Intake, Digestion and Duodenal Nitrogen Flow in Sheep Fed Tropical Diets Supplemented With Fruits of Sapindus saponaria

HANS-DIETER HESS1, ANDRÉS ABREU2, JUAN E. CARULLA2, MICHAEL KREUZER1, CARLOS LASCANO3

1Swiss Federal Institute of Technology (ETH), Institute of Animal Sciences, Animal Nutrition, Switzerland
2National University of Colombia, Department of Animal Production, Colombia
3Centro Internacional de Agricultura Tropical (CIAT), Colombia

Abstract

Suppression of ciliate protozoa is known to increase the flow of microbial protein from the rumen to the duodenum thus possibly improving nitrogen utilization. The incorporation of saponin-rich fruits from Sapindus saponaria into tropical ruminant diets may suppress rumen protozoa population. However, little information is available on its effects on nitrogen utilization and it is unknown whether these effects are depending on the quality of the basal diet or not. Thus an experiment was carried out to study the influence of S. saponaria on intake, digestion and duodenal N-flow in sheep fed two diets of contrasting quality (a grass-only and a grass-legume diet) using Brachiaria dictyoneura and Cratylia argentea. Both diets were fed either without supplementation or with fruits of S. saponaria (8 g/kg BW⁰·⁷⁵ per day) directly introduced into the rumen through fistula.

Intake was higher with the grass-legume diet than with the grass-only diet (p < 0.001). The administration of S. saponaria had no effect on forage intake, and interactions of basal diet and S. saponaria on intake were insignificant. Interactions (p < 0.05) were observed with digestibility. S. saponaria reduced DM and NDF digestibility in the grass-only diet but not in the grass-legume diet. Ciliate protozoa were not affected by the diet type and were increased by S. saponaria (p < 0.01). Higher amounts of total N (+55%, p < 0.001) and bacterial N (+30%, p < 0.05) reached the duodenum when the legume was fed. The supplementation with S. saponaria tended to increase total N flow (+18%, p < 0.1) and significantly increased bacterial N flow (+36%, p < 0.01) to the duodenum. Apparent N absorption was increased when the legume was fed (+48%, p < 0.05) but was unaffected by the supplementation with S. saponaria (p > 0.05). Interactions of forage quality and S. saponaria on nitrogen intake, digestibility and duodenal N-flow were insignificant.

These results indicate that the supplementation with fruits of Sapindus saponaria increases bacterial nitrogen flow to the duodenum independent of the quality of the basal diet. It is interesting to note that this was occurring even though the rumen protozoa counts per ml of rumen fluid were not suppressed.

Keywords: Duodenal nitrogen flow, rumen protozoa, Sapindus saponaria, saponins

Contact Address: Hans-Dieter Hess, Swiss Federal Institute of Technology (ETH), Institute of Animal Sciences, Animal Nutrition, Universitätstraße 2, 8092 Zürich, Switzerland, e-mail: dieter.hess@inw.agrl.ethz.ch