Effect of sexual condition on postmortem metabolism and meat quality of Nellore cattle males

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Introduction: Non-castrated beef cattle males (NC) have been reported to have poorer meat quality than castrated (CA) ones, which can be related to changes in postmortem metabolism (Silva et al., 2019) that affect ultimate pH, meat color and tenderness (Gagaoua et al., 2015). Thus, this study was carried out to evaluate the effect of sexual condition on postmortem metabolism and meat quality of Nellore cattle males.

Material and methods: Thirty-eight CA males (castrated 8-10 mo old) and 36 NC were feedlot fed for approximately 88 days and then slaughtered. Longissimus thoracis (LT) samples of 10 animals from each group were collected 1h after slaughter to perform the in vitro glycolysis system and measure pH, lactate, and glycogen concentrations. After 24h of chilling, LT samples were collected for meat pH 24h, lactate 24h, glycogen 24h and glycolytic potential (GP) 24h analyses. In addition, a 2.5 cm thick sample was obtained to evaluate meat color (CIE Lab system, 1986) and Warner-Bratzler shear force (WBSF; AMSA, 2015). Samples were processed according to England et al. (2014) and aliquots were collected after 0; 0.5; 1; 4, and 24 hours for determinations of in vitro pH, lactate, and glycogen. The pH was measured as described by Bendall (1973) and lactate and glycogen according to Bergmeyer (1984). Data were analyzed by analysis of variance using the MIXED procedure of SAS as a completely randomized design considering the sexual condition as a fixed effect and days on feed as random effect. The *in vitro* pH, lactate and glycogen were evaluated as time-repeated measures, considering the fixed effects of sexual condition, time of measurement and their interaction.

Results: Meat from CA animals showed lower pH 24h (5.60 vs 5.73, $P<0.001$) and higher lactate 24h (81.4 vs 70.0 µmol/g; $P<0.001$), glycogen 24h (18.5 vs 7.6 µmol/g; $P=0.030$), and GP 24h (139.5 vs 99.2 µmol/g; $P=0.005$) than NC, respectively. The *in vitro* glycogen concentrations were higher in CA at 0h (31.3 vs 28.7 mM; $P<0.001$), 1h (18.2 vs 15.3 mM; $P<0.001$), 4h (11.3 vs 8.6 mM; $P<0.001$), and 24h (7.2 vs 2.6 mM; $P<0.001$) than NC, respectively, but they did not differ for 0.5h measurement. However, no differences on pH decline and lactate accumulation were observed over time between treatments, in the *in vitro* system. Higher *in vitro* pH values were observed in CA compared with NC animals (6.22 vs 6.17, respectively; $P=0.002$). Following the pH results, lactate concentration was higher in NC compared with CA animals (19.7 vs 19.0 mM, respectively; $P=0.036$). Meat from NC animals was tougher (12.0 vs 9.9 kg; $P=0.005$) and darker than CA, with lower values of L* (37.4 vs 39.1; $P=0.040$), a* (14.6 vs 16.3; $P<0.001$) and b* (12.4 vs 13.9; $P=0.004$), respectively.

Conclusion: Meat from NC animals has higher pH 24h and lower glycogen24h, lactate 24h and glycolytic potential 24h than CA. CA animals have higher in vitro glycogen concentration during postmortem time. These results suggests that sexual condition is related to differences in post-mortem muscle metabolism and meat quality.

Acknowledgements and Financial support statement: The authors would like to thank the financial support provided by Foundation for Research Support of the State of Sao Paulo (FAPESP) [grant #2007/04445-6] and the National Council for Scientific and Technological Development (CNPq) for granting a scholarship to the first author.

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