



## The trend of body tissues share of Simmental cattle in about twenty years period

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**ABSTRACT** - This work investigated the bone, muscle and fat tissue shares in Simmental breed. The trial comprised 917 young bulls, progeny of 81 sires, during the period of 18 years. Sires were in their progeny testing for meat production traits. Average young bulls final body weight was  $557.73 \pm 1.78$  kg in range between 385 and 729 kg. Average body tissue share was as follows: bone  $19.21 \pm 0.10\%$ , muscle  $61.91 \pm 0.15\%$  and fat  $14.13 \pm 0.11\%$ . Significant ( $P < 0.001$ ) phenotypic correlations existed between final body weight and share of muscle (0.34) and fat (0.16), and between shares of bone and muscle (-0.13), bone and fat (-0.42) and muscle and fat (-0.28). Trend of increase in final body weight, muscle and bone share followed by slight decrease of fat share in investigated period was noted. It is suggested that was due to selection of large and robust sires.

*Key words:* Simmental cattle, Meat, Body composition.

**Introduction** - Simmental breed is 70.7% of the whole Croatia cattle population (CSC, 2007). This breed is known for its dual (meat and milk) production purposes and breeding type has changed during the years in accordance with the alteration of breeding goals in main Simmental breeding centers. Among most important factors which have influenced Simmental cattle characteristics in Croatia were rural development, breeder's knowledge, investments, experts, state of the whole economy and unfortunately war (1991-1995) with devastating effects. Shares of muscle (M), bone (B) and fat (F) tissue are among the main determinants of beef carcass quality. Today's consumers are demanding meat with less fat and more muscle. Beef breeders are able to influence the body composition through selection of breeding animals. This work investigated the body tissue shares in Simmental cattle.

**Material and methods** - The trial comprised 917 young bulls, the progeny of 81 sires chosen to be tested in Hrsovo test station for meat quality, during the period of 18 years (from 1984 till 2001). Young bulls were kept in loose housing system and fed with concen-

trates and hay (60% energy from concentrate diets). Final body weight (BW) was recorded at the end of fattening. After 24 hours from slaughter and on cooled carcasses, 7<sup>th</sup> to 9<sup>th</sup> thoracic rib cuts have been taken from the right hand side of each carcass. Rib cuts were anatomically dissected and share of M, B and F were determined (Rako, 1960). Forecast from known variable (year) was made for investigated traits by the means of linear regression. Influence of various factors (sire, year and final body weight) on investigated traits was performed with analysis of variance. Basic statistics, correlations, linear regression and analysis of variance were made with SAS (SAS, 1999-2001).

Table 1. Phenotypic correlation coefficient between investigated traits and influence of BW, sire and year on young bulls tissues share (n = 917).

	Correlation			Influence of various factors on tissues share		
	B-%	M-%	F-%	P-values of F statistics (ANOVA)		
				BW	S	Y
BW-kg	0.04	0.34*	0.16*			
B-%		- 0.13*	- 0.42*	0.14	<0.01	<0.01
M-%			- 0.28*	<0.01	<0.01	<0.01
F-%				0.92	<0.01	<0.01

\*Correlations significant at level  $P < 0.001$ .

BW-final body weight, B-bone, M-muscle, F-fat, S-sire, Y-year.

was 19.21±3.02%. Results are in accordance with findings of Mandell *et al.* (1997) who found 20.60% of bones in Simmental young bulls. In most works of the other researchers B share was between 13.08% and 17.63%. M (61.91±4.41%) and F share (14.13%±3.37%) were in accordance with the findings of other authors (Karadjole, 1978; Križanović, 1990; Augustini *et al.*, 1993; Gregory *et al.*, 1994; Steen and Kilpatrick, 2000; Lowe *et al.*, 2001; Božić, 2001; Block, 2001). Variability of considered traits was low to medium except for F share. Božić (2001), Karadjole (1978) and before mentioned authors stated that various factors such as year and sire influenced investigated traits. Our findings also showed that these influences are significant for investigated traits (Table 1) while final BW influenced significantly only on M share. All correlations were low to very low but statistically significant ( $P < 0.001$ ) except between final BW and B share (Table1).

Trend analysis for final BW, M and B share during period of 18 years (1984 – 2001) showed average yearly increase (3.44kg, 0.20 and 0.21% respectively) while F share showed slight yearly decrease (0.04%). Yearly increase of B and M share could be presented by the formulas B share (%)=17.18+0.21\*year and M share (%)=59.99+0.20\*year. Yearly decrease of F share could be presented by the formula F share (%)=14.49-0.04\*year. Final BW influenced significantly only on M share (table 1). Final BW yearly increase was followed by increase of M share, slight decrease of F share and proportionally higher increase of B share. Rompala *et al.* (1985) stated that higher final body weight is connected with higher

**Results and conclusions** - In our trial young bulls had higher average final BW (557.73±53.93kg) compared with final BW in previous trials (Božić, 2001; Križanović, 1990; Karadjole, 1978). In those trials final weight averaged from 436.6 to 533.7kg. This shows the shift toward aimed final BW (550 and 600kg) proclaimed in National cattle breeding plan. The average B share

accretion of fat, increased body fat percentage and in the same time lowered share of the other components. Possible cause of increased B and M share in our study could be selection of bigger and more robust sires for artificial insemination. Also, size and robustness could be responsible for decrease of F share as a consequence that those animals are later maturing with later onset of fat deposition.

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