Comparison between carcass quality from steers and cows

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Introduction

Meat from old cows comprises about 40% of the read meat at disposition for consumers in Brasil. This kind of meat is sold for the same price as the similar cut that is provenient from steers. The work was conducted in Southern Portion of Brasil where the predominant beef breeds are Europeans. In the region where the data was collected, central portion of State of Rio Grande do Sul, Charolais and Devon are the predominant breeds. That cows can produce quite good quality meat has been demonstrated by Müller (1974) where 143 cow carcasses from British, Dairy and Zebu breeds were compared. There was however a considerable variation in quality in each breed and mainly in the Dairy and Zebu. This is in close agreement with the results by Palmer (1963) and Riggs (1963). Cows also present a darker colour of lean and coarser texture than steers, as demonstrated by Lawrie (1966), Ransey at al (1967) and Müller (1974). The present work was conducted aiming to define how cow meat and carcass differs from steers in the peculiar conditions of Brasil.

Materials and Methods

Fifty-four animals were used: 24 steers (12 Charolais and 12 Devon) and 30 cows (15 Charolais and 15 Devon). The steers that were partially kept on cultivated grass during the winter time and native grass during the summer, were slaughtered at 2.5 years old. Cows were maintened always in native pasture and by slaughter time their age varied from 7 to 10 years of age. After 24 hs. chill in a Packing Plant, several measurements were taken from the right side, Carcasses were ribbed, area and fat ticknees were measured. Marbling, lean colour and texture were subjectivelly evaluated. A portion of the loin was removed from each carcass and brought to the Meat Laboratory in Santa Maria, where they were wrapped and stored at - 20C untill used for palatability studies. The 2.5 thick steaks were roasted in an oven to an internal temperature of 70C and tenderness was evaluated through taste panel and by using the Warner-Bratzler shear device. The left side was used to determine the proportion of the three major cuts in the carcasses: pistol cut with 8 ribs, forequarter with 5 ribs and the side.

Results and Discussion

Some of the measurements taken in the carcasses are presented in table 1. The data was analized only between sex.

TABLE 1. CARCASS CHARACTERISTICS OF STEERS AND CULL COWS

		Steers n=24		Cows n=30		
		Mean	SD	Mean	SD	
Hot carcass weight	kg	203.87	19.20	208.89	19.50	
Conformation [a]		10.30	1.22	6.20	.90	*
Physiological maturity [b]		B		E		*
Fat thickness	mm	1.37	.40	2.65	.60	*
Longissimus area	cm^2	58.27	5.25	55.84	5.21	
Carcass length	cm	123.37	6.35	135.07	6.42	*
Leg length	cm	65.02	4.30	66.30	4.32	
Thickness of cushion	cm	23.47	2.40	22.16	2.38	

[a] 1-3 = Inferior 4-6 = Bad 7-9 = Fair 10-12 = Good
[b] U.S.D.A. Systhem A = Youngest E = Oldest

Steers presented a significant (P .05) better conformation than cows. They also displayed a better, non significant, area in the muscle Longissimus and thickness of cushion. Cows on the other hand, evidenced a better finish, 2.65 mm against 1.37 for steers and were also longer. Grassi (1980) in a work with Charolais and Angus cows of 186 kg. carcass weight, found a conformation of 9.0, area of Longissimus of 60 cm^2 and fat thickness of 1.85 mm. The conformation, area of Longissimus, carcass and leg length and thickness of cushion found for steers in the present work are similar to the ones reported by Müller et al. (1980), Abaide (1981) and Müller et al. (1982).

Carcasses in Brasil, are normally divided in three major portion. The proportions of these cuts are presented in table 2.

TABLE 2. PROPORTION OF THE THREE MAJOR CUTS FROM STEERS AND CULL COWS.

		Steers n=24		Cows n=30		
		Mean	SD	Mean	SD	
Pistol cut [a]	%	49.19	2.25	49.51	2.80	
Forequarter [b]	%	37.47	1.55	35.98	1.28	*
Side	%	13.34	1.20	14.51	1.22	

[a] eight ribs
[b] five ribs

Cows presented a similar % of pistol cut, lighter (P .05) forequarter and a non significant heavier sides, about 1% more than steers. In the work conducted by Abaide (1981) using 2.5 years 1/2 blood Charolais steers, the following values were found: 48.92, 37.37 and 13.70% for pistol, fore and side respectivelly. Somewhat different values were reported by Müller et al. (1982) that working with 2.5 years Charolais steers found 50.8, 36.2 and 13.0% for the same cuts and in the same order. It seems that, as the proportion of Charolais blood increases, there is a tendency of increasing the percentage of pistol and decreases the ferequarter and the sides. The explanation possibly relies in the late phisiological maturity characteristic of the French breed.

Quality of the meat from steers and cows is presented in table 3.

TABLE 3. MEAT QUALITY FROM STEERS AND CULL COWS.

		Steers n=24		Cows n=30		
		Mean	SD	Mean	SD	
Marbling amount [a]		5.80	1.22	8.00	2.35	*
Texture of lean [b]		4.75	1.15	3.44	1.05	*
Colour of lean [b]		4.58	1.00	3.10	1.10	*
Panel tenderness [c]		5.08	1.05	3.13	1.02	*
Panel juiciness [c]		4.92	.70	4.81	.80	
Panel flavour [c]		4.80	.60	4.31	.90	
Warner-Bratzler Shear	kg	7.08	1.25	9.21	2.50	*
Thawing losses	%	4.03	.70	3.18	.65	
Cooking losses	%	17.20	3.50	16.71	3.25	

[a] 1-3 = traces 4-6 = slight 7-9 = small
[b] 1 = very dark, very coarse 5 = bright red, very fine
[c] 1 = Ext.tought dry, undesirable flavour 9 = Ext.tender, juice, flavorful

Cows presented a significant better amount of marbling, coarser texture, darker colour of the lean and less tender steaks than steers. There was no significant difference for juiciness, flavor, thawing and cooking losses.

The shear value of 7.08 for steers is similar to the values reported for this trait by Müller et al. (1980), Müller et al. (1982) and Müller and Restle (1983). Abaide (1981) working with steers of 2.5 years, reported a higher value of 8.09 and Müller and Robaina (1981) value of 8.45. In the last work, the 2.5 years old steers, presented quite light carcass weight (180 kg) and the auctors sugested that the cold shortening problem might have adversely affected the tenderness of the meat. Thawing and cooking losses were lower than the values reported by Müller et al. (1982) that found for these values 5.20 and 20.80% respectivelly.

Table 4 presents correlation coefficients calculated from all animals.

TABLE 4. SIMPLE CORRELATION COEFFICIENTS BETWEEN SOME CARCASS PARAMETERS IN BOVINES [a]

		2	3	4	5	6	7	8	9
Carcass wt.	(1)	.52	.85	-.34	.37	.31	.68	.98	.34
Conformation	(2)		.63	-.17	-.06	.35	.39	.53	.24
Longissimus	(3)			-.38	.30	.56	.63	.86	.45
Fat thickness	(4)				.24	-.44	.17	-.29	-.11
Carcass length	(5)					.12	.75	.43	.34
Leg length	(6)						.15	.31	.19
Thickness cushion	(7)							.76	.55
Wt. Pistol cut	(8)								.51
% Pistol cut	(9)								

[a] All 54 animals * r = .33 ** r = .43

The correlation between carcass weight and fat thickness is normally positive. In the present work it was negative - .34. It must be kept in mind however, that these coefficients were obtained using all animals and the heavier carcasses, Charolais breed, were the ones with lower deposition of sub-cutaneous fat.

Conformation did not present a significant coefficient with % of pistol cut, but the coefficients between the area of muscle Longissimus, .45 and thickness of cushion, .55 with this cut were highly significant (P .01).

Regression equations were calculated to estimated weight and percentage of pistol cut, the most valuable portion of the carcass.

TABLE 5. REGRESSION EQUATION TO ESTIMATIVE THE PISTOL CUT IN BOVINES [a]

Weight of pistol cut (kg)	y = -10.282 + .234 (hot carcass weight kg) +.514 (thickness of cushion, cm)	$s\bar{b}1$ = .010 $s\bar{b}2$ = .121 R2 x 100 = 97.32 %
% of pistol cut	y = 42.197 + .312 (thickness of cushion, cm)	$s\bar{b}1$ = .084 R2 x 100 = 30.25%

[a] Calculated using data from 54 animals

Weight of pistol was better estimated by carcass weight and thickness of cushion, being the first trait responsible for almost 94% of the variation. To estimative the proportion of pistol in the carcass, the only significant variable was thickness of cushion, being responsible for 30 % of the variation.

It can be concluded from the results of the present work, that cow carcasses differ quite noticeable from steers mainly in conformation, colour, texture and tenderness. Therefore a price differential must exist between the meat that comes from steers in relation to cow meat.

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