

CARCASS CUTS COMPOSITION OF SIMMENTAL AND BROWN BULLS

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Abstract

Carcass from 260 Simmental and 159 Brown bulls were dissected first to different cuts (chuck, shoulder, front shank, rib roast, back, loin, tenderloin, brisket, rib, flank, leg and hind shank) and then to lean, fat, tendon and bone. The comparison between two breeds was made at 12.5 % carcass fat. Simmental breed had statistical significant higher share of leg and brisket with rib and lower share of chuck, front and hind shank, rib roast, tenderloin and flank, with higher lean and lower bone percentage, but the differences were relative small.

Key words: cattle, carcass cuts, tissue composition

Introduction

The amount and distribution of carcass tissue is important, because it affects the commercial value of a carcass. Differences between breeds are supposed to be caused by different adult body weight and so different physiological age at slaughter (Berg and Butterfield, 1976, Taylor, 1985). Selection and introduction of American Brown Swiss genes into Slovenian Brown population has changed carcass traits of brown bulls (Čepon, 1994). We wanted to compare carcass traits of the two most important dual-purposed cattle breeds in Slovenia at the same physiological age, defined as carcass fat percentage.

Material and methods

Simmental (260) and Brown (159) bulls were from progeny testing stations. Simmental bulls were fed with maize silage and concentrates, Brown

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bulls with grass and maize silage and concentrates. They were slaughtered at subjective defined optimal fatness. The average weight of right carcass side of Simmental bulls was 166 kg and of Brown bulls 158 kg. The average carcass fat percentage was 12.5 % for Simmental and 13.1 % for Brown bulls. After slaughter the right carcass side was dissected to the following cuts: chuck, shoulder, front shank, rib roast, back, loin, tenderloin, brisket, rib, flank, leg and hind shank (Figure 1). Then the cuts were further dissected to lean, fat, tendon and bone. Means and standard deviation for carcass cuts percentage and carcass cuts tissue composition are presented in Table 1. For statistical evaluation GLM procedure was used (SAS, 1989), where breed as fixed effect and carcass fat percentage within breed as covariable, were included in the model. The comparison between two breeds was made at 12.5 % carcass fat. The differences between breeds were tested with F-test and the differences between regression coefficients for two breeds with t-test for significance.

Figure 1. - DISSECTION OF RIGHT CARCASS SIDE: LEG (1), HIND SHANK (2), LOIN (3), BACK (4), FLANK (5), RIB (6), TENDERLOIN (7), SHOULDER (8), FRONT SHANK (9), CHUCK (10), RIB ROAST (11) AND BRISKET (12).

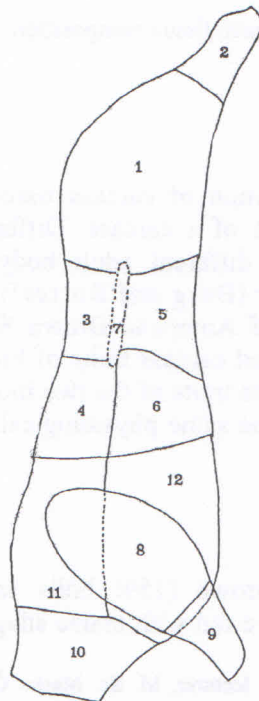


Table 1. - MEANS AND STANDARD DEVIATION FOR CARCASS CUTS PERCENTAGE AND THEIR TISSUE COMPOSITION OF SIMMENTAL AND BROWN BULLS

Carcass cut	Means±Sd			
	Share of carcass cut, %	Carcass cut composition, %		
		lean	fat	bone
Leg	28.47 ±1.06	75.23 ±2.35	10.03 ±2.18	13.41 ±1.23
Hind shank	3.60 ±0.30	39.45 ±3.22	6.48 ±3.08	48.09 ±3.61
Tender loin	2.40 ±0.25	80.22 ±6.16	19.78 ±6.16	-
Loin	3.80 ±0.34	67.01 ±4.34	7.03 ±3.25	24.06 ±4.08
Back	5.07 ±0.50	66.96 ±4.21	11.95 ±4.25	19.99 ±3.04
Rib roast	7.10 ±1.01	74.60 ±4.19	7.16 ±2.62	16.42 ±3.03
Chuck	8.94 ±1.10	78.64 ±3.22	7.14 ±2.79	12.42 ±2.11
Shoulder	15.35 ±0.92	71.97 ±2.48	12.75 ±2.68	14.12 ±1.16
Front shank	2.60 ±0.21	41.65 ±2.78	3.73 ±2.06	49.14 ±3.22
Brisket	9.66 ±0.83	59.19 ±4.07	22.83 ±4.81	17.98 ±2.26
Rib	5.92 ±0.77	64.51 ±4.48	18.79 ±5.40	16.70 ±2.67
Flank	5.69 ±0.70	67.34 ±6.48	28.14 ±6.60	-

Results and discussion

Simmental breed had at 12.5 % carcass fat statistically significant higher share of leg and brisket with rib and lower share of chuck, front and hind shank, rib roast, tenderloin and flank (Table 2). Brown and Simmental breeds are in Slovenia dual-purpose breed, though Brown breed is more pronounced dairy type. Selection for milk ability has for consequences also increased animal frame, so differences in share of carcass cuts could be explained by those changes (Nieuwhof et al. 1992) Dairy type cattle has thinner but longer chuck in comparison with beef type. This characteristic results in higher share of chuck in Brown bulls. Percentage of other cuts did not differ statistically significantly. All the differences were relative small, with leg percentage with around 0.5 % being the highest. The percentage of leg, hind and front shank, shoulder, rib roast in both breeds and tender loin in Simmental and chuck in Brown breed decreased with increased carcass fat, while percentage of brisket, rib and flank increased in both breeds. The regression coefficients for the percentage of back and loin did not differ statistical significant from zero, so the percentage of those cuts was not influenced by the carcass fat. The regression coefficients for chuck differed between the two breeds, being negative in Brown breed and not statistical different from zero in Simmental breed.

Table 2. - LS MEANS FOR CARCASS CUTS PERCENTAGE AND REGRESSION COEFFICIENTS FOR SIMMENTAL AND BROWN BULLS

Carcass cut	LS MEANS \pm SEE		b \pm SEE	
	Simmental	Brown	Simmental	Brown
Leg	28.68 ^a \pm 0.06	28.13 ^b \pm 0.08	-0.12* \pm 0.02	-0.14* \pm 0.03
Hind shank	3.53 ^a \pm 0.02	3.72 ^b \pm 0.02	-0.03* \pm 0.01	-0.03* \pm 0.01
Shoulder	15.33 \pm 0.06	15.36 \pm 0.07	-0.09* \pm 0.02	-0.03 \pm 0.03
Front shank	2.58 ^a \pm 0.01	2.64 ^b \pm 0.02	-0.02* \pm 0.01	-0.03* \pm 0.01
Rib roast	7.02 ^a \pm 0.06	7.23 ^b \pm 0.08	-0.11* \pm 0.02	-0.07* \pm 0.03
Chuck	8.84 ^a \pm 0.07	9.16 ^b \pm 0.09	0.03 ^a \pm 0.03	-0.09* ^b \pm 0.03
Back	5.04 \pm 0.03	5.11 \pm 0.04	0.02 \pm 0.01	0.03 \pm 0.02
Tender loin	2.37 ^a \pm 0.02	2.46 ^b \pm 0.02	-0.01* \pm 0.00	0.01 \pm 0.01
Loin	3.81 \pm 0.02	3.79 \pm 0.03	0.01 \pm 0.01	0.03 \pm 0.01
Brisket	9.74 ^a \pm 0.05	9.55 ^b \pm 0.06	0.14* \pm 0.02	0.10* \pm 0.02
Rib	6.04 ^a \pm 0.04	5.73 ^b \pm 0.06	0.10* \pm 0.02	0.11* \pm 0.02
Flank	5.61 ^a \pm 0.04	5.82 ^b \pm 0.05	0.10* \pm 0.01	0.14* \pm 0.02

* values differ statistically significant ($p < 0.05$) from 0

values marked with different letters differ statistically significant ($p < 0.05$) between breeds

In table 3 LS means for lean percentage in carcass cuts are represented. Simmental bulls had higher lean percentage in leg, back, tender loin, loin, brisket, rib and flank and lower percentage of lean in rib roast and chuck.

In Simmental bulls the regression coefficients of front shank and shoulder and in Brown bulls of front and hind shank were not statistically significant different from zero. In Brown bulls regression coefficient of shoulder was even positive. Regression coefficients of all other cuts were negative and the most outstanding in brisket, rib and flank. This means that lean percentage in those carcass cuts decreased most rapidly with increased carcass fatness. Regression coefficients between two breeds differed significantly only in tender loin.

Simmental bulls had higher fat percentage in hind and front shank, shoulder, rib roast, loin and rib and lower fat percentage in leg, back, tender loin, loin and flank (Table 4). Except regression coefficient for front shank in Brown bulls, were all statistically significant and the highest in brisket, rib and flank. This means that with increased carcass fat percentage, relative the highest amount of fat has been put on in brisket, rib and flank. Share of this carcass cuts also increased with increased carcass fat (Table 2) and this rise was primary a consequence of preferential fat deposition on those cuts (Table 4). Also for fat percentage, only regression coefficients of tender loin differed significantly between two breeds.

Table 3. - LS MEANS FOR LEAN PERCENTAGE IN CARCASS CUTS AND REGRESSION COEFFICIENTS FOR SIMMENTAL AND BROWN BULLS

Carcass cut	LS MEANS \pm SEE		b \pm SEE	
	Simmental	Brown	Simmental	Brown
Leg	75.78 ^a \pm 0.09	74.32 ^b \pm 0.11	-0.64* \pm 0.03	-0.64* \pm 0.04
Hind shank	39.66 \pm 0.20	39.11 \pm 0.25	-0.24* \pm 0.08	-0.13 \pm 0.10
Shoulder	72.05 \pm 0.10	71.84 \pm 0.14	0.01 \pm 0.01	0.03* \pm 0.01
Front shank	41.83 \pm 0.17	41.36 \pm 0.22	-0.02 \pm 0.07	-0.04 \pm 0.08
Rib roast	73.87 ^a \pm 0.22	75.78 ^b \pm 0.28	-0.83* \pm 0.09	-0.84* \pm 0.11
Chuck	78.25 ^a \pm 0.18	79.26 ^b \pm 0.22	-0.60* \pm 0.07	-0.60* \pm 0.09
Back	67.59 ^a \pm 0.21	65.84 ^b \pm 0.27	-0.98* \pm 0.08	-0.75* \pm 0.10
Tender loin	82.37 ^a \pm 0.30	76.89 ^b \pm 0.38	-0.77** \pm 0.11	-1.25* ^b \pm 0.15
Loin	67.85 ^a \pm 0.25	65.59 ^b \pm 0.32	-0.55* \pm 0.10	-0.43* \pm 0.12
Brisket	59.55 ^a \pm 0.17	58.58 ^b \pm 0.22	-1.16* \pm 0.06	-1.14* \pm 0.08
Rib	64.76 ^a \pm 0.21	64.07 ^b \pm 0.27	-1.16* \pm 0.08	-1.11* \pm 0.10
Flank	68.33 ^a \pm 0.24	65.71 ^b \pm 0.30	-1.93* \pm 0.09	-1.91* \pm 0.11

* values differ statistically significant ($p < 0.05$) from 0

values marked with different letters differ statistically significant ($p < 0.05$) between breeds

Table 4. - LS MEANS FOR FAT PERCENTAGE IN CARCASS CUTS AND REGRESSION COEFFICIENTS FOR SIMMENTAL AND BROWN BULLS

Carcass cut	LS MEANS \pm SEE		b \pm SEE	
	Simmental	Brown	Simmental	Brown
Leg	9.86 ^a \pm 0.06	10.30 ^b \pm 0.08	0.72* \pm 0.02	0.73* \pm 0.03
Hind shank	6.99 ^a \pm 0.18	5.73 ^b \pm 0.23	0.46* \pm 0.07	0.26* \pm 0.09
Shoulder	12.98 ^a \pm 0.11	12.34 ^b \pm 0.14	0.78* \pm 0.04	0.85* \pm 0.05
Front shank	3.93 ^a \pm 0.13	3.43 ^b \pm 0.16	0.14* \pm 0.05	0.07 \pm 0.06
Rib roast	7.34 ^a \pm 0.11	6.87 ^b \pm 0.14	0.78* \pm 0.04	0.74* \pm 0.05
Chuck	7.33 \pm 0.14	6.86 \pm 0.18	0.66* \pm 0.06	0.56* \pm 0.07
Back	11.56 ^a \pm 0.17	12.64 ^b \pm 0.22	1.28* \pm 0.07	1.12* \pm 0.08
Tender loin	17.64 ^a \pm 0.30	23.11 ^b \pm 0.38	0.77** \pm 0.12	1.25* ^b \pm 0.15
Loin	7.23 ^a \pm 0.14	6.70 ^b \pm 0.19	0.88* \pm 0.06	0.89* \pm 0.07
Brisket	23.02 \pm 0.17	22.55 \pm 0.22	1.58* \pm 0.06	1.52* \pm 0.08
Rib	19.27 ^a \pm 0.20	17.95 ^b \pm 0.26	1.62* \pm 0.08	1.75* \pm 0.10
Flank	27.56 ^a \pm 0.26	29.11 ^b \pm 0.33	1.95* \pm 0.10	1.92* \pm 0.12

* values differ statistically significant ($p < 0.05$) from 0

values marked with different letters differ statistically significant ($p < 0.05$) between breeds

Except in rib roast and chuck, Simmental bulls had lower percentage of bone in all other cuts. Regression coefficients for bone percentage that statistically significant differed from zero were negative and the most outstanding in back, loin, brisket and rib. In comparison with regression coefficients for lean and fat, regression coefficients for bone were much smaller. So the share of bone in different carcass cuts was less dependent on carcass fatness than lean percentage. Regression coefficients differed significantly between breeds only for rib cut.

Table 5. - LS MEANS FOR BONE PERCENTAGE IN CARCASS CUTS AND REGRESSION COEFFICIENTS FOR SIMMENTAL AND BROWN BULLS

Carcass cut	LS MEANS \pm SEE		b \pm SEE	
	Simmental	Brown	Simmental	Brown
Leg	13.06 ^a \pm 0.07	14.01 ^b \pm 0.09	-0.04 \pm 0.03	-0.08 \pm 0.03
Hind shank	47.70 ^a \pm 0.22	48.66 ^b \pm 0.28	-0.39* \pm 0.08	-0.19 \pm 0.10
Shoulder	13.86 ^a \pm 0.07	14.59 ^b \pm 0.09	-0.07* \pm 0.03	-0.14* \pm 0.03
Front shank	48.94 \pm 0.20	49.42 \pm 0.26	-0.23* \pm 0.08	-0.11 \pm 0.10
Rib roast	16.98 ^a \pm 0.18	15.47 ^b \pm 0.24	0.05 \pm 0.07	0.11 \pm 0.09
Chuck	12.60 ^a \pm 0.13	12.10 ^b \pm 0.17	-0.06 \pm 0.05	0.00 \pm 0.06
Back	19.74 ^a \pm 0.18	20.44 ^b \pm 0.24	-0.25* \pm 0.07	-0.35* \pm 0.09
Loin	22.97 ^a \pm 0.24	25.88 ^b \pm 0.30	-0.32* \pm 0.09	-0.41* \pm 0.11
Brisket	17.43 ^a \pm 0.12	18.86 ^b \pm 0.15	-0.42* \pm 0.05	-0.38* \pm 0.06
Rib	15.96 ^a \pm 0.13	17.98 ^b \pm 0.17	-0.46** \pm 0.05	-0.64** \pm 0.06

* values differ statistically significant ($p < 0.05$) from 0

values marked with different letters differ statistically significant ($p < 0.05$) between breeds

Conclusion

Differences between Simmental and Brown bulls in share of carcass cuts were relative small. Simmental bulls had higher share of leg and brisket with rib and lower share of chuck, front and hind shank, rib roast, tenderloin and flank. Simmental bulls had higher lean and lower bone percentage in all cuts except in chuck and rib roast. The highest differences in tissue composition was found in tender loin and flank, where Brown bulls had much higher fat content than Simmental bulls. Most of the regression coefficients did not differ between breeds, so alteration of carcass cuts composition due to carcass fatness was very similar in both breeds.

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SASTAV I DIJELOVI TRUPA SIMENTALSKIH I SMEDIH BIKOVA

Sažetak

Truplo 260 simentalških i smeđih bikova najprije je rasječeno na različite dijelove (vratina, plećka, prednja koljenica, rebra za pečenje, leđa, but bubrežnjak, prsa, rebra, potrbušina, noga i stražnja koljenica) a zatim na krto meso, mast, tetivu i kosti. Usporedba između dvije pasmine načinjena je kod 12,5% masti trupla. Simentalska pasmina imala je statistički značajno veći udio nogu i prsa s rebrima i manji udio vratine, prednje i stražnje koljenice, rebra za pečenje, bubrežnjaka i potrbušine s većim postotkom krtog mesa i kosti, ali su razlike bile relativno male.

Ključne riječi: govedo, dijelovi trupla, sastav tkiva.

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