

# Pulse-dose intraruminal butyrate infusion increases plasma glucagon-like peptide 2 in dairy calves

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Administration of exogenous glucagon-like peptide 2 (GLP-2) as a strategy to improve gut health in dairy calves is well documented. However, this strategy may not be feasible approach in the current dairy calf production system because of practical application and animal welfare issues. Thus, one approach to physiologically release endogenous GLP-2 might be through ingestion of nutrients that stimulate the enteroendocrine L-cells. Therefore, the objective of this study was to evaluate effects of pulse-dose intraruminal butyrate infusion on plasma concentration and dynamics of GLP-2 secretion in dairy calves. Five ruminally cannulated bull calves (330 kg  $\pm$  16.0; mean body weight (BW)  $\pm$  SD) were used in a 5 x 5 Latin square design with 4-d periods. On d 1 of each period at 0800 h, calves were ruminally infused with 1 of the 5 treatments: 1) no butyrate (0B), 2) 0.3 g of butyrate per kg of BW (3B; 0.38 g of sodium n-butyrate per kg of BW), 3) 0.6 g of butyrate per kg of BW (6B; 0.76 g of sodium n-butyrate per kg of BW), 4) 0.9 g of butyrate per kg of BW (9B; 1.14 g of sodium n-butyrate per kg of BW), and 5) 1.2 g of butyrate per kg of BW (12B; 1.52 g of sodium n-butyrate per kg of BW). Infusion of butyrate was preceded by 12 h of fasting to ensure a steady-state condition, and sodium chloride was added to treatments to balance for sodium. Sequential blood and rumen fluid samples were taken on d 1 of each period. As expected, butyrate and total volatile fatty acids concentration of the rumen fluid increased linearly ( $P < 0.001$ ), and both propionate and iso-butyrate increased quadratically ( $P = 0.047$ ;  $P = 0.040$ , respectively). Plasma GLP-2 increased ( $P < 0.001$ ; cubic effect) whereas plasma insulin ( $P = 0.001$ ), BHBA ( $P < 0.001$ ) and butyrate ( $P = 0.005$ ) increased linearly in direct proportion to the dose of butyrate infused. Glucose decreased linearly ( $P < 0.001$ ) and quadratically ( $P = 0.010$ ) as butyrate infused increased from 0 to 1.2 g/kg of BW. Area under the curve measured for all variables were affected by interaction of treatment with time ( $P < 0.001$ ). It can be concluded that under described experimental conditions the short-time intraruminal butyrate infusion increased plasma GLP-2 in dairy calves.