Revista Brasileira de Zootecnia
© 2009 Sociedade Brasileira de Zootecnia
ISSN 1516-3598 (impresso)
ISSN 1806-9290 (*on-line*)
www.sbz.org.br

R. Bras. Zootec., v.38, n.11, p.2230-2237, 2009

Meat yield of culled cow and steer carcasses

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ABSTRACT - The experiment evaluated the meat yield of prepared beef cuts, bone and trimmings of steer and culled cow carcasses. Culled 72-month-old Braford cows, 496 kg live weight and 36-month-old steers, 494 kg live weight were used, all from the same herd and finished on ryegrass pasture. A randomized complete design, with two treatments and 15 replications, was used. Hot carcass weight was lower for cows (248 kg) than for steers (263 kg). Steer carcasses presented better conformation, lower chilling loss, shorter (128.6 *vs.* 137.7 cm), with longer and thicker limbs compared to cows and similar fat finishing. Steer carcasses showed, compared to cow carcasses, always in the same order, similar side cut yield (13.5 *vs.* 13.4%), higher forequarter yield (38.4 *vs.* 37.2%), and lower hindquarter yield (48.1 *vs.* 48.9%), resulting lower yields of the sub-primal cuts full rump and sirloin, lower rump UK trim, rump tail and striploin. Steer and cow carcasses were similar in total yield of prepared meat cuts (77.8 *vs.* 77.6%), discarded bone (17.4 *vs.* 17.9%), discarded trimmings (4.54 *vs.* 4.09%), and losses inherent to the deboning process (0.34 *vs.* 0.34%). The results showed that cow carcasses are longer, have shorter and thinner limbs, have higher hindquarter and lower of forequarter yields, but the total yield of prepared meat cuts were similar between cow and steer carcasses.

Key Words: Braford, commercial cuts, deboning, hindquarter, primal cuts, retail cuts

Rendimento de cortes preparados de carcaças de vacas e de novilhos

RESUMO - Avaliaram-se os rendimentos de cortes cárneos preparados, de osso e de retalho descartado das carcaças de animais de novilhos e vacas de descarte. Utilizaram-se 15 vacas de 72 meses com peso vivo de 496 kg e 15 novilhos de 36 meses com peso vivo de 494 kg, todos da raça Braford e de mesmo rebanho, terminados em pastagem de azevém. O experimento foi realizado em delineamento inteiramente casualizado, com duas categorias animais, cada uma com 15 repetições. O peso de carcaça quente das vacas de descarte (248 kg) foi inferior ao dos novilhos (263 kg). As carcaças dos novilhos apresentaram melhor conformação, com menor quebra no resfriamento, e foram mais curtas (128,6 vs 137,7 cm), com membros mais longos e espessos em comparação às carcaças das vacas. A porcentagem de gordura de cobertura foi similar entre as categorias. Em comparação às vacas de descarte, os novilhos apresentaram rendimento similar de costilhar (13,5 vs 13,4%), maior de dianteiro (38,4 vs 37,2%) e menor de serrote (48.1 vs 48.9%). Novilhos apresentaram menor rendimento de alcatra e lombo e menor rendimento de miolo da alcatra, maminha e contrafilé. As carcaças de vacas e de novilhos são similares quanto aos rendimentos totais de cortes cárneos preparados (77,8 vs 77,6%), osso descartado (17,5 vs 17,9%), retalho descartado (4,54 vs 4,09%) e perdas inerentes (0,34 vs 0,34%). Vacas têm carcaça mais comprida, membros mais curtos e finos, maior rendimento de serrote, menor de dianteiro e similar de costilhar, mas o rendimento total de cortes cárneos preparados é similar ao de carcaças de novilhos.

Palavras-chave: Braford, cortes comerciais, cortes primários, desossa, porção comestível, serrote

Introduction

Packaged deboned cuts are the main products of beef of packing plants with federal inspection in Brazil. Brazilian farmers and packing plants have shown interest in research to identify biotypes producing carcasses with high total yield of ready-to-cook cuts and high value cuts.

The yield of prepared beef cuts is influenced by factors such as age, sex, weight, conformation, finishing, genotype and growth curve, which can be evaluated *in vivo* or in the carcass.

Received April 16, 2008 and accepted March 16, 2009.
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The absence of difference in total cut yield between cows and steers does not mean that the meat from these animals presents the same qualitative, commercial, and economic value, which is ultimately determined by the price paid to the farmer for the total and individual yield of the most valuable cuts, and the potential differences in sales price and benefits.

Packing plant tables of prices paid to farmers show that, both historically and today, the value paid for steers is 10-14% higher compared to females on live weight basis, and 4-8% higher, considering young and old cows and heifers, on carcass weight basis. The argument is that females, whether cows or heifers, have lower deboned yield, and less tender meat in the case of cows.

The objective of this study was to determine the possible differences in total and individual yield of primal cuts and ready-to-cook cuts between cows and steers derived from the same herd.

Material and Methods

Braford cows and steers, raised and finished on a commercial farm in Rosário do Sul, Rio Grande do Sul, Brazil, were used. The animals were weaned at seven months of age and finished on ryegrass pasture (*Lolium multiflorum* Lam). Cows were slaughtered at an average age of 72 months, and steers at 36 months of age, which corresponds to the ages when 90% of the females and 70% of the males are usually slaughtered in the region.

The animals were slaughtered in a local commercial packing plant in August 2007, according to the regulations of the Brazilian Federal Inspection System (SIF 1733). The carcasses were then chilled between –2 and 2ºC for 48 hours, when they were weighed to determine cold carcass weight. Carcass conformation was subjectively assessed by a panel of three trained evaluators, according to the methodology proposed by Müller (1987). Fat cover was subjectively evaluated according to the scale used by the packing plant where the animals were slaughtered by the same evaluators. This scale classifies fat cover according to the following scores: 4 = excessive (>8 mm); 3 = excellent (7-8 mm); 2 = good (5-6 mm); 1 = regular (3-4 mm); and 0 = insufficient (<3 mm). It must be mentioned that the evaluators were researchers trained in the assessment of beef carcasses.

The following carcass measurements were determined: carcass length, from the cranial edge of the intermediate part of the first rib to the cranial edge of the pubis; hindquarter length, from the cranial edge of the pubis until the tibial-tarsal joint; forequarter length, from the olecranon tuberosity until the distal extremity of the umerus; forequarter perimeter in the intermediate part of the umerus, involving the muscles that cover this region; and round thickness, measured with a compass by fixing one of the points in the most external portion of the topside and the other in the external face of the hindquarter, perpendicularly to the hindquarter.

In order to obtain the yield of each full primal cut, half carcasses were initially divided into forequarters and hindquarters cutting between the fifth and the sixth rib. The incision was made equally distant from those ribs, reaching the sternum (breast) and the backbone, at the fifth intervertebral space. The forequarter corresponds to the anterior part and the hindquarter to the posterior part of a half carcass. The hindquarter was subdivided in hindquarter and sidecut, cutting from the posterior extremity of the flank stake at the precrural lymphatic ganglion to the iliac tuberosity, following a straight line up to the sixth rib, approximately 32cm from the dorsal line.

The hindquarters were deboned first. Hindquarters were weighed and deboned on the same shift and by the same operators, aiming at maintaining the same cutting and trimming standard when preparing the parts, producing boneless beef (the t-bone steak remained in the wide hindquarter and was prepared with bone in), edible trimmings (edible meat + fat trimmings), discarded trimmings (excessive fat trimmings + tallow + membranes), discarded bone, and weight loss inherent to the deboning process. A typical deboning standard for the domestic market was used, with moderate to close trim, complying with the demands for the production of branded vacuum-packed beef. Meat cuts and edible trimmings were weighed, and consisted of yield meat, summing up the parts sold for human consumption. Discarded bone and trimmings were also weighed to calculate the participation of each fraction relative to cold carcass weight.

The same procedures were used for the forequarters, which produced all the boneless cuts and foreribs, as well as for the sidecut, except for short ribs and rib roast that, along with the T-bone steak, were the only meat cuts prepared and packaged with bone in.

A randomized complete design with 15 replications per treatment was applied. Data were submitted to analysis of variance, and means were compared by the Tukey test (SAS, 1997).

The following mathematical model was used:

$$Y_{ij} = M + C_i + E_{ij}$$

where Y_{ij} = dependent variables; M = mean of all observations; C = effect of the i^{th} animal classe; E_{ij} = random residual effect.

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Results and Discussion

The animals were not weighed individually. Upon arrival at the packing plant, each animal-class lot was weighed after 6-h fasting. Females weighed in average 496 kg, and males, 494 kg, with average hot carcass dressing percentage of 50.01% and 53.24%, respectively. Restle et al. (2002) observed average hot carcass dressing percentages of 50.12% for Charolais and Nellore purebred cows, and 51.30% for crossbred Charolais × Nellore cows.

The males presented higher carcass weight, better conformation, and lower chilling loss compared to the females, but were not different as to fat cover (Table 1). The inferior conformation of the females and superior conformation of the males, which are typical of these animal classes, often is negatively correlated with chilling loss due to the difference in carcass specific surface. Fat cover was not different between these animal classes, and presented, on a 0 to 4 scale, average values of 2.25 and 2.02 for the females and males, respectively, corresponding to 5-6 mm of fat cover, which is desired by the beef packing industry.

Evaluating young and super-young steer carcasses, Pacheco et al. (2005) showed that those with better conformation presented lower chilling loss, as well as no correlation between fat thickness and carcass drip loss during chilling. Vaz & Restle (2005) and Menezes et al. (2005) also obtained a higher correlation of chilling loss with carcass conformation and hindquarter thickness than with fat cover thickness.

The steer carcasses were shorter, with longer and higher perimeter forelimbs and thicker rounds compared to the cow carcasses (Table 2).

When comparing Hereford cows to 24-month-old steers from the same herd, Vaz et al. (2002) observed higher slaughter weights and longer carcasses in cows, indicating that the steers were still growing, as mature males are expected to be heavier and to have longer carcasses (Di Marco, 1996). Restle et al. (2001b) also found that cows slaughtered at seven years of age or older were heavier and longer than those slaughtered at four years of age.

The coefficients of variation of edible trimmings, discarded trimmings and inherent losses are typically high due to the lack of a definition line when cutting between trimmings and inherent losses, which absorb all weighing failures, evaporation, and any tissue disappearance.

The cows presented higher sidecut yield (Table 3). Coutinho Filho et al. (2006), worked with young (17-month-old) Santa Gertrudis non-castrated males and females from the same herd and also obtained significantly higher sidecut yield in females (50.0%) compared to males (48.1%). On the other hand, Vaz et al. (2002) did not detect any differences in hindquarter yield when analyzing the carcasses of 24-month-old Hereford cows and steers and obtained values of 48.5 and 48.9%, respectively. Cruz et al. (2004), distributed purebred and crossbred steers into three different slaughter weights, and observed that, in general, hindquarter and forequarter and/or rib yields increased as slaughter weight increased.

Several studies have shown the influence of genetic group on the yield of different cuts. When evaluating

Table 1 - Carcass traits, according to animal class

Trait	Animal class		Mean	CV%	P value
	Cows	Steers			
Half hot carcass, kg	124.0b	131.5a	127.77	7.16	0.031
Half cold carcass, kg	121.2b	129.0a	125.11	7.20	0.035
Chilling loss, %	2.26a	1.91b	2.09	10.95	0.001
Conformation, score[1]	5.13b	10.81a	7.97	33.89	0.001
Fat cover, score[2]	2.25	2.02	2.13	37.51	0.439

Means followed by different letters in the same trait are different by the Tukey test (P<0.05).
[1] 1 to 18 score scale: 4 a 6 = poor; 7 a 9 = regular; 10 a 12 = good.
[2] 0 to 4 score scale, with 1 = regular (3-4 mm); 2 = good (5-6 mm); 3 = excellent (7-8 mm).

Table 2 - Carcass measurements (cm) according to animal class

Item	Animal class		Mean	CV%	P value
	Cows	Steers			
Carcass length	137.67a	128.60b	133.14	5.35	0.001
Hindlimb length	66.93b	72.13a	69.53	5.16	0.001
Forelimb length	38.53b	40.87a	39.70	3.35	0.001
Forelimb perimeter	34.60b	37.20a	35.90	3.80	0.001
Round thickness	23.80b	25.13a	24.47	3.54	0.009

Means followed by different letters in the same trait are different by the Tukey test (P<0.05).

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Table 3 - Mean yield of cuts prepared from the hindquarter as a percentage of cold carcass, according to animal class

Item	Animal class		Mean	CV%	P value
	Cows	Steers			
Whole hindquarter	48.93a	48.13b	48.53	2.11	0.039
Round shank on	26.89	27.30	27.10	3.57	0.248
Flat	4.02	4.00	4.01	5.14	0.828
Topside	6.51	6.51	6.51	5.53	0.989
Eye round	1.72	1.83	1.78	11.43	0.153
Knuckle	3.96	3.92	3.94	5.59	0.618
Heel muscle	1.62	1.58	1.60	11.27	0.597
Shank	1.57	1.58	1.58	7.22	0.756
Edible trimmings	1.30	1.23	1.27	26.85	0.538
Discarded trimmings	0.98	0.96	0.97	25.53	0.857
Discarded bone	5.18b	5.66a	5.42	8.04	0.005
Full rump	7.36a	6.90b	7.13	6.40	0.011
Rump uk trim	2.80a	2.66b	2.73	4.92	0.016
Rump cap	1.18	1.11	1.15	16.21	0.365
Tail of rumpe	0.95a	0.87b	0.91	9.22	0.025
Edible trimmings	0.48b	0.60a	0.54	27.30	0.031
Discarded trimmings	0.45	0.35	0.40	43.27	0.146
Discarded bone	1.49a	1.30b	1.40	11.74	0.001
Full loin	14.68a	13.93b	14.31	5.30	0.009
Tenderloin	1.40	1.37	1.39	8.46	0.469
Tenderloin side chain	0.23	0.24	0.24	38.43	0.662
Striploin	3.92a	3.65b	3.79	9.47	0.048
Cuberoll	1.68	1.70	1.69	14.66	0.862
Cap of cube roll	0.95	0.97	0.96	16.34	0.666
Rib	2.22	2.18	2.20	14.17	0.740
Nerve	0.07b	0.08a	0.08	22.76	0.026
Edible trimmings	0.96	0.88	0.92	21.72	0.280
Discarded trimmings	0.54a	0.31b	0.43	44.78	0.003
Discarded bone	2.70	2.51	2.61	11.13	0.077
Inherent losses	0.01	0.02	0.02	165.22	0.203

Means followed by different letters in the same trait are different ($P<0.05$) by the Tukey test.

animals of the breeds Caracu, Nellore Seleção, and Nellore Controle, slaughtered at 22 months of age, with average cold half carcass weight of 149.5, 143.7, and 124.6 kg and fat cover of 4.5, 5.8 and 6.6 mm, Bonilha et al. (2007) obtained hindquarter yields of 44.3, 46.1 and 46.7%, respectively.

Restle et al. (2001a) observed higher hindquarter yield in Charolais heifers (36 months of age) (49.45%) as compared to Charolais × Nellore (48.57%) heifer of the same age and from the same herd. Higher hindquarter yield of Charolais cows (47.14%) compared to Nellore cows (45.98%) was reported by Restle et al. (2002).

There are no available studies in the Brazilian literature on sub-primal hindquarter cuts (round shank on, full rump, and loin) and their subdivisions into prepared meat cuts, edible trimmings, and discarded products that sum up the hindquarter percentage value. In the international literature, Koch et al. (1981, 1982) made these evaluations, but used animals with higher finishing and US cut and deboning standards, and did not define the methodology used for trimming, and therefore their results cannot be compared with those obtained in the present study.

Round shank was similar in yield between the steers and cows, as well for full rump cuts, except for discarded bone, which was higher for males. Cows presented higher full round, striploin, and full rump UK trim yields, whereas the steers had higher yield of bone discarded from the round. Full loin, striploin, and trimming yields were higher in the cows due to their higher length compared to male carcasses (Table 2).

Junqueira et al. (1998) also found higher full rump, rump cap, tenderloin, and striploin yields in females compared to contemporary non-castrated males. Studying carcass traits of males with 7.70 mm fat thickness and females with 7.29 mm fat thickness, Coutinho Filho et al. (2006) reported levels slightly higher than 5 to 7 mm, which are the values that prevent trimming losses the most. These authors observed that females presented higher tenderloin, knuckle, and edible trimming yields, whereas males had higher eye round yield. As to edible trimmings and discarded bone, Coutinho et al. (2006) did not find significant difference between males and females, with 10.08 and 10.31% of bone, 3.21 and 4.30% discarded trimmings, and 2.91 and 2.84% of edible trimmings for males and females, respectively.

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Evaluating non-castrated Nellore, Nellore × Simmental, Simmental, and Simbrasil males, Bianchini et al. (2007) found significant differences in cuts prepared from the hindquarter in absolute values, but not when these were expressed relative to cold carcass weight.

The results of hindquarter cut yields relative to the full hindquarter are not directly shown, but were calculated from the obtained data (Table 3). The hindquarter yielded 70.91% prepared meat cuts, 19.41% bones, and 9.68% total trimmings (4.06% edible + 5.62% discarded trimmings). This allowed us to compared our data with those obtained by Tarouco et al. (2007), who deboned the hindquarter of 102 Braford animals, which, however, were younger (12 months of age) and lighter (158.25 kg carcass) than the steers used in the present experiment, and obtained 68.53% prepared cut yield, 20.76% bones, and 10.82% total trimmings, which were very similar to our results.

The full forequarter deboning yield was higher in the steers due to higher shoulder yield, whereas chuck yield was similar to that of the cows (Table 4). The steers also presented higher shoulder discarded bone, which was the only difference obtained in the forequarter deboning products between males and females. Junqueira et al. (1998) reported higher yields of the forequarter and its respective meat cuts (chuck, neck, brisket, and shoulder) and bones in non-castrated males as compared to females.

Coutinho Filho et al. (2006) found higher forequarter yield in males (38.60%) than in females (35.67%), whereas Vaz et al. (2002), analyzing carcass traits of 24-month-old Hereford cows and steers, did not find any difference in forequarter yield, with 36.36 and 36.96%, respectively.

The total sidecut yield was similar between the cows and steers. The cows presented higher discarded trimming yield, which the only difference was in the production of prepared

Table 4 - Yield of forequarter meat expressed as a percentage of cold carcass according to animal class

Cuts	Animal class		Mean	CV%	P value
	Cows	Steers			
Full forequarter	37.17b	38.37a	37.77	2.44	0.001
Full shoulder	15.39b	16.09a	15.75	4.19	0.007
Shoulder cover	3.10	3.16	3.14	22.60	0.772
Oyster blade	1.63	1.72	1.68	10.36	0.160
Chuck tender	1.02	1.01	1.02	10.72	0.775
Shoulder heart	2.54	2.44	2.49	11.29	0.366
Shin	2.60	2.76	2.68	13.23	0.220
Edible trimmings	0.32	0.39	0.36	45.36	0.235
Discarded trimmings	0.43	0.50	0.47	37.96	0.256
Discarded bone	3.72b	4.06a	3.89	7.06	0.002
Inherent losses	0.03	0.04	0.04	58.27	0.185
Full chuck	21.79	22.28	22.04	4.54	0.195
Rib roast	3.72	3.84	3.78	12.81	0.535
Neck	5.10	5.22	5.16	11.91	0.600
Brisket	2.02	2.06	2.04	20.01	0.776
Chuck	5.15	5.14	5.15	10.42	0.950
Edible trimmings	0.42	0.46	0.44	31.32	0.370
Discarded trimmings	1.09	1.10	1.10	29.67	0.890
Discarded bone	4.26	4.42	4.34	7.65	0.193
Inherent losses	0.03	0.03	0.03	68.51	0.668

Means followed by different letters in the same trait are different by the Tukey test (P<0.05).

Table 5 - Yield of rib yield meat expressed as a percentage of cold carcass according to each animal class

Cuts	Animal class		Mean	CV%	P value
	Female	Male			
Total sidecut	13.89	13.50	13.70	5.97	0.221
Short ribs	5.48	5.46	5.47	8.70	0.927
Cube roll cover	3.67	3.38	3.53	12.26	0.082
Subcutaneous muscle	1.14	1.21	1.18	9.93	0.109
Thin flank	1.77	1.77	1.77	12.31	0.996
Flank steak	0.44	0.43	0.44	11.26	0.464
Edible trimmings	0.32	0.40	0.36	39.19	0.146
Discarded trimmings	1.06a	0.85b	0.96	20.94	0.008
Discarded bone	-	-	-	-	-
Inherent losses	0.02	0.01	0.01	89.95	0.081

Means followed by different letters in the same trait are different by the Tukey test (P<0.05).

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rib cuts (Table 5). Vaz et al. (2002) analyzed carcass traits of 24-month-old Hereford culled cows and steers and observed significantly higher rib yield in the cows (16.92%) compared to the steers (14.92%), as did Coutinho Filho et al. (2006), with 14.31% for females and 13.28% for males.

The yields of cuts prepared with each primal cut and their sub-primal cuts did not differ between the males and females (Table 6). The males tended to have lower yield of the cuts prepared from the hindquarter and higher forequarter yield, as the primal cuts were different when whole (Tables 3 and 4).

The yield of discarded trimmings from the hindquarter and the sidecut (Table 7) was higher in the cows; however, it did not result in total discarded trimmings (Table 8). Bonilha et al. (2007) found an average of 11.3% trimmings in their study, but they did not differentiate it in edible and discarded trimmings. In the present study, the sum of edible trimmings (Tables 3, 4, and 5) was 3.89%, which, added to 4.32% discarded trimmings (Table 3, 4, 5), resulted in 8.21% total trimmings, a value that is slightly lower than that reported by Bonilha et al. (2007). This difference may be related to the fact that the animals had an average of 2 mm fat cover or to the closeness of trimming used in the present study.

The total discarded bone yield (Table 7) was not different between animal classes, despite the higher forequarter discarded bone yield in the steers. In the study by Bonilha et al. (2007), an average of 19.13% total bone was determined for the three evaluated genetic groups, with 1.96% corresponding to rib bones. In the present study, total average bone yield was 17.65% (Table 8), not taking into consideration rib bones, as the rib cuts were prepared with bone in. Summing the 1.96% rib bone yield obtained by

Table 6 - Yield of cuts prepared from the primal cuts expressed as a percentage of cold carcass according to animal class

Cuts	Animal class		Mean	CV%	P value
	Female	Male			
Hindquarter	37.31	36.75	37.03	2.84	0.152
Round	20.71	20.66	20.69	3.80	0.487
Full rump	5.40	5.25	5.33	5.82	0.182
Sirloin	11.21	10.84	11.03	6.32	0.163
Forequarter	27.63	28.22	27.93	3.91	0.154
Shoulder	11.21	11.49	11.35	5.09	0.200
Chuck	16.42	16.73	16.58	6.29	0.427
Sidecut	12.82	12.65	12.74	6.03	0.555

Table 7 - Yield of discarded trimmings and bones derived from the primal cuts expressed as a percentage of cold carcass according to animal class

Cuts	Animal class		Mean	CV%	P value
	Cows	Steers			
			Discarded trimmings		
Hindquarter	1.97a	1.63b	1.80	23.18	0.034
Forequarter	1.52	1.61	1.57	28.07	0.572
Sidecut	1.06a	0.85b	0.96	20.94	0.008
Total	4.54	4.09	4.32	19.55	0.152
			Discarded bones		
Hindquarter	9.37	9.47	9.42	6.35	0.672
Forequarter	7.97b	8.48a	8.23	5.97	0.011
Sidecut	-	-	-	-	
Total	17.35	17.95	17.65	5.64	0.111

Means followed by different letters in the same trait are different by the Tukey test (P<0.05).

Table 8 - Average yield of products derived from deboning expressed as a percentage of cold carcass according to animal class

Parameter	Animal class		Mean	CV%	P value
	Cows	Steers			
Yield meat	77.77	77.62	77.70	1.64	0.752
Discarded trimmings	4.54	4.09	4.32	19.55	0.152
Discarded bones	17.35	17.95	17.65	5.64	0.110
Inherent losses	0.34	0.34	0.34	85.13	0.871
Total	100.00	100.00	100.00	-	-

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Bonilha et al. (2007) to the bone yield obtained in the present study, total bone adds up to 19.61% (17.65 + 1.96%), which is similar to that found by the aforementioned authors. Ledic et al. (2000) obtained 72.59% edible meat, 19.64% bones, and 4.21% discarded trimmings.

Studies that applied the direct deboning method (Osório et al., 1995; Junqueira et al., 1998; Ledic et al., 2000; Coutinho Filho et al., 2006; Bonilha et al., 2007; Tarouco et al., 2007) found lower percentages of edible cuts, and higher percentages of bone than those that reported the method proposed by Hankins & Howe (1946) (Perotto et al., 2000; Feijó et al., 2001; Vaz & Restle, 2005; Kuss et al., 2005; Canesin et al., 2006). The studies using the direct assessment method for deboning obtained 19.08% average bone yield, whereas those applying the HH method achieved 16.85%, resulting in a 3.23% difference. This suggests that the bone fraction may be underestimated and the edible portion, overestimated, in studies applying the direct method. However, Paulino et al. (2005) studied the validation of the equations of Hankins & Howe (1946) and concluded that the HH section (9^{th}, 10^{th}, and 11^{th} rib) provided a satisfactory estimate of the physical composition of the carcass of crossbred Nellore cattle weighing between 223.50 and 421.50 kg. None of these parameters presented any differences ($P>0.05$) between animal classes.

According to Luchiari Filho (2000), males and females have similar production of edible portions, as well as similar yield of the most valued cuts. Junqueira et al. (1998) observed higher yield of prepared meat cuts + edible trimmings in non-castrated males (75.33%) compared to females (73.72%) of the same age and genetic group due to the higher yield of discarded trimmings in females (8.03 *vs.* 6.71%). The authors argued that this resulted from the thicker fat cover in females (8.6 mm) as compared to males (4.5 mm), which was not the case in the present study (Table 1). Relating different fat covers measured on the loin with deboning yields, Parrett et al. (1985) found significant differences in fat, lean meat, and bone values in animals with fat covers of 5 mm, 10 mm, and 15 mm.

Conclusions

The male carcasses presented better conformation, lower chilling weight loss, were shorter, and had longer and thicker limbs than the female carcasses. Compared to the males, the female carcasses had similar rib yield, lower forequarter yield, and higher hindquarter yield, with higher full rump, loin, eye of full rump, tail of round, and striploin. The total yield of yield meat, discarded bone, discarded trimmings, and losses inherent to the deboning process was not different between male and female carcasses.

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