



HAL
open science

Effects of portal infusions of methionine on plasma concentrations and estimated hepatic balances of metabolites in underfed preruminant calves

Y Chilliard, C Audigier, Denys Durand, S Auboiron, Dominique Bauchart

► To cite this version:

Y Chilliard, C Audigier, Denys Durand, S Auboiron, Dominique Bauchart. Effects of portal infusions of methionine on plasma concentrations and estimated hepatic balances of metabolites in underfed preruminant calves. *Annales de zootechnie*, 1994, 43 (3), pp.299-299. hal-00889038

HAL Id: hal-00889038

<https://hal.science/hal-00889038>

Submitted on 11 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Effects of portal infusions of methionine on plasma concentrations and estimated hepatic balances of metabolites in underfed preruminant calves

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

¹ INRA, Laboratoire Sous-Nutrition des Ruminants,

² INRA, Laboratoire Croissance et Métabolismes des Herbivores,
Theix, 63122 Saint-Genès-Champanelle, France

The effects of portal infusions of methionine (Met) were studied in 6 preruminant male calves fed a conventional milk replacer in order to allow a daily body gain of 650 g (days 8–15 after birth) except during the experimental period (days 18–25 after birth) when the growth rate was lowered to about 200 g/d (instead of 1 000 g/d at this age) by a 45% restriction in feed allowance. Animals were fitted with catheters in the mesenteric artery (MA), the portal vein and one of the hepatic veins at 8 days of age.

After 5 d of feed restriction, metabolite concentrations were determined in the 3 blood vessels 7 h after the morning feeding with a view to calculating the estimated hepatic balances (EHB) using estimates of blood flows, according to body weight and previous equations (Durand *et al*, 1988). After a control measurement on day 23, Met was infused in the portal vein for 7 h after the morning feeding at dose 1 (day 24) and dose

2 (day 25). Met allowances were 2.4, 3.0 and 3.6 g/100 g of protein in the milk replacer (control, dose 1 and dose 2, respectively).

Met infusion at dose 2 decreased triglyceride, non-esterified fatty acid and 3-hydroxybutyrate plasma concentrations in the mesenteric artery. The EHB of glucose was significantly increased by this infusion. There was a trend to decrease the apparent captation of triglycerides and to decrease the apparent productions of non-esterified fatty acids and 3-hydroxybutyrate. These results suggest that an increase in Met availability in the energy- and protein-underfed calf can increase hepatic gluconeogenesis, without increasing ketogenesis, perhaps because of a stimulation of triglyceride secretion (thus decreasing the apparent triglyceride capture).

Durand D, Bauchart D, Lefavre J, Donnat JP (1988) *J Dairy Sci* 71, 1632-1637

Table I. Effects of methionine (Met) infusions on hepatic metabolism of plasma metabolites.

Metabolite	Control		Met-dose 1		Met-dose 2	
	MA ¹	EHB ²	MA	EHB	MA	EHB
Glucose ³	0.90	1.5	0.92	1.5	0.87 ^b	1.9 *
Triglycerides ³	0.31	-3.7	0.29	0.8	0.21 ^{***a}	-0.5
Non-esterified fatty acids ⁴	1.40	29.2	1.05 +	0.6	0.55 +	3.2
3-Hydroxybutyrate ⁴	0.07	1.0	0.05 +	0.4	0.04 **	0.5
Urea ³	0.15	0.3	0.15	0.1	0.15	0.4

¹ Concentration in the mesenteric artery ($n = 6$); ² estimated hepatic balance: apparent production, or (-) capture. Due to failure in the hepatic vein catheter, EHB balances were only available on 5 (control) and 4 (Met-dose 1 and Met-dose 2) calves; ³ mg/ml (MA) or mg/min/kg body weight (EHB); ⁴ mM (MA) or $\mu\text{mol}/\text{min}/\text{kg}$ body weight (EHB); +, *, ** significantly different from control-value, $P < 0.11, 0.06, 0.03$, respectively; ^{a,b} = significantly different from dose 1-value ($P < 0.11, 0.03$, respectively).