EFFECTS OF COMBINED BUTAPHOSPHAN AND CYANOCOBALAMIN APPLICATION ON HEPATIC METABOLISM IN EARLY-LACTATING DAIRY COWS

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The use of combined butaphosphan and cyanocobalamin is well acknowledged for the treatment of ketosis in dairy cows. The present study investigated the effects of combined butaphosphan and cyanocobalamin on liver metabolism in early lactating cows, since the liver plays a major role in the metabolic adaptation post partum. The evaluation was based on mRNA expression measurements of genes encoding 30 enzymes and transport proteins of major metabolic processes in the liver.

Sixteen dairy cows in their 2nd to 8th parity were used for this study, which started in week 4 post partum and lasted for 10 weeks. Cows were treated with 10ml/100kg BW butaphosphan and cyanocobalamin (Catosal®, Bayer Animal Health, Germany) or saline solution administered I.V. on 3 consecutive days. Liver samples were taken on the day before, 3 and 10 days after the treatment, and were measured for mRNA abundances of enzymes involved in gluconeogenesis, fatty acid beta-oxidation, fatty acid and triglyceride synthesis, ketogenesis, citric acid cycle, cholesterol synthesis, amino acid synthesis, bile acid synthesis, and urea cycle, and transport proteins. Blood samples were collected prior to the liver biopsy and weekly during the whole experiment and analyzed for enzymes and metabolites.

The cows had a mean BHB of 0.65 ± 0.13 mmol/L (MEAN ± SEM), which remained unaffected after the treatment. The plasma concentration of inorganic phosphorus was higher (P < 0.05) and for NEFA slightly lower (P = 0.10) in the treatment group (TG) compared to the control group (CG) after the treatment. In the liver, mRNA abundance of ACSL1, an enzyme involved in the fatty acid β-oxidation, was lower in the TG compared to the CG (P < 0.05) after the treatment. Furthermore, a slight group difference was observed for the mRNA abundance encoding HMGCS2 (involved in ketogenesis, P = 0.10) and CS (involved in the citrate acid cycle, P = 0.07). The mRNA abundance for HMGCS2 remained unchanged after treatment while it was lower in the CG. The mRNA abundance encoding CS for TG was slightly lower after the treatment compared to the CG.

The present study demonstrated certain effects of combined butaphosphan and cyanocobalamin on the liver metabolism, specially on enzymes involved in fatty acid β-oxidation, ketogenesis and citrate acid cycle in early lactating cows. We conclude that further studies are needed to understand the mode of action of combined butaphosphan and cyanocobalamin in the liver in detail.