METABOLOMIC PROFILE OF MEAT FROM DIFFERENT ZEBU BREEDS

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I. INTRODUCTION

The Brazilian meat production industry relies heavily on *Bos taurus indicus* (zebu) animals due to their notable rusticity and parasite resistance. A subset of this production is derived from purebred animals, which have been documented to possess specific genetic lineages. It is of paramount importance to conduct research into the metabolite compounds present in different cattle breeds, as these compounds significantly influence meat quality, including aspects such as flavor, tenderness, and nutritional value. The metabolomic profiles of these animals can be understood to lead to the standardization of meat quality, increased commercial value, and the selection of desirable traits for genetic improvement. The objective of this study was to compare the metabolomic profiles of meat from various Zebu breeds, thereby emphasizing the significance of such analyses in improving meat quality.

II. MATERIALS AND METHODS

A total of 110 purebred uncastrated young bulls from four zebu breeds were kept under the same conditions since weaning: Brahman (n = 17), Guzerá (n = 25), Sindi (n = 23) and Tabapuã (n = 41). The animals were fed on pasture for 10 months with balanced dietary supplementation, and finished for 120 days. Following the slaughter of the animals, meat samples (*Longissimus lumborum*) were collected and their metabolomic profiles were analyzed in accordance with the methodology described by Matias et al. [1]. The identification and quantification of metabolites were carried out through the analysis of spectra using the Chenomx NMR Suite Professional software (Chenomx INC., Edmonton, Canada). The data analysis was performed using MetaboAnalyst (Version 6.0, https://www.metaboanalyst.ca/MetaboAnalyst/) employing principal component analysis (PCA) and fold change (Figure 1).

III. RESULTS AND DISCUSSION

In the PCA, it was possible to observe an overlap between the cattle breeds, indicating similarity in the meat metabolomic profile of the different Zebu breeds analyzed. However, a more detailed analysis through fold change revealed some metabolites differences between groups. Carnosine was highest in Tabapuã, followed by Sindi, Guzerá, and Brahman. Malonate was highest in Sindi, followed by Guzerá, Brahman, and Tabapuã. Anserine was highest in Sindi, followed by Tabapuã, Guzerá, and Brahman. Variations in meat metabolism can lead to differences in meat properties. For instance, carnosine and anserine, dipeptides associated with antioxidant capabilities, can impact postmortem meat quality and preventing lipid peroxidation. Both metabolites exhibited similar patterns across breeds, with higher concentrations found in Sindi and Tabapuã cattle, potentially influencing meat postmortem and quality traits. These disparities may stem from the evolutionary and selective processes unique to each breed. Ramos et al. [2] elucidated those adaptations in *Bos taurus indicus* influence muscle physiology, enhancing cell survival and resilience to stress, thereby safeguarding cells from premature death and delaying tenderization.
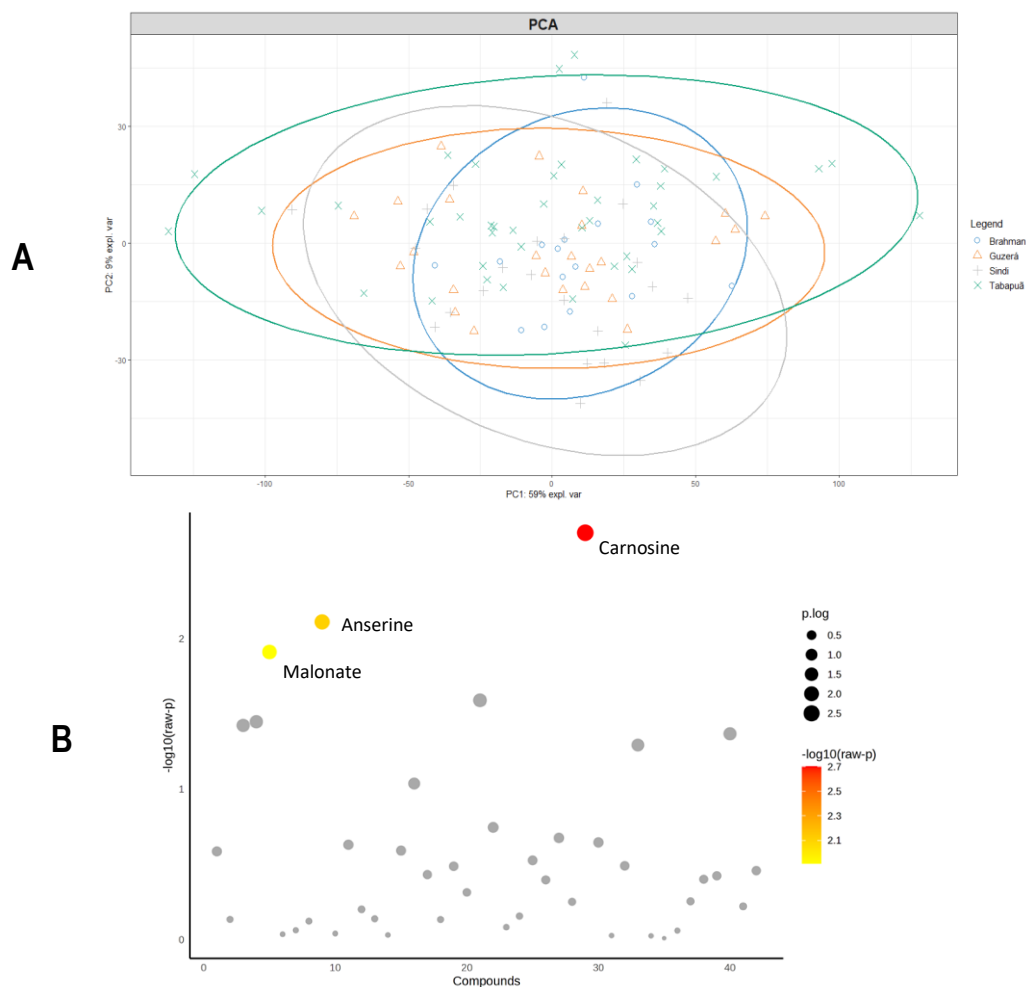
Figure 1. Principal component of analysis (A) and Fold Change analysis of meat metabolic profile between Zebu breeds (B).

IV.   CONCLUSION

Although Zebu breeds appear to have a degree of similarity in their meat metabolomic profiles, changes in the levels of anserine and carnosine may suggest differences in postmortem metabolism and potentially great antioxidant capacity in Sindi and Brahman cattle.

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