

SHARE OF MAIN CUTS AND TISSUES IN THE CARCASSES OF YOUNG SIMMENTAL CATTLE

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SUMMARY

Trend of recovery of the Croatian beef production in recent years and potential to renew the export of beef to some traditional European markets have actualised researches in young cattle (baby beef) – the most important export category. In this work, the shares of main cuts and tissues (muscle, fat, bones and connective tissue) in the carcasses of young Simmental cattle produced for the Italian market were analysed. With this aim the dissection of 26 carcass halves of average weight of 129.3 kg were carried out. The average share of cuts of the 1st category (leg) in the carcass was 30.5%, of the 2nd category (back and shoulder) 23.1% and of the 3rd category (upper sub-shoulder, lower sub-shoulder, ribs, breast, neck, belly, front and hind shank) 44.4% respectively. By cut tissue dissection, the greatest variability was found for share of fat and connective tissue and the lowest for share of muscle and bones. The average share of muscle tissue was 76.1% in the leg and 70.2% and 59.2% in the carcass parts of the 2nd category and 3rd category, respectively. The average share of fat tissue and bones in the leg was 5.2% and 13.3%, in the carcass cuts of the 2nd category it was 7.2% and 17.4%, and in the carcass cuts of the 3rd category it was 12.5% and 21.8%, respectively. The average share of connective tissue in carcass parts of the 1st, 2nd and 3rd category was 5.4%, 5.1% and 6.5%, respectively. The mean shares of muscle, fat, connective tissue and bones in the carcass halves were 68.8%, 9.1%, 5.9% and 16.3%, respectively.

Key words: young cattle, dissection, carcass cuts, tissue, Simmental breed

INTRODUCTION

In 2007, the annual production of all categories of beef in Croatia ranged between 70 and 75 thousand tons, as estimated by the association "Croatiastočar" (Poslovni dnevnik, 2008). Of that quantity meat of bulls and beef heifers accounted for about 45 thousand tons, cow meat about 20 thousand tons and veal about 10 thousand tons.

In comparison to 2006, beef production was increased by 20% and it was the first time, after 2000, that Croatia has reached again the self-sufficiency level of beef production. The average annual consumption of beef per capita in Croatia amounts to 9.2 kg of beef and 2.2 kg of veal (Statistical Yearbook, 2007). The export of beef was also increased, so that in 2007 it amounted to about 3.5 thousand tons. Covering of the home market demands and the increase of both the export and number of domestic beef cattle (37291 of 86331 heads fattened during 10 months of 2007), show an upward trend of recovery of this, once very important, branch of Croatian livestock production. For example, in the period between 1981 and 1998, the annual export to foreign markets was on average 19 thousand tons of live beef cattle and 12.8 thousand tons of beef and beef products (Pankretić, 1998). Traditionally, the most important export markets are Italy, about 90% of total sales, and Greece with about 5% (Kolega et al., 2003). In Italy, the average annual consumption of beef per capita is two-fold higher than in Croatia (about 24.5 kg, FAOSTAT, 2004). The highest share in total beef consumption is that of meat of intensively grown young bulls and heifers (Cozzi and Ragno, 2003). In 2006, these categories accounted for about 73% of total cattle production in Italy (Cozzi, 2007). However, the Italian beef production does not cover the needs of domestic market. For example, in 2005, it covered only 68% of beef needs (Cozzi, 2007), and consequently, the import of live cattle and beef from other countries is significant. Beef production in the European Union (EU-27) is in general insufficient and import from the third countries is a necessity. According to estimations of the European Commission, the import of beef in EU-27 in the period 2007 – 2014 will increase further and it is expected to reach the level of 741 thousand tons in 2014 (EC Directorate-General for Agriculture and Rural Development, 2007). Preferential quota for export of the Croatian beef in the EU countries amounting to 9.4 thousand tons has not yet been reached, and the national beef producers will have good opportunities for market expansion in the coming years, especially

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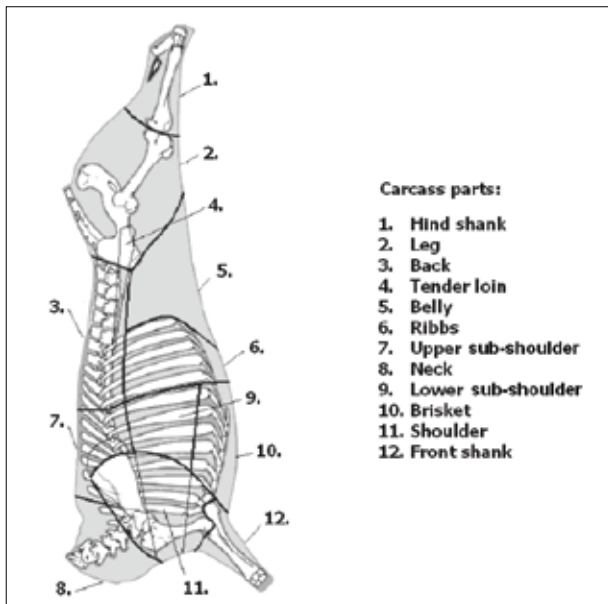
▼ **Table 1.** Descriptive statistics for shares (%) of main cuts and tissues in the carcasses of young Simmental cattle

Carcass parts	Mean	SD	CV (%)	Min.	Max.
Tender loin	2.03	0.17	8.37	1.75	2.43
Leg	30.47	0.82	2.69	28.52	32.15
Meat	76.14	1.78	2.34	72.27	80.01
Fat	5.22	1.59	30.46	2.43	8.45
Bones	13.29	0.79	5.94	12.08	14.85
Connective tissue	5.35	1.31	24.49	2.23	7.29
Back	8.55	0.48	5.61	7.55	9.43
Meat	68.47	2.82	4.12	62.54	73.14
Fat	5.41	2.43	44.92	2.08	12.99
Bones	20.35	1.83	8.99	17.11	23.92
Connective tissue	5.77	2.26	39.17	2.99	12.84
Shoulder	14.52	1.27	8.75	9.56	16.15
Meat	71.97	3.00	4.17	64.16	76.63
Fat	9.04	2.83	31.31	4.71	15.89
Bones	14.48	0.82	5.66	12.39	15.64
Connective tissue	4.51	1.74	38.58	2.10	10.23
Upper sub shoulder	7.79	0.37	4.75	7.08	8.52
Meat	64.99	3.66	5.63	58.44	70.43
Fat	7.07	2.24	31.68	4.47	12.81
Bones	20.15	1.93	9.58	16.52	23.89
Connective tissue	7.79	2.18	27.98	4.07	12.47
Lower sub shoulder	5.22	0.54	10.34	4.04	6.11
Meat	58.24	5.05	8.67	46.88	68.44
Fat	19.11	5.86	30.66	10.01	32.63
Bones	18.18	1.83	10.07	13.89	21.97
Connective tissue	4.47	1.83	40.94	1.52	7.74
Ribs	4.52	0.53	11.73	3.32	5.56
Meat	55.23	8.23	14.90	41.42	67.48
Fat	21.02	6.74	32.06	11.51	40.71
Bones	16.14	2.24	13.88	12.29	19.72
Connective tissue	7.61	4.90	64.39	1.75	16.39

Share of main cuts and tissues in the carcasses of young simmental cattle

▼ **Table 1. continued:** Descriptive statistics for shares (%) of main cuts and tissues in the carcasses of young Simmental cattle

Carcass parts	Mean	SD	CV (%)	Min.	Max.
Breast	6.45	0.50	7.75	5.23	7.30
Meat	57.64	3.59	6.23	52.17	65.39
Fat	19.73	4.76	24.13	10.14	29.66
Bones	17.77	2.13	11.99	14.57	23.16
Connective tissue	4.86	2.27	46.71	1.38	10.71
Neck	7.06	0.64	9.07	6.23	8.31
Meat	75.30	4.13	5.48	64.16	82.28
Fat	6.09	2.64	43.35	2.74	13.06
Bones	15.64	2.47	15.79	11.45	20.64
Connective tissue	2.97	1.49	50.17	1.44	8.26
Belly	6.41	0.66	10.30	4.90	7.51
Meat	71.15	6.30	8.85	60.34	82.13
Fat	19.31	6.44	33.35	10.25	33.35
Bones	-	-	-	-	-
Connective tissue	9.54	4.50	47.17	3.06	18.61
Front shank	3.19	0.16	5.02	2.92	3.55
Meat	49.15	1.80	3.66	45.49	51.52
Fat	1.52	0.41	26.97	0.75	2.26
Bones	41.91	1.98	4.72	38.95	46.43
Connective tissue	7.42	2.05	27.63	3.06	11.29
Hind shank	3.69	0.21	5.69	3.28	4.10
Meat	42.12	1.82	4.32	37.86	44.58
Fat	6.18	1.54	24.92	3.28	9.44
Bones	44.40	2.16	4.86	38.56	49.20
Connective tissue	7.31	1.52	20.79	4.94	10.05
Carcass side (kg)	129.23	13.48	10.43	106.00	157.00
Meat %	68.77	2.47	3.59	63.59	72.42
Fat %	9.08	2.47	27.20	5.72	15.53
Bones %	16.29	0.83	5.10	14.88	18.03
Connective tissue %	5.86	1.09	18.60	3.85	8.00

▼ **Figure 1.** Carcass cuts

as regards export to traditional markets such as Italian.

Meat of young cattle for export, known on the market as "baby beef", is obtained by intensive production of young cattle fed concentrated feed based on maize and with the addition of high-quality voluminous fodder (maize silage, alfalfa hay). Simmental calves of both sexes are used in the national production of baby beef. Fattening of young cattle for baby beef ends when the animals reach the age of about one year and weight of about 450 - 500 kg. Baby beef is characterised by excellent organoleptic quality, light red colour, marble-like and savoury. To the Italian market it is mostly exported in the form of Milan cut. Trend of recovery of the Croatian beef production in recent years and potential to renew the export of beef to some traditional European markets have actualised researches of the locally produced baby beef (Kolega et al., 2003). Distribution within the EUROP classes and traits of carcasses and meat of young Simmental bulls and heifers for the Italian market have been presented in some of earlier published works (Karolyi et al., 2006a and 2006b; Karolyi et al., 2008). In this work, the shares of main cuts and tissues (muscle, fat, bones and connective tissue) in the carcasses of young Simmental cattle were analysed.

MATERIAL AND METHODS

Twenty-six heads of locally grown young Simmental cattle were included in the investigation of shares of main cuts and tissues in the carcasses. Breeding, fattening and slaughterhouse processing were carried out as described in earlier works of Karolyi and co-authors (2006a and 2006b). The average live weight before slaughter was 489.6±46.5 kg. Cutting of right carcass halves of aver-

age weight of 129.2±13.5 kg into main cuts was carried out as presented in Figure 1 (DLG method, Scheper and Scholz, 1985). Each carcass side was weighed, cut by total dissection method and separated into muscle tissue, fat tissue, bones with cartilage and connective tissue, and then weighed separately. The weight of the carcass half was used as a denominator for calculation of shares (%) of individual main cuts, while the weight of the main cut was used as a denominator for calculation of shares (%) of individual types of tissue in the main cut. Descriptive statistics of main cuts and tissues (average, standard deviation, coefficient of variation, minimum and maximum) were calculated by UNIVARIATE Procedure of SAS Statistical program (SAS Institute, 1999).

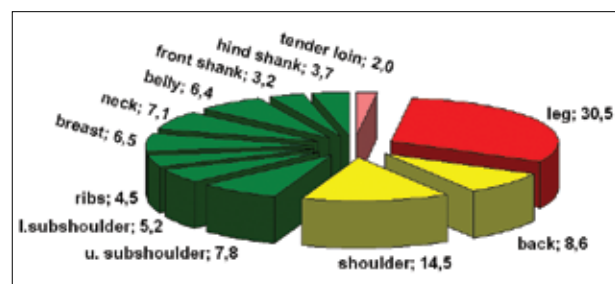
RESULTS AND DISCUSSION

Descriptive statistics for shares of main cuts and tissues in the carcasses of young Simmental cattle is presented in Table 1. Graphs 1 and 2 give graphical presentation of the average shares of main cuts and tissues. The average shares of individual tissues in the carcass cuts of different categories are presented in Graph 3.

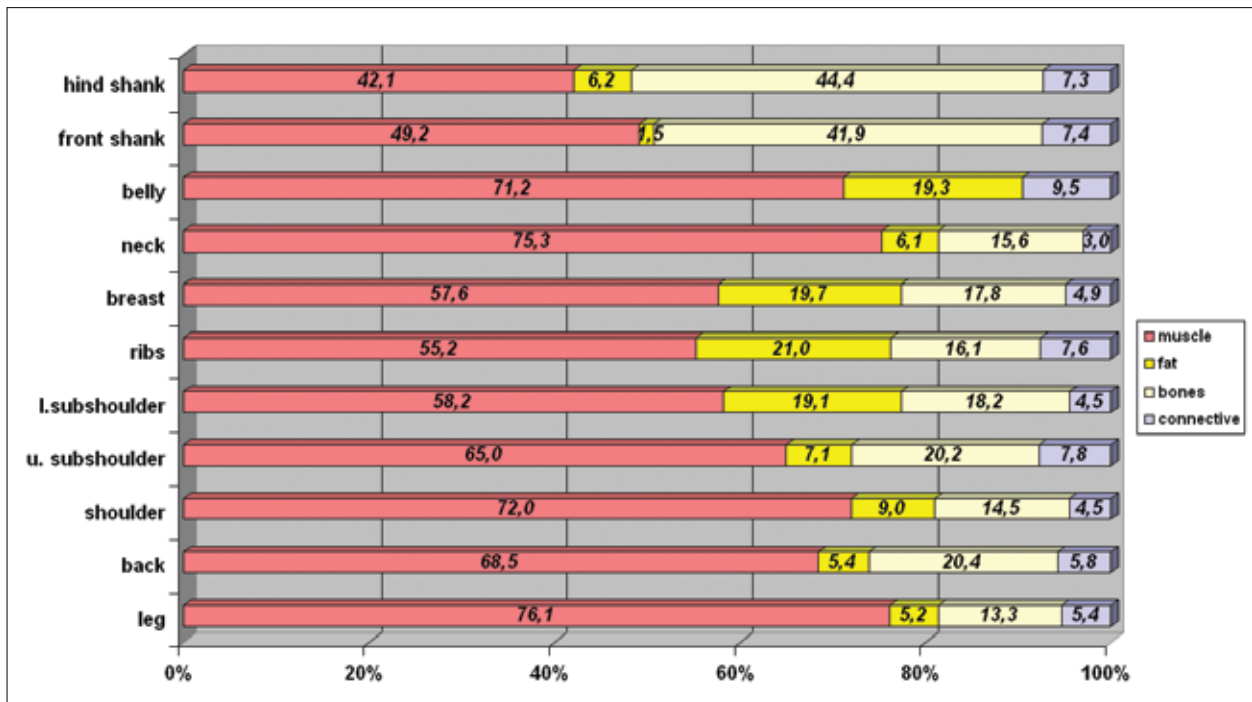
The average share of sub-loin muscles (*beefsteak*) in the carcass accounted for 2.0%. The average share of cuts of category I (leg) in the carcass was 30.5%, of category II (back and shoulder) 23.1% and of category III (upper sub-shoulder, lower sub-shoulder, ribs, breast, neck, belly, front and hind shank) 44.4% respectively. When a somewhat different method of dissection into main cuts was applied in beef cattle carcass halves of 169 kg average weight, Aleksić et al. (2007) found the average shares of 29.2%, 23.5% and 47% of cuts of category I, II, and III, respectively. Žgur and Čepon (2000) reported the average shares of 28.5%, 24.2% and 43.5% of category I, II, and III respectively, in the carcass halves of Simmental bulls of 166 kg average weight.

As regards the shares of individual types of tissues in the carcass cuts, the greatest variability was found in fat tissue (coefficient of variation ranging from 24.1 to 44.9%) and connective tissue (coefficient of variation 20.8 – 64.4%), and the lowest for shares of bones and

▼ **Graph 1.** The average share (%) of main cuts in the carcasses of young Simmental cattle



Share of main cuts and tissues in the carcasses of young simmental cattle

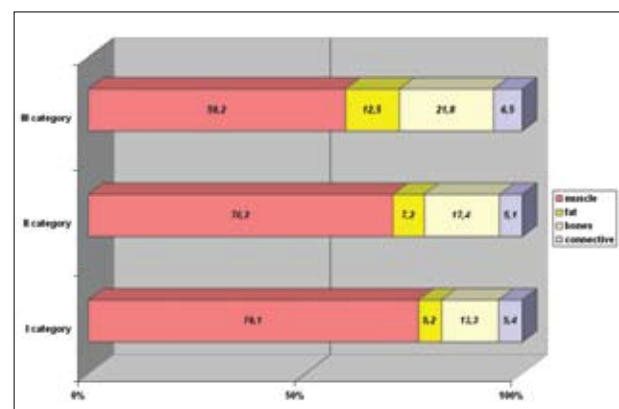
▼ **Graph 2.** The average share (%) of main tissues in the carcass cuts of young Simmental cattle

muscle tissue (coefficient of variation 4.7 – 15.8% and 2.3 – 14.9% respectively). The average share of muscle tissue (Table 1) was the highest in the leg (76.1%), while the share of meat in the cuts of category II and III was 70.2%, 59.2% respectively. The average shares of fat tissue and bones were the lowest in the carcass cuts of category I (5.2% and 13.3%), but higher in those of category II (7.2% and 17.4%) and even higher in category III (12.5% and 21.8%). The average share of connective tissue showed the maximum value in the cuts of category III (6.5%). Results of another study (Aleksić et al., 2007) also showed the maximum share of muscle tissue in the carcass cuts of category I and the minimum share in that of category III. Opposite results were recorded in case of share of fat tissue and bones. However, in all categories investigated in that study, as well as in individual carcass parts, the average share of muscle tissue was in general higher and the share of fat and connective tissue lower compared to results of our study, what could be attributed to different methods of dissection used. Shares of tissues in individual carcass cuts recorded in this study are comparable with results reported by Žgur and Čepon (2000). They have found similar relationship between the main tissues in the leg, back, shoulders and other parts with, in general, a slightly higher share of fat tissue. The latter may be attributed to higher final body weight of animals analysed in this research.

Considering the individual carcass parts of category II (Table 1), the share of muscle and fat tissue in the shoulder

(72.0% and 9.0%) was higher in comparison with the back (68.5% and 5.4%). On the other hand, the share of bones and connective tissue was higher in the back (20.4% and 5.8%) than in the shoulder (14.5% and 4.5%).

Considering the individual carcass parts of category III (Table 1), the share of muscle tissue was the highest in the neck (75.3%) and belly (71.2%), and the lowest in the hind and front shank (42.1 and 49.2%). The highest share of fat tissue was found in the ribs (21.0%) and belly (19.3%), and the lowest in the front shank (1.5%). With the exception of boneless belly, the lowest share of bones was recorded in the neck (15.6%), and the highest in the

▼ **Graph 2.** The average share (%) of tissues in the cuts of I, II and III category

hind shank (44.4%). Only 3.0% of connective tissue was found in the neck, in contrast to belly (9.5%). In the carcass halves the average share of muscle tissue amounted to 68.8%, in addition to 9.1% of fat tissue, 5.9% of connective tissue, and 16.3% of bones.

CONCLUSION

The average shares of main cuts of category I, II and III in the carcasses of young Simmental cattle of baby beef type were 30.5%, 23.1% and 44.4% respectively. By cut tissue dissection, the greatest variability was found for share of fat and connective tissue and the lowest for share of muscle and bones. Share of muscle tissue was the highest in the carcass cuts of category I, the lowest in those of category III, and quite opposite in case of share of fat tissue and bones. Individually, the highest shares of muscle tissue were found in the leg, shoulder and neck. On average, the mean shares of muscle, fat, connective tissue and bones in the carcass halves were 68.8%, 9.1%, 5.9% and 16.3%, respectively.

ZUSAMENFASSUNG

ANTEILE VON GRUNDTEILEN UND GEWEBE IN RÜMPFEN VON JUNGEM SIMMENTALRIND

Die Wiederherstellung der einheimischen Erzeugung von Rindfleisch und die Möglichkeit einer bedeutender Rückkehr auf die ehemaligen Ausfuhrmärkte haben in den letzten Jahren die Forschung des einheimischen jungen Rinds für die Ausfuhr (sg. "baby-beef") aktualisiert. In dieser Arbeit wurden die Anteile von Grundteilen und Gewebe (Muskelgewebe, Fettgewebe, Knochen und Bindegewebe) in Rumpfen von jungem Simmentalrind für die Ausfuhr auf italienischen Markt analysiert. Zu diesem Zwecke wurde die Dissektion von 26 Hälften der durchschnittlichen Masse 129,2 kg durchgeführt. Der Anteil des Rumpfes der I. Kategorie (Schenkel/Oberschale) machte im Durchschnitt 30,5 % aus, der Anteil des Rumpfes der II. Kategorie (Rücken, Schulter) 23,1 %, der Anteil des Rumpfes der III. Kategorie (obere Unterschulter, untere Unterschulter, Rippen, Brustkern, Hals, Wanst, vordere und hintere Hachse) 44,4 %. Durch die Dissektion der Grundteile auf Gewebe wurde die größte Variabilität für die Anteile von Fettgewebe und Bindegewebe und die kleinste für die Anteile von Muskelgewebe und Knochen festgestellt. Der durchschnittliche Anteil der Muskelgewebe im Schenkel/Oberschale war 76,1 %, in Rumpfteilen der II. und III. Kategorie 70,2 % bzw. 59,2 %. Der durchschnittliche Anteil von Fettgewebe und Knochen war in Rumpfteilen der I. Kategorie 5,2 % und 13,3 %, in Rumpfteilen der II. Kategorie 7,2 % und 17,4 % und in Rumpfteilen der III. Kategorie 12,5 % und 21,8 %. Der durchschnittliche Anteil von Bindegewebe in Rumpfteilen

der I., II. und III. Kategorie betrug 5,4 %, 5,1 % und 6,5 %. Der durchschnittliche Anteil von Muskelgewebe betrug in den Hälften 68,8 %, von Fettgewebe 9,1 %, von Bindegewebe 5,9 % und von Knochen 16,3 %.

Schlüsselwörter: junges Rind, Dissektion, Rumpfteile, Gewebe, Simmentalrasse

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