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## Effects of a diet rich in medium-chain fatty acid on lipoprotein lipase (LPL) and carnitine palmitoyltransferase I (CPT I) activities in the heart from preruminant calves

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C. Piot, Jean-François J.-F. Hocquette, P. Herpin, Dominique Bauchart. Effects of a diet rich in medium-chain fatty acid on lipoprotein lipase (LPL) and carnitine palmitoyltransferase I (CPT I) activities in the heart from preruminant calves. *Reproduction Nutrition Development*, 1999, 39 (1), pp.85-85. hal-00900259

**HAL Id: hal-00900259**

**<https://hal.science/hal-00900259>**

Submitted on 11 May 2020

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they enhance lipolysis in both the basal – and epinephrine – stimulated states and suppress basal – and insulin-stimulated lipogenesis. The most effective phytoestrogen was genistein. At concentrations of  $10^{-3}$  and  $10^{-4}$  mol·L<sup>-1</sup> in the medium it enhanced basal (respectively,  $1.21 \pm 0.08^{a*}$  and  $0.58 \pm 0.01^b$  versus  $0.37 \pm 0.02^c$   $\mu\text{mol}/10^6$  cells/90 min) and stimulated lipolysis (respectively,  $2.79 \pm 0.05^a$  and  $2.70 \pm 0.07^a$  at concentrations of  $10^{-4}$  and  $10^{-5}$  mol·L<sup>-1</sup> versus  $2.37 \pm 0.04^b$   $\mu\text{mol}/10^6$  cells/90 min). Lipogenesis was inhibited at concentrations of  $10^{-3}$ ,  $3 \times 10^{-4}$  and  $6 \times 10^{-4}$  mol·L<sup>-1</sup>, respectively, in both basal ( $139 \pm 5^a$ ,  $349 \pm 5^b$  and  $227 \pm 5^c$  versus  $580 \pm 11^d$  nmol/10<sup>6</sup> cells/90 min) and stimulated ( $181 \pm 5^a$ ,  $427 \pm 3^b$  and  $280 \pm 6^c$  versus  $667 \pm 12^d$  nmol/10<sup>6</sup> cells/90 min) states. Zearalenone had a similar effect on lipogenesis but inhibited stimulated lipolysis.

### Communication no. 13

**Effects of a diet rich in medium-chain fatty acid on lipoprotein lipase (LPL) and carnitine palmitoyltransferase I (CPT I) activities in the heart from preruminant calves.** C. Piot<sup>a</sup>, J.F. Hocquette<sup>a</sup>, P. Herpin<sup>b</sup>, D. Bauchart<sup>a</sup> (<sup>a</sup> Laboratoire croissance et métabolismes des herbivores, Inra, centre de recherches de Clermont-Ferrand/Theix 63122 Saint-Genès-Champanelle, France; <sup>b</sup> Station de recherches porcines, Inra, 35590 Saint-Gilles, France)

In bovines, triglycerides (TG) are energy-yielding substrates of prime importance for growth and physical activity of muscles and of the heart. Their metabolic utilisation is controlled by the level of activity of several enzymes such as LPL and CPT I which are both considered to be rate-limiting for fatty acid (FA) uptake and catabolism in muscles. The objectives of this study were to compare the effects of the incorporation of coconut oil (CN), rich in medium-chain fatty acids (MCFA, C12:0 and C14:0) or tallow (TA), rich in long-chain fatty acids (C16:0

and C18:1) in a milk diet on the LPL and CPT I activities in calf heart.

The experiments were performed using two groups of five 1-month-old preruminant Holstein-Friesian male calves following adaptation for 19 days to a high fat milk replacer (22.4 % diet DM) containing CN or TA but the same amount of carbohydrate. Heart LPL activity was assayed with intralipid into which [<sup>3</sup>H]triolein had been incorporated (Peterson et al., *Biochim. Biophys. Acta* 837 (1985) 262–270). Heart TG contents were determined from total lipid extracts as described previously (Leplaix-Charlat et al., *J. Dairy Sci.* 79 (1996) 1826–1835). Heart CPT I activity was assayed by a radioactive method on fresh isolated intermyofibrillar mitochondria and malonyl-CoA concentration in homogenates was determined by reversed-phase HPLC (Schmidt, Herpin P., *J. Nutr.* 128 (1998) 886–893).

The higher heart LPL activity (+27 %,  $P < 0.05$ ) measured in calves fed the CN diet suggested a stimulation of LPL activity by MCFA, and hence an increase in FA uptake. On the contrary, CPT I activity and malonyl-CoA concentrations were not significantly affected by the source of FA in the diet (1.68 versus 1.46 nmol of palmitoylcarnitine formed/min/mg mitochondrial protein and 1.26 versus 1.94 nmol of malonyl-CoA/g tissue for the TA and CN groups, respectively). This indicated that, in our conditions, CPT I activity in the heart was probably not rate-limiting for FA catabolism. Since a lower TG concentration (–42 %, NS) was found in the heart of calves fed the CN diet, we can hypothesise that MCFA from the diet were probably mainly oxidised either by the mitochondrial and/or the peroxisomal pathways. In conclusion, this study clearly showed, for the first time, that the LPL activity in calf hearts could be stimulated by coconut oil rich in MCFA, favouring a higher uptake of dietary FA without any increase in TG storage.