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A Metabological Approach Of Bovine Liver As A Search Of Biomarkers To Mitigate Methane Emission

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Enteric methane emissions constitute a significant environmental concern, leading Brazil to commit at the 26th Conference of the Parties (COP26) in 2021 to reduce methane emissions by 30% by 2030. As the livestock sector is one of the main contributors to methane emissions, mainly through the process of enteric fermentation of ruminants, it is necessary to use strategies to achieve the goals defined by COP 26. Among the various methods, the manipulation of diet stands out. In this way, it is important to study how modulations in bovine diets cause physiological changes in the organisms of ruminants. Since the liver plays a key role in regulating energy balance and general metabolic physiology, it is essential to investigate the biomarkers associated with the metabolism of the bovine liver. In view of this, this study focuses on the evaluation of polar and apolar metabolites of the Nelore bovine liver to understand how the various nutritional interventions can contribute to the mitigation of methane. A total of 52 liver samples from castrated male bovine animals, Bos indicus (Nelore), subjected to various diets, including conventional and by-products-based diets, were analyzed. Extraction procedures have been employed for polar and apolar compounds, and analytical techniques such as nuclear magnetic resonance spectroscopy (1H NMR) and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF/MS) have been applied. The data from the polar compounds were collected by 1H NMR and processed using the Chenomx software, while the data from the apolar components were gathered by MALDI-MS and handled in R using the MALDIquanti package. The lipids were annotated using the CEU 3.0 mass mediator tool. Multivariate and univariate analyses were performed using the software MetaboAnalyst 5.0. The study so far has not found biomarkers, but the analyses carried out have allowed the identification and quantification of metabolites in samples of bovine liver and demonstrated significant differences between the food diets submitted, conventional and by-product.

Index Terms: bovine, methane, liver, diets.

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