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THE FACTORS AFFECTING THE CARCASS QUALITY OF THE CZECH FLECKVIEH BULLS

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Abstract

The aim of the study was to evaluate the effects of the slaughter age at bulls, the carcass weight and the level of the daily net gain on the carcass classification according to the SEUROP system. The carcass classification for the statistical analysis was carried out according to the following system: the classes of meatiness - S=1, E=2, U=3, R=4, O=5, P=6; the classes of fattiness: 1=1, 2=2, 3=3, 4=4, 5=5). All the studied bulls (n = 521) were slaughtered and evaluated in a slaughterhouse by a classifier. The age at the slaughter and the daily net gain had a highly significant ($P < 0.01$) effect on meatiness. The best meatiness was found at the bulls slaughtered at the age from 701 to 800 days and from 651 to 700 days (2.44 and 2.69). On the other hand the worst meatiness (3.11) was found at the bulls slaughtered at the age from 480 to 550 days. The best meatiness (class E) was found within the bulls with daily net gain from 601 to 650g and from 651 to 700g. On the contrary the worst meatiness was found at the bulls with the top daily net gain 50g. The carcass weight had a highly significant ($P < 0.01$) effect on fattiness. The lowest fattiness (2.05) was found at carcasses with the maximum weight 31kg but on the other hand the highest fattiness (2.48) was found at the carcasses with the weights from 361 to 400kg.

Keywords: SEUROP, bull, carcasses, age, weight, net daily gain

Introduction

The carcasses classification is done by the SEUROP system, a subjective classification of the carcass conformation and the fat content. The classification is done by the trained experts at the end of the slaughtering line.



The SEUROPE system looks for beef carcasses with high level of meat and relatively low fat content. Subsequently the price has to correspond to the carcass quality. However the production of quality beef is affected by many factors, mainly by the biological origin. The most important are the selection of a suitable breed, the aptitude, the sex, feeding, the slaughtering weight and age. The influence of these points on the beef quality was also dealt with by *Augustini et al* (1992). *Chambaz et al* (2003), who studied the influence of Angus, Simmental, Charolais and Limousine on beef quality in relation with the fat content changes in the *Musculus longissimus dorsi* and the muscular marbling. Conformation and fat covering were assessed by the Swiss classification, which corresponds to the SEUROPE system. The Limousine carcasses were evaluated as the best, placed at "E" class. The sex also influences the weight and the quality of transversely stripped muscles. The thickness of muscle fibres is less significant between the sexes, although females have them generally finer than males. Direct heifer rearing is not too common in the Czech Republic. Animals unsuitable for the further breeding or over plus heifers are designated for meat stock as well as hybrid heifers crossed between the dairy and the beef cattle in case they are not used for the next breeding. Also heifers selected negatively from a beef herd are integrated to rearing, if there is no interest to expand and fewer animals are needed to revive the herd. In the Czech Republic ox rearing probably will not get as popular as overseas, although in the last few years, due to the European trend of agricultural production, is more intensive because of meat abundance in the market and requirement to use extensive grasslands. So there is the possibility of conjoint oxen and heifers pasture rearing. Extensive rearing would take longer and it would lower the risk of over fattening, in certain circumstances it can have a good impact on a company's economy. *Čuboň et al* (2000) researched relations among the sex and the aptitude in the Slovakian Fleckvieh classification. The result was the positive interrelation between the grow intensity of body tissues and the animal age, their grow intensity, the aptitude and breeding conditions at the top level of feeding and breeding management. The age and the weight of slaughtering are important factors influencing the beef quality. It can be established from the work of *Cicala et al* (1998) that the proportion of the connecting tissue in muscle tissue grows proportionally with the age and the weight of bulls, though muscle fibre can occasionally decrease. *Kögel* (1990) learnt positive correlation ($r = + 0,55$) between the slaughtering weight and the quality of carcasses. The relation between the slaughtering weight and their final classification was also found out by *Šubrt et al* (1999).



Materials and methods

The work studied 521 Czech Fleckvieh bulls. The analysed cattle weight data were issued by a technician of SEUROP system for each beef cattle supplier. The lineage was rewritten from the cattle safe conduct. Statistic analysis was done by STATISTICA 8.0, where apart of basic statistic calculation, GLM procedure was used to figure multifactor analysis of variance with fixed effect, to explain the level of characteristics chosen in the final classification of carcasses, conformation and fattiness according to the SEUROP system.

$$Y_{ijkl} = \mu + A_i + W_j + N_k + e_{ijkl}$$

where:

μ = the average value of meatiness and fattiness

A = slaughtering age (1- 480- 550 days, 2- 550 to 650 days, 3- 651 to 700 days, 4- 701 - 800 days)

W = carcass weight (1- 270 - 310 kg, 2 – 311 to 360 kg, 3- 361 to 400 kg, 4- 401 - 440 kg)

N = net daily gain (1 – 470 - 500 g/day, 2 – 501 to 550 g/day, 3- 551 to 600 g/day, 4 – 601 to 650 g/day, 5- 651 - 700 g/day)

e_{ijklmn} = residuum

Results and discussion

Czech Fleckvieh bulls were slaughtered at an average age of 647 days. The carcass weight was 343 ± 44 kg and mean daily net gain of animals during fattening were $536 \text{ g} \cdot \text{day}^{-1}$. Bulls were classified with the SEUROP system as a class “U” (2.87 point) according to conformation and as a class 2 (2.44 point) according to fattiness. Variability within a group of carcasses is on the same level 30.0 respectively 40.0 % (Table 1).

Table 1. Basic carcasses characteristics of Czech Fleckvieh (C) bulls (LS mean \pm SE)

Indicator	Czech Fleckvieh bulls (n= 521)
Slaughter age (days)	647 ± 27
Weight of carcass (kg)	343 ± 44
Daily net gain (g)	536 ± 58
SEUROP conformation (point)*	2.87 ± 0.3
SEUROP fatness (point)**	2.44 ± 0.4

* S = 1; E = 2; U = 3; R = 4; O = 5; P = 6; ** 1 = 1; 2 = 2; 3 = 3; 4 = 4; 5 = 5;



Four age groups were made due to statistic database processing. The youngest bulls did not get 550 days (480 – 550 days) at slaughtering. The second group formed bulls between 551- 650 days. Bulls aged 451 to 700 days belonged to the third group and the last one was for animals older than 701 days (701 – 800 days). As is obvious in the Table 2, the slaughtering age affects the final carcass conformation classification. Bulls ranked to a higher age group go to a higher classification class. Statistically highly evidential difference ($P < 0,01$) were found between the groups 1-3; 1-4 and 2-4, respectively between the age group 480-550 days and the groups 651-700, respective 701-800 days and between the groups 551-650 and 701-800 days. The fattiness classification did not show any significant differences in any age group. Average point's value, or the classification classes given by a classifier, ranges for fattiness from 2.21 to 2.38 points, which means most of the half carcasses were evaluated as a class 2 “weakly fatty”.

Table 2. The influence of the slaughter age on the SEUROP system

SEUROP	Slaughter age (days)	LS mean \pm SE	Significant difference	
			P< 0.05	P<0.01
Conformation	480 - 550	3.110 \pm 0.034	1-3, 1-4, 2-3, 2-4;	1-3, 1-4, 2-4
	551 – 650	3.042 \pm 0.018		
	651 – 700	2.788 \pm 0.020		
	701 - 800	2.435 \pm 0.026		
Fattiness	480 - 550	2.217 \pm 0.096	–	–
	551 – 650	2.302 \pm 0.051		
	651 – 700	2.375 \pm 0.058		
	701 - 800	2.303 \pm 0.072		

The carcasses weight was also divided into four groups for statistical evaluation. The heaviest group covered carcasses above 401kg (401-440kg). Among these weight groups was not proved any statistically important difference. Combine aptitude carcasses were classified as the third conformation class, the class “U” (Table 3).

**Table 3. The effect of the carcass weight on the SEUROP system**

SEUROP	Weight of carcass (kg)	LS mean±SE	Significant difference	
			P< 0.05	P<0.01
Conformation	270 - 310	3.125±0.030	-	-
	311-360	2.985±0.017		
	361-400	3.011±0.020		
	401 – 440	3.005±0.038		
Fattiness	270 - 310	2.054±0.018	1-3	1-3
	311-360	2.211±0.021		
	361-400	2.483±0.014		
	401 – 440	2.154±0.038		

The average points for conformation at individual groups ranged between 2.98 and 3.12 (Table 3). The fattiness classification identified statistically significant differences ($P < 0.01$) at the carcasses of Czech Fleckvieh between the weight groups 1 (Weight from 270 to 310kg) and the group 3 (Weight from 361 to 400kg). *Chládek and Ingr* (2003) assessed the influence of slaughtering weight on the beef production. The animals slaughtered at a higher weight were better evaluated for conformation together with a higher proportion of the main beef parts.

The *Table 4* shows the relations between the SEUROP system and net daily gain. The first group includes bulls with the lowest net daily gain – 470- 500g.day⁻¹. Bulls of the last group reached over 651g.day⁻¹ (651-700g.day⁻¹). The statistical data processing proved highly important differences of conformation in Czech Fleckvieh carcasses – groups 1-4 and 1-5. Highly important difference ($P<0.01$) was proved among the net daily gain from 470 to 500g.day⁻¹ and 601 – 650g.day⁻¹ respective the absolute daily gain exceeding group 651 to 700g.day⁻¹. The analyses of the net daily gain influence on the fattiness classification did not prove any conclusive difference between the grades of net daily gain at any monitored aptitude. *Bjelka et al* (2002) published that higher net gain of slaughtered animals agrees with higher feeding intensity. As the result is a positive connection between the net gain and the conformation class. This identical tendency is noticeable from the results written in the *table 4*. The fattiness evaluation showed the opposite relation.

**Table 4. The effect of the daily net weight gain on the SEUROP system**

SEUROP	Daily net weight gain (g)	LS mean±SE	Significant difference	
			P< 0.05	P<0.01
Conformation	470 - 500	3.139±0.028	1-3,1-4,1-5	1-4,1-5
	501 - 550	3.045±0.021		
	551 - 600	2.993±0.020		
	601 - 650	2.495±0.029		
	651 - 700	2.485±0.036		
Fattiness	470 - 500	2.206±0.080	-	-
	501 - 550	2.258±0.059		
	551 - 600	2.324±0.057		
	601 - 650	2.367±0.083		
	651 - 700	2.342±0.102		

Conclusion

The aim of the work was to specify the influence rate of the SEUROP system to the appropriate slaughtering age, the carcass weight and the net daily gain. More statistically important differences were found at Czech Fleckvieh bulls between the age groups and the daily net gain groups in relation to the carcass conformation classes. The bulls with the higher daily net gain and bulls slaughtered at the higher age had better classification of conformation. The classes of fattiness are appropriate to the carcass weight.

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References

- Augustini, C., Brantscheid, W., Schwarze, F.J., Kirchgessner, M. (1992): Wachstumsspezifische Veränderung der Schlachtkörperqualität von Mastrindern der Rasse Deutsches Fleckvieh. *Fleischwirtschaft*, 72: 1584-1589.
- Bjelka, M., Šubrt, J., Polách, P., Krestýnová, M., Uttendorfský, K. (2002): Carcass quality in crossbred bulls in relation to SEUROP system grading. *Czech J. Anim. Sci.*, 47: 11. 467-475.



- Cicala, C., Cirino, G.* (1998): Linkage between inflammation and coagulation: An update on the molecular basis of the crosstalk. *Life sciences*, 62: 20. 1817-1824.
- Čuboň, J., Nosál, V., Mojto, J.* (2000): Classification of carcass structure of bulls and Heifer in EUROP system. *Czech J. Anim. Sci.*, 45: 8. 367-372.
- Chambaz, A., Scheeder, M.R.L., Kreuzer, M., Dufey, P.A.* (2003): Meat quality of Angus, Simmental, Charolais and Limousine steers compared at the same intramuscular fat content. *Meat Science*, 63: 491-500.
- Kögel, J.* (1990): Das „Idealgewicht“ des Flekviehbullen. *Tierzuchter*, 42: 287-289.
- Polách, P., Šubrt, J., Bjelka, M., Uttendorfský, K., Filipčík, R.* (2004): Carcass value of the progeny of tested beef bulls. *Czech J. Anim. Sci.*, 49: 7. 315-322.
- Šubrt, J., Frelich, J., Polách, P., Voříšková, J.* (1999): Analysis of carcass quality in sons of breeding bulls of meat breeds. *Czech J. Anim. Sci.*, 44: 1. 39-48.