

Does The Concentration of Ruminal Ammonia Affect the Urea Recycled to the Rumen?

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Increasing the efficiency of nitrogen utilization in dairy cattle is becoming of increasing importance due to economic and environmental pressures. Throughout a normal day, dairy cattle will undergo fluctuations in concentrations of ruminal ammonia as well as blood urea nitrogen (BUN), which may impact the efficiency of nitrogen utilization through depressions in microbial protein synthesis. Previous studies have shown that high ruminal ammonia decreases the nitrogen efficiency of the animal, thereby increasing BUN, leading to increased excretion of N in feces and urine. However a high BUN will increase the amount of urea recycled back to the rumen, where it can be incorporated into microbial protein. It is important to know how concomitant changes in concentrations of ruminal ammonia and BUN will affect the short-term movement of urea across the rumen wall.

The objectives of this study were to determine the short-term effects of high or low ruminal ammonia and BUN concentrations on the rate of urea transfer across the ruminal wall. Six weaned Holstein bull calves were fed a common diet (14.2% CP) *ad libitum* consisting of 38% alfalfa hay, 31% barley silage, 20% rolled barley and 11% protein-mineral supplement (DM basis) for 28d. Calves were fed at 0730 h. Calves were killed at 1000 h and rumen tissues were collected and used to measure the secretion of urea from the 'blood' to the 'rumen' *in vitro*. A high rumen ammonia (15mg/dL) tended to inhibit the transport of urea across the rumen wall when BUN was high (20 mg/dL), however there was no effect when BUN was low (5 mg/dL).

Implications: This study emphasizes the fact that minimizing spikes in ruminal ammonia will have positive effects on improving the nitrogen efficiency of dairy cattle.