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Bacterial and Non-Bacterial Duodenal Protein Supply in Steers Fed Roughage and Grain Diets

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Duodenal nitrogen flow was estimated in four steers fitted with duodenal cannulas, using automated total collection of digesta. Steers were fed an all-roughage and/or an 80% sorghum grain diet. Nitrogen in duodenal digesta was partitioned into bacterial and non-bacterial fractions, using DAP as a bacterial marker. Daily flow of crude protein into the duodenum was about 35% greater ($P<.01$) when steers were fed the grain diet compared with the roughage diet, although protein intake was 10% less from the grain diet. Bacterial protein rather than feed by-pass protein appeared to account for most of this difference. Bacterial protein was 55% greater ($P<.01$), whereas non-bacterial-protein was only 20% greater ($P>.05$) in the grain than in the roughage diet. Ratios between duodenal bacterial-N and estimated food-N apparently degraded in the rumen averaged greater ($P<.05$) with the grain than with the roughage diet (1.8 vs .8). These data suggest extensive amounts of endogenous-N entered the gastro-intestinal tract in steers fed the grain diet. Average duodenal flow of N expressed as g/Mcal ME intake was 9.5 with the grain diet and 10.9 with the roughage diet ($P<.06$). Partitioning this ratio, bacterial-N g/Mcal ME intake was similar ($P>0.5$) in both diets (4.7 vs 4.6), however, the ratio for the non-bacterial-N fraction was lower ($P<.05$) in the grain diet as compared to the roughage diet (4.8 vs 6.3). If higher N:energy ratios are considered desirable, then it appears that varying dietary concentrate/roughage ratio and/or dietary source of protein should be effective in optimizing duodenal protein supply.

Key Words: Duodenal Protein, Bacterial Protein, By-Pass Protein.