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In vitro Gas Production and Short-Chain Fatty Acid Production from Tropical Forage Legumes Incubated with and without Polyethylene Glycol

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Abstract

The aim was to evaluate the effects of polyethylene glycol (PEG) supplementation to young or old tropical forage legumes (TFL) that were either fresh or ensiled on *in vitro* gas production (IVGP) and short-chain fatty acid (SCFA) production.

Samples of tropical forage grasses (TFG) i.e. *Pennisetum purpureum* (PP) and *Setaria sphacelata* (SS) were collected as control from El Salvador and Indonesia, and samples of TFL, i.e. *Arachis pintoi* (AP) and *Glycine max* (GM) from Brazil. All TFL differed in their stage of maturity (i.e. young and old) and in the type of conservation (i.e. fresh and silage).

The Hohenheim gas test was used to determine IVGP after 8 and 24 h of incubation. The sample of each species was incubated individually without and with 750 mg PEG supplementation. All data were analysed using the mixed procedure of SAS with species, maturity, forage type of conservation, PEG supplementation, and their interactions as fixed effects and run as random effect. Least squares means were compared at a significance level of $p < 0.05$.

The IVGP after 8 h incubation was lowest for SS with PEG supplementation (average ± standard deviation; 4.2±0.68 ml/200 mg dry matter; DM) and highest for fresh young GM without PEG supplementation (15.2±1.33 ml/200 mg DM). Meanwhile, IVGP after 24 h incubation was lowest for SS (24.7±1.39 ml/200 mg DM) and highest for old AP silage (39.5±0.77 ml/200 mg DM) when both were supplemented with PEG. PEG supplementation increased IVGP after 8 and 24 h of incubation in fresh old AP and old AP silage ($p < 0.001$). Similarly, the estimated SCFA production was lowest in SS (0.49±0.03 mmol) and greatest in AP silage old without and with PEG inclusion (0.80±0.02 and 0.80±0.05 mmol, respectively). Similar to the increase in IVGP, estimated SCFA production increased for young and old fresh of AP.

The difference between the IVGP with and without PEG supplementation in each sample is an indicator of tannin effect. According to the findings, tannins are more active in old than young AP and more active in fresh than ensiled AP. Instead, tannin have no effect on *in vitro* fermentation in GM and TFG.

Keywords: Gas production, keywords: PEG, SCFA production, tropical forage grasses, tropical forage legumes

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