

# CATTLE TEMPERAMENT CHANGES NELLORE *TRICEPS BRACHII* METABOLISM

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## I. INTRODUCTION

Animals with more excitable temperament or aggressive behavior are more susceptible to diseases and may exhibit inferior performance, reproductive efficiency and poorer meat quality [1,2]. All these physiological changes are derived through alterations in basal metabolism and metabolic rates. It is well established that metabolites, particularly hormones (cortisol), are correlated with excitable temperament in animals. However, variations in metabolic rates and pathways can extend beyond this initial correlation. In this context, metabolomics serves as a potent tool to uncover pathways linked to temperament, providing a clearer understanding of the metabolic processes underlying stress and behavior. This, in turn, can influence meat quality in a more comprehensive manner. Therefore, our objective was to evaluate whether differences in cattle temperament alter the metabolites of the *Triceps brachii* muscle in the early post-mortem period (1h).

## II. MATERIALS AND METHODS

The experimental procedures were conducted in accordance with the Institutional Animal Care of the College of Animal Science and Food Engineering at the University of Sao Paulo (6493190121). Twenty-two animals were selected from a larger group of 72 Nellore males, based on temperament tests during the first handling (after animals were transferred from pasture and adapted to feedlot). Chute score and flight speed were determined and averaged to calculate temperament index, which was used to classify animals either as excitable or calm. After finishing, animals were slaughter and approximately 1h after latter, a small sample was taken from each carcass from the *Triceps brachii* muscle, immediately frozen using liquid nitrogen and stored in an ultra-freezer until processing. Metabolites were extracted as previously described by [3] and analyzed through nuclear magnetic resonance spectrometry (<sup>1</sup>H-NMR). 1D <sup>1</sup>H-NMR spectra were processed, metabolites were identified and quantified using the Chenomx software v 10.0 (Chenomx Inc., Edmonton, Canada). Metabolomic data were analyzed using MetaboAnalyst 6.0 (<http://www.metaboanalyst.ca/>), through Volcano Plot and enrichment analysis.

## III. RESULTS AND DISCUSSION

Excitable animals presented a greater glycerol and creatine on muscle early after slaughter (Figure 1). Glycerol is part of the metabolism of lipolysis, indicating an extensive use of energy by those animals, either from carbohydrate or lipids. On the other hand, calmer animals presented a greater carnosine and acetate in the muscle (Figure 1). Carnosine plays a versatile role in cell metabolism, including cellular redox reactions and antioxidative, which in turns may influence the establishment of *post mortem* and further, meat quality [4]. The overview of enriched pathways showed most pathways correlated to the aminoacids and energy metabolism differentiating groups (Figure 2).

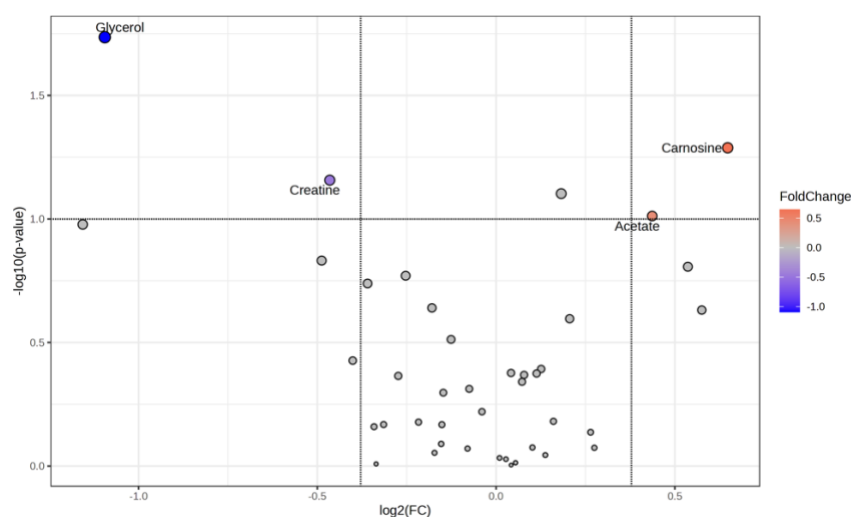


Figure 1. Volcano plot of metabolites from *Triceps brachii* muscle 1h *post mortem* from Nellore cattle according to the temperament scores

Metabolite Set	Total	Hits	Statistic	Expected	P value	Holm P	FDR
Phenylalanine and Tyrosine Metabolism	27	2	13.506	5.2632	0.070477	1.0	0.46962
Aspartate Metabolism	35	5	9.8568	5.2632	0.082719	1.0	0.46962
Inositol Metabolism	30	2	12.143	5.2632	0.096322	1.0	0.46962
Inositol Phosphate Metabolism	24	2	12.143	5.2632	0.096322	1.0	0.46962
Phosphatidylinositol Phosphate Metabolism	17	2	12.143	5.2632	0.096322	1.0	0.46962
Ethanol Degradation	19	1	14.529	5.2632	0.097285	1.0	0.46962

Figure 2. Overview of enriched pathways differentiating groups

#### IV. CONCLUSION

Nellore cattle classified as excitable presented greater catabolism of lipids and lower antioxidant power compared to calmer animals. Those changes on metabolites early *post mortem* can influence meat properties.

#### ACKNOWLEDGEMENTS

This work was partially supported by FAPESP (grant number 2021/10205-5 and 2020/08845-3).

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