Meat quality of Nellore males is affected by sexual condition

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Introduction: Castration is widely used practice in beef cattle as a way to overcome meat quality problems by reducing abnormal ultimate pH (Miguel et al., 2014), increasing fat deposition (Bong et al., 2012), and improving beef tenderness (Seideman et al., 1982) and color (Gómez et al., 2017). Alternatively, non-castrated (NC) males have been fed with high concentrate diets in feedlot systems to improve carcass fat deposition and reduce meat quality problems. Thus, the aim of this study was to evaluate the effect of sexual condition on meat quality traits of Nellore males.

Material and methods: Two hundred and forty (240) Nellore males with 21±1 month of age and 362±36 kg body weight, were assigned into two treatments, castrated (CA) and NC, in a three-year study. Each year, half of the animals were castrated at 8-10 month of age. Animals were feedlot fed for 70-140 days and slaughtered when reached 5 mm backfat thickness (BFT). After 24h of chilling, carcasses were ribbed between the 12th and 13th ribs for pH measurement. Further three 2.5 cm thick samples were collected, vacuum packaged and aged for 0, 7, and 14 days to evaluate meat color (CIE, 1986), cooking loss and Warner-Bratzler shear force (WBSF; AMSA, 2015). Data were analyzed by analysis of variance using the MIXED procedure of SAS, as a completely randomized design considering the treatments as a fixed effect and days on feed within year as random effect. Meat quality traits of aged meat were evaluated as time-repeated measures, considering the fixed effects of treatments, aging time, and their interaction.

Results: The average back fat thickness measured at 12th rib level was higher in CA than NC (6.1 vs 4.9 mm, respectively; $P<0.001$). The 24h pH was higher in NC than CA animals (5.68 vs 5.54, respectively; $P<0.001$) even though both can be considered within the normal range. No significant interaction between sexual condition and ageing period was found for meat quality traits. Meat from NC animals had lower values of L* (33.2 vs 34.8; $P<0.001$), a* (17.8 vs 19.2; $P<0.001$), and b* (15.1 vs 16.5; $P<0.001$) than CA, respectively. In addition, meat from CA was tender than NC animals (7.7 vs 8.1 kg, respectively; $P<0.001$). However, no effect of sexual condition was observed for cooking loss ($P=0.497$). A time effect was observed for L* (32.1, 35.2, 34.6; $P<0.001$), a* (18.5, 18.0, 19.1; $P<0.001$), b* (15.2, 16.1, 16.0; $P<0.001$), and WBSF (9.2, 7.9, 6.6; $P<0.001$) during aging time (0, 7, and 14 days).

Conclusion: NC have lower BFT and higher pH 24h than CA animals. Meat from CA animals is tender and have more desirable color than NC.

Literature:

American Meat Science Association-AMSA. (2015). Research guidelines for cookery, sensory evaluation, and instrumental tenderness measurements of meat. American Meat Science Association, Champaign, IL. Available in: meatscience.org/docs/default-source/publications-resources/amsa-sensory-and-tenderness-evaluation-guidelines/research-guide/2015-amsa-sensory-guidelines-1-0.pdf?sfvrsn=6

Bong, J. J., Jeong, J. Y., Rajasekar, P., Cho, Y. M., Kwon, E. G., Kim, H. C., ... & Baik, M. (2012). Differential expression of genes associated with lipid metabolism in longissimus dorsi of Korean bulls and steers. Meat science, 91(3), 284-293.

Colorimetry, C. I. E. (1986). CIE Publication No. 15.2. Commission Internationale de l'éclairage, Vienna, 19-20.

Miguel, G. Z., Faria, M. H., Roça, R. O., Santos, C. T., Suman, S. P., Faitarone, A. B., ... & Savian, T. V. (2014). Immunocastration improves carcass traits and beef color attributes in Nellore and Nellore× Aberdeen Angus crossbred animals finished in feedlot. Meat Science, 96(2), 884-891.

Seideman, S. C., Cross, H. R., Oltjen, R. R., & Schanbacher, B. D. (1982). Utilization of the intact male for red meat production: a review. Journal of Animal Science, 55(4), 826-840.

Gómez, J. F. M., Netto, A. S., Antonelo, D. S., Silva, J., Sene, G. A., Silva, H. B., ... & Silva, S. L. (2019). Effects of immunocastration on the performance and meat quality traits of feedlot-finished Bos indicus (Nellore) cattle. Animal Production Science, 59(1), 183-190.