Effect of grass and legume intercropping and crop-livestock integration on enteric methane, forage nutritional value and soil C stock

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BACKGROUND

Integrated systems improve the nutritive value of pastures, contribute to the storage of carbon (C) in the soil, and consequently, to the reduction of greenhouse gases (GHG), especially enteric methane (CH_4).

OBJECTIVES

The objective of this study was to evaluate the intensity of enteric CH_4 emission in cattle, stock C in soil, yield and nutritional value of forage in different pasture production systems.

MATERIALS & METHODS

The study was conducted at Embrapa Cerrados, Planaltina-DF, Brazil, 6 Nellore animals (324±37 kg of live weight) per treatment and 3 production systems: continuous pasture of BRS Piatã (S1), pasture of BRS Piatã with consortium legume pigeon pea (S2) and pasture of BRS Zuri rotated every 3 years with crop (S3). The C stocks calculated to a depth of 40 cm, LSD test at 5%. The CH_4 evaluations took place in May, August and December 2024. The trace gas technique, sulfur hexafluoride (SF_6) was used.
The bromatological analyses performed in the transition between wet-dry and dry season. Tukey's test at 5%.

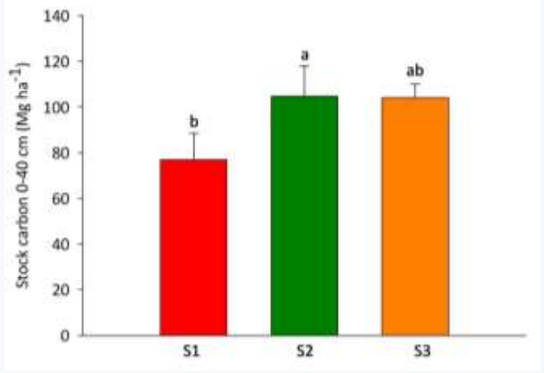


Figure 1. C stocks (Mg ha^{-1}) at the 0–40 cm depth

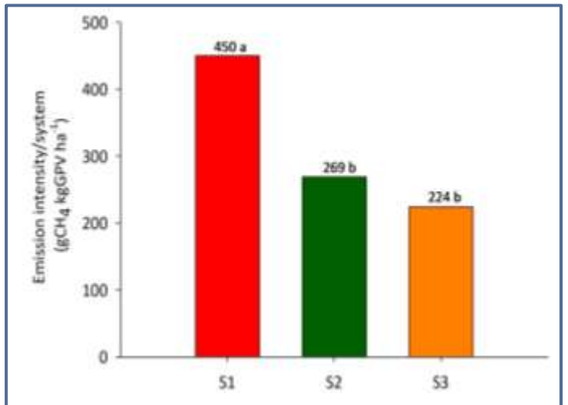


Figure 2. Emission intensity (gCH_4 $kgGPVha^{-1}$)

RESULTS

The C stock was higher in S2 compared to S1 ($p < 0.05$), was 76.99, 93.18 and 80.43 Mg ha^{-1} for land use systems S1, S2, and S3.

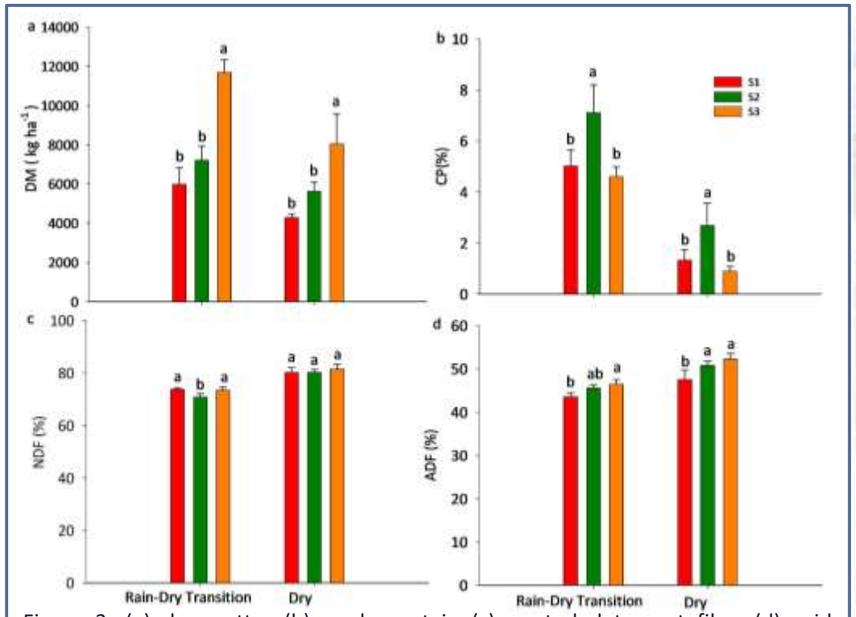


Figure 3. (a) dry matter (b) crude protein (c) neutral detergent fiber (d) acid detergent fiber



The S2 showed higher crude protein content and lower neutral detergent fiber content in the wet-dry transition. S3 has the highest dry matter (DM) yield.

CONCLUSIONS

Therefore, the intercropping of grasses and grasses with legumes increase soil C stocks, showed better nutritional value while rotational pasture has higher DM production and both lower CH_4 emission intensities.

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