# EFFECT OF SEX AND AGE ON BEEF TENDERNESS IN PASTURE-RAISED CATTLE

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## I. INTRODUCTION

The consumption of beef has been increasing over the years and becoming increasingly scrutinized by consumers, who associate their perceptions with the quality of the meat and thus direct their preferences for purchasing decisions [1]. This decision is mainly guided by tenderness, which can be determined through intrinsic muscle characteristics, fat distribution, age, and sex of the animals [2] [3]. Age and sex have long been discussed factors due to being ante mortem characteristics that can contribute to variations in meat quality through the influence they exert on its composition and consequently, its tenderness [4]. The aim of this study was to evaluate the tenderness of meat from castrated male and female cattle of different ages, with British genetics, finished in an extensive system.

## II. MATERIALS AND METHODS

Samples of striploin from 95 British genetics cattle carcasses, obtained from a Uruguayan slaughterhouse, were used for this study. The samples were collected from 31 females and 64 castrated males, with each group composed of animals with 4, 6, and 8 permanent incisor teeth (PIT), with 25 animals having 4 PIT, 26 animals having 6 PIT, and 44 animals having 8 PIT. The carcasses were previously weighed and after collection, the samples were aged for 15 days, frozen, and sent to the laboratory for evaluation of subcutaneous fat thickness, marbling, visually supported by photograpic standards (Quallity Grade- USA) and instrumental tenderness analysis, using the Warner-Bratzler Shear Force method [5]. The obtained data were analyzed by factorial ANOVA, and the means were compared by Tukey's test (P < 0.05), using Statistica 10 software (StatSoft, USA, 2010).

# III. RESULTS AND DISCUSSION

Regarding age, differences were observed between younger animals (PIT 4 and 6) and older animals (PIT 8), where older animals presented heavier carcasses and higher marbling compared to carcasses of younger animals. However, when observing subcutaneous fat thickness and tenderness, no differences were found among the three age groups evaluated. Regarding sex, no significant differences were observed between castrated males and females when evaluating weight, subcutaneous fat thickness, marbling, and tenderness. However, when relating sex to age, differences were found between castrated males of the three age groups and females of the three age groups regarding carcass weight. It was also found that older castrated males (PIT 8) had marbling in greater quantity compared to the other evaluated groups.

The obtained results show that the data of subcutaneous fat thickness and tenderness in the applied treatments were statistically similar, however, when relating the characteristics of fat distribution and carcass weight to sex and age, differences were observed. With increasing age, the organoleptic characteristics of meat may vary due to changes in collagen with increased cross-linking [6]. However, other factors related to the genetics of the animals may also influence these changes. Regarding sex, it is known that differences in weight and fat cover are justified by the influence that the metabolism of different sexes can promote in the composition of the animals' musculature [7].

Treatments	n	Weight (kg)	SFT (mm)	Marbling	Tenderness (kg)
Sex Castrated Male	64	155,40 ± 1,32 ª	5,88 ± 0,30 ª	3,36 ± 0,13 ª	3,23 ± 0,08 ª
Female	31	140,98 ± 3,91 ª	6,87 ± 0,53 ª	4,00 ± 0,25 ª	3,52 ± 0,11 ª
Age					
PIT 4	25	143.88 ± 3.61 <sup>b</sup>	5.48 ± 0.55 <sup>a</sup>	2.84 ± 0.16 <sup>b</sup>	3.26 ± 0.16 <sup>a</sup>
PIT 6	26	148.75 + 3.73 <sup>b</sup>	$6.04 \pm 0.39^{a}$	3.35 + 0.23 <sup>b</sup>	$3.30 \pm 0.11^{a}$
PIT 8	44	155,70 ± 1,84 ª	$6,70 \pm 0,43^{a}$	4,11 ± 0,18 ª	$3,39 \pm 0.09^{a}$
Sex x age		, ,			
CM x 4	21	150,62 ± 1,85 ª	5,38 ± 0,62 ª	2,95 ± 0,18 <sup>b</sup>	3,23 ± 0,17 ª
CM x 6	21	154,79 ± 2,36 ª	6,43 ± 0,44 ª	3,43 ± 0,26 <sup>b</sup>	3,28 ± 0,14 ª
CM x 8	22	160,54 ± 2,19 ª	5,82 ± 0,50 <sup>a</sup>	$3,68 \pm 0.22$ ab	3,19 ± 0,11 ª
Fx4	4	108.53 ± 5.89 <sup>b</sup>	6.00 ± 1.22 ª	2.25 ± 0.25 b	3.39 ± 0.41 ª
F x 6	5	$108.53 \pm 5.89^{b}$	$6.00 + 1.22^{a}$	2.25 + 0.25 <sup>b</sup>	3.39 + 0.41 <sup>a</sup>
F x 8	22	108,53 ± 5,89 b	6,00 ± 1,22 ª	2,25 ± 0,25 b	$3,39 \pm 0,41$ a

Table 1. Means  $\pm$  standard deviation of weight, subcutaneous fat thickness, marbling, and tenderness of samples from castrated males and females of different ages.

\*Subcutaneous Fat Thickness (SFT); Permanent Incisor Teeth (PIT); Castrated Male (CM); Female (F). The same letters in the same column do not differ statistically according to Tukey's mean test (P > 0.05).

#### IV. CONCLUSION

It was found that fat distribution and weight differed, while subcutaneous fat thickness and tenderness were statistically similar according to the treatments applied. The study of fat thickness, marbling and tenderness shows that despite differences in ante mortem factors, tenderness is not always directly affected. This study may provide more efficient selection of animals that better meet consumer expectations.

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