

CUMULATIVE METHANE EMISSIONS IN DUNG OF DIFFERENT HERBIVORE SPECIES

EMISSÕES CUMULATIVAS DE METANO EM EXCRETA DE DIFERENTES ESPÉCIES DE HERBÍVOROS

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Abstract

Grasslands cover about 40% of the Earth's surface, and in addition to forage production, they provide ecosystem services such as carbon storage and soil protection, so they are considered important sinks of greenhouse gases (GHG). Despite this, the dung from grazing animals deposited in the soil, usually unevenly distributed in relatively small areas, can provide favorable conditions for methane (CH₄) emissions. The objective of this study was to evaluate the accumulated methane emissions in the dung of different species of herbivores (sheep, goats, beef cattle, dairy cattle, and horses). Incubation was carried out in a greenhouse. Soil collection was carried out in an area of Palisade grass planted more than 10 years ago. The experiment was carried out in a completely randomized design with five treatments and five replications. The treatments used were dung from sheep, goats, beef cattle, dairy cattle, and horses. The amounts added per treatment were 400 g of soil and 100 g of fresh dung. The soil was maintained at a constant temperature and 18% volumetric moisture throughout the experimental period. The remaining vials were kept in the incubator at a constant temperature of 25.0 ± 1.0 °C and 80% relative humidity during the test period. After applying the treatments, samples were collected daily during the first week. From the 8th day after application (DAA) onward, sampling was performed three times a week until 30 DAA, and weekly until 100 days of evaluation. Sampling was performed after closing the chambers (T₀) and after 30 minutes (T₃₀). A difference was found between the accumulated emissions of CH₄ from the evaluated dung. The highest emissions were released by dairy cattle manure, followed by beef cattle (p<0.001). The dung of goats, sheep, and horses showed the lowest accumulated emissions of CH₄, not differing from each other. The cumulative emissions found in the present study corroborate the findings reported by several studies, that the manure of dairy cows is responsible for more significant CH₄ emissions compared to beef cattle, sheep, goats, and horses. The authors indicated that fecal moisture has a high influence on CH₄ emissions. The high moisture content observed in dairy cattle manure may have hindered oxygen infiltration, favoring a longer period of anaerobic conditions and CH₄ emission, unlike what was observed for small ruminant manure, where low humidity may have limited the process of methanogenesis. Although the equine dung presented high humidity, low cumulative methane emissions were observed. Franz et al. (2010) and Elghandour et al. (2019) reported that horses have intestinal structures and microbial communities in contrast to ruminants, with smaller communities of protozoa and archaea, explaining the lower emission of CH₄ by the dung of these animals. Thus, factors inherent to each animal influence GHG emissions through dung.

Keywords

Dung, greenhouse gas, herbivores, methane.