

N₂O and CH₄ emission from cattle excreta in two livestock production system in Brazilian Cerrado

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Introduction. Urine and dung deposited by cattle on pasture are important sources of greenhouse gases such as nitrous oxide (N₂O) and methane (CH₄). Our objectives were to determine the impact of excreta type, seasonal climate and livestock production system on soil N₂O and CH₄ emissions.

Material and Methods. The study was carried out in a clayed Oxisol, on a long-term experiment at the Embrapa Agropecuária Oeste, Dourados, MS, Brazil, with *Brachiaria decumbens* integrated with crop each two year (ICL) and permanent pasture of *B. decumbens* without fertilization (PP). On each livestock production system, one area of 15 x 20m was isolated from animals and the experiment was developed. We added urine (2.2 L) and fresh feces (2.6 kg) inside of bases (40 x 60cm) previously fixed in pasture soil, and other base were maintained without excreta for discount soil emissions. Gases flux were measured by static chambers technic. The gas flux rates were calculated for each chamber from the linear increase in headspace gas concentration over the sampling time. For each gas, the soil gas emission was discounted from emission of the excreta. Results were evaluated by ANOVA procedure and Tukey test (P <0.05).

Results and Conclusions. Feces were the main source of CH₄ emis-

sions in the pastures (99%) and did not differ ($P < 0.05$) between livestock systems. In the rainy season an increase of soil CH₄ emissions has been observed, maybe due to rainfall and higher air humidity keep longer initial moisture content of feces. Urine was the main source of N₂O (96%) and higher emissions were observed in ICL than PP. Urine was the major source of gas emission from excreta and represented 73% of carbon dioxide equivalent (CO_{2eq}) emission in ICL and 62% in PP.

Table 1. Cumulative average emissions of N₂O, CH₄, and CO_{2eq} from excreta deposited in integrate crop-livestock (ICP) and permanent pasture (PP) in Brazilian Cerrado (Savannah)

Production system	Excreta	N ₂ O (mg m ⁻²)			CH ₄ (mg m ⁻²)			CO _{2eq} (g m ⁻²)
		Rainy season	Dry season	Mean	Rainy season	Dry season	Mean	
ICL	Feces	18 Aa	10 Aa	14 A	2615 Aa	311 Ab	1463 A	45 A
PP		9 Aa	22 Aa	15 A	2778 aA	310 Ab	1544 A	47 A
ICL	Urine	631 Aa	281 Aa	456 A	9 Aa	10 Aa	10 A	121 A
PP		277 Ba	294 Aa	285 A	5 Aa	20 Aa	12 A	76 B

Means followed by the same capital letter in the column (for each excreta) and small letter in the row (between season) are not significantly different Tukey test ($P > 0.05$). CO_{2eq} = N₂O x 265 + CH₄ x 28

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