

Finishing regime and growth rate change fresh beef color attributes independent of postmortem metabolism and ultimate pH

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Introduction: Rearing practices such as finishing regime (FR) and growth rate (GR) may impact beef color development, which is a function of muscle characteristics and energy metabolism postmortem. Thus, the aim of this study was to evaluate the effects of FR and GR on muscle energy metabolism postmortem and beef color attributes in cattle harvested at a constant body weight (530 ± 20 kg).

Materials and Methods: Thirty-six Angus x Nellore crossbred steers were randomly assigned to one of four treatments: 1) feedlot, high GR, 1.5 kg ADG (FH); 2) feedlot, low GR, 0.9 kg ADG (FL); 3) pasture, high GR, 0.8 kg ADG (PH); and 4) pasture, low GR, 0.6 kg ADG (PL). Samples from Longissimus thoracis muscle were collected at 24 h postmortem for pH, metabolite, immunoblotting, and color analyses. Data were analyzed in a completely randomized design using PROC MIXED procedure of SAS 9.4, and means were compared using the Student t-test with 5% statistically significant.

Results: No differences were found in the ultimate meat pH (5.76, 5.83, 5.88 and 5.80; $P = 0.693$), lactate (88.2, 76.9, 82.7 and 82.7 $\mu\text{mol/g}$; $P = 0.328$) and glycogen (39.8, 35.3, 25.2 and 28.4 $\mu\text{mol/g}$; $P = 0.292$) concentrations, glycolytic potential (189.4, 168.4, 142.2 and 160.6 $\mu\text{mol/g}$; $P = 0.071$), LDH-A (1.00, 0.84, 0.73 and 0.89; $P = 0.071$) and SDH-A (0.78, 0.95, 1.09 and 1.00; $P = 0.761$) relative abundance among FH, FL, PH and PL animals, respectively. However, muscle from PL cattle had more myoglobin than that of FH and FL steers, while that of PH cattle did not differ from others (FH = 0.47, FL = 0.51, PH = 0.80 and PL = 1.00; $P = 0.011$). Lean from FH animals had the highest L^* (40.3, 37.0, 35.0 and 34.7; $P < 0.001$), a^* (19.3, 16.9, 16.6 and 16.4; $P = 0.002$) and b^* (15.9, 12.8, 12.4 and 12.2; $P < 0.001$) values compared to those from FL, PH and PL animals, respectively. Furthermore, muscle from FL cattle had higher L^* values than those from PH and PL groups, but no differences in a^* and b^* values were detected between muscle of FL, PH and PL cattle. Overall, lean from PH and PL steers were darker than that of FH and FL cattle, even though no differences in ultimate pH or glycolytic metabolites were detected. Although the exact reason for this lack of difference is not known, it may be related to changes in the rate of pH decline postmortem and the oxidative nature of muscle in animals finished on pasture, particularly those growing slower, similar to that reported by (Apaoblaza et al., 2020). Finally, steaks from FH cattle had the highest chromatic attributes compared to those from FL, PH and PL cattle.

Conclusions: These results showed that improved GR caused by cattle in more intensive operations (FH versus PH, and FH versus PL), and that within a finishing (FH versus FL) improves lean color attributes, and argue that GR is more important than FR in improving fresh beef color, independent of changes in postmortem metabolism and ultimate pH.

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Reference:

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