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## Effect of Protein Supplementation on Rumen Environment and *in sacco* Rumen Degradation in Bali Cows

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### Abstract

Five non-pregnant Bali cows were used to study the effects of supplementation of graded levels of urea or fishmeal on rumen environment and ruminal feed degradation in Bali cows fed low quality tropical grass hay (crude protein, CP = 3.53%). In a 5 × 5 latin square experimental design, the animals were given *ad libitum* access to grass hay (G) or supplemented daily with two levels of urea, *i.e.* 38 g (GU38) and 74 g (GU74), or two levels of fishmeal, *i.e.* 156 g (GFM156) and 312 g (GFM312). At each corresponding level, urea supplement was equal to fishmeal at CP base. The measured parameters included rumen pH, ammonia and VFA concentration, and *in sacco* rumen DM and Protein degradation. Rumen pH largely fluctuate during the day but the diurnal pattern of rumen pH did not differ among treatments, *i.e.* being the lowest after few hours post feeding and increasing thereafter. Supplementation of both urea and fishmeal reduced significantly ( $p < 0.01$ ) the average rumen pH from 6.89 in G to 6.74 in GFM156. Rumen ammonia concentration increased linearly ( $p < 0.01$ ) with levels of supplementation and the increase was more pronounced with urea than with fishmeal supplementation. Rumen ammonia concentration was significantly higher ( $p < 0.01$ ) in Bali cows supplemented with urea than with fishmeal at both level of supplementation.  $\text{NH}_3$  concentration was improved from consistently below  $50 \text{ mg l}^{-1}$  to more than  $100 \text{ mg l}^{-1}$  in supplemented animals. Ruminal total as well as individual VFAs (Acetate, Butyrate and Propionate) concentration were not affected by increasing level of supplementation of both urea and fishmeal. The proportion of individual VFAs expressed as percentage of the total VFA also did not differ among treatments. Supplementation improved significantly *in sacco* degradation of DM but not protein in the rumen. Ruminal DM effective degradability was increased significantly with increasing level of fishmeal supplementation but not with increasing level of urea supplementation. Supplementation of increasing level of both urea and fishmeal improved rumen environment and DM degradability in Bali cows maintained on low quality tropical grass hay with fishmeal was proven to be the better supplement over urea.

**Keywords:** Rumen environment, degradation, fishmeal, Bali cows, low quality hay, urea