

Effects of protein and carbohydrate supplementations on fibre digestion and microbial population of sheep

ABSTRACT

The effects of two types of protein, soybean meal (SBM) and fish meal (FM); and two types of energy supplements, corn flour (CF) and paper pulp (PP), on intake of guinea grass (*Panicum maximum*), fibre digestion and microbial activities in four Merino rams with an average weight of 54.4 ± 4.5 kg were studied. Each animal was fitted with a ruminal cannula and a duodenal cannula at the proximal position. The animals were fed twice daily with chopped guinea grass (5 cm) ad libitum and one of the four dietary supplements: 170 g FM + 268 g PP; 170 g FM + 268 g CF; 200 g SBM + 200 g PP or 200 g SBM + 200 g CF. All the supplements were mixed with 100 g molasses. In sacco and in vivo digestibilities, digesta flow rates, fermentation and microbial population were studied in a 4×4 Latin square design with a 2×2 factorial arrangement of dietary treatments. The effects of energy or protein sources were not significant on grass intake of sheep. The potential degradabilities of NDF and ADF were not significantly affected by any of the supplements. However, the energy and protein sources had significant effects on disappearance rate of NDF and ADF. The disappearance rate of both NDF and ADF were significantly ($p < 0.05$) higher in animals fed PP when compared to animals fed CF. Animals fed FM also showed significantly ($p < 0.03$) higher disappearance rate of ADF than those fed SBM. Animals fed PP showed better digestion in the rumen and total tract. Total flow of NDF and ADF through the duodenum was not significantly affected by the various supplements. The mean rumen pH values (5.8-6.1) were not significantly different among the four different diets. The concentration of rumen ammonia was significantly ($p < 0.0001$) higher in animals fed SBM (235-266.4 mg N/L) supplement than in animals fed FM (174.9-179.7 mg N/L), while total VFA concentration was not significantly affected by both energy and protein supplements. Mean values of total VFA ranged from 72.5-82.3 mM. Molar proportions of acetate, propionate and butyrate were typical of a roughage type fermentation. Molar proportion of acetate was significantly ($p < 0.0001$) higher in sheep fed PP when compared to sheep fed CF. Animals fed FM had higher total viable bacterial counts, while animals fed CF showed higher protozoal numbers. Proportions of cellulolytic bacteria were only slightly higher in animals fed SBM or PP.

Keyword: Energy and protein supplementations; Fibre digestion