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CARCASS CHARACTERISTICS AND TESTICULAR BIOMETRY OF YOUNG NON-CASTRATED MALES OF DIFFERENT GENETIC GROUPS

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ABSTRACT

The objective of this work was to evaluate carcass characteristics and testicular biometry of non-castrated Hereford (H), 3/4H 1/4 Nellore (N), 5/8H 3/8N and 3/4 Charolais (C) 1/4 N steers, slaughtered at fourteen months of age. No statistical difference occurred among genetic groups for final and carcass weights and dressing percentages. The pistola cut yield was higher in 3/4CN than other genotypes. Flank yield was higher for 5/8HN in relation to 3/4HN and 3/4CN. *Longissimus dorsi* area was higher for 3/4CN (71.5 cm^2) animals in relation to Hereford (63.5 cm^2). Hereford animals also showed lower leg length than all other groups. The 3/4CN males showed lower (2.6 mm) subcutaneous fat thickness than Hereford (5.0 mm), 5/8HN (4.1 mm) and 3/4HN (4.1 mm) ones. In conclusion, all genetic groups present compatible carcass characteristics for young cattle market. Besides, muscular development related characteristics, such as conformation and pistola cut yield, were better in Charolais crossbred genotype, while characteristics related to fat deposition, such as fat thickness and flank yield, were better in Hereford and crossbred Hereford genotypes.

KEYWORDS: crossbred; feedlot; Hereford; Nellore; yield.

CARACTERÍSTICAS DE CARCAÇA E BIOMETRIA TESTICULAR DE MACHOS BOVINOS SUPERJOVENS NÃO CASTRADOS DE DIFERENTES GRUPOS GENÉTICOS

RESUMO

O objetivo deste trabalho foi avaliar as características de carcaça e a biometria testicular de machos não castrados superjovens das raças Hereford (H), 3/4H 1/4 Nelore (3/4HN), 5/8H 3/8 Nelore (5/8HN) e 3/4 Charolês 1/4 Nelore (3/4CN), abatidos aos quatorze meses de idade. Não houve diferenças estatísticas entre os grupos genéticos para pesos de fazenda, de carcaça e rendimentos de carcaça. A percentagem de serrote foi maior nos animais 3/4CN em relação aos outros genótipos. A percentagem de ponta de agulha foi maior nos 5/8HN em relação aos 3/4HN e 3/4CN. A área de *Longissimus dorsi* foi maior nos animais 3/4CN (71,5 cm^2) em relação aos Hereford (63,5 cm^2). Animais Hereford também apresentaram menor comprimento de membro posterior do que todos os demais grupos. Os machos 3/4CN apresentaram menor (2,6 mm) espessura de gordura subcutânea do que os Hereford (5,0 mm), 5/8HN (4,1 mm) e 3/4HN (4,1 mm). Concluiu-se que as características relacionadas à musculosidade, como a conformação e o rendimento de serrote foram melhores no genótipo mestiço Charolês, enquanto as características relacionadas à deposição de gordura, como espessura de gordura e rendimento de ponta de agulha, foram melhores nos animais Hereford e mestiços.

PALAVRAS-CHAVE: confinamento; cruzamento; Hereford; Nelore; rendimentos.

INTRODUCTION

Climatic variations, which occur from north to south of Brazil, was responsible for the establishment of the different livestock production systems of the largest commercial cattle herd in the world. Within this context, farmers show uncertainty about the appropriateness of the different genotypes to the purposes set out in each production system of agricultural business in Brazil (SANTOS et al., 2002).

Breed complementarity is the basis of crossbreeding success, and several studies have shown that the combination of Zebu with European breeds represent the best results in the formation of synthetic breeds (KOGER, 1980). Among Zebu breeds, Nellore shows the greatest participation in the national herd, producing both defined or crossbred animals with *Bos taurus taurus.* According to TORAL et al. (2011), an alternative to speed up beef production in the tropics is to use European breeds over the Nellore basis of the Brazilian herd. For these authors, the European breeds have gone through a long process of genetic improvement, and hence are more productive.

Currently, Hereford breed is considered, worldwide, one of the earliest beef genotypes among the breeds that constitute a significant herd. Furthermore, it is recognized due to the meat quality, which has enhanced softness and good marbling, compared to other larger breeds (SHERBECK et al. 1995). Due to its precocity, this breed represents a genotype suitable for short-cycle production systems (TORAL et al., 2011). These systems produce high quality meat, and hence are better valued, producing better remuneration for the entire production chain.

On the other hand, Charolais breed is present in most of the crosses in the South of Brazil, but it is also significant in the rest of the country. This is due to the adaptability and the size of the breed, which results in heavier calves at weaning and slaughter, and carcasses of good conformation and weight (PEROTTO et al., 2000).

The literature has shown that the study of young steers can be justified for three main reasons: i) the slaughter of cattle at one year of age is a good option for precocious breeds, such as Hereford and their crosses (SHERBECK et al., 1995); ii) short-cycle production systems are biologically and economically more efficient (IGARASI et al., 2008); and iii) the younger the age at slaughter, the better the meat quality (LAWRIE, 2005).

The use of uncastrated animals is also justified for three main reasons: i) uncastrated animals have a faster growth rate than castrated males and females, due to the anabolic effect of male hormones (ÍTAVO et al., 2008); ii) in short-cycle systems, the process of castration and the consequent stress may represent a short period during which the animals lose weight (BAKER, 2008); and iii) the carcasses of whole animals slaughtered at a young age do not have lower commercial value, because sexual dimorphism is not very intense under one year of age (BERG & BUTTERFIELD, 1976). Therefore, this work aimed to evaluate carcass traits and testicular biometry of uncastrated males of Hereford (H); 3/4 H 1/4 Nellore (3/4HN); 5/8 H 3/8 Nellore (5/8HN), and 3/4 Charolais 1/4 Nellore (3/4CN), confined and slaughtered at 14 months of age.

MATERIAL AND METHODS

This study was carried out at the Beef Cattle Sector of the Animal Science Department, at the Federal University of Santa Maria, State of Rio Grande do Sul, in the period from June to December 1995, using 32 uncastrated male calves, weaned at seven months of age, born and raised under the same sanitary, management and feeding (near the cow and without creep feeding) conditions. At the beginning of the study, the animals had an average weight of 195 kg. The animals belonged to four genetic groups, being eight Hereford (H), eight 3/4 H 1/4 Nellore (N), eight 5/8 H 3/8 N and eight 3/4 Charolais (C) 1/4 N, coming from a private property.

We conducted the experiment in confinement, and used corn silage as forage and a forage/concentrate ratio ranging from 70/30 at the first period until 40/60 at the 7th period, with average ratio of 56.4/43.6 (dry matter basis - DM). The concentrate had, on average, 46.8% soybean meal, 51.0% ground corn, 1.0% salt and 1.2% limestone. At the first four periods of 28 days, the diet had 16.1% crude protein, and we recalculated it from the 5th period on to 12.8% crude protein. The diet offered had 3.16 Mcal/kg digestible energy, 2.60 Mcal/kg metabolizable energy, 1.69 Mcal/kg net energy for maintenance and 1.08 Mcal/kg net energy for weight gain estimated to 1.0 kg per day (NRC, 1996).

The acclimation period of the animals to the diet and facilities lasted 14 days. The feed was provided ad libitum twice a day. The leftovers from the previous day were collected daily in the morning before weighing the diet, and recorded on a field spreadsheet to obtain the consumption of the previous day.

The weighing of the animals occurred at the beginning of the experiment and then every 28 days, except for the 3rd and 7th period, when the animals were weighed at 27 and 21 days, respectively, for a total period of 188 days. Prior to weighing, the animals were submitted to solid fast for 14 hours. Before the animals were sent to the slaughterhouse, the same weighing procedure was performed, obtaining the farm weight of the animals, and the scrotal circumference was measured with the aid of a tape measure

After slaughtering, the two half-carcasses were identified with numbered metallic labels. The pair of testis was collected from each animal immediately after its removal at the slaughter line, followed by separation and immediate weighing of the glandular portion.

At the end of the slaughter line, the two half-carcasses were weighed before washing to obtain hot carcass weight. After washing, they were taken to the freezer, where they remained for 24 hours at a temperature of 1 ^{o}C.

After cooled, the carcasses were reweighed to obtain the cold carcass weight of the animals. The weight difference between the two measurements, expressed as a percentage of hot carcass weight, represented the weight loss during carcass cooling. The measures of carcass length of hindlimbs and forelimbs, the cushion thickness and circumference of the forelimb were performed on the right half-carcass after cooling.

The left half-carcass was divided into three commercial cuts: pistola cut, fore cut and flank, according to the method used by slaughterhouses. The flank or special hind cut comprises the posterior (caudal) portion of the carcass. The cut is separated from the fore cut and the flank, between the 5th and 6th rib within ± 22 cm of the spine, remaining with eight ribs. The fore cut comprises the anterior (cranial) portion of the carcass, and it is separated from the hind cut and the flank between the 5th and 6th ribs, remaining with the 5th rib. The flank or ribs, comprising the lateral and ventral portions of the carcass, is formed by the eight ribs of the hind portion and the empty portion.

The fat thickness was measured in mm after cooling the carcass, measuring the fat that covers the muscle *Longissimus dorsi* from the cut made between the 12th and 13th ribs, using the average of two readings. The ribeye area was measured in the *Longissimus dorsi,* exposed by a cross-section in the carcass between the 12th and 13th ribs.

The assessment of carcass conformation was also carried out after cooling, subjectively, by means of a point scale indicated by MÜLLER (1987), seeking to prevent the fat covering interfere in the evaluation. As for the evaluation of the carcass physiological maturity, we used a scale of fifteen points described by MÜLLER (1987). This measurement was performed by assessing the cartilage calcification of the spinous process of the thoracic and lumbar vertebrae, and between the sacral vertebrae. To determine the physical composition of the carcass, we removed a section including the 9th, 10th and 11th ribs, according to the methodology proposed by HANKINS & HOWE (1946).

The experimental design was completely randomized with four treatments and eight replications, in which each animal was an experimental unit. We performed analysis of variance applying the F test, and, when the average showed a statistical difference ($P < 0.05$), we compared them using Tukey test.

RESULTS AND DISCUSSION

Table 1 shows the weights, carcass yield and loss during cooling. We observed no difference among genotypes for the farm weight of the animals, as well as for hot carcass weight and cold carcass weight (P> .05).

Table 1 - Farm weight, hot and cold carcass weight, hot and cold carcass yield and cooling loss of uncastrated bovine animals of different genetic groups slaughtered at 14 months of age

Characteristics	H[a]	3/4HN[b]	5/8HN[c]	3/4CN[d]	CV[e] (%)	P[f]
Farm weight, kg	440	436	453	451	6.11.	0,63
Hot carcass weight, kg	236	240	251	242	6.63	0.32
Cold carcass weight, kg	232	233	242	242	6.14	0.31
Hot carcass yield,%	53.6	55.1	55.4	54.6	3.64	0.28
Cold carcass yield,%	(52.7)	54.1	54.3	53.8	3.67	0.32
Cooling loss,%	1.79	1.28	1.98	1.50	0.47	0.62

[a] Hereford; [b] 3/4 Hereford 1/4 Nellore; [c] 5/8 Hereford 3/8 Nellore; [d] 3/4 Charolais 1/4 Nellore; [e] coefficient of variation; [f] probability.

The similarities between hot and cold carcass weight observed in this study indicate that the effects of heterozygosity of crossbred animals were not intense enough to result in higher carcass weight compared with pure Hereford genotype. Such behavior may be due to the fact that we only used beef breeds genotypes in this experiment, different from the results of VAZ et al. (2002), who verified slaughter weight of 379.9 and 371.3 kg, respectively, for Hereford and 5/8HN, while 1/2 Jersey 1/2 Hereford animals showed lower results, 346.6 kg, for steers slaughtered at 14 months of age.

The values of slaughter weight and carcass weight of animals of different genotypes represent one of the major issues to be studied in this work, as we aim to understand the effect of crossbreeding with Nellore on weight change, compared with pure Hereford. The similarity between slaughter and carcass weight of the animals was reflected in similar hot and cold carcass yield among the genotypes (P> .05). The mean values for these characteristics were 54.7 and 53.7%, respectively. The literature suggests that crossbred Zebu must have higher carcass yield than British breeds (BIDNER et al., 2002). PACHECO et al. (2005) reported carcass yield of 57.5% for steers with the highest percentage of zebu blood against 54.1% for steers with the highest percentage of Continental breed. The cold carcass yield was also higher for crossbred Zebu animals (54.8 against 52.6%).

Although the yield found in this study was lower than the findings reported by PACHECO et al. (2005), the mean hot carcass yield (54.7%) is considered high compared with the averages found in other studies that investigated young but castrated steers (PACHECO et al., 2005). This is an effect of sexual dimorphism of the uncastrated animal that, by developing larger muscles, result in higher carcass yield than castrated steers (PURCHAS et al., 2002). SAMPAIO et al. (1998) also observed high yield (55.1%) in uncastrated crossbred Canchim steers. Furthermore, it is noteworthy that the results of comparisons between carcasses measured in different experiments may reflect the variation in the method of trimming fat excess of the carcass and internal fat, varying among slaughterhouses and being subjective in experiments.

In this paper, cooling loss of the carcass ranged from 1.28 to 1.98%, with no statistical difference among the four genotypes. Cooling losses verified by PACHECO et al. (2005) (4.63% for 5/8N3/8C and 2.74% for 5/8C3/8N) and by VAZ et al. (2002) (2.70% for Hereford and 2.37% for 5/8HN) were not statistically different between the genotypes and, on average, were lower than the values observed in the current study. These differences in cooling loss of the carcass could be the result of differences in fat cover on the carcasses or changes in muscle pH (LAWRIE, 2005), resulting from variations during the pre-slaughter management, which might be impaired due to Nellore animals being more susceptible to higher pre-slaughter stress in relation to Hereford animals. However, the fact that the animals remained in confinement for nearly seven months reduced their susceptibility to pre-slaughter stress, due to the constant contact with people and to the small space in the confinement settings, which is similar to the conditions found in the slaughterhouse.

Table 2 shows that the subcutaneous fat thickness of the carcass was lower (P <0.05) in crossbred Charolais animals than in the other animals, which did not differ among each other. BARBER et al. (1981) compared Charolais cattle with the British breed Aberdeen Angus, and stated that the Charolais breed reaches mature weight at an older age; therefore, as the animals show reduced weight, higher fat thickness on the carcasses of British breeds should be expected.

Table 2 - Subcutaneous fat thickness, absolute and adjusted *Longissimus dorsi* area for hot carcass weight, conformation and carcass metric measurements of uncastrated steers of different genetic groups slaughtered at 14 months of age

Characteristics	H ^{a}	3/4HN ^{b}	5/8HN ^{c}	3/4CN ^{d}	CV^{e} (%)	P^{f}
Fat thickness, mm	5.0 ^{g}	4.1 ^{g}	4.1 ^{g}	2.6 ^{h}	35.40	0.03
Longissimus dorsi area, cm ^{2}	63.5 ^{h}	67.8 ^{gh}	69.4 ^{gh}	71.5 ^{g}	9.30	0.04
Longissimus dorsi area, cm ^{2} /100kg	27.4	29.3	28.1	29.5	9.09	0.41
Conformation, points e	12.1 ^{gh}	12.0 ^{h}	11.5 ^{h}	13.3 ^{g}	9.41	0.04
Carcass length, cm	124	121	124	126	11.02	0.09
Forelimb length, cm	37.4 ^{h}	38.6 ^{gh}	39.3 ^{g}	39.9 ^{g}	7.05	0.04
Hindlimb length, cm	64.0 ^{h}	66.6 ^{g}	67.8 ^{g}	67.6 ^{g}	11.99	0.02
Cushion thickness, cm	23.9	24.6	25.0	25.8	34.1	0.33
Hindlimb perimeter, cm	38.2	36.8	36.7	38.0	21.1	0,14

[a] Hereford; [b] 3/4 Hereford 1/4 Nellore; [c] 5/8 Hereford 3/8 Nellore; [d] 3/4 Charolais 1/4 Nellore; [e] scale from 1 to 18 points, with 10 = less, 11 = good, typical, and 12 = good, more; [e] coefficient of variation; [f]probability; [g, h] in line, means followed by letters differ significantly among genetic groups by t test at 5%.

We did not observe difference of the fat thickness of the carcass between crossbred Hereford x Nellore of 50% (3/4HN) and 62% (5/8HN) heterozygosity (Table 2, P> 0.05); however, it was expected because VAZ & RESTLE (2001) argued that measures related to the fat deposition on the carcass are the characteristics that show the greatest effect of heterosis. VAZ et al. (2002) mentioned similarity between purebred and crossbred genotypes involving Hereford and Nellore, when they observed 6.25 and 6.74 mm of fat thickness, respectively, for genotypes Hereford and 5/8HN in steers finished in feedlot from seven months of age on and slaughtered at 14 months of age.

In the present study, the carcass conformation was greater (P <0.05) for 3/4CN than for crossbred Hereford x Nellore, but it was not different from pure Hereford (Table 2). The continental breeds, such as Charolais, are characterized by better carcass conformation compared with the British breeds, such as Hereford; however, in this study, carcass conformation decreased only when the Nellore genotype was included. Hereford and crossbred Hereford x Nellore animals did not differ in this feature. The conformation verified by VAZ et al. (2002) was similar, as well as the absolute *longissimus dorsi* areas that were 55.5 and 57.0 $cm^{2,}$ respectively, for Hereford and 5/8HN. Adjusted values to 100kg of carcass were 28.4 and 29.0 $cm^{2,}$ respectively.

In the present work, *Longissimus dorsi* absolute area, which is also indicative of carcass muscling (BERG & BUTTERFIELD, 1976), was higher in 3/4CN, than in Hereford males, not differing from 3/4 and 5/8 crossbreds (Table 2). The similarity between crossbred Hereford and Charolais indicates that heterozygosity of the latter offset part of the greatest ability of continental breeds to develop muscularity on carcass.

However, we observed that by adjusting the characteristic to 100 kg of carcass, the difference disappeared (P> 0.05), although numerically the crossbred 3/4CN showed area 2.1 cm^2 greater than pure Hereford (Table 2). From these results, it is possible to infer that the carcass weight affects the *Longissimus dorsi* area and, thus, heterozygosity of crossbred animals can reduce the difference in muscularity between British breeds, such as Hereford, and continental breeds, such as Charolais (PEROTTO et al. 2000).

This statement can be confirmed by the observation that when comparing 3/4CN and 3/4HN animals, there is no difference between the groups for any of the metric characteristics of the carcass (Table 2). Also 5/8HN animals were similar to 3/4 HN (P> 0.05). Carcass length, cushion thickness and forelimb perimeter did not differ among genetic groups (P> .05). Also, regarding the metric measurements of carcasses, we verified that Hereford animals had lower forelimb length than 5/8HN and 3/4CN crossbreds and lower hindlimb length than the other groups (Table 2).

Crossbred Nellore animals tend to have longer limbs than defined European breeds, resulting from individual heterosis for the body development traits (ARANGO et al., 2004). This behavior can be maximized when the crossbred Zebu genotype involves another breed such as Charolais, a continental breed larger than Hereford. We can also see that, if we consider only the Hereford animals and their crossbred with Nellore, the lengths of leg and arm increased with the increase in Nellore proportion (Table 2).

If we consider only the Hereford and Hereford x Nellore males, we observe that the *Longissimus dorsi* area in absolute and adjusted for cold carcass weight was not affected by crossbreeding. SHERBECK et al. (1995) state that Brahman crossbred animals have lower *Longissimus dorsi* area than steers of British breeds.

Table 3 shows the data on commercial cuts weights of carcasses of animals of different genotypes, displaying similarity between the genotypes for the weights of the three commercial cuts. The similarity among the cuts weights is a result of the similarity among carcasses weights (Table 1). The results indicated no effect of Nellore, Hereford and Charolais breeds on this characteristic. OLIVEIRA et al. (2009) observed greater weight of forequarter in Nellore bulls than in Canchim bulls, and hence in the yield percentage of this cut, which was 39.3 and 38.1%, respectively. For the authors, this difference was due to the presence of hump in the forequarter of Nellore animal carcasses.

Table 3 - Weight of commercial cuts (pistola, flank and forequarter) of uncastrated cattle of different genetic groups slaughtered at 14 months of age

Characteristics	H[a]	3/4HN[b]	5/8HN[c]	3/4CN[d]	CV% [e]	P[f]
Pistola kg	53.7	54.4	55.1	58.3	11.02	0.29%
Flank, kg	18.9	18.3	20.3	17.0	14.51	0.37
Forequarter, kg	43.2	43,8	46.4	45.9	9.99	0.22%
Pistola%	46.4 [h]	46.7 [h]	45.3 [i]	48.1 [g]	2.40%	0,01
Flank,%	16.3 [gh]	15.7 [h]	16.6 [g]	14.0 [i]	5.25	0,01
Forequarter,%	37.4	37.6	38.1	37.8	2.70	0.56

[a] Hereford; [b] 3/4 Hereford 1/4 Nellore; [c] 5/8 Hereford 3/8 Nellore; [d] 3/4 Charolais 1/4 Nellore; [e] coefficient of variation; [f] probability; [g, h] in line, means followed by letters differ significantly among genetic groups by t test at 5%.

The results of similarity among genotypes show that breed patterns developed by the improvement of Charolais, Hereford and Nellore breeds are compatible. Although some researchers have emphasized that animal improvement should aim at increasing pistola weight, a region where the most prized cuts are located on beef carcass (PASCOAL et al., 2011),VAZ et al. (2002) showed similarity between Hereford and 5/8HN genotypes regarding forequarter percentages (37.4% for both), flank (14.2 and 15.1%, respectively) and pistola (48.5 and 47.6%, respectively).

In the current study, the 3/4CN animals had higher percentage of pistola (48.1%), compared to the other crossbred groups (3/4HN = 46.7% and 5/8HN = 45.3%) not differing from Hereford group (46.4%) (Table 3). The highest percentage of pistola cut in continental crossbred breeds reflects the fact that these breeds underwent strict selection for carcass conformation (PEROTTO et al., 2000).

The highest percentage of flank (Table 3) was observed in 5/8HN animals compared with 3/4HN and 3/4CN (P <0.05). In this study, the 5/8 animals showed the highest percentage of zebu genotype compared with others. This result may point out to the need of dissecting the flank in major tissues, bone, muscle and fat tissue in order to study which one would reflect greater development of this cut in 5/8 European x Zebu animals.

The sexual state of the animal could interfere with the percentage of retail cuts as the sexual dimorphism of the male, activated by the androgen hormone, would increase the percentage of forequarter rather than the percentage of hindquarter (BERG & BUTTERFIELD, 1976). Due to existing doubts regarding the development and maturity of animals of different genotypes, in this study, we evaluated the testicles biometry, to identify possible changes in the development of the male glands, which could result in differences in the androgen hormones production and, hence, further development of some carcass traits in non-castrated males (Table 4).

Table 4 - Scrotal circumference and testicular weight, expressed in absolute terms, relative to farm weight and hot carcass weight, of uncastrated cattle of different genetic groups slaughtered at 14 months of age

Characteristics	H[a]	3/4HN [b]	5/8HN [c]	3/4CN [d]	CV%[e]	P[f]
Scrotal circumference (SC), cm	33.3	31.6	29.2	29.9	14.34	0.47
SC / slaughter weight, cm/100 kg	7.57	7. 29	6.45	6.71	17.26	0.29%
SC / carcass weight, kg cm/100	14.1 [g]	13.3 [gh]	11.4 [h]	12.4 [gh]	17.15	0.04
Testicular weight (TW), g	514	498	408	420	20.59	0.59
TW / farm weight, g/100 kg	1.17	1/14	0.90	0.96	29.02	0.21
TW / carcass weight, g/100 kg	"2.18.	2.07	1.62	1. 74	29.27	0.16

[a] Hereford; [b] 3/4 Hereford 1/4 Nellore; [c] 5/8 Hereford 3/8 Nellore; [d] 3/4 Charolais 1/4 Nellore; [e] coefficient of variation; [f] probability; [g, h] in line, means followed by letters differ significantly among genetic groups by t test at 5%.

Of the dependent variables displayed in Table 4, the only feature that showed differences (P <0.05) among genotypes was the scrotal circumference adjusted to 100 kg of carcass weight, which was higher in Hereford than in 5/8HN animals. The scrotal circumference varied, with no statistical difference, from 29.9 cm to 33.3 cm in 3/4CN and in Hereford animals, respectively. Smaller scrotal circumference, also called testis biometry, is cited in zebu by VALENTINE et al. (2002), when comparing Nellore animals with crossbred Nellore x European breeds. DAL-FARRA et al. (2000) explained that the differences in scrotal circumference are due to the fact that European breeds are more precocious than Zebu breeds.

The monitoring of the testis biometry in studies comparing animals slaughtered at a younger age is due to the fact that the livestock improvement aims at the precocity of the animals, to reduce the age at slaughter, to improve meat quality and to reduce the costs of the production system by increasing the offtake. In this study, it seems evident that the smallest testicular circumference of the genotype with the highest percentage of zebu breed indicates later maturity, resulting from the crossbreeding of a precocious breed, Hereford, with a more suited but later breed, Nellore. However, the characteristics of early termination associated with fat deposition, have high heterosis in crosses of Zebu and European genotypes (VAZ & RESTLE, 2001), which may have offset a possible lower finishing of animals that presented later maturity by the greater proportion of Zebu.

CONCLUSIONS

No differences in hot carcass weight and cold carcass weight, hot and cold carcass yield and carcass cooling loss among Hereford males, Hereford x Nellore crossbreds and Charolais x Nellore crossbreds, implying that these genotypes are suitable for the current Brazilian marketing system that does not differentiate the composition of the carcass and percentage of primal cuts.

Considering the carcass composition, crossbred Charolais have better conformation and increased *Longissimus dorsi* area than Hereford crossbred steers. Crossbred and pure Hereford, at a young age, have carcasses with higher fat thickness and percentage of flank than crossbred Charolais.

By evaluating the testis, 3/8 Nellore animals presented later finishing than pure Hereford males, but the heterozygosity present in the genotype may improve the finishing of these animals.

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