Consumer perception and acceptance of pork and chicken sausage

M Ristić1, K Troeger1, J Đinović-Stojanović2, N Knežević3 and M Damnjanović3

1 BAFF, Former Federal Centre for Meat Research, Kulmbach, Germany (retired researchers)
2 Institute of Meat Hygiene and Technology, Kaćansko 13, 11000 Belgrade, Serbia
3 Zlatiborac Company d.o.o., Mojkovačka 58, 11136 Belgrade, Serbia

E-mail: ristic.rc-kulmbach@t-online.de

Abstract. This study was performed to evaluate consumers’ perception and acceptance of selected pork and chicken sausage (budim and chicken sausages, respectively) from Zlatiborac Meat Company. Sensory evaluation was performed by Serbian consumers (n=1157) in three retail stores in Belgrade. Consumers were asked for their preference for taste, salt content and smoke of two sausages and to recognize the kind of meat which was used to make these meat products. Consumers evaluated taste, salt content and smoke flavor of budim and chicken sausages with the highest percentage of the best offered answer. Between 47-55%, 72-76% and 82-84% of consumers evaluated the taste of sausages as good, the salt content as well-balanced and the smoke flavor as balanced, respectively. Tukey’s HSD test was applied to analyze variations of male and female perception and acceptance of analyzed sausages.

1. Introduction
Meat and meat products have played a very important role in the daily diet of consumers over the world. They are highly valued sources of protein, iron, zinc and vitamins etc. On the other hand, some scientific research emphasized the strong relationship between high red meat consumption and an increased risk of cancers, diabetes, and cardiovascular diseases [1,2]. Despite that, global meat production is projected to more than double from 229 million tones (1999/2001) to 465 million tones by 2050 [3]. Meat consumption statistics vary among and within countries and depends on many factors, such as socio-economics, ethics, cultural, religious beliefs and tradition [4].

Sensory evaluation of meat and meat products is not an easy task for consumers. Consumer trust often leads to consumer acceptance of products. The relationship between consumer perception of quality and meat industry has a direct influence on profitability. Also, it is well documented that consumer reactions to food scandals result in economic implications [5]. Thus, scientific knowledge and technology innovation play an important role and can help industry to respond to consumer expectations [6]. Modern consumers are becoming increasingly interested in health and safety of food with good sensory properties [7,8].

This study was carried out to elaborate consumers’ perception and acceptance of two sausages. The main objectives of this study were to evaluate pork and chicken sausage (budim and chicken sausage,
respectively) by consumers in three retail stores in Belgrade, Serbia, and determine the main deficiencies of those meat products in order to improve their quality.

2. Materials and Methods
Consumer testing was performed in three large retail stores (Delhaize, DIS and Mercator S) in January 2016, in Belgrade. A total of 1157 consumers were participated in one day during the period from 10 a.m. to 4 p.m. Consumers were males (45%) and females (45%) older than 18 years of age.

The questionnaire started with general questions about the consumers, referred to their age, number of family members, education levels and shopping habits. Thereafter respondents were asked to evaluate budim and chicken sausages produced by Zlatiborac Meat Company, but the origin and market name of the products were unknown to the consumers. Budim sausage (in Serbian budimska kobasica) consists of pork (57.5%), beef (19.2%) and solid fat (19.2%). Chicken sausage (in Serbian pileća čajna kobasica) consists of chicken drumstick meat (69.2%), pork (9.7%) and solid fat (19.5%). Consumers were asked the following questions: (1) Rate the taste (The offered answers were: good, satisfactory, unsatisfactory); (2) Rate the salt content (The offered answers were: balanced, not salty enough, too salty); (3) Rate the smoke flavor (The offered answers were: balanced, not strong enough, too strong); (4) Which type of meat has been processed? (The offered answers were: pork, beef, poultry and mixture).

Statistical analysis of experimental data was performed using software Statistica 10.0 (StatSoft Inc., Tulsa, OK, USA). Tukey’s HSD test for comparison of consumers answers were used to analyze variations of male and female perception of budim and chicken sausages.

3. Results and discussion
Results concerning some demographic parameters of consumer are shown in figures 1 and 2. Consumers (n=1157) were males (45%) and females (45%) older than 18 years of age.

The highest percentages of consumers were between 40 and 49 (34.5%) and between 50 and 65 years old (34.4%), and more than 60% of them had completed high school. The average test person was male, aged 40-49, with a secondary school education, living in a family of four.

The results of sensory evaluation of budim and chicken sausage by consumers are shown in figures 3 and 4.
Sensory evaluation of budim sausage (figure 3) showed that only 47-50% of consumers evaluated the taste as good while 10-13% of them were not satisfied with the taste. More than 70% and 80% of consumers evaluated salt content and smoke flavor as well-balanced and balanced, respectively. In the case of chicken sausage more than 50% of consumers evaluated the taste as good; around 75% of consumers rated the salt content as well-balanced; more than 80% of consumers rated the smoke flavor as balanced (figure 4). Among the possible answer categories, the highest percentage of consumers were not satisfied with salt content of both sausages, since 21-24% and 18-22% of consumers evaluated salt content of budim and chicken sausage, respectively, as not salty enough. Post-hoc Tukey’s HSD test showed that there were no statistically significant differences (at p<0.05 level) in male and female answers concerning rating the taste, salt content or smoke flavor of budim and chicken sausages.
Consumers were also asked to identify which animal species they thought the meat incorporated in the sausages was from (table 1). Only 57% and 38% of consumers recognized that the budim and chicken sausages were prepared from pork and mixed (beef and pork) meat, respectively.

**Table 1.** Consumers’ answers [%] to the question: What kind of meat was used to make this sausage? Answers in bold and italic are correct answers.

| Type of meat       | Sausage |          |          |
|--------------------|---------|----------|----------|
|                    | Budim   | Chicken  |          |
| Beef               | 6       | 5        |          |
| Mixed (beef and pork) | 27   | 38       |          |
| Pork               | 57      | 28       |          |
| Chicken            | 10      | 29       |          |

The data obtained from this study could be compared with the data from DLG (German Agricultural Society) evaluation in Germany in 2016 [9], where meat company Zlatiborac participated. In the DLG Test Center Food, in 2016, 1577 international meat products were evaluated in accordance with the DLG-5-points‐scheme. It is a descriptive sensory analysis with scales on the basis of assessment by experts, which included visual (appearance/exterior), haptic (consistence/texture), olfactory (odor) and gustative (taste) criteria of the meat products. The main deficiencies of the
international meat products were related to their external appearance, consistency, odor and taste [9]. They were denoted as “sinew component too high” (11%), “surface film” (7%), “too soft” (5%), “sour” (5%), etc. The main deficiencies of meat products from Serbian origin [10] were “sinew component too high”, “smoke too strong”, “sour” and “salty”. However, beside mentioned deficiencies, all meat products from Serbia pass the DLG tests and received a “DLG award winner”.

It is clear that Serbian consumers and DLG experts had different perceptions of Serbian meat products in some aspects of sensory evaluation. For example, DLG experts evaluated some products as “salty” and “smoke was too strong” [10]. However, although consumers in Belgrade evaluated taste, salt content and smoke flavor of budim and chicken sausages with the highest percentage of the best offered answer, the main deficiencies of analyzed meat products were evaluated as “not salty enough” (18-24%) and smoke flavor was “too weak” (14-16%) (figures 3 and 4). Serbian consumers’ responses concerning analyzed meat products could be associated with the fact that salty and highly-smoked meat products are traditional in the country.

4. Conclusion
Sensory evaluation of budim and chicken sausages produced by Zlatiborac Meat Company showed that consumers were satisfied with the taste, salt content and smoke flavor of the products. Their responses concerning the analyzed meat products could be associated with traditional meat production in Serbia. Post-hoc Tukey’s HSD test showed that there were no statistically significant differences (at p<0.05 level) in male and female answers concerning sensory evaluation of budim and chicken sausages. The obtained data could be useful cues for industry to enhance some parameters of meat product quality in order to place them on the EU market.

Acknowledgments
The authors would like to thank Mr Dejan Djurdjevic from Zlatiborac Meat Company, Serbia, for his help in sensory evaluation of the meat products.

References
[1] McAfee A J, McSorley E M, Cuskelly G J, Moss B W, Wallac E J M W and Bonham M 2010 Meat Sci. 84 1
[2] Alisson-Silva F, Kawanishi K and Varki A 2016 Mol. Aspects Med. 51 16
[3] Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M and De Haan C 2006 Livestock’s long shadow: Environmental issues and options, Rome, Italy
[4] Naylor R W, Droms C M and Hawks K L 2009 JPP&M 28 221
[5] Rieger J, Kuhlgatz C and Anders S 2016 Food Policy 64 82
[6] Troy D J and Kerry J P 2010 Meat Sci. 86 214
[7] Olewinik-Mikolajewska A, Guzek D, Glataska D and Gutkowska K 2016 J. Sens. Stud. 31 193
[8] Chamhuri N and Batt P J 2015 Brit. Food J. 117 1168
[9] Lautenschläger R, Thumel H and Hillgärtner K 2016 Fleischwirtschaft 96 10 47
[10] Dinovic-Stojanovic J, Troeger K, Ristic M, Knezevic N and Damnjanovic M 2017 J. Agr. Sci. Food Tech. 3 15