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Nitrous oxide emission factor for cattle urine and dung in subtropical Brazilian pastureland

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Introduction

The Brazilian cattle herd is over 200 million heads and its excreta contribute to 41% of the national nitrous oxide (N₂O) emission, a potent greenhouse gas. According to the Intergovernmental Panel on Climate Change (IPCC), the emission factor (EF) of N₂O from cattle urine or dung on pasture is 2% (Tier 1), but this is a global value that may not suit many agroecosystems around the world. The objective of this study was assess if this IPCC's 2% default EF for urine and dung N₂O emission is appropriate for subtropical Brazilian pasture.

Material and Methods

A field experiment on a Cambisol in Pinhais-PR, Brazil, included a control treatment (no excreta) and application of urine (U) and dung (E). The experimental design was a randomized block design with four replications. Metal collars of 0.083 m² were inserted into the soil and served to delimit the treatment spots and to support the gas collecting chamber (static chamber method). Air samples were analyzed by gas chromatography. Assessments occurred from January to October 2014, in three seasons representing summer, autumn, and winter.

Results and Conclusions

The emission factor for N₂O-N across the three stations averaged 0.30% and 0.11% for urine and dung, respectively, lower than the 2% indicated by the IPCC. Different emission factors for urine and dung suggest that such excreta should be considered separately, not together, as suggested by the IPCC.

Table 1. Emission factor (EF%) for urine and dung applied in the summer, autumn and winter seasons for 70 days at each season.

Season	U (%)	Mean-U (%)	D (%)	Mean-D (%)
Summer	0,18 Ba	0,13 A	0,07 Ba	0,07 B
Autumn	0,35 Aa	0,20 A	0,10 ABa	0,11 AB
Winter	0,36 Aa	0,26 A	0,16 Ab	0,17 A
Mean	0,30 a	0,20 ± 0,07	0,11 a	0,12 ± 0,05

References

IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Agropecuário. Rio de Janeiro, 2010.

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