CARCASS TRAITS AND BEEF QUALITY OF FEEDLOT NELLORE BULLS DIVERGENT FOR STRIPLOIN TENDERNESS

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I. INTRODUCTION

Nellore cattle, the main beef breed raised in Brazil, may have greater calpastatin activity in the muscle, which results in less postmortem proteolysis and, consequently, tougher meat [1]. Tenderness, that is instrumentally measured through Warner-Bratzler shear force (WBSF) analysis, is one of the most important meat quality traits as it is highly associated with eating satisfaction [2]. However, because tenderness cannot be assessed at the moment of purchase, it is important to determine its association with other traits that could be more easily identified by consumers. Therefore, this study was conducted to characterize carcass traits and beef quality of feedlot Nellore cattle classified as high- or low-WBSF based on values measured in the *L. thoracis* (LT) muscle.

II. MATERIALS AND METHODS

This study was conducted with a dataset from another trial, in which 112 Nellore bulls with 20 months of age and 306 ± 38 kg of initial body weight (BW) were divided into 4 treatments (2 supplementation levels in the stocker phase vs. 2 adaptation periods in the feedlot finishing phase) and group-fed in 16 feedlot pens (7 bulls/pen). After 143 days on feed, final BW was taken, and real-time ultrasonic measurements were obtained from the LT muscle between the 12th and 13th ribs to determine ribeye area and backfat thickness. Then, 3 animals per pen were slaughtered in a commercial slaughterhouse, and carcass dressing was determined as the ratio of hot carcass weight (HCW) to final BW. Following a 24-hour chilling period, striploin samples were collected between the 12th and 13th ribs for later analysis of pH, instrumental color (with a Minolta BC10 colorimeter), thawing, cooking, and total losses. The WBSF was determined by shearing six 1.27-cm-diameter meat cylinders after samples were cooked to an internal temperature of 71°C and then cooled to 7°C. The original dataset with data from 48 carcasses was used to segregate cattle into 2 divergent WBSF groups: high (8.02 to 5.53 kgf) and low (4.28 to 2.40 kgf) WBSF. Animals from the 4 treatments of the original trial were equally distributed across both WBSF groups in the resulting dataset, and those treatments were considered as blocks in the statistical analysis to remove their effects. Therefore, the resulting dataset consisted of 2 treatments (high and low WBSF), 4 blocks (treatments from the original trial), 12 replicates per treatment, comprising 24 experimental units. Data were analyzed as a randomized complete block design using the MIXED procedure of SAS, and significance was declared at $P \leq 0.05$.

III. RESULTS AND DISCUSSION

Although final BW was greater ($P = 0.05$) for high-WBSF bulls, HCW, carcass dressing, ribeye area, and backfat thickness did not differ between cattle naturally divergent for striploin tenderness (Table 1). Beef from low-WBSF bulls had higher pH ($P < 0.01$) than those from high-WBSF cattle, which has been associated with a more rapid tenderization of the meat due to the faster rates of degradation of muscle proteins by calpains at higher pH values (pH > 6.2) [3]. Moreover, slow rates of pH decline are

also associated with more tender beef when cold shortening is prevented [3], which likely occurred considering the 4.85 mm average backfat thickness for low-WBSF bulls. Higher beef pH is also related to greater water-holding capacity, thus explaining the lower values for thawing, cooking, and total losses, as well as for beef lightness (L*) in the meat of low-WBSF cattle [4].

Table 1. Carcass traits and beef quality of feedlot Nellore bulls divergent for striploin tenderness.

Item[1]	Treatment		SEM[2]	*P*-value
	High WBSF	Low WBSF		
WBSF, kgf	6.29	3.54	0.317	<0.01
Initial body weight, kg	309.50	303.50	7.073	0.49
Final body weight, kg	512.33	498.92	5.055	0.05
Hot carcass weight, kg	287.12	279.63	3.565	0.11
Carcass dressing, %	56.03	56.02	0.304	0.99
Ribeye area, cm^2	81.31	79.92	1.364	0.62
Backfat thickness, mm	5.60	4.85	0.213	0.08
pH	5.76	6.22	0.082	<0.01
Thawing losses, %	8.00	2.58	0.692	<0.01
Cooking losses, %	23.53	20.03	0.652	<0.01
Total losses, %	31.77	23.85	1.203	<0.01
L*	37.79	35.79	0.509	0.03
a*	12.31	8.52	0.645	<0.01
b*	6.52	5.01	0.366	0.04

[1] WBSF = Warner-Bratzler shear force; L* = lightness; a* = redness; b* = yellowness; [2] SEM = standard error of the mean.

IV. CONCLUSION

In summary, carcass traits were similar for Nellore bulls naturally divergent for striploin tenderness. Low-WBSF cattle had slightly darker beef with fewer thawing and cooking losses resulting from a greater pH.

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