EFFECT OF TEMPERAMENT AND REACTIVITY OF HEIFERS ON MEAT QUALITY - A STUDY IN A COMMERCIAL ENTERPRISE

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I. INTRODUCTION

Animals must be reared with minimum stress. When animals have a calm temperament, the use of nutrients in the diet and reproductive efficiency can reach their maximum potential. However, calm temperaments during pre-slaughter management provide higher-quality meat conditions. This study aimed to determine how cattle's reactivity can interfere with their performance and meat quality.

II. MATERIALS AND METHODS

The work was carried out in a commercial farm context for 150 days (40 days of adaptation and 110 of data collection). One hundred forty heifers with average initial weight 296±36Kg were placed in 2 contiguous pens (100X50m). The pens had 2 shaded places, next to the feeding and watering areas and in the middle of the pen. Feed was provided *ad libitum*. All animals had access to shade and mineral salt without restrictions. After the adaptation period, all animals were weighed, and their temperament was evaluated according to a reactivity score between 1 and 6 (1-Docile, 2-Slightly Restless, 3-Restless, 4-Nervous, 5-Flighty, 6-Aggressive). Throughout the experimental period, the animals were weighed and evaluated by kick score 3 more times. At the end of the fattening period, the animals presented an average weight of 382.2±35.7 Kg. From the group, 12 animals were randomly selected, 6 from the most reactive and 6 from the less reactive animals. Handling procedures such as loading and transport to the slaughterhouse were carried out according to low-stress handling principles. The boarding and travel of the animals to the slaughterhouse were monitored by cameras and thermometers placed in the truck. After the standard slaughter procedure in a certified slaughterhouse, the *Longissimus dorsi* pieces were obtained from each animal, and subjected to evaluation.

Microbiological analyses of beef cuts' samples were carried out for total viable count on tryptone glucose extract agar after incubation at 30°C for 2 days according to EN ISO 4833-1:2013 and for *Enterobacteriaceae* counts on Violet Red Bile Dextrose agar after incubation at 37°C for 2 days according to ISO 21528-2:2017. All counts were expressed as log colony forming units (log CFU.g-1).

A texture profile analysis was performed on the beef cuts to obtain the hardness parameter. A TA.HDPlus Texture Analyser equipped with a load cell of 250kg to obtain the force-time deformation curves was used. A 2-cycle compression test was performed up to 80% (strain) compression of the initial height with a 20mm diameter plate and 20% (strain) compression for the second cycle at a test speed of 5mm/s. Each striploin sample was tested in triplicate at 21°C.

Color evaluation of striploin samples were assessed using CIELAB color system using the $L^*a^*b^*$ coordinates, with a colorimeter. The average value of L^*, a^* and b^* (3 measurements *per* replicate) were used for statistical analysis. The pH values of the striploin cut samples were measured using a digital pH meter equipped with a surface probe previously calibrated with buffer solutions pH 4.0 and 7.0. The analysis was performed by the direct contact of the probe with 3 different points.

III. RESULTS AND DISCUSSION

The group of less reactive animals showed higher average daily gains of about 16%. Related to meat quality, as can be seen in Figure 1, it was possible to observed that reactive animals presented higher hardness values compared to less reactive animals ($P < 0.05$). Thus, this result can be correlated to the muscular stress of the reactive animals, which provides higher tenacity as an outcome. Overall, high reactive animal did not significantly influence the striploin lightness (L*), redness (a*) and yellowness (b*) compared to the low reactive animals. All striploin samples from different levels of animal reactivity showed similar pH values ($P < 0.05$). The TVC and Enterobacteriaceae results showed that the microbial population was not directly related to the animal reactivity level.

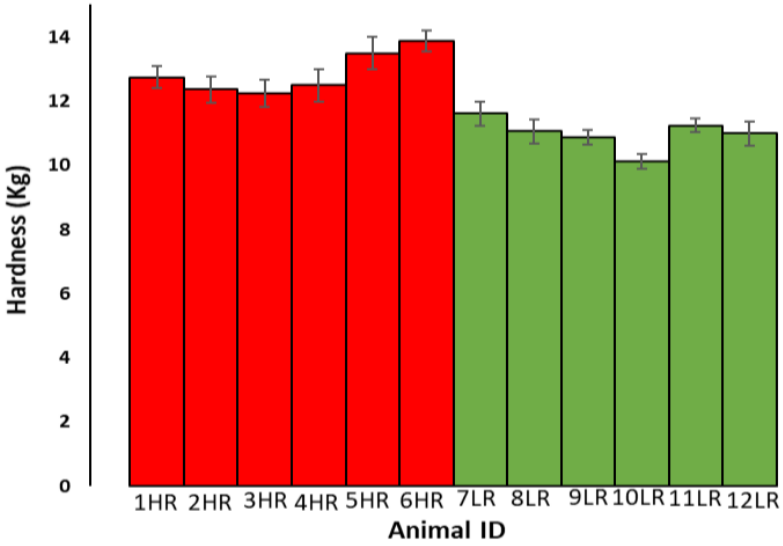

Figure 1. Hardness parameter obtained for the for high reactive animal (HR – red color) and low reactive animals (LR – green color).

IV. CONCLUSION

Heifers with calmer temperaments have better performance. Overall, the core effect of reactivity level was observed on the texture parameter (hardness) of the meat striploin cut. However, further research is still required to assess the influence of reactivity level on the sensorial attributes.

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