein. Hepatic balance was estimated as indicated by Chilliard *et al* (1993).

OI did not alter metabolite concentrations in the hepatic vein but increased estimated he-

patic apparent production (EHAP) of glucose and urea, probably due to an increased use of amino acids for gluconeogenesis. T3I decreased uremia and EHAP of urea, but increased glycemia and tended to increase EHAP of glucose, as in the rat (Hermann and Cier, 1976). Insulin I decreased glucose, triglyceride, NEFA and 3-OH-B concentrations, as well as EHAP of 3-OH-B and urea, as in normally-fed mammals. The antiketogenic effect of insulin did not seem to be associated with a lipotropic effect. The hepatic balance of triglycerides was always found to be negative (release lower than uptake).

Chilliard Y, Audigier C, Durand D, Auboiron S, Bauchart D (1993) *Ann Zootech* 42, 207

Hermann H, Cier JF (1976) *Endocrinologie, Précis de Physiologie*. Masson, Paris

Tableau I. Long-term effects of hormone injections on hepatic metabolism.

Metabolite (n = 4)	17 β -Oestradiol		Triiodothyronin		Insulin	
	Control ¹	Treated ²	Control	Treated	Control	Treated
Hepatic vein concentration						
Glucose (mg/ml)	0.82	0.83	0.87	1.06**	0.84 ⁸	0.49*
Triglycerides (mg/ml)	0.41	0.21	0.21	0.14	0.32	0.11**
NEFA ³ (mM)	0.97	0.70	0.78	0.75	0.95	0.45**
3-OH-B ⁴ (mM)	0.16	0.17	0.17	0.19	0.21	0.14**
Urea (mg/ml)	0.45	0.42	0.48	0.38**	0.46	0.41
Estimated hepatic balance ⁵						
Glucose ⁶	1.4	3.2**	3.2	4.9	1.3	1.0
Triglycerides ⁶	-1.7	-2.5	-2.1	-1.3	-1.6	-1.1
NEFA ⁷	-6.4	5.7	-0.1 ⁸	2.3	0.0	2.3
3-OH-B ⁷	0.9	2.5	2.6	2.8	3.0	1.3**
Urea ⁶	0.2	1.3**	0.7	0.4*	0.6	0.0*

¹ 7 h after morning feeding on d 5, before hormone treatments; ² 7 h after morning feeding on d 10; ³ non-esterified fatty acids; ⁴ 3-hydroxy-butyrate; ⁵ apparent production, or (-) captation; ⁶ mg/min/kg BW; ⁷ micromol min/kg BW; ⁸ 3 animals only; *, ** = *P* < 0.13, 0.07, respectively.