

Growth and enteric methane emission evaluation of cattle in livestock- forest integration system in the Amazon biome in the dry period

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Introduction

The dry period is the most challenging time for animal production, especially for beef cattle raised on pasture without irrigation. At this stage usually the animals lose weight, which can compromise their development in the following period. This activity is also aimed to cause great impact on the environment, especially the issue of enteric methane emission and in deforested areas. The objective of this study was to evaluate the weight development and the emission of enteric methane by crossbred steers (Curraleiro Pé-Duro x Nellore).

Material and Methods

The study was performed during the dry season 2015 in the experimental field of the Federal Institute of Maranhão (IFMA), Campus Codó-MA, located in the Amazon biome in 04° 27 '19' 'South and 43° 53' 08 '' West, altitude of 47m. We used two different areas in grazing, the first consisting of grass Mombasa and Babassu palm trees (80 trees per hectare) and the second area only by "Momba-

ça" grass (*Panicum maximum* Jacq. cv Mombaça), in full sun. Each system consisted of seven paddocks of 4200 m² each, in rotation. The entrance and exit of the animals was determined by the height of the "Mombaça" grass (80 cm at the entrance, and 40 cm at the exit). The present study used twelve contemporaries steers (crossbred steers Curraleiro Pé-Duro x Nellore) supplemented with mineral salt and fresh water. Evaluation of growth was determined by monthly weighing on electronic scales.

The enteric methane was determined with sulfur hexafluoride tracer technique according to Johnson & Johnson (1995) and adapted in Brazil by Primavesi et al. (2004). The eructated and expired gas was collected daily in five consecutive days. The concentrations of CH₄ and SF₆ were determined at the laboratory of Embrapa Meio Ambiente, located in Jaguariúna, São Paulo state, Brazil, by gas chromatograph (HP6890) equipped with flame ionization detector (FID) and megabore column (0.53 µm, 30 m) HP- Al/M Plot (for CH₄) and electron capture detector (μ -ECD) and megabore column HP- MoSiv (for SF₆), with two loops 0.5 cm³ coupled to two six-way valves.

Analysis of the available forage was performed according to "Agronomic technique zero cut" (Lopes et al., 2000). We analyzed the percentage of dry matter of leaves (DML), stems (DMS), leaf / stem ratio (L/S), relative living matter / dead matter (LM / DM). The dried material was also chemically analyzed for protein content and fiber fractions. The experimental design was a randomized block. The data were submitted to analysis of variance and compared Tukey test using the program Assistat. Version 7.6 beta (Silva 2011).

Results and Conclusions

In the shaded pastures, the animals showed an average weight gain of 10 kg during this period, while in the pasture in full sun, weight gain was 3 kg on average per animal. The best performance in

the integrated system (livestock / forest) could be explained by the higher quantity and quality of forage. Forage availability in the integrated system was 2.041 kg MS and in the traditional system was 1.811 kg MS. The shaded area was also observed higher values of MSLF and MV / MM were 761.4 and 372.7 and 3.12 against 0.85 in grassland in full sun, respectively.

The “Mombaça” grass on integrated system showed higher values of crude protein, 7.33 against 5.66% MS in the traditional system and lower fiber values (ADF and NDF), 35.46 and 64.00% against MS 37.43 and 66.44% DM respectively in pure pasture. The methane production was similar in both systems and were 121,04 g / CH₄ / day and 44.18 kg / CH₄ / year for the integrated system and 121,53 g / CH₄ / day and 44.361 kg / CH₄ / year for the system in full sun (Table 01).

Although there are no differences in methane emissions, there was greater productivity in the integrated system which reduces the emission of methane per kilogram of meat produced. Thus it can be concluded that the forest livestock integration system provides better animal performance in the dry season and lower methane emissions per kilogram of meat produced in the period.

Table 1: evaluation systems as the availability and chemical analysis of the forage and methane emissions.

Variable	System	
	Forest livestock integration	Pure pasture
DMTF	2041 kg/ha	1811 kg
DML	761 kg/ha	372kg/ha
LM/DM	3,12	0,85
CP	7,33 % ^a	5,66 % ^b
ADF	35,46 % ^a	37,43 % ^b
NDF	64 % ^a	66,44% ^b
G/CH ₄ /DAY	121,04	121,53
KG/CH ₄ /YEAR	44,18	44,36

Means followed by the different letter in the line differ significantly, Tukey test at 5% probability.

DMTF = dry matter total forage. DML = dry matter of leaves. LM/DM = living matter / dead matter.

CP = Crude Protein. ADF = acid detergent fiber and NDF = neutral detergent fiber

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