



Relative energy loss of Nellore cattle on pasture intercropped with legume

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With the increase in population, the demand for food is growing. Therefore, it's necessary to intensify existing production systems and mitigate the environmental impacts caused by increased resource exploitation. One strategy is to raise cattle in more efficient systems, such as pastures combined with grasses and legumes. One of the ways to determine relative energy loss (REL) considers the loss of energy in the form of methane (CH₄) due to the production of short-chain fatty acids (SCFA). We hypothesize that intercropping pigeon pea with tropical pastures improves the nutritional value of the food, which can help animal production efficiency and mitigate CH₄ emissions. For the experiment, nine Nellore bulls rumen-cannulated were randomly distributed into three treatments with three grazing replicates in a completely randomized design, totaling nine grazing units: i) degraded pasture (DEG); ii) pasture fertilized with 200 kg N-urea ha⁻¹ year⁻¹ (REC) and iii) mixture legume-grass pasture composed of *Urochloa* spp. and pigeon pea (*Cajanus cajan* cv. BRS Mandarin) (MIX). Samples was carried out for two years during the dry and rainy seasons. In the rainy season, all animals received mineral mixture supplementation, while in the dry season, animals from REC and DEG received protein-energy supplementation, and MIX, a mineral mixture. The SCFA production and CH₄ were determined using the *ex-situ* ruminal fermentation technique. Data were submitted to analysis of variance (PROC MIXED), and means were compared by the Fischer test at the 5%. The REL was calculated as the ratio between the energy in the CH₄ produced, and the energy sum of all quantified fermentation products (CH₄ and SCFA), expressed as a percentage. The REL observed during the experimental period was 29.70^A; 22.92^B; and 24.33^B% (P = 0.0367) for DEG, REC, and MIX, respectively. The best diet quality results from the consumption of pigeon pea, especially in the dry period, when this legume reaches its peak of growth and enters the reproductive phase, emitting flowers and pods, resulting in an increase in consumption by cattle. Furthermore, pigeon pea plants have a considerable concentration of condensed tannins, which can modulate rumen fermentation, thus reducing SCFA production and, therefore, CH₄ emissions. The REL was higher for DEG, with MIX and REC demonstrating a REL of 18 and 23% lower than the degraded pasture. It proves that intercropping and pasture fertilization are efficient strategies to mitigate energy losses in the form of CH₄.

Keywords: cattle; *Cajanus cajan*; consortium; *Urochloa* spp.; pigeon pea

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