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Increased inclusion of forage peanuts in ruminant diets: *In vitro* assessment of changes in enteric methane production

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The livestock contributes to greenhouse gas (GHG) emissions of anthropogenic origin, especially enteric methane (CH4). The objective of this work is to quantify in vitro the potential for reducing CH4 emissions through the inclusion of increasing levels of forage peanuts (FP) in a brachiaria-based diet. Samples were collected in two seasons of the year: summer and winter. Four field replications (pastures) were used. The samples were collected, dried, ground to 1mm and mixed to create FP inclusion levels of 0 %, 25 %, 50 % and 100 %. The experimental design was a randomized blocks desing, with a 4x2 factorial arrangement and four replications. The samples were weighed on an analytical balance (0.5g), placed in filters and placed in 50 mL bottles. The in vitro experiment was carried out at the Multi-User Laboratory of Livestock Bioefficiency and Sustainability, at Embrapa Gado de Leite, in Coronel Pacheco-MG. Three adult bovines fistulated in the rumen received a diet with a roughage:concentrate ratio of 90:10 and served as rumen fluid donors. In each bottle, 12 mL of culture volume, 4 mL of rumen fluid, 0.5 mL of reducing agent were added and saturated with CO2. The vials were incubated in a temperature-controlled chamber at 39ºC. Gas production was determined by the displacement of the water column, at 2, 4, 6, 8, 10, 12, 14, 17, 20, 24, 28, 34, 48, 72 and 96 hours of incubation. CH4 was collected 24 hours into the incubation. A 10 ml portion of gas was stored in an Exetainer® (Labco Limited, Lampeter, United Kingdom) and analyzed by gas chromatography. The data were analyzed considering the fixed effects of season, the level of FP inclusion and the interaction between these factors and the random effect of the collection paddock. Statistical significance was considered when $P<0.05$ and, when there was significance for the effect of inclusion of FP, a regression study was carried out depending on the level of inclusion. The variables of dry matter degradability (DMD; $P<0.001$) and gas production as a function of incubated dry matter (DM) (GASI; $P<0.05$) presented higher averages in the summer season and as the temperature increased. inclusion of FP in the samples. This can be explained by the higher nutritional quality of the samples with increased inclusion of FP and the greater development of forage crops in this harvest season. In both seasons, there was a linear and quadratic increase in methane production with the increase in the FP level in the samples. In turn, the highest averages were produced in the winter season, which may be associated with the lower concentration of condensed tannins at that time. The inclusion of FP has the effect, of increasing the digestibility of the diet and reducing methane production in the summer season, when compared to the winter season.

Keywords: Condensed tannins, digestibility, legumes, gas production

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