

Effects of protein and carbohydrate supplements on feed digestion in indigenous Malaysian goats and sheep

ABSTRACT

Experiments were conducted to determine the effects of soybean meal (SBM) as a source of protein and sago meal (SM) as a source of carbohydrate on in situ and in vivo digestibility of dietary components in four male goats (Kambing Katjang) and four male sheep (Malin) weighing 25-35 kg. Rumen volume, as well as rumen fluid dilution rate were also determined. The animals were housed in single pens with individual feeding and drinking troughs and each animal was fitted with a rumen fistula. They were fed two diets : chopped rice straw+200 g soybean meal (SBM), and chopped rice straw+190 g soybean meal+300 g sago meal (SBM+SM). Rice straw was offered ad libitum. The supplements were isonitrogenous (80 g crude protein/animal/d), but the proportions of dry matter (DM), organic matter (OM), crude fibre (CF), neutral detergent fibre (NDF) and acid detergent fibre (ADF) were lower in the SBM supplement (191, 165, 11, 40, 15 g/animal/d for DM, OM, CF, NDF and ADF, respectively) than in the SBM+SM supplement (445, 423, 25, 102, 38 g/animal/d for DM, OM, CF, NDF and ADF, respectively). Two animals from each species were fed either supplement in a cross-over design in two periods. Each period lasted for four weeks. In situ and in vivo digestibility studies were carried out, followed by the determination of rumen volume and rumen fluid dilution rate. The results showed that straw DM and total DM intakes of goats (average of 48.7 g/kg W0.75, 72.7 g/kg W0.75, respectively) were significantly ($p<0.01$) higher than sheep (average of 35.6 g/kg W0.75, 61.6 g/kg W0.75, respectively), but OM, N and GE intakes were not significantly different between the two animal species. When the effect of supplements was compared, animals fed SBM+SM supplement had significantly ($p<0.001$) higher DM, OM and GE intakes than animals fed SBM supplement. Potential degradabilities of rice straw DM were significantly ($p<0.01$) higher in goats (average of 48.8%) than in sheep (average of 46.1%). The supplements had no significant effect on the potential degradabilities of DM, OM and NDF, but they had a significant ($p<0.05$) effect on the degradation rates of DM and NDF. The addition of sago meal in the diet reduced the degradation rates of DM and NDF of rice straw in the rumen. Potential degradability of DM of soybean meal was not significantly different between animal species as well as between supplements. Sago meal was highly degradable. At 24 h of incubation in the rumen, 90-95% of DM loss was observed. There was a significant interaction between animal species and supplements in the in vivo digestibility of ADF and GE. In animals fed SBM supplement, the in vivo digestibility of ADF was significantly ($p<0.05$) higher in goats ($50.6 \pm 4.22\%$) than in sheep ($44.4 \pm 3.21\%$), but digestibility of GE was significantly ($p<0.05$) higher in sheep ($70.2 \pm 1.93\%$) than in goats ($63.0 \pm 3.07\%$). The digestibility values of CP and OM were significantly ($p<0.05$) higher in sheep when compared to goats. Animals fed SBM+SM supplement showed significantly ($p<0.05$) higher DM and OM digestibility values than animals fed SBM supplement, but digestibility values of CP were significantly ($p<0.05$) higher in animals fed SBM supplement. Differences in in vivo digestibility values of CF and NDF were not significantly different between animal

species or supplements. Water intake, rumen volume (1/kg W^{0.75}), rumen fluid dilution rate and mean retention time were similar between the two animal species. However, rumen fluid dilution rate and mean retention time was significantly ($p < 0.01$) affected by supplements. Animals fed SBM+SM had faster rumen fluid dilution rate and consequently shorter mean retention time.

Keyword: Digestion; Goats; Sheep; Straw; Supplements