



Effect of lactating cows' proportion in the herd on enteric methane and manure in different production systems

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Dairy farming in Brazil involves over a million producers and generates employment in various chain sectors. Brazilian production systems are heterogeneous, requiring a more in-depth analysis of the existing impacts. Growing consumer awareness is driving the industry towards practices with a lower environmental impact. Therefore, the objective of this study was to analyze the effect of the proportion of lactation cows in the herd on enteric methane (CH₄) emissions and manure considering different production systems: unconfined (UC) and confined (C), located in tropical climates. Visits were made to 18 properties to apply questionnaires and collect data. The methodology used in this study was based on the guidelines of the National Greenhouse Gas Inventory, the Intergovernmental Panel on Climate Change, and the Fourth National Inventory of Anthropogenic Emissions and Removals of Greenhouse Gases. Linear models were used to test the effect of production systems. The variables of interest (γ) followed a normal distribution (Shapiro-Wilk test). Confidence intervals were estimated using Type II Wald chi-square tests. Data processing and analyses were performed in R using RStudio software. A balanced herd consists of 70% cows and 30% heifers. In this study, it was not possible to observe this pattern. It was observed that both production systems were growing, that is, retaining heifers to increase the herd, which was considered a transitory situation until the number of cows planned for the herd was reached. UC systems presented a lower proportion of cows ($p=0.02946$ - mean 48.47%) and a higher proportion of heifers ($p=0.03762$ - mean 51.53%) compared to C systems (mean 54.63% cows and 45.37% heifers). In addition, a higher proportion of enteric CH₄ production by lactating cows concerning the total herd was observed for C systems ($p=0.00319$ - mean 75.91%) compared to UC systems (mean 64.65%) due to the higher proportion of cows in the herd of C properties. About manure management, no difference was observed between the production systems. In dairy cattle systems, the lactating cow category is the highest emitter in the herd, even when the proportion of cows is below the recommended level for an efficient system. This is mainly due to the higher feed intake that will be converted into milk. These results suggest the importance of specific strategies to reduce the environmental impact of dairy farming, especially concerning the management of the lactating cow category.

Keywords: dairy farm, cattle, sustainability.

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