BEEF QUALITY OF YOUNG NELLORE CATTLE IS NOT AFFECTED BY POST-WEANING GROWTH RATE OR GENDER

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I.   INTRODUCTION

The growing demand for animal-based protein has led to implementation of management strategies to improve the quantity and quality of beef produced by the sector. In addition to the nutritional benefits, consumption of beef offers a unique set of sensory stimuli, where tenderness ranks among the greatest concern to most consumers. Meat tenderness is a complex trait that is affected by a myriad of pre- and post-harvest factors. In particular, cattle with higher growth rates generally possess beef with greater tenderness ratings [1]. Gender also affects the quantity and quality of beef products, where non-castrated males (NC) are more robust and efficient in lean protein accretion rates, while castrate males tend to have more fat which positively affects flavor and sensory attributes [2]. Surgical castration (SC), however, faces welfare issues and immunocastration (IC) is only partially effective in improving yield and quality of beef. Therefore, this study was conducted to evaluate the growth rate during the rearing period and gender on carcass traits and beef tenderness of feedlot finished Nellore cattle harvested at an equivalent fat endpoints.

II.   MATERIALS AND METHODS

Seventy-two Nellore calves (8 months old; 200±30 kg of body weight; BW) were randomly assigned to one of two treatment groups consisting of: 1) low growth rate (LGR), reared on pasture (*Brachiaria brizantha spp*) supplemented with a mineral mixture (control); or 2) high growth rate (HGR), reared on pasture supplemented with an energy/protein supplement (0.5% of BW) to achieve average weight gains of 0.3 and 0.7 kg/day, respectively. After 229±15 days (rearing period), groups were randomly assigned equality to three gender treatments consisting of: non-castrated (NC); surgically castrated (SC); and imunocastrated (IC). Immunocastrated cattle received two doses of anti-GnRH vaccine (Bopriva®, Zoetis, Brazil) one given 72 days before to entering the feedlot and the other, at the beginning of the feedlot phase. Surgical castration was conducted by a certified veterinarian, 60 days before entering the feedlot. All the procedures were in accordance with Institutional Animal Care and Use Committee (#IACUC 9413210121). Animals were transferred to a feedlot and fed a diet containing 25% corn silage and 75% concentrate. When ultrasound measurements of 12th rib thickness reached 4 mm, animals were harvested in five groups, averaging 118±11 days on feed and 20 months old. At harvest, carcasses were weighed and after 24h of chilling (0-2°C), muscle pH and temperatures were evaluated and four 2.54 cm steaks were collected from the *Longissimus thoracis* and aged for 0, 7, 14, and 21d and subsequent Warner-Bratzler shear force (WBSF) analysis. Data were analysed using the MIXED procedure of SAS, as a 2 x 3 factorial arrangement, considering growth rate (LGR versus HGR), gender (NC, SC, IM) and its interaction as fixed effects and slaughter date as a random variable.

III.   RESULTS AND DISCUSSION

No growth rate X gender interaction was observed for any carcass traits and WBSF. The HGR group had heavier (P < 0.001) carcass weights than LGR cattle (Table 1) but did not differ for backfat thickness. Gender tended (P = 0.070) to affect carcass weight, with NC carcasses being heavier (P < 0.05) than that of SC and IM treatments, while backfat thickness did not differ among genders. Ultimate lean pH was not affected by either growth rate or gender, while 24h carcass temperatures were greater in HGR carcasses than those from LGR cattle (P < 0.001), but was not impacted by gender. WBSF scores decreased with ageing (P<0.001) but was not affected by either growth rate (Figure 1) or gender (Figure 2).

Table 1 – Means $\pm$ standard errors (SEM) and probabilities (Pr > F) of carcass traits, according to growth rate and gender.[1]

Traits	Growth rate		SEM	Gender			SEM	Pr > F	
	LGR	HGR		SC	IC	NC		Growth rate	Gender
Hot carcass weight, kg	249	293	4.36	263[b]	269[b]	281[a]	5.34	<0.001	0.070
Backfat thickness, mm	4.87	4.78	0.35	5.03	4.63	4.83	0.38	0.788	0.574
24h lean pH	5.59	5.58	0.02	5.59	5.59	5.57	0.02	0.192	0.136
24h temperature, °C	6.42	7.12	0.21	6.81	6.77	6.72	0.25	<0.001	0.871

[1] LGR – Low growth rate; HGR – high growth rate; SC – surgically castrated; IC – imunocastrated; NC – non-castrated.
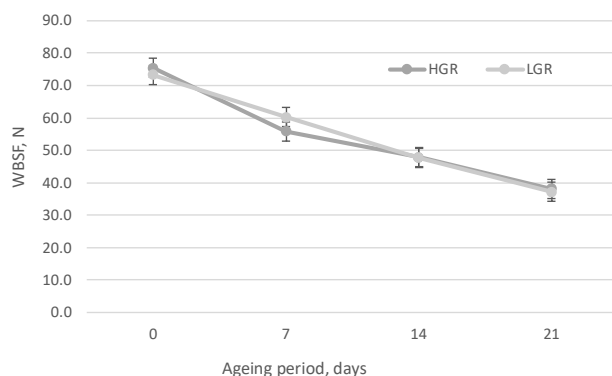

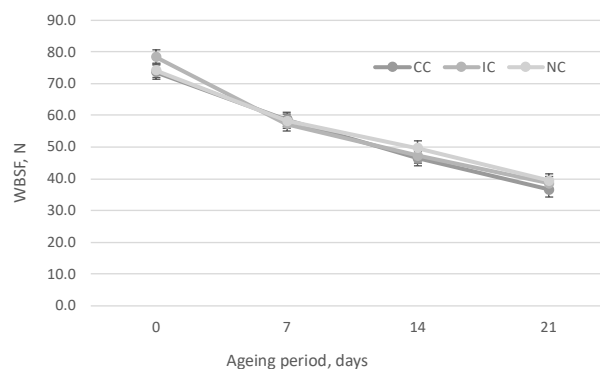Figure 1. Warner-Bratzler shear force (WBSF) according to growth rate and ageing period.

Figure 2. Warner-Bratzler shear force (WBSF) according to gender and ageing period.

IV.   CONCLUSION

Intensive rearing (HGR) results in heavier carcasses at harvest but does not alter tenderness scores compared to cattle raised less intensively (LGR) when animals are slaughtered at same degree of fatness. While NC cattle have heavier carcasses, no differences were detected in beef tenderness across any gender studied. These data show gender has no significant impact in beef tenderness and suggest when young cattle are harvested with adequate fatness, gender has little effect on meat tenderness.

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