EFFECTS OF ADDING NARASIN OR THE COMBINATION OF MONENSIN AND VIRGINIAMYCIN IN THE DIETS OF FEEDLOT NELLORE HEIFEIRS ON THE BEEF METABOLITE PROFILE

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I. INTRODUCTION

In Brazil, the dietary inclusion of monensin (MON) and virginiamycin (VM), in combination, has been widely recommended to improve growth performance and manipulate rumen fermentation of feedlot cattle. However, because of the relatively high cost of those feed additives, the isolated use of narasin (NAR) has been recently tested as a potential alternative for this nutritional strategy [1]. Despite their promising effects on rumen metabolism, little is known about how ionophore and non-ionophore antibiotics could affect the metabolite profile of meat. Therefore, this study aimed to evaluate the effects of including NA or the combination of MON and VM (MON+VM) in the diets of feedlot Nellore heifers on the metabolite profile of the meat.

II. MATERIALS AND METHODS

Twenty Nellore heifers (21 months old; 344 ± 16 kg initial body weigh) were finished in the feedlot, when they received diets containing either NA at 13 mg/kg of the dry matter (DM) or the combination of MON (28 mg/kg of the DM) and VM (40 mg/kg of the DM). Heifers were slaughtered in a commercial packing plant after 67 days on feed, and *L. thoracis* muscle samples were collected between the 12th and 13th ribs from each carcass after a 24-hour chilling period. Metabolites were extracted from 0,2-g muscle samples as described by Silva *et al.* [2], and then identified and quantified using TopSpin. Data were analysed using the web-based tool MetaboAnalyst. Random Forest analysis was performed to identify potential features responsible for variations between MON+VM and NAR treatments, and metabolic pathway analysis was conducted using the *Bos taurus* library [3].

III. RESULTS AND DISCUSSION

According to the Random Forest analysis, in order of importance, the metabolites acetate, adenosine monophosphate (AMP), valine, hypoxanthine, and alanine were differentially detected in the meat of heifers receiving MON+VM or NAR (Fig. 1A). The concentration of all those metabolites were greater in the meat of heifers fed NAR, indicating that changes in the rumen metabolism may reflect in the meat *postmortem* metabolome. The carbohydrate metabolism was influenced by the treatments, as the most expressive pathways differing between groups were glyoxylate and dicarboxylate metabolism, glycolysis, gluconeogenesis, and pyruvate metabolism (Fig. 1B). Acetate was the most important metabolite differing between treatments, which could be at least partially explained by the fact that the combined use of ionophore and VM alters rumen fermentation towards a greater production of propionate and a lower production of acetate [4], thereby leading to a decreased accumulation of acetate in the meat. The dietary treatments also affected protein and purine *postmortem* metabolism, as the meat from NAR-fed heifers had greater amounts of amino acids and hypoxanthine. These changes may suggest a faster progress of the *postmortem* metabolism in the meat of the NAR group, but it still needs to be confirmed. In addition, the greater amount of hypoxanthine in the NAR treatment may also suggest differences in meat palatability traits, as this metabolite is correlated with umami taste [5].

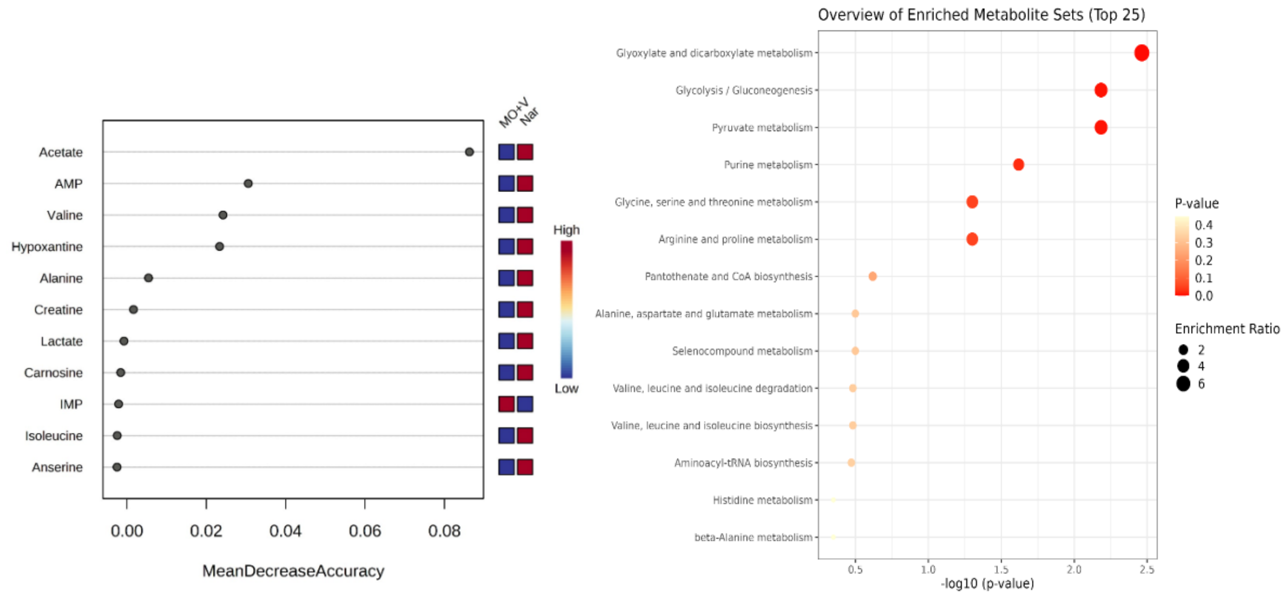

Figure 1. Random forest plot (A) and pathway analysis using metabolites (B) according to dietary treatments (MO + V = monensin and virginiamycin; NAR = narasin). * IMP = Inosine monophosphate and AMP = Adenosine monophosphate

IV. CONCLUSION

The dietary inclusion of NAR, as an alternative to MON+VM, affected the meat metabolite profile of Nellore heifers as a response to changes in carbohydrate, protein, and purine *postmortem* metabolism.

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