

EVALUATION OF QUALITY ACCEPTANCE OF COW'S MEAT IN RESPECT TO CERTAIN SOCIAL ASPECTS OF CONSUMERS

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ABSTRACT

The aim of the research study was to determine the attitudes of consumers towards sensory properties of beef (cow's meat) with regard to gender, age, education and preference of beef consumption under conditions of Slovakia. Sensory properties were analysed on 199 samples of cow's meat of various breeds and crosses. Cows were kept on the farms in different regions of Slovakia and slaughtered during 2006-2011. The samples (approx. 800 g) of *musculus longissimus lumborum et thoracis* between 9th to 11th ribs from the right side of the carcass were taken 24 h post mortem. Seven days after slaughter a consumer panel test for determination of sensory traits of meat was performed. The samples were sliced into 2.0 cm thick steaks and grilled for four minutes. Sensory traits (odour, taste, tenderness, juiciness) were evaluated by 5-point scale (1 - the worst, 5 - the best). The effect of gender (men - women), age (≤ 30 years; 31-50 years; ≥ 51 years), education (high-school, university) and preference of beef consumption (liking, disliking, indifferent) were determined. Overall, the sensory properties were evaluated by 612 randomly selected consumers.

Men evaluated better odour, juiciness and taste in comparison with women. The difference for odour was significant (3.66 and 3.64, respectively, $P < 0.05$). Age of consumers had significant influence on tenderness and taste of cow's meat where both traits were assessed more positive by a group of consumers aged 31-50 years than by the older group (3.31 vs. 3.10 and 3.64 vs. 3.40). High-school educated consumers evaluated better than university educated ones for all the traits except for odour. The difference for tenderness was significant between both groups (3.38 and 3.16, respectively). Preference of beef consumption had significant impact on juiciness and taste where, paradoxically, the highest assessment was conceded by consumers disliking beef.

Key words: beef; sensory properties; panel test, consumer preferences

INTRODUCTION

Currently cows are slaughtered at slaughterhouses in Slovakia in growing numbers. In the past, cow's meat was used more for processing into products, however it is being offered to consumers also as retail beef cuts. In some states cow's meat is not accepted as retail beef cuts, as a matter of principle (Benes, 1994). On the other hand, meat of beef cows under age of 6 years is considered as very valuable in France. It is often discussed if cow's meat should not be

used to produce meat products only; there is also opinion that it should be prohibited as retail beef cuts (Steinhauser, 2001) or be limited by the age of 3 years, i.e. selected primiparous cows (Franc and Herrmann, 1994). The cow's meat does not fulfil higher demands for retail meat, mainly because of its less tender consistency after heat treatment (Benes, 1994). The price of cow's meat is lower compared to young bull's meat, which can positively influence the customer at purchase of beef in favour of the cow's meat (Gondeková, 2011). Consumer demand for beef is highly influenced by

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consumer concerns about beef quality, health issues, nutritional value and safety, environment and animal welfare requirements (Xue *et al.*, 2010), as well as by the product origin (Banović *et al.*, 2010). Nevertheless, sensory characteristics still remain the main purchasing and repeated purchasing criteria (Calkins and Hodgen, 2007). Sensory traits, such as juiciness and tenderness, are known to be important to the consumer and thus influence their consumption of meat, especially beef. These traits are difficult to measure and often require the use of taste panels to assess the complex parameters involved in the eating experience (Gill *et al.*, 2010). A number of studies dealt with the sensory evaluation of cow's meat (Hoffman, 2006; Juie *et al.*, 2007; Koucký and Kudrna, 2006; Mojto *et al.*, 2009; Moon *et al.*, 2006; Stelzleni, 2007; Stelzleni and Johnson, 2008; Raines *et al.*, 2009; Stika *et al.*, 2007). The social aspect of consumers (age, sex, region, education level, income, preference of beef) was given less attention. Mennecke *et al.* (2007) studied the factors that influence consumer attitudes toward beef products using the conjoint market analysis tool. Consumers' preferences for quality grade and degree of doneness were solved in study of McKenna *et al.* (2003). Evaluation of beef quality by consumers from the viewpoint of various social aspects (age, sex, consumption of beef) were analysed by Oliver *et al.* (2006). Branscheid *et al.* (2006) reported consumer acceptability of beef and lamb in respect of certain social aspects of consumers (age, education, region). The acceptability of cow's meat by customer remains doubtful. According to our knowledge the acceptance of cow's meat by customers from the viewpoint of various social aspects has not been evaluated in Slovakia till now. The objective of this work was to evaluate acceptance of cow's meat by customers considering their sex, age, education and preference for beef consumption.

MATERIAL AND METHODS

Animals

Samples of meat from the carcasses of 199 cows of various breeds were collected randomly from different farms in Slovakia. Breeds composition copied herd structure in Slovakia and was as follows: Black and White Holstein, Red and White Holstein, Simmental, crossbreds of Black and White Holstein and Simmental crossbreds. Cows were slaughtered at abattoirs in Slovak Republic during 2006-2011 at the average age of 59 months. The oldest cow from evaluated group was 167.9 months old and the youngest was 19 months old. The animals whose meat samples were used to determine meat quality parameters were subjected to stressful situations, or otherwise

handled to improve meat quality.

Sensory indicators

Meat samples from *musculus longissimus thoracis et lumborum* for tasting the meat were taken from the right carcass halves between 9th to 11th ribs. Sensory characteristics of meat were determined on 7th day after the slaughter of animals by a consumer test. Samples of meat were sliced into 2.0 cm pieces and then were grilled for 4 min at 200°C using electrical contact grill. Odour, taste, tenderness and juiciness were assessed. To evaluate the sensory characteristics, 5 - point scale (Jedlička, 1988) (1st degree - very bad, 5th degree - very good) was used. The effects of gender [men (M), women (F)], age of respondents [≤ 30 (AGE 1); 31-50 (AGE 2); ≥ 51 years (AGE 3)], education [high-school (EDH), university (EDU)] and preference of beef consumption [liking (LI+), disliking (LI-), indifferent (LI0)] were determined. Totally, the sensory properties were evaluated by 612 randomly selected consumers.

Statistical analysis

Statistical package SAS/STAT (2002-2003, v. 9.2) was used in the analysis. Basic statistics was done using MEANS procedure. The effect of gender, age, education and beef preference was investigated using GLM procedure.

RESULTS AND DISCUSSION

The results observed in the study showed the effect of gender. Differences between men and women only when odour of grilled meat was taken into account (Table 1). Rhodes *et al.* (1955), Van Syckle and Bruog (1985) and Ramsey *et al.* (1963) pointed out that odour is dominant for the customer at sensory evaluation. This statement was confirmed also by Koch *et al.* (1982), McKeith *et al.* (1985) and Galli *et al.* (2008) in their works. Men evaluated better the odour, juiciness and taste of meat compared to women. Women evaluated grilled meat as follows: odour was evaluated the best, followed by taste, juiciness and tenderness of meat. The lowest obtained value was tenderness evaluated by men, and the highest value was odour also evaluated by men. Men overall gave more points to the evaluated samples of grilled cow's meat. It can be caused by the fact that at home women prepare meat more often than men, and so they were stricter as far as the studied parameters of grilled meat were concerned. On the contrary, men are more active at "grilling at home". Branscheid *et al.* (2006) found no influence of consumer's gender when evaluating beef; Farmer *et al.* (2006). Mojto *et al.* (2009b) reported statistically significant differences between sex when women evaluated more

Table 1: Organoleptic quality of cow's meat with respect to gender of tasters

Indicator	M (n = 270)		F (n = 342)		t-test
	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$	
Tenderness	3.20	0.06	3.25	0.06	-
Odour	3.66	0.04	3.64	0.04	*
Juiciness	3.49	0.06	3.46	0.04	-
Taste	3.64	0.05	3.48	0.05	-

* $P < 0.05$

Scale: 1 - without tenderness, odour, juiciness, taste; 5 - very high tenderness, odour, juiciness, taste

Table 2: Organoleptic quality of cow's meat with respect to the age of tasters

Indicator	AGE1 (n = 85)		AGE2 (n = 349)		AGE3 (n = 178)		f-test	t-test
	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$		
Tenderness	3.20	0.09	3.31	0.05	3.10	0.08	*	2:3
Odour	3.67	0.07	3.67	0.04	3.60	0.06	-	-
Juiciness	3.34	0.10	3.52	0.05	3.46	0.07	-	-
Taste	3.48	0.09	3.64	0.04	3.40	0.07	*	2:3

* $P < 0.05$,

Scale: 1 - without tenderness, odour, juiciness, taste; 5 - very high tenderness, odour, juiciness, taste

favourable not only tenderness but also juiciness of meat. Men evaluated better taste and odour of meat only.

When analysing data according to age, we noted statistically significant differences in taste and tenderness of meat between groups AGE2 and AGE3. Group AGE2 gave the most points to all properties of grilled meat, i.e. the consumers evaluated the meat samples as the best ones. The group AGE1 evaluated all parameters, better than group AGE3 with the exception of juiciness. The respondent's group AGE3 evaluated the organoleptic properties of grilled cow's meat as the worst, and group AGE2 evaluated them as the best. Farmer *et al.* (2006) also noticed the influence of the panel's age when evaluating the organoleptic characteristics of meat.

Significant effect of education of consumers was found when tenderness of grilled cow's meat was evaluated. The group EDH gave more points to all parameters except for odour. Branscheid *et al.* (2006) studied the influence of education in two different

regions. The university graduates found tenderness and odour of grilled meat better in one region, whereas the graduates of high-school found them better in the other region.

The effect of preference for beef consumption is shown in the table 4. We noted statistically significant differences between group LI+ and group LI- as well as between group LI- and group LI0 in juiciness. Similar statistically significant differences among the above mentioned groups of consumers were found also when taste was evaluated. Consumers in group LI- gave the most points (the best evaluation) to all parameters. Group LI+ gave the least points, except for odour. Overall we obtained the best evaluation from consumers who do not prefer beef. The consumers who like beef were the strictest evaluators. It is necessary to remember that in this case the consumers who do not like beef did not have acquired experiences with the evaluated meat properties compared with those preferring and consuming beef. Therefore they were more benevolent;

Table 3: Organoleptic quality of cow's meat with respect to education level of tasters

Indicator	EDH (n = 197)		EDU (n = 415)		t-test
	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$	
Tenderness	3.38	0.07	3.16	0.05	*
Odour	3.62	0.06	3.66	0.04	-
Juiciness	3.53	0.06	3.45	0.04	-
Taste	3.57	0.06	3.54	0.04	-

* $P < 0.05$

Scale: 1 - without tenderness, odour, juiciness, taste; 5 - very high tenderness, odour, juiciness, taste

Table 4: Organoleptic quality of cow's meat with respect to the preference of beef consumption of tasters

Indicator	LI+ (n = 464)		LI- (n = 9)		LI0 (n = 139)		f-test	t-test	
	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$	\bar{x}	$S_{\bar{x}}$		1:2	2:3
Tenderness	3.18	0.05	4.00	0.29	3.36	0.08	-	-	-
Odour	3.66	0.04	3.67	0.37	3.63	0.06	-	-	-
Juiciness	3.43	0.04	4.44	0.18	3.58	0.07	*	***	**
Taste	3.54	0.04	3.89	0.31	3.55	0.06	*	*	*

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Scale: 1 - without tenderness, odour, juiciness, taste; 5 - very high tenderness, odour, juiciness, taste

it means they gave more points to the samples at degustation and subsequent evaluation.

A comparison of our results with other studies is problematic due to a lack of research on cow's meat. It does not attract such attention as the beef – meat from bulls. Since the share of cow's meat has been still growing in commercial sale in Slovakia, further research including other social aspects (e.g. region, income, effect of advertising) of consumers will be needed.

CONCLUSION

The effect of gender, age, education level and beef preference of consumers on sensory properties of cow's meat was observed. Men, consumers aged 31-50, high-school educated and not preferring beef evaluated cow's meat more positive than women, younger and/or older, university-educated and beef preferring respondents.

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