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Effect of exogenous fibrolytic enzymes on ruminal fermentation and methanogenesis of rice straw (*Oryza sativa*)

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A study was conducted to evaluate the use of exogenous enzymes as a potential means of improving the cell wall degradation of rice straw. The enzymes used for the *in vitro* incubations were characterized for xylanase (XY) and cellulase (CE) and were supplied at rates of 50 (T1), 100 (T2), 150 (T3) and 200 (T4) µl for 0.5 g ground (1 mm) substrate dry matter including a control (without CE or XY). Anaerobic buffer medium and strained ruminal fluid were added to the *in vitro* incubations in triplicates and gas production (GP) was measured at 4 h intervals during 24 h of incubation. Degradability of DM, ruminal ammonia nitrogen, ruminal protozoa population and methane percentage were determined at the end of the 24 h incubation. All enzyme treatments of CE and XY increased total GP and DM degradability ($P < 0.05$) in rice straw. The total ammonia–N percentage (NH_3-N%) in fermentation liquid was highest for T4 with both CE (106.78%) and XY (122.62%). even though it was not a significant improvement. Ruminal protozoa population has significantly decreased ($P < 0.05$) with T1 and T4 of enzyme CE when compared to the control (C, 46.44×10^2; T1, 12.22×10^2; T4, 14.66×10^2) while there was no significant influence of XY. Supplementation of CE and XY has not suppressed the methane production in rice straw. The results revealed that use of fibrolytic enzymes is an effective way to improve the ruminal fermentation characteristics of fibrous feeds and several other beneficial characteristics in ruminants. However, further investigations are necessary to identify the potential of using exogenous fibrolytic enzymes as a methane suppresser and for correct doses of enzymes.

Keywords: Cellulase, xylanase, *in vitro* gas production, methane, ruminal fermentation

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