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COMPARISON OF CARCASS QUALITY OF SLOVAK PIED AND HOLSTEIN BULLS BY SEUROP SYSTEM

K. ZAUJEC, J. MOJTO, M. GONDEKOVA

[1]Animal Production Research Centre Nitra, Slovak Republic

ABSTRACT

Objective of the experiment was to compare carcass quality between two breeds from the viewpoint of qualitative classes for conformation and fattiness by means of SEUROP system; verify the hypothesis if carcasses of different breeds are approximately of the same quality when incorporated in the same class. We used slaughter aged bulls of Slovak Simental (SS) and Holstein (H) breed. The results show that the smallest differences between breeds were in class of conformation U. In some parameters occurred almost balanced values in both breeds, e.g. in dressing percentage 54.32 % with SS, and 54.56 % with H breed, in parameter proportion of meat in carcass 75.80 % with SS, and 75.07 % with H breed and in parameter weight of bones 24.24 kg with SS, and 24.45 kg with H breed. In parameter proportion of fat in carcass were the same values 7.60 % with SS and H breeds. The highest statistically significant differences were observed in parameter weight of valuable cuts and proportion of valuable cuts in carcass (59.14 kg with SS, and 55.86 kg with H breed; 40.73 % and 39.64 %, respectively). Greater statistical significant differences between breeds were noticed in conformation class O. In this class we noticed the greatest differentiation ($P<0.001$) in the parameter proportion of bones (18.77 % with SS and 20.16 % with H breed) as well as in parameter weight of valuable cuts (47.39 kg with SS, 42.76 kg with H breed). When evaluating fattiness in all classes the highest differentiation statistical significant between breeds was in parameters: live weight before slaughter, carcass weight, half-carcass weight, weight of meat carcass, and proportion of meat cuts; as well as in parameters weight of valuable cuts, proportion of valuable cuts in carcass. Better results were for SS breed. Weight of fat and proportion of fat from half carcass at technological dissection seems to be the only objective parameter suitable to assess fattiness in the carcass of cattle and to evaluate the correctness of classification of carcass. We found similar tendency for weight of fat classes and for conformation. The smallest differences in weight of fat parameter were found in class 2 for fattiness between breeds (7.64 kg with SS, and 6.68 kg with H breed). Greater differences were observed in class 4 for fattiness, in which was significance between breeds (13.94 kg with SS breed, 11.77 kg with H breed). We found the highest in parameter weight of fat in class 3 for fattiness, where the difference between classes was nearly 2 kg fat. In this case we can say that better results were for H breed. We did not notice significant results in classes between breeds with parameter proportion of fat. Better results with this parameter were for SS breed in class 2 (6.17 % with SS, and 6.47 % with H breed); in other classes were better results for H breed. Similar to classes of meatiness also in classes of fattiness we found linear rise in values from class 2 to class 4 in parameters weight of fat and proportion of fat as well as in parameter live weight before slaughter.

Keywords: bulls, Slovak Simental, Holstein breed, carcass quality, SEUROP system

INTRODUCTION

Increase of carcass value in cattle for production of good quality beef is still a topic of interest. This fact has been confirmed by repeated experimental works and analyses of carcass value. In the past evaluation of carcass quality was based mainly on experiments, in which carcass quality was compared among breeds (Nosal et al., 1996, Cubon et al., 1995, 1994). At present, with increasing demands on carcass quality, it has become necessary to study carcass quality from the viewpoint of breeds, and first of all to follow the trends and related

Correspondence: E-mail: zaujec@scpv.sk
Animal Production Research Centre Nitra, Hlohovecká 2,
951 41 Lužianky, Slovak Republic

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problems and needs of primary producers, processors and consumers.

According to Zaujec and co-workers (1998), the present system of quality evaluation in cattle (SEUROP system) enables requisite accuracy and objectivity of evaluation within the breed and among breeds as well. Similarly, Koch et al (1982) pointed to the differentiation among breeds when carcass value and meat quality are under study. Some parameters of carcass composition are given by genetic predispositions among breeds (Coleman et al., 1993, Ferrell and Jenkins 1998). Polach et al (2000) also confirmed these facts in their work with the Czech Pied cattle and its crosses. Similarly Campo et al (1999), Nkruman et al (2007), Dannenberger et al (2007) and Pfuhl et al (2007) reported differences in technological dissection of half carcasses in different breeds. Zaujec et al (1998) found that if dual-purpose and milk type cattle are compared by SEUROP system, diametrically opposed values occur in identical quality classes. Opposed to it Golda et al (2002) found increasing linear tendency from class E to class R in the parameter dressing percentage of carcass.

The objective of this study was to compare carcass quality in young bulls of two breeds, which are most frequent in Slovakia, taking into account classes of quality for conformation and fat cover, which were evaluated by criteria used in SEUROP system. Also, the experiment aimed to test the hypothesis whether the carcasses of different commercial types also have approximately the same values of significant parameters of carcass quality after classification into the same quality class.

MATERIAL AND METHODS

Young bulls of Slovak Pied (SP) and Holstein (H) breed were used in the experiment. The animals were weighed before slaughter; live weight in SP was 450 – 600 kg and in H 400 – 550 kg. The bulls were brought from different agricultural enterprises. Carcasses were classified within 60 minutes after slaughter according to Regulation of the Ministry of Agriculture of the Slovak Republic (No. 206/2007 L.d. Percentage carcass classification). According to the above mentioned regulation, percentage carcass classification with SP breed was as follows: in class U - 35.49 %, in class R - 51.15 %, in class O - 13.36 %, in class 2 -21.43 %, in class 3 - 59.82 % and in class 4 - 18.75 %. Carcass classification of H breed was: 8.85 % in class U, 38.02 % in class R, 53.13 % in class O, 32.20 % in class 2, 49.76 % in class 3 and 18.04 % in class 4.

It is necessary to mention that in this experiment only those classes of conformation and fat cover, within which most carcasses in both breeds were classed, were used.

After 24 hours, the weight of carcass was determined, which was subsequently used for calculation of slaughter yield. We also detected the weight of right half of carcass on which technological dissection was performed (technological-economic standards 1989). We observed the proportion of meat, bones, fat and 1st class meat (shoulder, round, fillet, roast beef) in absolute (kg) as well as relative (%) values. Arithmetic mean ($\overline{x}$) and standard deviation (s) was calculated. Statistically significant differences between breeds in individual classes of quality were tested by the method of t-test using PC programme EXCEL.

RESULTS AND DISCUSSION

Comparison of qualitative parameters in carcass of bulls with classes of conformation is given in table 1. The results show that the differences between breeds are quite variable in qualitative parameters of carcass value in individual classes. The differences between breeds were the smallest in class U. This fact became evident almost in all parameters of carcass. In some parameters even almost balanced values in both breeds occurred, e.g. in slaughter yield (54.32 % with SP vs. 54.56 % with H breed), in meat proportion (75.80 % with SP vs. 75.07 % with H breed), and weight of bones (24.24 kg with SP vs. 24.45 kg with H breed). The values were even identical for the parameter proportion of fat (7.60 % in both breeds). Considerably greater differences were observed for other parameters in this class of conformation; however, they had no statistically significant differences. The largest statistically significant differences ($P<0.05$) were observed in class U for the parameter weight of 1st class meat and proportion of 1st class meat (59.14 kg with SP and 55.86 kg with H breed, and 40.73 % with SP and 39.64 % with H breed, respectively). Greater statistically significant differences were noticed between the breeds in class O ($P<0.01$). In this class, statistically significant differences were noticed for the parameter proportion of bones (18.77 % with SP and 20.16 % with H breed) as well as for the parameter weight of 1st class meat (47.39 kg with SP and 42.76 kg with H breed). More interesting results in this class were with obtained with SP breed. Largest differences between breeds were noticed in class R. There were statistically significant differences almost in each parameter, which influences incorporation of carcass into classes of conformation. These parameters are: weight of carcass (kg), weight of half carcass (kg), weight of meat (kg) and proportion of meat (%). Also, interesting results were obtained in the class R with the SP breed.

Although there were smaller or greater statistically significant differences between breeds in individually studied classes, we can see the decreasing tendency in

Tab. 1: Average values ($\bar{x} \pm s$) of carcass quality by different class of conformation

Parameter	Class of conformation											
	U				R				O			
	SS (n=77)		H (n=17)		SS (n=111)		H (n=73)		SS (n=29)		H (n=102)	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
Live weight before slaughter (kg)	545.58	53.23	529.88	55.25	506.86	55.17	477.45	52.11	464.48	66.89	432.95	53.08
t-test					+++				++			
Carcass weight (kg)	296.14	31.91	289.00	39.72	270.44	29.75	251.56	30.01	246.00	38.10	226.64	30.88
t-test					+++				++			
Dressing percentage (%)	54.32	3.19	54.56	4.96	53.40	2.54	52.66	2.15	52.91	1.95	52.29	2.38
t-test					+							
Weight carcass side (kg)	145.45	15.73	141.37	15.64	134.19	15.15	121.36	14.20	119.49	17.83	110.43	15.35
t-test					+++				++			
Weight of meat (kg)	110.18	11.73	106.06	11.71	99.44	11.55	89.68	10.71	87.78	12.87	79.99	11.29
t-test					+++				++			
Proportion of meat (%)	75.80	2.44	75.07	2.12	75.24	2.34	73.91	2.69	73.52	2.28	72.43	1.98
t-test					+++				+			
Weight of bones (kg)	24.24	4.03	24.45	4.06	22.65	3.26	22.66	3.65	22.25	3.11	22.16	2.79
t-test												
Proportion of bones (%)	16.67	2.29	17.30	2.20	17.20	2.24	18.70	2.40	18.77	2.17	20.16	1.47
t-test					+++				+++			
Weight of fat (kg)	11.23	3.02	10.83	3.20	10.09	3.07	8.98	2.61	9.45	3.80	8.27	2.74
t-test					+							
Proportion of fat (%)	7.60	1.66	7.60	1.90	7.54	1.76	7.34	1.66	7.70	2.23	7.40	1.78
t-test												
Weight of valuable cuts (kg)	59.14	6.06	55.86	5.76	53.47	6.00	47.98	5.48	47.39	6.30	42.76	5.84
t-test	+				+++				+++			
Proportion of valuable cuts (%)	40.73	2.01	39.64	2.65	40.51	2.26	39.63	2.53	39.81	2.26	38.78	2.09
t-test	+				+				+			

+ $P < 0.05$. ++ $P < 0.01$. +++ $P < 0.001$

values from class U to class O in both the breeds. We supposed that the differences between breeds would be markedly smaller in individual parameters of carcass quality. This hypothesis was confirmed only in class U.

In previous works Zaujec et al. (1998) compared carcass quality in SP and H breed in dependence on SEUROP system; they found linear decrease in values from the best to the worst classes of quality. They obtained results similar to those in the present study, when comparing SP and H breed within a class. Our results correspond also with results of Campo et al. (1999), who compared carcass quality in meat and dual-purpose breeds. However, they obtained lower values in dual-purpose breed in class U and R in the parameter meat %, compared with our results. Similarly, Pruhl et al. (2007) obtained lower values in parameter meat % and bones % in H breed in class O than those obtained in this study. Nkruman et al. (2007) detected increase in weight of carcass in crosses with meat breeds, with classing of carcasses within better classes of conformation. By contrast, they found reversed tendency in slaughter yield. Similarly, Golda et al. (2002) detected rising linear tendency in the parameter dressing percentage from class E to class R in H breed, which is unusual.

Carcass quality of SP and H bulls in classes of fat cover is compared in table 2. The comparison of breeds as far as fat cover is concerned showed highly significant differences in all classes between breeds almost in all parameters of carcass quality.

A more detailed analysis showed that in all classes the greatest differences were between breeds in following parameters: live weight before slaughter, weight of carcass, weight of half carcass, and weight of meat, proportion of meat; and also in parameters weight

Tab.2: Average values ($\bar{x} \pm s$) of carcass quality by different class of fat

Parameter	Class of fat											
	2				3				4			
	SS (n=48)		H (n=66)		SS (n=134)		H (n=102)		SS (n=42)		H (n=37)	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
Live weight before slaughter (kg)	477.43	64.24	409.07	56.93	518.11	52.22	458.99	55.83	561.50	50.77	502.08	47.54
t-test	+++				+++				+++			
Carcass weight (kg)	254.18	32.96	212.98	34.17	278.84	32.14	242.58	34.14	301.61	32.44	263.62	30.25
t-test	+++				+++				+++			
Dressing percentage (%)	53.33	2.58	51.96	2.50	53.81	2.95	52.77	2.44	53.73	3.26	52.53	3.62
t-test	++				+++							
Weight carcass side (kg)	123.63	16.08	103.09	16.08	136.65	16.16	116.55	15.88	149.12	14.96	129.82	13.95
t-test	+++				+++				+++			
Weight of meat (kg)	93.49	13.14	75.44	13.06	103.16	12.76	86.46	12.82	110.51	11.79	93.52	10.11
t-test	+++				+++				+++			
Proportion of meat (%)	75.52	1.82	73.03	2.38	75.48	2.68	73.30	2.75	74.08	1.97	72.02	1.60
t-test	+++				+++				+++			
Weight of bones (kg)	22.45	2.71	20.95	2.92	23.11	3.96	22.56	3.40	24.66	2.87	24.52	2.22
t-test	++											
Proportion of bones (%)	18.28	1.87	20.47	2.16	16.95	2.50	19.27	2.49	16.58	1.50	18.95	1.23
t-test	+++				+++				+++			
Weight of fat (kg)	7.67	2.16	6.68	1.83	10.44	2.55	8.75	2.31	13.94	2.78	11.77	2.66
t-test	+				+++				++			
Proportion of fat (%)	6.17	1.34	6.47	1.43	7.61	1.47	7.41	1.48	9.33	1.57	9.01	1.50
t-test												
Weight of valuable cuts (kg)	41.17	7.07	41.04	6.80	40.66	6.68	45.86	7.78	39.08	6.21	48.78	5.67
t-test	+++				+++				+++			
Proportion of valuable cuts (%)	50.91	1.77	39.78	1.90	55.50	2.13	38.87	4.08	58.25	1.88	37.56	1.69
t-test	+++				+++				+++			

+ $P < 0.05$. ++ $P < 0.01$. +++ $P < 0.001$

of 1st class meat and proportion of 1st class meat. We found highly significant differences in these parameters; with better results from SP breed. We assume that high significance of these differences is given by evaluation of carcass quality in classes of fat cover, which is based on fat layer on the surface of carcass and in thoracic cavity, when slaughter cattle is classified. Parameters weight of fat in half carcass and proportion of fat in half carcass at technological dissection seem to be the most suitable ones to assess the fat cover of carcass and to evaluate correctness of carcass classification. With the parameter weight of fat in half carcass we found similar tendency as with classes of conformation. We detected the smallest differences between the breeds in class 2 (7.64 kg with SP and 6.68 kg in H breed) in the parameter weight of fat in half carcass. Greater statistically significant differences between breeds in parameter fat in half carcass were noticed in class 4 (13.94 kg with SP breed and 11.77 kg with H breed). Statistically, highly significant differences in parameter weight of fat in half carcass were noticed in class 3, the difference between breeds being almost 2 kg fat. In this case we can state that better results in parameter weight of fat in half carcass were in H breed. Also, more balanced results between breeds were in this parameter in class 2 in comparison to class 4 and the least balanced results were between breeds in class 3 to SP breed's disadvantage. We did not notice any significant difference between breeds in individual classes of quality in the parameter proportion of fat in half carcass. Better results with this parameter were in class 2 for SP breed (6.17 % in SP and 6.47 % in H breed), in other classes the results were better in H breed. Similar to classes of conformation also in classes for fat cover we found linear increase of values from class 2 to class 4 in parameters weight of fat and proportion of fat in half carcass before slaughter. Similar results were reported by Zaujec et al. (1998) as they noticed more favourable results in parameters fat in kg and fat in % in H breed compared with SP breed in all qualitative classes of fat cover. It can be given by live weight before slaughter, when in H breed large fat deposition in half carcass still does not occur. Works of Campo et al. (1999) and Pfuhl et al. (2007) agree with our results. On the other hand, Golda et al. (2002) found different results in the parameter fat in kg as well as fat in % with H breed, with considerably higher weights before slaughter than we did. Nosal et al. (1998) reported similar results as Golda et al. (2002) with crosses of Slovak Pied breed with bulls of Limousine breed, and Ostojic-Andric et al. (2007) with crosses of native breeds with Charolais and Limousine. It should also be weighed if other contents of fat as for instance kidney and pelvic fat, or marbling of meat can positively influence classing of carcass within classes of fat cover.

CONCLUSION

Obtained results of small differences between breeds in classes of quality partly confirmed the hypothesis of no difference between the breeds. This hypothesis was confirmed almost in all parameters of carcass value in the qualitative class U. The hypothesis of approximately identical values of parameters in both breeds in classes for conformation was not confirmed in qualitative classes R and O. The smallest differences were in class U and the largest ones in class R. The hypothesis of small differences between breeds was confirmed in parameter proportion of fat in half carcass in all classes as far as qualitative classes for fat cover were concerned. Although these differences between breeds were not statistically significant with this parameter in classes for fat cover, the smallest differences were noticed in class 2 and the greatest in class 3. It is also necessary to emphasize that although there were statistically significant differences between breeds in some classes, we noticed linear tendencies of increase and decrease of values in individual classes. This proves correctness of classing the carcasses within qualitative classes according to conformation and fat cover.

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