

Mitigation of methane emissions in Nellore beef cattle grazing different systems

Althieres J. Furtado*¹, Annelise A. G. Lobo¹, Gabriele V. Silva¹, Rolando Pasquini Neto¹, Bruna S. P. Barros³, Alexandre Berndt²

¹Universidade de São Paulo, Pirassununga/SP, Brasil;

²Embrapa Pecuária Sudeste, São Carlos/SP, Brasil;

³ Universidade Federal de São Carlos, São Carlos/SP, Brasil.

*M.Sc student - althieresjf@usp.br

Mitigation of greenhouse gas (GHG) emissions has become a very popular issue in recent years, due to the potential of these emissions to global warming. Ruminants produce one of the main greenhouse gases, methane (CH₄), which has a warming potential, 25 times greater than CO₂. Among ruminants, cattle in Brazil represent about 83% of all Brazilian livestock production with about 214.7 million heads, thus becoming the major target in research to reduce CH₄ emissions into the atmosphere. The intense production and the adequate nutritional balance are good strategies to make cattle emit less CH₄ than when subjected to unfavorable situations. As a CH₄ mitigation strategy, this project proposes the combined use of a legume and grass. The legume brings benefits such as biological nitrogen fixation and serves as food, mainly in the dry season, thus providing better nutritional supply when compared to grasses during the dry season. Likewise, the project evaluates the performance and production of CH₄ in male *Nellore* cattle, submitted to 3 treatments divided into The treatments with two replications were: 1) rainfed pasture with a mix of *Urochloa* (*syn. Brachiaria*) *decumbens* Stapf cv. Basilisk and *Urochloa* (*syn. Brachiaria*) *brizantha* (Hochst ex A. Rich) Stapf cv. Marandu, with moderate stocking rate (RMS); 2) degraded pasture of *Urochloa decumbens* cv. Basilisk (DP) and 3) Grass and legume mixed, *Urochloa* (*syn. Brachiaria*) *decumbens* Stapf cv. Basilisk, *Urochloa* (*syn. Brachiaria*) *brizantha* Stapf cv. Marandu and *Cajanus cajan* (*L. Millsp.*) cv. BRS Mandarin with moderate stocking rate (LGM); divided into 9 pens of 1.5 hectares (stocking adjustment is carried out with a variable number of animals using the technique of "Put on and take off"). An experimental number of 18 steers weighing approximately 280 kg and 15-16 months was used. The animals were weighted monthly, and measurement of CH₄ using the sulfur hexafluoride (SF₆) tracer gas technique was carried out in the dry and wet seasons. The results of weight gain in the rainy season for treatments of grass intercrop with legume, recovered pasture and degraded pasture are 0.59 kg.day⁻¹-10.45 kg.day⁻¹ and 0.34 kg.day⁻¹, respectively; and the methane emission per animal in kg.year⁻¹ was 90.27 kg.year⁻¹; 83.67 kg.year⁻¹ and 74.61 respectively. The emission ratio (kg.day⁻¹) for weight gain (kg.day⁻¹) was 0.42; 0.51 and 0.60 with R² = 0.9993. These results demonstrate efficiency in the use of pigeon pea as a strategy to mitigate methane emissions and improve weight gain. The second collection period will be in the dry period (June).

Keywords: mitigation, methane, intercropping, pigeon pea, brachiaria, beef cattle

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