Methane production in bovines using different food additives determined by SF_6 tracer technique

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The rumen methane production is a byproduct of microbial digestion process and represents a loss of 2-12% of the energy supply. Furthermore, methane (CH_4) expelled by the ruminant is currently the focus of critical since it presents a greenhouse effect 21 times greater than CO_2. Ruminants, mainly cattle and sheep, are important sources of CH_4 emissions, accounting for about a third of global anthropogenic emissions of this gas. The use of ionophores have been successful in reducing these losses of energy and protein in the rumen. However, the use of ionophores in animal nutrition is increasingly being rejected because of the possibility of emergence of resistant bacteria and waste. For this reason, researchers have become interested in evaluating alternatives to modulate rumen fermentation, including the use of yeasts, organic acids, plant extracts, probiotics and antibodies. Plants containing tannin are being studied because of its anti-methanogenic activity, mainly plants rich in condensed tannins, due to its lower risk of toxicity to the animal than hydrolysable tannins. The study aimed to evaluate the effect of feed additives on methane production by bovine using the sulfur hexafluoride (SF_6) tracer technique. According to the experimental design replicated 3x3 Latin square (n = 18 experimental units), six cannulated cows (873 ± 81 kg) in the rumen were used and distributed to three diets with 50% of concentrates, which differed on the used additive, where: Control (CON): no additives; Monensin (MON): addition of 300 mg of sodium monensin per animal per day; Tannin (TAN): addition of 100 g of concentrated extract condensed tannin obtained from Black-Acacia (*Acacia decurrens*) per animal per day. Each experimental period consisted of 21 days, where the first 15 days were used for adaptation and the last 6 days for data collection of dry matter intake (DMI) and CH_4 production. The concentrations of SF_6 and CH_4 were determined by gas chromatography. Data were analyzed using the SAS software (Version 9.2, 2010) through the MIXED procedure. In the model, treatment effect was considered fixed and the effects of time, square and animal within square considered random. The effect of treatment was separated by the Tukey test at a significance level of 0.05. There were no significant differences ($P>0.05$) among treatments for DMI expressed in kilograms per day (kg d^{-1}), percentage of body weight (% BW) or per unit of metabolic weight (g kg^{-1} $BW^{0,75}$). The emission of CH_4 by bovine ranged from 282.97 to 373.97 grams per day (g d^{-1}), and the treatment containing monensin reduced in 24.3% ($P<0.05$) CH_4 production in g d^{-1} and 24.4% in megacalories per animal per day (Mcal Ani^{-1} d^{-1}) compared to the control treatment. Tannin proved to be an intermediary additive, despite not differing statistically from the others, and shows great potential as an additive for reducing methane emissions if used in higher doses.
Keywords: Greenhouse gases, Methane, Monensin, Ruminants,Tannin.

Acknowledgments: Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP.