

## MEAT QUALITY OF BRITISH STEERS OF DIFFERENT CHRONOLOGICAL AGE

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## INTRODUCTION

Beef cattle in the southern portion of Brasil (Rio Grande do Sul) where this study was conducted, are normally kept on native pastures until they reach the necessary weight and finish to be slaughtered. The normal age that the steers reach this stage is around 4.5 years since they loose weight during the winter due to frosts that kill or at least stop the growth of grass. In the last few years an increasing number of ranchers have started using cultivated winter pastures, mainly rye-grass, aiming to reduce the normal slaughter age to about 2 years of age. A great deal of this younger steers, however, present quite light carcasses and a poor finish. The present study was conducted with the main objective of comparing meat quality from steers that were slaughtered at 2.5 years old against 4.5 years old steers.

## EXPERIMENTAL

Twenty 2.5 years old steers (6 Angus, 7 Devon and 7 Herefords) and twenty five 4.5 years (8 Angus, 8 Devon and 9 Herefords) originated from the University experimental herd were used in this experiment. They were weaned and castrated at about 7 months old. The 2.5 steers grazed in this experiment. They were weaned and castrated at about 7 months old. The 2.5 steers were temporarily a rye grass pasture during the winter time and native pasture during spring, summer and fall. The 4.5 steers were kept on native pastures all year round. They were slaughtered in a nearby Packing - Plant. After 48 hs. chill, the carcasses were evaluated for conformation. The right side of each carcass was then ribbed between the 12 and 13 rib, fat thickness was measured and marbling, colour and texture of lean were subjectively evaluated. A portion of the loin was taken to the University Meat Laboratory for palatability and cooking losses studies. The 2.5 cm thick steaks were roasted in an oven to and internal temperature of 70 C and objective measurement of tenderness was conducted through the use of the Warner-Bratzler shear device.

## RESULTS AND DISCUSSION

The 4.5 years old steers presented significantly heavier carcasses, a thicker layer of subcutaneous fat and a greater deposition of intramuscular fat, table 1.

TABLE 1. EFFECT OF AGE ON SEVERAL CARCASS AND MEAT CHARACTERISTICS

	2.5 years - n=20		4.5 years - n=25		
	Mean	SD	Mean	SD	
Hot carcass wt.					
Fat thickness	kg	180.35	20.17	224.82	15.80*
Marbling a	mm	1.79	.49	3.79	1.06*
Conformation b		4.06	1.56	5.04	1.48*
Colour of lean c		8.35	.93	7.46	1.53
Texture of lean c		4.80	.50	4.50	.42
Panel tenderness d		4.20	.62	4.15	.90
Panel juiciness d		4.94	1.20	5.07	1.41
Warner-Bratzler shear	kg	5.06	.75	5.39	.78
Panel flavor d		5.12	.33	5.11	.41
Warner-Bratzler shear	kg	8.45	2.39	7.72	2.42
Cooking loss	%	20.59	3.01	20.12	2.81

a 1-3 = Traces  
b 1-3 = Inferior

4-6 = slight

7-9 = Standard

13-15 = Very good

5 = Bright red - Very fine

9 = Ext. tough, dry, undesirable flavor

No significant differences were found for conformation, texture, colour of the lean and cooking losses. Tenderness as evaluated subjectively or through the Warner-Bratzler shear, juiciness and flavor scores, were also similar for the two age groups. Beef carcass maturity is generally accepted as an important factor influencing the palatability of beef. The general concept is that with an increase in maturity there is a gradual decrease in tenderness (Hiner (1960), Romans, Tuma and Tucker (1965) failed to detect differences in the shear values in carcasses of A, B, C and D U.S.D.A maturity groups in the second. No significant differences concerning palatability of beef, were also reported by Müller, Lauzer and Robaina (1980) in a work conducted in Brasil with Charolais steers of three different age: 2, 2.5 and 4.5 years old. The live weight for the 3 groups were 422, 380 and 479 kg respectively. The cooking loss of 20% is a little higher than the loss reported by Müller (1977). In his work with

Charolais cows, it was found a cooking loss of 17.9%. Since in the present work, the older steers were heavier and also presented a better finish it was suspected that the lack of difference in tenderness between the 2 groups could be attributed to the cold shortening effect as reported by Locker and Hagyard (1963) as well as the beneficial effect of fat on tenderness. The data was therefore reanalyzed grouping the carcasses into 3 groups of marbling, independently of age: G1 = traces, G2 = slight and G3 = small and into 3 groups of subcutaneous fat: G1 = less than 2 mm, G2 = 3 and 4 mm and G3 = over 5 mm. Carcasses that displayed a small amount of marbling (G3), presented significantly more tender steaks that were also juicier with more juice and showed a lower cooking loss than the traces group (G1) table 2.

TABLE 2. EFFECT OF MARBLING ON SEVERAL CARCASS AND MEAT QUALITY

	G1 n=12		G2 n=22		G3 n = 11	
	Mean	SD	Mean	SD	Mean	SD
Hot carcass wt. kg	201.36	32.82	210.59	24.95	207.91	30.60
Fat thickness mm	1.55 <sup>a</sup>	.85	3.20 <sup>b</sup>	1.52	3.82 <sup>b</sup>	1.25
Conformation	7.91	1.30	7.86	1.28	7.82	1.60
Colour of lean	4.60	.50	4.62	.45	4.80	.54
Texture of lean	4.02	1.30	4.20	1.42	4.25	1.10
P. tenderness	4.73 <sup>a</sup>	1.19	4.86 <sup>ab</sup>	1.46	5.56 <sup>b</sup>	1.03
P. juiciness	5.45 <sup>a</sup>	.69	5.42 <sup>a</sup>	.77	6.00 <sup>b</sup>	.79
P. flavor	5.09	.30	5.18	.50	5.10	.02
W-B shear kg	9.29 <sup>a</sup>	2.48	8.37 <sup>a</sup>	2.30	6.23 <sup>b</sup>	1.21
Cooking loss %	21.00 <sup>a</sup>	3.35	20.68 <sup>a</sup>	3.11	19.54 <sup>b</sup>	1.57

ab Values in the same line bearing different superscripts are different (P .05). The beneficial effect of marbling on tenderness here described is in agreement with the findings of Blumer (1963) and Kauffman et al. (1964). Müller (1974) also reported lower shear values for cows that presented a moderate amount of marbling in relation to cows with slight quantity. The G3 group presented about 1.5% less cooking loss than G1, which agrees with data cited by Romans et al. (1965), Breidenstein et al. (1968) and Müller (1977). The effect of grouping the carcasses into different amount of external fat, can be seen on table 3.

TABLE 3. EFFECT OF SUB-CUTANEOUS FAT ON SOME CARCASS AND MEAT QUALITY

	G1 n=18		G2 n=17		G3 n=10	
	Mean	SD	Mean	SD	Mean	SD
Hot carcass wt. Kg	194.63 <sup>a</sup>	31.38	215.12 <sup>b</sup>	23.85	223.22 <sup>b</sup>	11.33
Marbling	3.53 <sup>a</sup>	1.21	4.94 <sup>b</sup>	1.20	6.00 <sup>c</sup>	1.50
Conformation	8.02	1.20	7.65	1.32	7.22	1.39
Colour of lean	4.80	.52	4.85	.50	4.90	.44
Texture of lean	3.20	1.02	4.42	1.04	4.80	1.10
P. tenderness	4.37 <sup>a</sup>	1.30	5.41 <sup>b</sup>	1.12	5.44 <sup>b</sup>	1.13
P. juiciness	5.10 <sup>a</sup>	.80	5.41 <sup>a</sup>	.79	5.75 <sup>b</sup>	.52
P. flavor	5.05	.31	5.18	.52	5.05	.05
W - B shear Kg	9.36 <sup>a</sup>	2.37	7.41 <sup>b</sup>	2.02	6.55 <sup>b</sup>	1.92
Cooking loss %	20.91 <sup>a</sup>	3.33	20.51 <sup>a</sup>	2.81	19.02 <sup>b</sup>	1.32

abc Values in the same line bearing different superscripts are different (P .05). Carcasses in G2 and G3 were heavier and also presented more marbling (P .05). The same two groups also produced more tender and juicy steaks and lower cooking loss, in agreement with data presented in table 2. Although the drop in the internal temperature of muscles was not measured it can be assumed that the cold shortening phenomenon had occurred in the lighter and whit less finish carcasses. This fact could explain why no significant difference with regard to tenderness was found between the two age groups as one could expect, table 1. Simple correlation coefficients were determined for some parameters studied, table 4.

TABLE 4. SIMPLE CORRELATION COEFFICIENTS BETWEEN SOME MEAT QUALITY PARAMETERS

	V2	V3	V4	V5	V6
Age					
Marbling (V1)	.36*	.58**	.15	-.20	.07
Fat thickness (V2)		.69**	.34*	-.56**	-.26
Panel tenderness (V3)			.33*	-.43**	-.30
Warner-Bratzler shear (V4)				-.77**	-.33*
Cooking loss (V5)					.34*

The coefficient of  $-.56$  between marbling and shear value is similar to that reported by Muller (1974) who working with cows found a coefficient of  $-.50$  between these two variables, that are higher than the many values cited by different workers in the review of Jeremiah et al. (1970). It seems that in older animals, the beneficial effect of finish on tenderness is more pronounced. The coefficient of  $-.26$  and  $-.30$  between marbling and fat thickness with cooking loss, although not significant, give an indication that carcass with more finish loose less juice while cooking. Cooking loss was negatively correlated with tenderness.

## SUMMARY

Forty-five British steers (Angus, Devon and Herefords) of two different ages, 2.5 and 4.5 years old were used in this study that was conducted in Brasil. No significant differences were observed for the organoleptic characteristics between the two age groups. However, when the data was re-analyzed grouping the carcasses by finish, either marbling or external fat deposition, independently of age, it was found that carcasses with more finish produced more tender and juicy steaks that also presented lower cooking loss. The 2.5 years old steers, that were lighter in weight and did not presented a good finish, possibly suffered a faster cooling rate that adversally affected their eating qualities.

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