

Methane Emissions from Nellore Heifers under integrated Crop Livestock Forest Systems

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Adoption of Integrated Crop-Livestock-Forestry Systems (ICLFS) has been encouraged as a greenhouse gases (GHG) mitigation measure in Brazil. Accurate estimate of enteric methane emission (E_{CH_4}) is essential to compute carbon footprint and, consequently, to improve the evaluation and design of GHG mitigation strategies for cattle production systems.

E_{CH_4} and dry matter intake (DMI) of Nellore heifers (322 ± 33 kg of live weight (LW)) grazing *Brachiaria* (*Urochloa*) *brizantha* CV Piatã were evaluated under three different types of ICLFS at Embrapa Cerrados (lat -15.604088° ; long: -47.713837°), in the autumn of 2013. Three replicates, containing two animal testers each, were set in a randomized complete block design. The treatments were integrated to the crop-livestock system with:

a) 6 years old pasture (control) - ICLS6;

b) one year old pasture - ICLS1, and;

c) one year old pasture established under *Eucalyptus urograndis* trees in a north-south orientation and spacing between rows of 22m (417 trees.ha⁻¹) - ICLSF1.

Enteric CH_4 production was measured using the SF6 tracer gas technique collected for 6 days after 14 days adaptation period. Dry matter intake (DMI) was estimated using LIPE® fecal marker in association with *in vitro* dry matter digestibility (DMD) of pasture samples simulated on all treatments by hand pulling pasture. The grazing pressure was set to 10% per kg of LW for all treatments. Tukey test ($P < 0.05$) was used to compare treatment means.

Mean DMD was 46.3%, 56.9% and 55.0% for ICLS6, ICLS1 and ICLFS1, respectively. ICLS6 differed from ICLS1 and ICLFS1, suggesting that trees did not influence DMD. The same pattern was verified for DMI. ICLS1, ICLFS1 and ICLS6 resulted in mean DMI of 6.2, 6.0, 4.3 kg.day⁻¹, corresponding to 2.2, 1.9 and 1.3 DMI in % of live weight, respectively. Comparing ICLS6 and ICLS1, for each percentage point reduction in DMD animals ingested 180 g less pasture. Despite the differences in DMD and DMI, E_{CH_4} emissions were similar ($P > 0.05$). ICLS1, ICLFS1 and ICLS6 CH_4 emissions were 112.4, 96.6 and 88.5g.animal⁻¹.day⁻¹, respectively. When it comes to the ratio between E_{CH_4} and DMI(g CH_4 .kgDM⁻¹) treatments means also did not differ ($P > 0.05$), with overall mean of 18.6. Pasture age, *i.e.* time after planting, affects DMD and DMI but not E_{CH_4} and E_{CH_4} /DMI in ICLFS during the Cerrado autumn season.