

Papaya (*Carica papaya*) leaf methanolic extract modulates *in vitro* rumen methanogenesis and rumen biohydrogenation

ABSTRACT

Papaya leaf methanolic extract (PLE) at concentrations of 0 (CON), 5 (LLE), 10 (MLE) and 15 (HLE) mg/250 mg dry matter (DM) with 30 mL buffered rumen fluid were incubated for 24 h to identify its effect on *in vitro* ruminal methanogenesis and ruminal biohydrogenation (BH). Total gas production was not affected ($P > 0.05$) by addition of PLE compared to the CON at 24 h of incubation. Methane (CH₄) production (mL/250 mg DM) decreased ($P < 0.05$) with increasing levels of PLE. Acetate to propionate ratio was lower ($P < 0.05$) in MLE (2.02) and HLE (1.93) compared to the CON (2.28). Supplementation of the diet with PLE significantly ($P < 0.05$) decreased the rate of BH of C18:1n-9 (oleic acid; OA), C18:2n-6 (linoleic acid; LA), C18:3n-3 (linolenic acid; LNA) and C18 polyunsaturated fatty acids (PUFA) compared to CON after 24 h incubation, which resulted in higher concentrations of BH intermediates such as C18:1t11 (vaccenic acid; VA), c9t11 conjugated LA (CLA) (rumenic acid; RA) and t10c12 CLA. Real-time PCR analysis indicated that the total bacteria, total protozoa, *Butyrivibrio fibrisolvens* and methanogen population in HLE decreased ($P < 0.05$) compared to CON, but the total bacteria and *B. fibrisolvens* population were higher ($P < 0.05$) in CON compared to the PLE treatment groups.

Keyword: Biohydrogenation; *In vitro* gas production; Methanogenesis; Papaya leaf extract; Rumen fermentation