Effects of rumen-protected γ-aminobutyric acid on feed intake, lactation performance, and antioxidative status in early lactating dairy cows

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Abstract: The objective of this study was to investigate effects of rumen-protected γ-aminobutyric acid (GABA) ondry matter intake, milk performance, and serum metabolites in Chinese Holstein lactating cows. Thirtynine multiparous cows were blocked based on days in milk (60 ± 6.3 d; mean ± SD) and milk production (30.9 ± 4.17 kg; mean ± SD), and were randomly assigned to 1 of 4 treatments, with rumen-protected GABA added at levels of 0, 0.8, 1.6, or 2.4 g/d, the actual predicted available amounts being 0, 0.30, 0.61,or 0.91 g of GABA/d, respectively. The experiment lasted for 8 wk, with the first week for adaptation. Milk yield and milk compositions were recorded weekly, and serum concentrations of GABA, neuropeptide Y, and biochemical and antioxidant variables were analyzed in the first, fourth, and seventh weeks of the study. Dry matter intake linearly increased in cows receiving added GABA compared with that for the control. Addition of 0.8 g of GABA/d was associated with higher milk yield than the other treatments, but contents of milk protein and fat did not differ across the treatments. Dietary GABA tended to quadratically enhance the serum content of GABA (23.6, 30.2, 29.8, or 28.3mmol/L for 0, 0.8, 1.6, or 2.4 g/d, respectively), and increased neuropeptide Y, with the highest value (3.07ng/L) for 0.8 g of GABA/d. Nonesterified fatty acid quadratically decreased with GABA addition, with the lowest value (218.1 μmol/L) for 0.8 g of GABA/d. Serum glutathione peroxidase and superoxide dismutase quadratically increased in cows fed GABA, whereas serum malondialdehyde was quadratically reduced for all GABA groups. Rumen-protected GABA quadratically improved N efficiency across all treatments, contributing to the enhanced production of milk and milk protein and reduced N emission to the environment. In conclusion, addition of rumen-protected GABA is beneficial for early lactation dairy cows in terms of feed intake, lactation performance, and animal health.

Key words: γ-aminobutyric acid, dry matter intake, milk performance, early lactation cow