

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

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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).