COMPARISON OF INTRAMUSCULAR FAT QUALITY (LONG.THORACIS) IN YOUNG SLAUGHTER BULLS AND STEERS FROM STABLE FATTENING

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Background

We notice the increasing interest in beef from slaughter steers, which has some culinary advantages, during the recent years in the countries of Central Europe (Augustini et al., 1992). The production of beef from castrates was traditional in Slovakia mainly during the years before the war but then it stopped because of economic reasons. The category of slaughter steers can fulfill the trends of production of regional and ecological beef to meet the demand for marbled meat for quick preparation in the kitchen. The intramuscular fat and its components play an important role in beef, not only influencing its consumption quality but also from the viewpoint of healthy alimentation. The question of saturation or non-saturation of various forms of fat in the carcass of various categories of slaughter cattle is still topical (Demeyer, 1999) also because in some countries is the evaluation of fat quality a part of carcass grading at purchase (Yang et al., 1999). Representation of fatty acids, cholesterol content and other characteristics of intramuscular fat quality can be affected by various systems of nutrition, genotype, and sex belongs also to the important factors (Garcia et al., 1999; Elias Calles et al., 2000; Ender et al., 2000).

Objectives

The objective was to evaluate the intramuscular fat quality in young slaughter bulls and steers from stable fattening, and to compare the representation of individual fatty acids and other characteristics of fat quality in both categories.

Methods

In a comparative experiment were 10 young slaughter bulls and 10 slaughter steers, crosses of Holstein x Blond d'Aquitaine. The animals were housed in a tying stall during the whole fattening. The feed ration consisted of maize silage, concentrates and hay. The fattening finished at the age of 19 months, at average daily gain 0.95 kg in young bulls and 0.85 kg in steers. The live weight before slaughter was 570.12 kg in young bulls and 513.50 kg in steers. Sample of muscular substance was taken from m.longissimus thoracis (LT) from the right carcass side between 9^{th} and 11^{th} rib during the dissection 24 hrs post mortem.Content of intramuscular fat was assessed by the apparatus Infratec 1265, content of cholesterol by the method described by Horňáková et al. (1974). Content of fatty acids was determined by the capillary gas chromatographic analysis of methyl esters in the apparatus Hewlett-Packard, model 419. We calculated the representation of individual fatty acids, saturated fatty acids (SFA), mono unsaturated fatty acids (MUFA), ratio MUFA:SFA and ratio C18:2 (n-6) : C18:3 (n-3). Basic statistical parameters and differences between averages were calculated by the programme Statgraphics.

Results and Discussion

We analysed totally 14 fatty acids (Table 1) in the intramuscular fat of both categories, the significant differences being found in the myristic and palmitic acids out of the more important ones. We did not detect the presence of arachidonic acid C 20:4 (n-6) compared with e.g. its presence in the intramuscular fat of calves (Mojto et al., 2001). Physiologically important linolenic acid C18:3 (n-3) was represented in young bulls by 0.37 % and in steers by 0.32 %. Further characteristics of intramuscular fat quality (Table 2) showed that there are no significant differences between the compared categories with the exception of the fat content. Higher content of intramuscular fat was found in the meat of steers with stable fattening. The average content of cholesterol 59.88 mg.100 g^{-1} in young bulls and 64.69 in steers falls into the values commonly mentioned with beef. Representation of SFA over 50 % in steers is higher than mentioned e.g. by Elias Calles et al. (2000) or Yang et al. (1999). The proportion of fatty acids representation n-6 : n-3 (7.78 and/or 8.71) is in line with the optimum ratio 5 – 8:1(Singer, 1995) and markedly higher than mentioned with pasture fattening (Garcia et al., 1999).

Conclusion

Important significant differences in representation of fatty acids and other qualitative characteristics of fat did not become evident in stable fattening of young bulls and steers except for the content of intramuscular fat. The quality of intramuscular fat is equivalent in both categories.

Pertinent literature

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Table 1. Representation of individual fatty acids in intramuscular fat

FATTY ACID	BULLS		STEERS		STATISTICAL
	MEAN ± SE		MEAN ± SE		SIGNIFICANCE
$C_{10:0}$ capric	0.03	0.01	0.03	0.01	ND
$C_{12:0}$ lauric	3.22	0.15	2.88	0.09	ND
$C_{14:0}$ myristic	2.13	0.27	1.14	0.04	++
$C_{14:1}$ myristooleic	0.17	0.11	0.27	0.02	++
$C_{16:0}$ palmitic	27.79	0.39	29.56	0.36	++
$C_{16:1}$ palmitooleic	5.40	0.20	4.73	0.26	ND
$C_{17:0}$ heptadecanoic	0.27	0.02	1.25	0.05	++
$C_{18:0}$ stearic	19.16	0.92	18.52	0.56	ND
$C_{18:1}$ oleic	36.01	0.52	37.01	0.62	ND
$C_{18:2}$ linoleic	2.86	0.19	2.81	0.10	ND
$C_{18:3}$ linolenic	0.37	0.02	0.32	0.02	ND
$C_{20:0}$ arachidic	1.59	0.11	1.03	0.18	+
$C_{20:2}$ eicosadienic	0.18	0.02	0.19	0.02	ND
$C_{22:0}$ behenic	0.13	0.01	0.14	0.01	ND

ND - not different, +P<0.05, ++P<0.01

Table 2. Further qualitative characteristics of quality in intramuscular fat

	BULLS		STEERS		STATISTICAL
	mean ± SE		mean ± SE		SIGNIFICANCE
Content of fat $g.100g^{-1}$	1.52	0.12	2.65	0.18	+
Content of cholesterol $mg.100g^{-1}$	59.88	3.052	64.69	5.70	ND
SFA %	54.27	0.62	54.17	0.72	ND
MUFA %	42.40	0.53	42.02	0.78	ND
MUFA/SFA	0.79	0.02	0.78	0.02	ND
C18:2 n-6/C18:3 n-3	7.78	0.21	8.71	0.19	ND

ND- not different, +P<0.05