

# BOOK OF PROCEEDINGS



*VIII International Scientific Agriculture Symposium  
Jahorina, October 05-08, 2017*



**AGRO** 2017  
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## EFFECT OF AGE OF YOUNG SIMMENTAL BULLS ON THE CLASS CARCASS AND DEGREE OF FAT TISSUE CARCASS COVERING

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### Abstract

The quality of slaughtered animals is a subject of interest, of both primary production and the meat industry. The aim of the study was to analyze the effect of age of Simmental young beef cattle (bulls) on the class and degree of fat tissue carcass covering in a slaughterhouse in Raska district, according to the standard applied in the European Union (Council Regulation (EC) N 1234/2007, Commission Regulation (EC) N 1249/2008; European Commission, Directorate-General for Agriculture and Rural Development). The rules defining the quality of meat have been partially applied in Serbia (Official Gazette of the SFRJ 34/74, 26/75, 13/78). The quality assessment, classification and determining the degree of the carcass fat tissue covering is performed immediately after a veterinary examination and measurement of the carcasses weight. The study was conducted on 116 young cattle (young bulls) carcasses of domestic Simmental breed from redemption, which are divided into two age groups. The first group were cattle of age from 269 to 350 days ( $n = 78$ ) and the second 351- 450 days of age ( $n = 38$ ). The results showed that the tested groups differed significantly ( $P < 0.05$ ) in the values of animals weight prior to slaughter and carcasses weight after primary processing. The average weight of cattle in the first group was 508.89 kg and 531.2 kg in the second, while the average slaughter weight of the hull in the first group was 268.83 kg and 279.97 kg in the second. Both observed age groups had identical average class 4.66. Fat tissue coverage degree of carcass in the first group was estimated an average score of 3.09, while the average rating of fat tissue coverage degree of carcass in the second group was somewhat higher (3.21), but this difference was not statistically confirmed ( $P > 0.05$ ). The given results show that it is necessary to intensify the upgrading of primary production in order to achieve better quality of meat.

**Key words:** *Age, Simmental cattle, Class, Fat tissue coverage.*

### Introduction

Global population growth in last few decades increases the livestock products demand, therefore in 2016, according to FAO data (*Food Outlook, Biannual Report on Global Food Markets, 2016*) 320.7 million tons of meat were produced worldwide which is by 0.3% more compared to production in 2015. Beef world production in its scope is in third place, behind pork and poultry meat. In total production, poultry participates with 36.23% (116.2 tons), 36.3% pork (116.4 million tons), beef 21.32% (68.4 million tons) and mutton 4.4% (14.1 million tons) according to FAO 2016. On the other hand, the US (19%), Brazil (15%) and the European Union, (13%) produce approximately 47% of global beef production, i.e. less than one-half of the beef in the world. Globally observed, since 1960 the entire meat production



tripled, milk production nearly doubled, and egg production increased four times (Speedy, 2003). The world's average annual meat consumption per capita in 2016 amounted 43.4 kg. In the EU countries there are significant differences in the beef consumption between the individual member states. Thus, in 2011 per capita consumption in France was 25.4 kg, 19.7 kg in Slovenia, 17.3 kg in Austria, in Romania it was 6.5 kg while in Bulgaria it was only 4.5 kg (Grgić and Rakić, 2015). In the last decade, in Serbia is present continuously negative trend of total number of cattle with an average annual decline by 2-3% (Petrović et al., 2011). Number of cattle in 2013 was only 913. 000 and it is the smallest in the period since 1995 to 2013 and a slight increase was recorded in 2014 (920.000). In registered slaughterhouses 302.000 bovines were slaughtered in 2015, which is by 45.9% less than in 1995 (658.000 slaughtered animals). According to official statistics in Serbia 70.000 tons of beef have been produced in 2013, 73.000 tons in 2014 and 77.000 tons in 2015. The low production of beef in Serbia has also resulted in low consumption - the annual consumption in 2003 was 6.1 kg, 3.6 kg in 2005, 4.5 kg in 2007, and only 3.5 kg in 2010 (Zlatanović, 2012). However considering current situation, production and consumption of beef in the Republic of Serbia is very low despite natural resources and Simmental breed of cattle with a predisposition for fattening. In last 20 years, the selection was enacted for the purpose of milk production, but it can be said as well that the production of meat was developed through selection work. This is best indicated by the fact that young bulls were first tested for growth traits and physical development, and tested to progeny test for milk traits and conformation. Maternal characteristics, feed conversion ratio, as well as the quantitative and qualitative characteristics of carcass and meat are substantial for meat production (Bogdanović et al., 2005). Having in mind that the beef production in Serbia is based on Simmental race, selection must be meant to improve fattening and slaughter characteristics and to ensure retention of already achieved level of milk production. It is necessary to breed the domestic cow with lower production traits with bulls of breeding races such as the French, Italian and English. The aim of this crossing is the usage of heterosis effect in creating the genotype, which will result in the final body weight in the F1 generation of 550 kg, the average daily weight gain of 1500 g, carcass yield of above 60% and the content of the muscle tissue in the body of more than 60% (Petrovic et al., 2007). On the other hand, the Republic of Serbia is currently in the process of joining the EU and it is necessary to make certain amendments to the existing regulations and adopt new ones in order to make meat originating from Serbia competitive on the European market. This will mean that payments to farmers-owners of animals will be conducted according to the achieved quality, not live weight.

### **Material and Methods**

According to the Rulebook on the quality of animals for slaughter, poultry and game (Official Gazette of SFRY 34/74, 26/75, 13/78) carcasses or half-carcasses in Serbia are classified into categories according to age (three age groups): (1) veal (age in both sexes up to 6 months); (2) beef (bull the age of 6 to 18 months; female and castrated males between the ages of six to 30 months); (3) of cattle (bull the age over 18 months; female and castrated males over the age of 30 months). Within each of these age groups, grading of carcasses is provided according to certain criteria such as: (1) carcass weight (or mass of the two halves); (2) conformation of the carcass; (3) fat tissue covering and meat marbling of carcass; (4) color of muscle and fat, and (5) texture and consistency of muscle and fat tissue.

Weight of the carcass implies carcass with removed skin, head, lower legs (separated in the compartment and the carpal joint), tail and all the viscera thoracic, abdominal and pelvic cavities have been removed, with the exception of kidney and renal adipose tissue. Half is represents the slit carcass along the line of separation, through the center of the vertebrae, pelvic and thorax. A favorable conformation (excellent) of carcass implies that all profiles are extremely well developed and convex. Butch fleshy carcasses have a convex profile, the back are

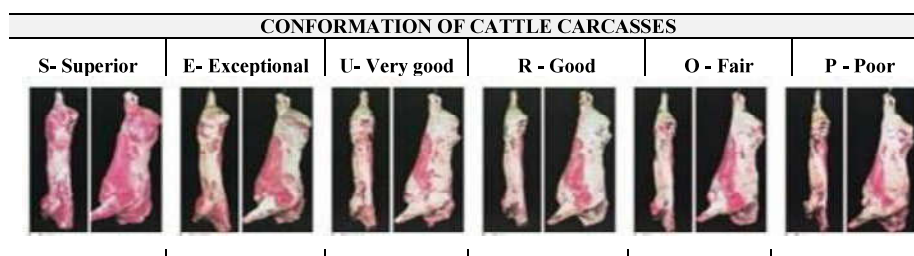


well developed and wide, and the blades are filled and well-formed. Poor or unfavorable torso / hemisphere conformation is characterized by concave, but poorly developed, back are narrow, the blade is straight and noticeable are convex bones (Regulations of quality of beef carcass and half, Official Gazette of R. of Croatia no. 2/09).

Fat tissue coverage refers to the amount and allocation of subcutaneous, kidney and pelvic fat tissue and residues on the inside surfaces of the chest and abdominal cavity. From a quality point of view, it is considered a favorable overlap when the carcasses or hemispheres have a uniform and well-distributed, continuous, but not too thick layer of fatty tissue.

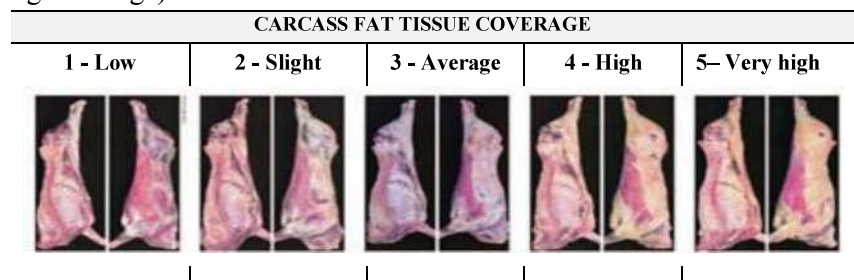
Following parameters are used for classification of cattle carcasses in the EU countries: carcass weight, category of slaughtered animal according to age and physiological condition, class based on conformation, muscular development of the carcass or half as well as the development of the basic parts (but, the back and shoulders), the degree of coverage of fat tissue, etc. Carcasses or half-carcasses are classified into categories based on the age and physiological status of the animal on: calves (up to eight months old), elderly calves (from eight to 12 months old), heifers (female animals that have not calved), young bulls (up to 24 Month olds), bulls (older than 24 months), castrated male animals and cows (female animals that have calved) (Council Regulation (EC) N° 1234/2007, Commission Regulation (EC) N° 1249/2008; Commission European, Directorate-General for Agriculture and Rural Development).

Based on the development of the carcass, the carcasses are classified into one of six classes according to the system represented in the EU: S (superior), E (excellent), U (very good), R (good), O (fair), and P (poor), image 1.



**Image 1.** Carcass of adult cattle and grading (SEUROP) in EU countries (Council Regulation (EC) N° 1234/2007, Commission Regulation (EC) N° 1249/2008; Commission European, Directorate-General for Agriculture and Rural Development)

Fat tissue coverage (Image 2) is assessed by numerical grades from 1 (very low coverage) to 5 (very strong coverage).



**Image 2.** Adult cattle carcass fat tissue coverage and evaluation in the EU countries (Council Regulation (EC) N° 1234/2007, Commission Regulation (EC) N° 1249/2008; Commission European, Directorate-General for Agriculture and Rural Development)

The study was conducted in the period from 10.07.2014 to 04.08.2014, in one slaughterhouse in the Raska district. The study was included 116 carcasses of young cattle (young bulls) of domestic Simmental breed, which were divided into two groups according to age. The first group were cattle age from 269 to 350 days (n = 78) and the second 351- 450 days (n = 38). The aim of this study was to examine the effect of age of young Simmental cattle (young bulls) to class and fat tissue

coverage degree in slaughterhouse by following appropriate criteria. In order to accomplish this objective, tasks were set to test the quality of beef cattle (bulls) by monitoring the following parameters: live animals mass, slaughtered weight of the carcass, carcass class on the basis of conformation, fat tissue coverage, the accuracy of the slaughter of carcass.

Measuring the weight of the animal prior to slaughter was carried out on the scale with accuracy of  $\pm 0.5$  kg, immediately after animals were brought to the slaughterhouse. Measuring the mass of the carcass after slaughter was carried out on the scale with accuracy of  $\pm 0.5$  kg, at least 45 minutes after the slaughter. Carcass weight includes processed carcass without internal organs (with the exception of the kidneys), skin, head, lower parts of legs (separated in the lower part of the carpal, tarsal joints is measured respectively), large blood vessels, spinal cord and the genital organs.

At the end of the processing line, assessment of slaughter processing of carcass was performed by the classifier (veterinary or agronomist staff): carcass without internal organs (except kidneys), skin, head, lower parts of the legs (separate in the lower carpal or tarsal joint), large blood vessels, spinal cord and the genitals. After data have been collected, ANOVA procedure was applied for the statistical analysis. Statistical analysis was performed in a statistical package StatsSoft INC (1995).

### Results and Discussion

Sampling covered 116 cattle (young bulls). All of the carcasses have been processed adequately. Table 1 shows the average values per groups that include several parameters: live weight, slaughter weight, carcass class and fat coverage degree for all 116 carcasses of cattle that have been tested.

**Table 1.** Phenotypic manifestation and variability of slaughtering characteristics of young bulls of the Simental race, depending on age at slaughter

Age groups (days)	Characteristics	N	$\bar{x}$	S $\bar{x}$	SD	CV (%)	Variation interval		F <sub>exp</sub>
							Min.	Max.	
269-350	Weight before slaughter	78	508.89	5.05	44.60	8.76	388.00	613.00	F <sub>MBS</sub> =* F <sub>CM</sub> =** F <sub>COH</sub> =ns F <sub>DOTFC</sub> =ns
	Carcass weight	78	268.83	2.76	24.42	9.08	205.00	325.00	
	Class of carcass (1-5)	78	4.66	0.05	0.47	10.08	4.00	5.00	
	DOTFC(1-5)	78	3.09	0.03	0.28	9.06	4.00	5.00	
351-450	Weight before slaughter	38	531.32	11.01	67.85	12.77	417.00	713.00	F <sub>MBS</sub> =* F <sub>CM</sub> =** F <sub>COH</sub> =ns F <sub>DOTFC</sub> =ns
	Carcass weight	38	279.97	5.29	32.60	11.64	206.00	342.00	
	Class of carcass	38	4.66	0.07	0.48	10.30	4.00	5.00	
	DOTFC	38	3.21	0.07	0.41	12.77	3.00	4.00	

Weight before slaughter – WBS; Carcass weight – CW ; Class of carcass – COC; Degree of total fat cover (1-5) – DOTFC; ns - P>0.05; \* - P<0.05; \*\* - P<0.01; \*\*\* - P<0.001;

Results from Table 1 indicate that examined groups differed statistically significant (P<0.05) in the weight values of the animals before slaughter and the carcass mass after primary treatment. The average weight of cattle prior to slaughter in the first group was 508.89 kg and 531.2 kg in the second, while the average slaughter weight of the carcass in the first group was 268.83 and 279.97 kg in the second.

Both age groups tested, had identical average class rating - 4.66. Fat tissue coverage degree of carcasses in the first group was assessed with the average score of 3.09, while the average estimated fat tissue coverage degree of the carcasses in the second group was somewhat higher (3.21), but this difference was not statistically confirmed (P>0.05).

Petrović et al. (2017) came to similar results by analyzing the fat tissue coverage degree. The analysis included 123 young bulls. Three categories were stated (2, 3, 4). Only one carcasses was of the category 2. The category 3 was found at 107 carcasses, which is significantly more (p<0.01)

than in the category 2 and in category 4 (15 trunks.) Aleksić et al. (2002) state the following production results of male beef of domestic Simmental breed (weight of animals before slaughter 592.7 kg, weight of warm halter with basil 329.9 kg, yield 55.66%. In their experiment, Ostojić et al. (2011) found statistically significant differences ( $p < 0.01$ ) between crossbreeds and domestic Simmental breeds in terms of trophic conformation. Crossbreed Charolais achieved best assessment of conformation of carcasses (3.94), however slightly less than in our experiment. Also, significantly more fatt tissue on the outer part of the carcass was found in the domestic Simmental breed (3.44) compared to the Charolais crossbreed (3.27). Ostojic et al. (2007) came to similar results in their researches. In 477 days a final weight of Simmental bulls of 579 kg was achieved. In the same study, crossbreed of Charolais and Limousine at a younger age (446 and 443 days) achieved higher body weight at the end of the fattening (621 kg and 590 kg).

Results matching this were also published by Kögel et al. (1995), who found that crossbreed of Simmental with French flesh-colored races, Limousine and Blonde Aquitaine had better slaughter values than the Simmental breed: a higher randman, a better conformation of the hull, a larger proportion of muscle, and a smaller proportion of fatt tissue and bones in carcass.

### **Conclusions**

Based on the results and their critical consideration, following can be concluded:

- Average weight of live animals and slaughter weight in the first group (508.89 kg, 268.83 kg) were significantly lower ( $P < 0.05$ ) compared to the second group (531.2 kg and 279.97 kg);
- Both examined groups had identical average class rating grades - 4.66;
- There was no significant difference ( $P > 0.05$ ) in the fat tissue coverage degree (3.09: 3.21).

Consequently, the obtained results indicate that the age of the bulls does not affect the carcass class and the degree of fat cover.

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