

Abstract

# Strategic Supplementation Enhances Rumen Microbiome Efficiency in Pregnant Tropical Beef Cows <sup>†</sup>

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**Abstract:** Lick-blocks that are used in northern Australian beef enterprises contain varying levels of macro-nutrients (crude protein, sulfur and phosphorus) to correct deficiencies in the forage. It is thought that organic forms of nitrogen and sulfur are used more efficiently for growth and function of the rumen than the inorganic nutrients. A trial was undertaken in pregnant heifers grazing a poor-quality dry season diet in the Northern Territory. The animals received three lick supplements containing varying forms of organic and inorganic N. No significant differences on animal performance and rumen fermentation parameters were observed between supplements. Animals were initially deficient for rumen ammonia-N (15.8 mg/L) and BUN (4.7 mg/100 mL) concentration. All nitrogen supplements led to a significant improvement in ammonia N (24.7–31.8 mg/L) but levels remained deficient until the wet season and availability of higher quality pasture. Even though the rumen ammonia levels were sub-optimal, the supplemented animals gained approximately 650 g liveweight daily compared with a weight loss of 330 g daily in un-supplemented animals. The increased availability of N in either an organic or inorganic form had a similar influence on the rumen microbiome and rumen fermentation products with increases in ammonia, branched fatty acids, butyrate and the acetic: propionic ratio. All three N supplements showed the same significant increase in species of *Ruminococcus*, *Bacteroidetes* and *Cyanobacteria* (*Melainabacteria*) involved in cellulose and hemicellulose digestion. It appears inorganic N is as effective as organic N in improving rumen efficiency when there is a gross deficiency of N for microbial growth.

**Keywords:** rumen; efficiency; supplements; cows; tropics



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