INFLUENCE OF GENDER STATUS ON INTRAMUSCULAR CONECTIVE TISSUE AND BEEF TENDERNESS IN DIFFERENT MUSCLES OF CROSSBRED ANGUS X NELLORE CATTLHE

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I. INTRODUCTION

The physiological differences between heifers, steers, and bulls can affect beef quality by modulating their growth and development [1]. Additionally, variation in beef quality can occur due to the type of muscle, as the proportions of different tissues vary among them. Intramuscular connective tissue supports muscle fibers and can influence muscle resistance, consequently affecting beef quality, especially in terms of tenderness [2]. It is suggested that gender status can affect the beef quality from different muscles of beef cattle due to differences in deposition of intramuscular connective tissue in these animals. Therefore, this study aimed to evaluate the influence of gender status and muscle type of crossbred Angus x Nelore cattle on intramuscular connective tissue and beef tenderness.

II. MATERIALS AND METHODS

Were used 102 F1 Angus x Nellore cattle, divided info bulls, steers and heifers. The animals were confined and kept under the same diet composed of 86% concentrate and 14% roughage for 150 days and were slaughtered at 16 months. The final mean weight was 488.9 ± 30.7 kg, 452.5 ± 24.9 kg, and 431.3 ± 26.3 kg for bulls, steers, and heifers, respectively. During boning, samples of the *Longissimus thoracis* (LT) and *Triceps brachii* (TB) muscles were collected and stored frozen at -18°C until analysis of shear force and quantification of collagen and its fractions. The shear force analysis was performed according to AMSA (2016) and the quantification of total, soluble and insoluble collagen was performed according to Woessner Junior (1961). The effects of gender status (bulls, steers and heifers) and muscle type (LT and TB) for shear force, levels of total, soluble and insoluble collagen were analyzed considering a completely randomized experimental design in a 3x2 factorial arrangement. Data was submitted to analysis of variance (ANOVA) using the MIXED procedure of the SAS® and the means of the results were compared using the Tukey test with a significance level of 5%.

III. RESULTS AND DISCUSSION

The results are presented on the Table 1. For the shear force, the meat of bulls presented higher results when compared to steers and heifers, which did not differ from each other (P = 0.001); and in relation to types of muscles, no differences were found between the LT and TB (P = 0.335). For the total collagen, there was no difference between the gender status (P = 0.448), and there was a difference between the muscles, where TB had a higher content (P <.000). For the soluble collagen, there was a difference for both factors, where bulls presented meat with higher collagen solubility content (P = 0.004), as well as muscle TB (P <.000). As for insoluble collagen, there was no difference between the gender status (P = 0.752), and TB had a higher content (P <.000). Bulls may have presented higher collagen solubility content due to the fact that they present a higher growth rate, which causes the intramuscular collagen to be continuously remodeled, so that the higher protein

turnover provides greater proportion of newly synthesized collagen, which is heat labile; however, bulls presented tougher meat. This finding can be explained by the fact that the animals were slaughtered young, suggesting that, in young cattle, other factors may be associated with differences in beef tenderness. Furthermore, in relation to the types of muscles, TB had a higher content of intramuscular collagen, which is justified by the fact that locomotion muscles normally present a higher content of this supporting tissue, however, the collagen did not affect the beef tenderness.

Table 1 – Shear force and and total, soluble and insoluble collagen levels on *Triceps brachii* (TB) and *Longissimus thoracis* (LT) muscles of crossbred Angus x Nelore cattle heifers, steers and bulls.

		Gender status					P-value		
Variable	Muscle	Heifers	Steers	Bulls	Mean	EPM	Gender status	Muscle	Gender status *Muscle
Shear Force (N)	TB	67.130	66.091	73.304	68.842	0.288	0.002	0.335	0.093
	LT	65.807	62.661	89.699	72.722	0.288			
	Mean	66.468B	64.376B	81.501A					
	EPM	0.353	0.353	0.353					
Collagen Total (mg/g)	TB	2.221	2.036	2.439	2.232a	0.079	0.137	<0.0001	0.151
	LT	1.217	1.547	1.538	1.434b	0.079			
	Mean	1.719	1.792	1.989					
	EPM	0.097	0.097	0.097					
Collagen Soluble (mg/g)	TB	0.373	0.379	0.487	0.413a	0.014	0.001	<0.0001	0.256
	LT	0.220	0.282	0.304	0.268b	0.014			
	Mean	0.296C	0.330B	0.395A					
	EPM	0.018	0.018	0.018					
Collagen Insoluble (mg/g)	TB	1.848	1.657	1.953	1.819a	0.067	0.318	<0.0001	0.139
	LT	0.997	1.266	1.234	1.166b	0.067			
	Mean	1.423	1.461	1.593					
	EPM	0.082	0.082	0.082					

TB: *Triceps brachii* muscle; LT: *Longissimus thoracis* muscle; EPM: Standard Error of the Mean. Means followed by the same uppercase letter in the rows and lowercase letters in the columns do not differ from each other using the Tukey test ($P \leq 0.05$).

IV. CONCLUSION

The intramuscular connective tissue was influenced by the gender status of the cattle and by the type of muscle, while the beef tenderness was influenced only by the gender status. Moreover, in this study, the constitution of intramuscular collagen does not seem to be related to variations in meat tenderness.

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