

COMPARATIVE STUDY OF FATTENING AND SLAUGHTER TRAITS OF MALE SIMMENTAL BREED AND CROSSES WITH CHAROLAIS BREED

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Abstract: The objective of this study was to determine the slaughter traits, conformation score and fat covering of carcass and composition of carcasses of young cattle of two genotype groups: domestic Simmental breed (A) and its crosses with Charolais breed (B). The sample included a total of 30 animals, 15 in each group. Both groups were slaughtered at final weight of about 660 kg. After the slaughtering, warm carcass sides with and without kidney fat were weighed individually. After cooling, the left carcass sides were cut into main parts according to the Rulebook ("Off. Gazette of SFRY", No. 34/74, 26/75, 13/78 - Rulebook, 1/81 - Rulebook and 2/85 - Rulebook). The results of research show that the young cattle of group (B) achieved a statistically significant ($p < 0.05$) higher yield of warm carcass compared to group A, and statistically highly significant ($p < 0.01$) higher yield of warm carcass without tallow/fat. A statistically significant difference was found in the share of tongues ($p < 0.01$), which was higher in young cattle of group (B) and a statistically significant difference in the share of offal ($p < 0.01$), which was higher in group (A). Shares of tenderloin and the shoulder of young cattle of group (B) were statistically significantly ($p < 0.05$) higher than in young cattle of group (A). A statistically significant difference was determined in carcass conformation scores between groups of young cattle.

Key words: slaughter traits, carcass side composition, carcass conformation score

Introduction

The importance of meat in human nutrition is well known and meat is considered the indispensable and the best-quality component of proper and well balanced diet (*Biesalski, 2005*). Beef is characterized by exceptional nutritional

value, which sets it apart from other types of meat and makes highly respected food (Petrović *et al.*, 2002).

Fattening traits and carcass/slaughter traits, are the basic characteristics of every breed which influence directly the quantity and quality of the final product. Based on data on body development, the amount of bone in the body, the meat : bone ratio, as well as the total amount of meat can be more or less predicted (Ostojić-Andrić *et al.*, 2007).

The use of domestic Simmental breed as the basis for crossbreeding with specialized beef cattle breeds is the fastest and most economical way to improve the fattening and slaughter traits of cattle (Mišćević *et al.*, 2003; Bogdanović *et al.*, 2005). French beef breeds like Charolais are characterized by favorable fattening and slaughter traits, as well as good quality meat with a low fat content in carcasses, which is why they can be fattened to higher final weights ((Ostojić-Andrić *et al.*, 2007).

Number of slaughtered cattle in the Republic of Serbia has been steadily declining (Aleksić *et al.*, 2007). The continuing decline in the number of cattle leads to reduction in the number of calves for fattening (Aleksić *et al.*, 2005 and Aleksić *et al.*, 2012). In European Union member states, a deficit of beef is established with the estimate that the deficit will amount to 600,000 tons. Serbia today exports only 1,000 tons, even though the permitted export preferential quota in the EU is 8,870 tons. For comparison it should be noted that the largest beef export was achieved in 1985 and amounted to 20,000 tons, which is about 20 times more than today. All this points to the need that it is necessary to take advantage of cattle population of lower production characteristics and apply new methods in breeding, nutrition and reproduction in order to obtain a larger number of quality calves for fattening. One quick and efficient way to produce quality calves for fattening is by application of the method of industrial crossing with French beef cattle breeds, as well as through increase of pre-slaughter body weight to provide more meat per animal.

In this trial, final pre-slaughter weight of beef cattle amounted to approximately 660 kg. In the current production practices cattle are mainly fattened to final weight of 450 kg. In this way, we can provide a greater amount of meat per animal without compromising the quality of beef. In particular, given the reduction of breeding animals in Serbia, it is essential that future technologies are based on the crossing and increase of pre-slaughter body weight, in order to compensate for the reducing number of cows and heifers and thus the number of calves for fattening (Aleksić *et al.*, 2005).

Materials and Methods

The trial was conducted at the experimental farm of the Institute for Animal Husbandry (Belgrade, Serbia). Two groups of male calves group were formed: A (n = 15) Simmental breed and group B (n = 15) of the F1 generation with Charolais breed. Both groups of cattle were fed a combined meal which consisted of a mixture of corn silage *ad libitum* according to the table of nutrition depending on the weight group. Final weight before slaughter was about 660. One day prior to slaughter young cattle did not receive food, but had free access to water. Slaughtering and primary processing were carried out in the experimental slaughterhouse of the Institute for Animal Husbandry. Animals were weighed immediately before slaughter, and then slaughtered according to standard commercial procedures. After primary treatment, carcasses were placed in cold storage at 4°C for another 24 hours. Warm carcass weight, weight of offal (heart, lungs, liver, kidneys, spleen and tongue), head, tail and kidney fat were measured one hour after slaughtering and processing. After chilling, the carcasses were measured and split along the vertebral column in two halves, and the left side was used for all measurements. The left side of each carcass was divided into twelve anatomical regions: round/leg, tenderloin, loin part, shoulder, back, neck, brisket, undershoulder, ribs, flank (belly), forshank and hindshank, using a standard technique. Carcass scores were determined based on two systems: JUS (carcass conformation and covering of carcass with fat tissue - measured using a scale of 1 to 5, where 1-very low; 2-low; 3-average; 4-high and 5-very high) and Europe (beef conformation and covering of carcass and round/leg with fat tissue measured using a scale from 1 to 5, where 5 (E) - Great, 4- (U) Very good, 3 - (R) Good, 2 - (O) - Moderate or 1- (P) -Poor).

The data obtained for certain parts were processed using the variance analysis of the single factorial experiment (One-way ANOVA) by SPSS Statistics 20. The statistical significance of differences between mean values was determined by t-test.

Results and Discussion

Average values of the slaughter results of the studied beef cattle group (A) and group (B) are shown in Table 1. The results show that the cattle of group (B) achieved higher carcass yield by 2.11% in relation to young cattle of group (A). *Kamieniecki et al. (2009)* state that the carcass yield of crosses between domestic Simmental and Charolais breed is 58.8%. *Oprządek et al. (2001)* come to similar results in their research.

Table 1. Average values of slaughter traits of young cattle

Indicator	A	B	t-test
Pre-slaughter mass (kg)	672.00 ± 16.67	644.12 ± 54.03	ns
Daily gain (g)	1436.82 ± 199.17	1699.20 ± 423.36	ns
Warm carcass mass (kg)	390.05 ± 9.27	385.72 ± 37.92	ns
Warm carcass yield (%)	58.07 ± 1.36	60.18 ± 2.20	*
Warm carcass mass without fat/tallow (kg)	408.55 ± 95.15	379.71 ± 37.86	ns
Warm carcass yield without fat/tallow (%)	56.93 ± 1.37	59.24 ± 2.04	**

ns – not significant

* significant at the level of (p<0.05)

** significant at the level of (p<0.01)

Share offal was not significantly different between groups of young cattle (Table 2). A statistically significant difference was found in the share of tongues (P<0.01), which was 0.30% higher compared to young cattle of group B.

Aleksić et al. (2002) come to similar results. Data obtained are consistent with the study of *Aleksić et al. (2009)* for young cattle of domestic Simmental breed.

Table 2. Share of slaughter by-products

Share of carcass (%)	A	B	t-test
Kidney fat/tallow	1.12 ± 0.45	0.79 ± 0.43	ns
Liver	1.17 ± 0.11	1.10 ± 0.09	ns
Lungs	0.53 ± 0.08	0.58 ± 0.09	ns
Spleen	0.19 ± 0.03	0.17 ± 0.03	ns
Kidneys	0.18 ± 0.02	0.17 ± 0.02	ns
Tongue	0.22 ± 0.03	0.30 ± 0.06	**
Heart	0.37 ± 0.04	0.36 ± 0.06	ns
Head	2.37 ± 0.15	2.39 ± 0.20	ns
Tail	0.18 ± 0.04	0.20 ± 0.04	ns
Skin	8.35 ± 0.77	9.17 ± 0.66	ns

ns – not significant

* significant at the level of (p<0.05)

Carcass conformation scores showed no statistical significance between the groups (Table 3). Scoring of conformation and fat covering of beef carcasses has great significance in the contemporary systems of carcass quality assessment. According to research of *Ostojić-Andrić et al. (2011)* Charolais crosses with domestic Simmental breed had carcass conformation score 3.94 and covering of

round/leg 3.77. In the research by *Chambaz et al. (2003)*, carcasses obtained from Simmental cattle demonstrated the poorest conformation compared to Charolais and Limousin carcasses which were significantly heavier. *Karolyi et al. (2006)* suggest that the young cattle of domestic Simmental breed have shown favorable carcass conformation with the highest scores.

Table 3. Evaluation of beef carcass conformation using two systems (jus and eu)

Trait	A	B	t-test
Conformation (jus)	4.95 ± 0.15	4.90 ± 0.20	ns
Covering (jus)	4.23 ± 0.41	4.20 ± 0.24	ns
Meat colour (jus)	4.59 ± 0.49	4.50 ± 0.45	ns
Conformation (eu)	4.95 ± 0.15	4.90 ± 0.20	ns
Covering of carcass (eu)	4.18 ± 0.40	4.00 ± 0.32	ns
Covering of leg/round (eu)	4.32 ± 0.40	4.10 ± 0.20	ns
Colour of fat/tallow (eu)	4.09 ± 0.20	4.10 ± 0.20	ns

ns – not significant

The share of parts of extra category (tenderloin) and category II (loin, back, shoulder) were significantly different between groups of young cattle (Table 4). A statistically significant difference ($P < 0.05$) was found in the share of steak that was higher in young cattle of group B (1.27%) compared to young cattle of group A (1.00%). Share of shoulder was lower in young cattle of group A (12.20%) compared to young cattle of group B (13.82%). Similar results are obtained by *Oprządek et al. (2001)*. *Oprządek et al. (2001)* suggest that the share of the shoulder in young cattle of domestic Simmental crosses with Charolais breed is 15.40%.

Table 4. Share of main beef carcass parts

Carcass parts (%)	A	B	t-test
Round/leg	28.36 ± 1.55	28.82 ± 1.20	ns
Hind shank	3.59 ± 0.40	3.72 ± 0.51	ns
Tenderloin	1.00 ± 0.17	1.27 ± 0.29	*
Back-loin part	9.71 ± 1.44	10.33 ± 1.30	ns
Shoulder	12.20 ± 1.25	13.82 ± 1.85	*
Fore shank	2.73 ± 0.28	3.07 ± 0.59	ns

ns – not significant

* significant at the level of ($p < 0.05$)

Conclusion

Based on the research results, statistically significant effect of genotype on slaughter traits and certain parts of the carcass and slaughtering by-products can be concluded. Based on the results presented in this paper it can be stated that young cattle of group (A) and young cattle of group (B) do not differ significantly in their carcass conformation scores. A statistically significant difference was found in a higher share of yield in young cattle of group (B), which amounted to 59.24%, in the share of by-products: tongue, which was higher in young cattle of group (B) – 0.30%; and statistically significant difference was established in the share of offal-cuts that was higher in young cattle of group (A) – 0.54%. The share of basic carcass parts differed between groups. Share of tenderloin and shoulder was higher in young cattle of group (B) and amounted to 1.27% and 13.82% respectively.

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Uparedno ispitivanje tovnih i klaničnih osobina muške junadi simentalske rase i meleza šarolea sa simentalskom rasom

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Rezime

Cilj ovog istraživanja je bio da se utvrde klanične osobine, ocena konformacije i prekrivenosti trupova lojem i sastav polutki junadi dve genotipske grupe: domaće simentalske rase (A) i njenih melaza sa šarole rasom (B). Uzorkom je obuhvaćeno ukupno 30 grla, po 15 u svakoj grupi. Obe grupe su zaklane pri dostizanju težine oko 660 kg. Nakon klanja izvršeno je pojedinačno merenje toplih polutki sa i bez bubrežnog loja. Posle hlađenja leva polutka je rasecana u osnovne delove prema pravilniku ("Sl. list SFRJ", br. 34/74, 26/75, 13/78 – dr. pravilnik, 1/81 – dr. pravilnik i 2/85 – dr. Pravilnik). Dobijeni rezultati istraživanja pokazuju da su junad grupe (B) ostvarila statistički značajno ($p < 0.05$) veći randman toplog trupa u poređenju sa grupom A, kao i statistički vrlo značajno ($p < 0.01$) veći randman toplog trupa bez loja. Statistički značajna razlika je pronađena u udelu

jezika ($p < 0.01$), koji je bio veći kod junadi grupe (B) i statistički značajna razlika u udelu obrezaka ($p < 0.01$), koji je bio veći kod grupe (A). Udeo bifteka i udeo plečke kod junadi grupe (B) su statistički značajno ($p < 0.05$) bili veći nego kod junadi grupe (A). Statistički značajna razlika nije utvrđena kod ocene konformacije trupova između grupa junadi.

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