

CARCASS AND MEAT QUALITY OF CHAROLAIS AND ZEBU STEERS

L. MULLER, L. F. P. BORGES and L. A. PFAU

Universidade Federal de Santa Maria - Departamento de Zootecnia-Santa Maria RS, BRASIL

INTRODUCTION

Most of Brasil is under tropical climate and Zebu cattle is the predominant type of beef cattle raised. In the Southern portion of the Country, however, there is a temperate climate and the European breeds can be raised successfully. Although this is true, about 50% of the cattle raised in this area, is composed of crosses between Zebu bulls with "criollo" cows, which means cattle with European blood without racial definition. On the other side, in the area where this work was conducted, central region of Rio Grande do Sul, Charolais is the predominant breed. The main objective of this experiment was to compare carcass and meat quality of Charolais and Zebu type steers (at least 60% Zebu blood).

EXPERIMENTAL

The experiment was conducted in a private Ranch and thirty-five steers were used in it (20 Charolais and 15 Zebu). They were weaned and castrated at about 8 months old when the experiment began. The Charolais were grading up cattle and the Zebu presented Nelore and Gyr (*Bos indicus*) blood. They were kept in native pasture all year round. During the winter season, however, when there is a shortage of grass, their nutrition was complemented with some hay and corn until they reached slaughter weight at about 2,5 years old. They were slaughtered in a nearby Packing Plant. After 48 hs. chill, the carcasses were evaluated for conformation, and carcass length and round thickness were measured the right side of the carcasses were then ribbed between the 12th and 13th rib, the *Longissimus* muscle traced, fat thickness was measured and marbling, colour and texture of lean were subjectively evaluated. The left side was used to obtain the pistol cut (8 ribs) that was posteriorly deboned- A portion of the loin was taken to the University Meat Laboratory for tenderness, thawing and cooking losses determinations. The 2.5cm thick steaks were roasted in an oven to an internal temperature of 70 C and tenderness was evaluated through the use of the Warner-Bratzler shear device. A 5 member panel also judged the steaks for tenderness, juiciness and flavor.

RESULTS AND DISCUSSION

Table 1 presents the results that were obtained in several carcass measurements taken.

TABLE 1. COMPARISON BETWEEN CHAROLAIS AND ZEBU STEERS WITH RESPECT TO SEVERAL CARCASS MEASUREMENTS

	Charolais n= 20		Zebu n= 15	
	Mean	SD	Mean	SD
Hot carcass weight kg	221.40	15.20	229.50	16.50
Conformation ^a	10.50	.85	8.00	.93
Fat thickness mm	1.25	.50	3.00	1.05 *
Loin area cm ²	67.72	2.95	65.25	2.87
Carcass length cm	123.10	5.20	123.80	5.38
Leg length cm	66.70	2.35	69.70	2.32 *
Round thickness cm	23.00	1.20	23.40	1.35

^a 1-3= Inferior, 7-9= Fair, 10-12= Good, 16-18= Superior

Zebu steers presented a non significant ($P \geq .05$) heavier carcass weight than Charolais. They also displayed a better finish, 3mm of sub-cutaneous fat and more length in the leg. Corte et al. (1980) in a work where Nelore young bulls were compared with crosses between Nelore with Chianina and Marchigiana also found that the Nelore breed presented better finish than the crosses. The Italian breeds are also late maturing breeds like Charolais. In an experiment conducted by Ramos e Müller (1982), however, Nelore presented less finish than Nelore x Holstein steers. Brahman also presented more length in the leg than Brahman x Shorthorn steers but no difference was found for carcass length and circumference of round, Carpenter et al. (1964). No significant differences were found for conformation, loin area, carcass length and round thickness between the two groups. The results found in the present work for the Charolais steers, closely agree with the data published by Müller et al. (1980) who reported for 2 years

old Charolais steers carcass weight of 230 kg, 1mm of external fat, 11 for conformation, 60.5 cm² of loin area and round thickness of 24.2 cm. The proportion of the three major wholesale cuts is presented in table 2.

TABLE 2. COMPARISON BETWEEN CHAROLAIS AND ZEBU STEERS ON THE YIELD OF SOME MAJOR CUTS.

		Charolais n= 20		Zebu n= 15	
		Mean	SD	Mean	SD
Pistol cut (8 ribs) ^a	%	50.80	1.25	49.00	1.12 *
Forequarter (5 ribs)	%	36.00	.85	37.50	.98 *
Side	%	13.20	.67	13.50	.65
Edible portion of pistol in relation to carcass wt. b	%	35.70	1.23	36.50	1.45

^a Pistol cut = Round, rump and loin

^b Includes the heel of round

Charolais steers presented a significant higher percentage of pistol cut (50.8%) than Zebu (49%). This is a result of the heavier forequarter produced by the later (37.5%) against 36% for the Charolais. No significant difference was found for the proportion of side and edible portion of pistol when the same was deboned. The slightly higher proportion of edible portion presented by Zebu steers is a result of their better finish and also lighter bone. Felicio et al. (1981) reported for Nelore steers special hindquarters (pistol cut) of 48.8%, forequarters of 39.2% and 12% for the sides. The values are higher for the forequarter and lower for the sides than the ones that were found in the present work. It must be kept in mind however that in this experiment the steers used were not 100% Zebu blood what can explain the differences. A greater proportion of forequarter and less special hindquarter for Nelore steers in comparison with Brown Swiss x Guzera, was also reported by Felicio et al. (1978). Similar results were reported by Carpenter et al. (1964) when comparing Brahman versus Brahman x Shorthorn steers. In a work conducted by Müller et al. (1980) when Charolais was compared with British steers the following data was reported for the Charolais: 49.7% of pistol cut, 36.6% of forequarter and 13.7% for the side, which agree with the results of the present paper. Meat quality from the two groups of steers is presented in table 3.

TABLE 3. BREED EFFECT ON THE CARCASS AND MEAT QUALITY.

		Charolais n= 20		Zebu n= 15	
		Mean	SD	Mean	SD
Physiological maturity ^a	kg	13.00	.98	12.00	.87
Marbling ^b		9.80	.70	11.00	.82
Colour of lean ^c		4.50	.35	3.80	.32
Texture of lean ^c		4.25	.42	3.45	.28
Warner-Bratzler shear	kg	7.58	.60	10.07	.93 *
Panel tenderness ^d		5.33	.42	4.38	.38 *
Panel juiciness ^d		5.70	.47	4.85	.43
Panel flavor ^d		5.80	.53	4.95	.51
Thawing losses	%	5.20	.45	5.40	.42
Cooking Losses	%	20.79	3.03	21.33	3.42

^a 1-3 = E, 10-12 = B, 13-15 = A (U.S.D.A. System)

^b 1-3 = Traces, 7-9 = Small, 10-12 = Average

^c 1 = Very dark, very coarse, 5 = Bright red, very fine

^d 1 = Ext. tough, dry, undesirable flavor, 9 = Ext. tender, juicy, flavorful

Charolais were slightly younger in physiological maturity than Zebu. Although the later presented a higher deposition of intramuscular fat, the difference was not significant. Charolais presented a non significant brighter colour and finer texture of lean. Tenderness was better for Charolais either when tested through the use of the Warner-Bratzler shear device or scored by a taste panel. Evidence for European cattle to present more tender steaks than Zebu been reported by Carpenter et al. (1964) and Felicio et al. (1978). Corte et al.

(1980) and Ramos and Müller (1982) however failed to detect any significant difference in tenderness when comparing Nelore with several crosses between Nelore and European breeds. Juiciness and flavor also favored the Charolais breed although not significantly. Müller et al. (1980) found a shear value of 8.00 for 2 years old Charolais steers and Felício et al. (1981) a value of 12.7 for 2.5 years old Nelore steers. Tawing and cooking losses were similar for both groups and within the limits reported by other workers, Müller et al. (1980) and Pires and Müller (1979). The results of the present work demonstrate that, Zebu type cattle can be successfully raised as a beef producer. The greater toughness displayed, possibly would not be detected by the average consumer.

REFERENCES

- Carpenter, J.W., A.Z. Palmer, W.G. Kirk, F.M. Peacock and M. Koger. 1964. Slaughter and carcass characteristics of Brahman and Brahman-Shorthorn steers. University of Florida. Technical Bulletin 680.
- Corte, O.O., G. Cia, P.C. de Felício and A. Luchiani FQ. 1980. Composição e qualidade da carne de tourinhos Nelore, Chianina x Nelore e Marchigianina x Nelore. ITAL-EMBRAPA. Boletim Técnico nº 5.
- Felício, P.E. de, G.A. Norman, O.O. Corte, A.B. de Oliveira and C. Barbosa. 1978. Comparação das carcaças de tourinhos Nelore a mestiços Suiço x Guzerã. ITAL-EMBRAPA. Boletim Técnico nº 2.
- Felício, P.E. de, G. Cia, V. Picchi and O.O. Corte. 1981. Qualidade das carcaças de novilhos Nelore e equações de previsão dos rendimentos em carne aproveitável. ITAL-EMBRAPA. Boletim Técnico nº 6.
- Müller, L., J.J. Lauzer and G.P. Robaina. 1980. Carcass characteristics of British and Charolais steers raised on grass. 26th Eur. Meet Res. Colorado Springs.
- Ramos, J.C. and L. Müller. 1982. Effect of level of nutrition on the carcass and meat quality of beef. In press.
- Pires, G. da S. and L. Müller. 1979. Effects of freezing in the meat quality. Rev. CCR-Univ. Fed. S. Maria 9(1): 1-7.
- United States Department of Agriculture-USDA. 1965. Official United States Standards for Grades of Carcass Beef. Mimio.