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Effect of selenium and zinc oxide nanoparticles on *in vitro* ruminal fermentation by gas production

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In recent years, there has been a search for nutritional methods to make ruminal fermentation more efficient and reduce methane production. The use of feed additives in the form of nanoparticles in bovine diets has been investigated as a promising technique. Therefore, the aim of this study was to evaluate the effects of zinc oxide (ZnO) and selenium (Se) nanoparticles on in vitro ruminal fermentation using the gas production technique. The treatments evaluated were control (CT, without additives), zinc oxide nanoparticles (NZnO) (0.019 mg), selenium nanoparticles (NSe) (0.00005 mg), sodium monensin (MON) (0.00006 mg), zinc oxide microparticles (MZnO) (0.019 mg), sodium selenite (SS) (0.00005 mg), and zinc sulfate (SZn) (0.070 mg). Forage (*Brachiaria brizantha* cv. Marandu) dried and ground (0.5 g) was used as a substrate. The ruminal fluid (25 mL) used was collected from two rumen-cannulated animals on the day of the assay, added to a buffer solution (75 mL) along with the nanominerals and other additives (in mg/kg DM) in hermetically sealed 250 mL glass flasks, and incubated in an anaerobic medium. The assays were conducted with three repetitions over time, containing three replicates per treatment. The pressure of the gases produced by the fermentation of the substrate accumulated in the flasks was automatically measured by radiofrequency using the AnkomRF Gas Production System modules maintained in a water bath at 39 °C for 48 hours. Data were subjected to analysis of variance at a significance level of 5%. There was no treatment effect on any of the evaluated fermentation variables. The average results were: gas production at 48 hours = 102.90 mL, dry matter degradability = 65.70%, total volume of degraded dry matter = 312.76 mL/g DM; asymptotic gas production = 108.45 mL, lag time = 2.67 hours, gas production rate = 0.0908 %/hour. Zn and Se nanoparticles did not influence the ruminal fermentation pattern *in vitro*.

Keywords: additives, nanominerals, ruminant nutrition.

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