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RESULTS OF BEEF CARCASS GRADING IN SLOVENIA FROM 1997 TO 2006

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Scientific review

SUMMARY

Carcass traits (carcass weight, conformation and fatness note and payment class) were collected in the commercial slaughterhouses with automatic data collection for the last ten years. On the average more than 80 % of all graded bovine animals in Slovenia were taken into the study. The average carcass weight of calves increased by 20 kg, but was with 79 kg still very low. The carcass weight of young bulls, heifers and cows varied among different years, but no trend could be noticed, whereas carcass weight of old bulls decreased markedly (more than 50 kg). The carcass conformation decreased in all categories, in calves, young bulls and heifers by two thirds and in old bulls and cows by more than 0.9 of conformation class. The carcass fatness decreased in all categories too. The most pronounced decrease was noticed in the category of old bulls (0.6 class) and the least in young bulls (0.2 class). Most of the above mentioned changes occurred after the year 2002 in the category of cows and after the year 2001 in all other categories. The main reasons for changes in conformation and fatness were probably the changes in cattle breed structure in Slovenia.

Key-words: beef, carcass, EUROP, conformation, fatness

INTRODUCTION

The carcass quality is defined by the traits estimated and measured on the carcass of slaughtered animals. Gender, age, carcass weight, conformation and fatness define the value of the carcass. The system must guarantee an independent uniform and objective classification. The European countries defined the uniform estimation system of carcass conformation and fatness (Council Regulation No 1208/81; 1981). Also the first and the subsequent Slovenian regulations of carcass grading and classification followed the official EU regulations (Pravilnik..., 1994, 2001, 2005). Cattle breeding in Slovenia experienced great structural changes in the last ten years (Agricultural institute..., 2006), which consequently also modified cattle population regarding different cattle breeds. The percentage of Black and White dairy cows included in the recording increased by 14% while the percentage of Brown and Simmental cows decreased by 9.4% and 7.6%, respectively. The consumers increasingly require lean meat. Both of this could have a direct effect on carcass conformation and fatness. Thus the aim of the present work was to analyse the changes of carcass traits of slaughtered bovine animals in the last ten years in Slovenia.

MATERIAL AND METHODS

Data on slaughtered animals from January 1997 to December 2006 were collected from commercial slaughterhouses in Slovenia that had introduced automatic data collection. Altogether 923,056 data on bovine animals were taken into this study. The conformation and fatness were estimated by independent controllers. The degree of conformation was defined by using E, U, R, O, P letters, which were in our calculation transformed to the numbers where E=5, U=4, R=3, O=2, P=1. Fatness was defined according to regulation of classification with numbers from 1 to 5 where the number 5 presents very fatty and 1 fatless carcasses. On the basis of conformation and fatness notes carcasses were graded into one of six payment classes, where 1 means the best and 6 the worst payment class. The carcass traits were evaluated for each category (calves under 8 months and 185 kg

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carcass weight, young bulls under 24 months, old bull over 24 months, heifers, steers and cows). The data for steers are not shown, because the slaughtered steers represent less than one percent (0.6 %) of graded animals.

RESULTS AND DISCUSSION

In the year 1997 seven slaughterhouses were included in data collection and up to the year 2006 the number increased to eleven. In 1997 128,022 carcasses, and in 2006 134,034 carcasses were graded in Slovenia. At the beginning the percentage of included animals (from total classified animals in all slaughterhouses in Slovenia) was around 50 % and increased year by year to 85.3% in the year 2006. Hence the number of included animals into analysis is a representative sample of slaughtered bovine animals and the results can be extrapolated to the whole cattle population.

In Table 1 carcass weight, conformation, fatness and payment class of calves are presented. The number of graded carcasses increased from 1997 to 2000, decreased in year 2001 and increased continuously after 2002, but in the years 2005 and 2006 decreased again. These changes were the consequence of including of new slaughterhouses into analysis on one hand and more slaughtered calves on the other. The percentage of calves included into valuation in comparison of all slaughtered calves increased from 48% in the year 1999 to 81.6% in the year 2005, and the percentage of all slaughtered calves in Slovenia increased from the year 1999 to 2004 by 13%. The average carcass weight of calves through the last ten years was 79 kg and though the weight rose by 20 kg, it is still low if compared to calves slaughtered in Austria (Zaufaly et al., 2005). The best conformation was estimated for the calves slaughtered in the year 1999. After this year the conformation got worse from year to year. Better conformation was expected because the weight of slaughtered carcasses increased. But the increased percentage of dairy animals in Slovenian cattle population (Agricultural institute..., 2006) led to use the dairy calves for veal meat production and such calves had worse conformation. The fatness varied between 2.6 and 2.5 from 1997 to 2000 and afterwards decreased almost to the class 2.0. In young animals muscles grow earlier and the fat starts to be put on later by greater body weight (Hossner, 2005). This could explain very poor fatness in this category. Calves with lower conformation were graded also into worse payment class (higher number in the payment class means worse payment class).

Table 1. Carcass traits of calves slaughtered from 1997 to 2006

Year	N	Carcass weight		Conformation	Fatness	Payment class
		kg	SD			
1997	6721	67	19	2.85	2.62	3.18
1998	9875	67	18	2.90	2.57	3.13
1999	13188	68	18	3.10	2.60	2.92
2000	14991	69	19	2.98	2.51	3.04
2001	10230	82	23	2.79	2.29	3.27
2002	13232	80	20	2.60	2.14	3.39
2003	22828	78	16	2.68	2.06	3.40
2004	23244	79	17	2.49	2.03	3.61
2005	22330	82	18	2.35	2.03	3.76
2006	19522	87	19	2.39	2.07	3.73
Σ/Average	156161	79	19	2.71	2.27	3.48

The average carcass weight of bulls under 24 months of age (Table 2) was 345 kg in the last ten years. Since 2002 the tendency of decreasing carcass weight was noticed. The highest carcass weight through all the years was noticed from February to April and the lowest from August to October (data not shown). The conformation was very good (around 3.6) till the end of 2000, but from this time it started to decrease and reached the value below 3.0 in the years 2005 and 2006.

Table 2. Carcass traits of young bulls (under 24 months of age) slaughtered from 1997 to 2006

Year	N	Carcass weight		Conformation	Fatness	Payment class
		kg	SD			
1997	32854	340	54	3.62	2.89	2.40
1998	33090	348	54	3.65	2.88	2.38
1999	32516	350	55	3.62	2.89	2.42
2000	36220	353	58	3.58	2.88	2.47
2001	46173	354	56	3.51	2.88	2.56
2002	35483	343	62	3.44	2.86	2.62
2003	47886	340	66	3.30	2.75	2.75
2004	47933	341	64	3.17	2.66	2.98
2005	42921	342	63	2.98	2.65	3.09
2006	47639	340	63	2.94	2.65	3.12
Σ/Average	402715	345	60	3.35	2.79	2.71

One of the reasons for that is lower carcass weight. The major reason is probably the change in cattle breed structure in Slovenia. The percentage of Black and White animals increased on account of Brown, and also in Simmental breed the dairy characteristics became more pronounced on account of beef traits through crossing with Montbeliard and Red Holstein. Bulls younger than 2 years reached on the average the fatness class 2.79. The fatness tended to decrease in the same way as conformation but it occurred later on in the year 2003; in the last three years it remained at the same level. Decrease of fatness could have an influence on worse conformation with lower intermuscular fat content. Lower fatness class could be the consequence of lighter carcasses or/and larger frame of adult animals. Animals in dairy type put on more fat into body cavity and less as subcutaneous fat. The fat in the body cavity is removed before carcass estimation and it isn't a part of fatness value. The value for the payment class is inversely proportioned to the conformation. Worse conformation since the year 2001 in this category means also worse payment class.

The quality of slaughtered carcasses of bulls older than 24 months is presented in Table 3. Prior to the year 2001 the percentage of slaughtered old bulls was negligible and in the year 2001 the number of them started to increase. In the year 2002 the number of slaughtered old bulls increased and reached the number of 16370 in 2005. It is the result of age definition based on the birth date. Before the year 2002 the age of bulls was defined with the estimation of vertebra ossification. The average carcass weight of the old bulls throughout ten years was 365 kg and amounted above 400 kg between the years 1997 and 2001, and decreased to around 360 kg after 2001. The estimation of conformation in the years before 2001 varied because of low numbers of slaughtered animals in this category and was quite well valuated (between 3.88 and 3.52). In the last two years the conformation decreased under the class R (2.9). In comparison to other categories the decrease of conformation was the highest in the old bulls category. Also the fatness decreased by more than 0.6 classes. The payment class decreased in the last years by almost one class.

Table 3. Carcass traits of old bulls (over 24 months of age) slaughtered from 1997 to 2006

Year	N	Carcass weight		Conformation	Fatness	Payment class
		kg	SD			
1997	224	409	82	3.78	3.14	2.43
1998	216	389	79	3.52	3.13	2.69
1999	218	409	62	3.71	3.00	2.46
2000	491	420	69	3.88	3.09	2.29
2001	2365	409	64	3.77	3.03	2.38
2002	9988	363	60	3.37	2.74	2.67
2003	10049	357	66	3.19	2.64	2.85
2004	9710	360	67	3.07	2.54	2.97
2005	16370	365	62	2.92	2.55	3.13
2006	16176	365	63	2.94	2.54	3.12
Σ/Average	65807	365	64	3.10	2.62	2.95

Average carcass weight of heifers represented in Table 4 was 259 kg. The decrease of carcass weight after year 2001 was observed in this category too. The estimation of conformation was on the average 3.14 and decreased markedly after the year 2002. After the year 2002 the fatness decreased with the same tendency as the conformation. Values between 3.3 and 3.2 in the years between 1997 and 2002 meant that an important part of heifer carcasses was too thick. The payment class got worse in the last years being the result of decreased conformation. Due to the decrease of fatness the outcome in the payment class is not so worse.

Table 4. Carcass traits of heifers slaughtered from 1997 to 2006

Year	N	Carcass weight		Conformation	Fatness	Payment class
		kg	SD			
1997	10660	262	46	3.37	3.22	2.94
1998	9921	265	44	3.44	3.25	2.89
1999	9808	264	44	3.46	3.24	2.86
2000	10718	264	43	3.41	3.24	2.90
2001	11997	269	45	3.35	3.30	3.04
2002	12876	261	52	3.32	3.20	3.00
2003	16234	251	56	3.12	3.04	3.14
2004	15377	251	51	2.73	2.94	3.26
2005	13972	255	51	2.78	2.97	3.45
2006	12756	256	53	2.74	2.94	3.47
Σ/Average	124319	259	49	3.14	3.12	3.12

Estimated values for slaughtered cows are shown in the Table 5. The number of slaughtered cows increased with the year 2000 and started to decrease in the year 2004. The cows were slaughtered at average carcass weight of 296 kg, where the weight varies from year to year for around 10 kg. The conformation of cows was around the value 3.0 before the year 2002, which means the conformation class R. After the year 2002 the conformation decreased for almost 1 class till to the year 2006 and reached class O (2.08), probably for the same reason as it is described in other categories. In the last years fatness decreased as well. The cows reached on the average the fatness note 2.7. A worse payment class is an outcome of worse conformation.

Table 5. Carcass traits of cows slaughtered from 1997 to 2006

Year	N	Carcass weight		Conformation	Fatness	Payment class
		kg	SD			
1997	9702	282	61	2.94	2.79	3.34
1998	8414	292	64	3.00	2.79	3.30
1999	8149	298	64	3.01	2.85	3.33
2000	11571	290	62	2.96	2.79	3.36
2001	16755	289	61	2.97	2.83	3.34
2002	32347	313	60	2.93	2.79	3.37
2003	39990	308	62	2.69	2.70	3.66
2004	25442	291	61	2.50	2.60	3.82
2005	21559	283	57	2.22	2.58	4.17
2006	17740	281	56	2.08	2.51	4.34
Σ/Average	171632	296	60	2.68	2.70	3.66

CONCLUSION

The evaluation of cattle carcasses slaughtered and included into automatic data collection in the period from 1997 to the end of the year 2006 in Slovenia showed that the percentage of different categories changed evidently in the years 2002 and 2003. In the mentioned period the number of slaughtered cows and bulls older than 2 years increased.

In the last years the carcass weight of calves increased by 20 kg, but with 79 kg still remained relatively low. The carcass weight of young bulls, heifers and cows varied in the last ten years, but no trend could be noticed. The carcass weight of old bulls decreased by more than 50 kg.

The valuation of the carcass conformation was constant in all categories prior to the year 2001 but started to decrease soon. The tendency of conformation decreased in the categories calves, young bulls, heifers classed in the year 2005. In the categories of cows and old bulls the conformation started to decrease in the year 2002. The conformation of cows and old bulls decreased by more than 0.9 whereas in calves, young bulls and heifers by two thirds of conformation class.

After the year 2002 the fatness of carcasses decreased in the categories of young bulls, heifers and old bulls; one year earlier the same was noticed in the category of calves and one year later in the category of cows. The least pronounced decrease was noticed in young bulls (0.2 class) and the most in old bulls (0.6 class).

The changes in conformation and fatness led also to the worse payment class. In the category of heifers the decrease of fatness positively influenced the payment class.

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