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Response to different concentrations and sources of dietary protein on blood urea nitrogen concentrations and plasma amino acid utilization for milk production.

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A trial was conducted to determine the response of feeding 2 different crude protein (CP) concentrations (15% and 17%) and sources (canola meal [CM] and high-protein dried distillers grain [DDG]) on blood urea nitrogen (BUN) concentration and plasma amino acid (AA) utilization. Sixteen lactating Holstein cows were used in multiple 4 x 4 Latin squares having a 2 x 2 factorial arrangement of treatments. Each period was 4 wk, and blood samples were collected once during wk 4 of each period from the tail artery (TA) and mammary vein (MV) 3 h after feeding. Diets were formulated with 15% CP with CM (15 CM), 15% CP with DG (15 DG), 17% CP with CM (17 CM) and 17% CP with DG (17 DG). All diets contained 55% forage (50% alfalfa hay and 50% corn silage) and 45% concentrate and approximately 4.1% ether extract. Average DMI (25.2 kgld) and milk yield (34.2 kgld) were similar between diets. Concentration of BUN (mg/dL) from TA was higher ($P < 0.01$) for cows fed 17% CP diets than the 15% CP diets (18.1 vs 14.3), but similar between CM and DG. Concentration of BUN from MV and artery-vein difference (AVD) were different ($P < 0.01$) between CP concentrations, but similar between CP sources. Total essential amino acid (EAA) concentrations (μmol/dL) in TA plasma were higher ($P < 0.01$) for cows fed 17% CP diets compared to 15% CP diets (106.1 vs 91.1), but similar for CM and DG. Branched chain amino acid (BCAA) concentrations (μmol/dL) in TA plasma were higher ($P < 0.01$) for cows fed 17% CP diets compared to 15% CP diets (62.9 vs 52.0), but similar for CM and DG. Total plasma MV EAA concentrations were higher ($P < 0.01$) for 17% CP diets, but similar between sources. Total EAA AVD (μmol/dL) were higher ($P < 0.05$) for 17% CP diets than for 15% CP diets (33. 6 vs 27.8), but similar between sources. Mammary gland EE of EAA indicated that Met was the first-limiting AA for CM-based diets followed by Lys, Arg and Phe while Lys was first limiting for DG-based diets, followed by Met, Arg, Glu and Phe. The order of limiting AA for milk production is altered by the protein source.

KEYWORDS

Crude protein,
Blood urea nitrogen,
Plasma amino acids

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