Back to Amornsak content

Effects of supplementing local plants on rumen fermentation, microbial protein synthesis, digestibility and voluntary feed intake in beef cattle steers

Amornsak Ngamsaeng

Tropical Feed Resources Research and Development Center, Department of Animal Science, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand
ngamsaeng@hotmail.com

Abstract

Two experiments were conducted to investigate the effects of local plants on rumen fermentation, microbial protein synthesis, digestibility and voluntary feed intake in beef cattle steers fed urea treated rice straw.

In the first experiment, seventeen samples of local feed resources were analyzed for condensed tannins (CT) and/or crude saponins (CS). These plant materials were evaluated for their potential effects on rumen fermentation by incubation *in vitro* with buffered rumen fluid. Gas production and volatile fatty acids (VFAs) production were measured and related to the levels of secondary plant compounds. Feed resources were divided into three groups vis high, 11.4 to 16.8%; medium 2.1 to 4.6%and low 0.7 to 1.7%, content of CT concentrations. There were significant differences ($P< 0.001$) in gas production in the *in vitro* incubation between these groups. Gas production was lowest from plant materials in group which had higher level of CT (32.2 to 181.9 ml g^{-1} DM). There were significantly differences ($p<0.05$) in total VFA production (from 48 to 88 mML^{-1}) and individual VFA production; acetate to propionate ratio (from 1.6 to 4.6). Propionate production was slightly higher from the plant materials that contained CT compared with those that had no CT. The correlation coefficients (*R*) were remarkable low between gas production after 48 h incubation and total VFAs (0.39), acetate (0.16) and butyrate (0.05) production.Gas production was negatively correlated with propionate production (-0.20).

In the second experiment, four, rumen fistulated beef cattle steers were randomly assigned according to a 4 x 4 Latin square design. The cattle were provided with urea-treated rice straw (UTRS) fed *ad libitum* and this was supplemented with ground mangosteen peel (MSP) at 0, 50, 100 and 150 gDM/hd/d. The results were obtained that roughage and total dry matter intakes in terms of kg/d and %BW were slightly higher for the 100 gDM/hd/d supplemented cattle. Apparent digestibility of DM, OM, CP, NDF and ADF were similar among treatments. The values of ruminal

temperature, pH, NH_3-N and BUN were not significantly different ($P>0.05$) among treatments. MSP supplementation increased ($P<0.05$) the bacterial population, which was highest at 150 gDM/hd/d of MSP supplementation. The protozoal population was significantly decreased while fungal zoospore population was not affected, and was highest for the 100 gDM/hd/d supplementation group. However, it was observed that lower values of TVFAs and C2/C3 ratio, and a higher proportion of C3 were found at 100 gDM/hd/d of MSP supplemented than in the control group. In addition, differences in microbial nitrogen supply, efficiency of rumen microbial protein synthesis and P/E ratio were not significantly different ($P>0.05$), but were highest at 100 g DM/hd/d of MSP supplementation.

In summary, results from the two experiments revealed that local feed resources containing variable levels of CT and/or CS contents could be potentially used as alternative strategic supplements to improve rumen ecology in ruminants. These findings would be very useful for small-holder farmers to improve feed efficiency and production, however, further researches with regards to level and type of feed resources are recommended to be conducted in feeding trials.

Key words: Local feed resources; Condensed tannins; Saponins; Rumen ecology; Ruminants.