

# Consumer Perception and Acceptance of Meat Products from Serbia

Jasna Đinovic-Stojanovic<sup>1</sup>, Klaus Troeger<sup>2</sup>, Milan Ristic<sup>2\*</sup>, Nemanja Knezevic<sup>3</sup> and Milica Damnjanovic<sup>3</sup>

Accepted 18 March, 2017

<sup>1</sup>Institute of Meat Hygiene and Technology, Kacanskog 13, 11000 Belgrade, Serbia.

<sup>2</sup>BAFF, Former Federal Centre for Meat Research, Kulmbach, Germany (retired researchers).

<sup>3</sup>Zlatiborac Company d.o.o., Mojkovacka 58, 11136 Belgrade, Serbia.

## ABSTRACT

The aim of this study was to evaluate consumers' perception and acceptance of selected meat products from Serbia. Sensory evaluation was performed by Serbian consumers in Belgrade and by DLG (German Agricultural Society) experts in Germany. Three types of salami (chicken, homemade and beef) were sensory evaluated by consumers (n=1157) in three retail stores in Belgrade. Consumers rated the taste, salt content and smoke of salami. Chicken salami was evaluated with the highest marks; more than 70% of consumers evaluated its taste as good and salt content as well-balanced; 90% of consumers rated the smoke flavour as balanced. Between 2009 and 2016, 165 traditional meat products from Serbia were sensory evaluated in accordance with the DLG-5-points-scheme in Germany. All analysed meat products were recognised with DLG awards (57% received gold medals, 31% silver and 12% bronze). The main deficiencies of the Serbian meat products, as determined by the DLG experts, were related to their consistency, odour and taste. Some products were evaluated as "sour", "smoke too strong" and "sinew component too high". However, considering the positive DLG evaluations, there are clearly good marketing opportunities for traditionally manufactured meat products from Serbia to be placed on the EU market.

**Key words:** consumer perception, sensory properties, traditional smoked meat products.

\*Corresponding author. E-mail: ristic.rc-kulmbach@t-online.de.

## INTRODUCTION

Meat and meat products is complex and, nutritionally, form a significant component of human diets that play an important role in the consumption patterns of consumers in many parts of the world (Elzerman et al., 2011; Akpan, 2016). Generally, consumption of animal-based foods has increased since the 1960s throughout the word, but there has also been a general decrease in the amount of red meat consumed in developed countries, primarily attributed to the reduction in beef consumption in the late 1990s (Williamson et al., 2005). Consumption of meat and meat products depends on many factors such as socio-economics, ethics, cultural, religious beliefs and tradition (Font-i-Furnols and Guerrero, 2014). It should be

noted that meat consumption cannot be predicted in the next year, but global meat production is projected to more than double from 229 million tonnes (1999/2001) to 465 million tonnes by 2050 (Steinfeld et al., 2006). Globally, pork is the most widely consumed meat (15.8 kg/capita/year), followed by poultry (13.6 kg/capita/year), beef (9.6 kg/capita/year) and finally sheep and goat meat (1.9 kg/capita/year) (FAOSTAT, 2014). Meat consumption statistics vary among and within countries. For example, in Muslim countries, pork consumption is extremely low or absent, whereas it can exceed 50 kg/capita/year in countries such as Austria, Poland, Germany and Lithuania (FAOSTAT, 2014). Figure 1

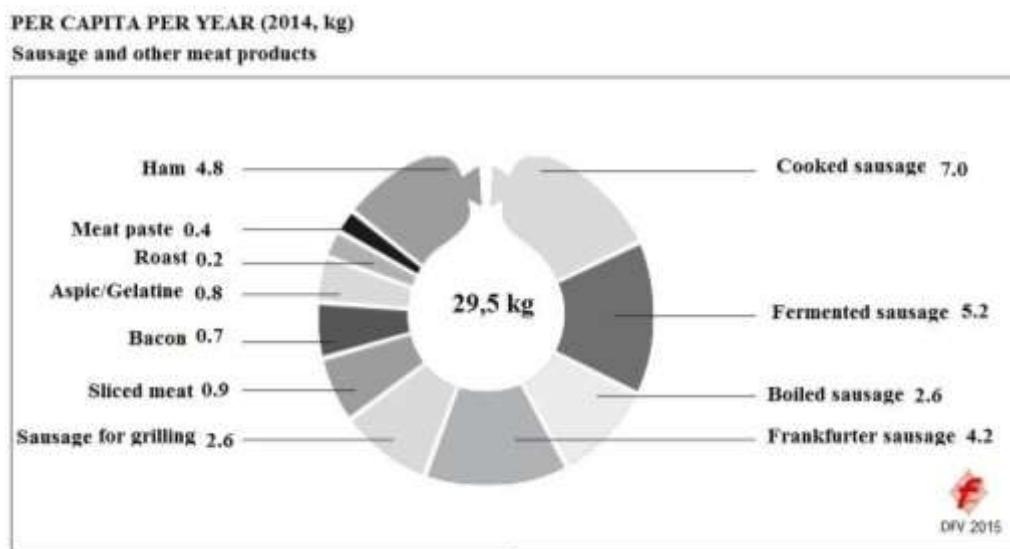


Figure 1. Consumption of sausage and other meat products in Germany (DFV, 2016).

shows the distribution of consumption of sausage and other meat products in Germany (DFV, 2016). The average annual meat consumption in Serbia in 2013 was 60.8 kg/per capita (the EU average is 78 kg/per capita) of which pork was the most commonly consumed meat (27.3 kg), followed by poultry (17.2 kg) and beef (14.4 kg) (USDA Foreign Agricultural Service, 2013). With respect to the high meat consumption pattern in many countries, there is a growing interest from modern consumers in consuming meat and meat products with good sensory properties and with no undesirable effects on their health (Andersen et al., 2005). Consumer perceptions of meat/meat product quality and meat industry needs are directly related. Namely, consumers' perception and acceptance of meat products are critical issues for the meat industry because it has a direct influence on profitability.

The meat industry should satisfy consumer needs, a task which is complex and involves many different components (Troy and Kerry, 2010). Science and innovation play an important role between the industry and consumer concerns and expectations (Grunert et al., 2004). The process of influencing consumers to accept meat or meat products is complex, dynamic and sometimes difficult to define. Consumers' responses concerning an analysed food are based not only on sensory properties of the product and its physical status, but are also associated with some other factors, such as previous knowledge and experience, as well as consumers' attitudes and beliefs (Issanchou, 1996). However, consumer perceptions are not fixed and could be changed. Concerning the purchase of meat, taste is the most important criterion for consumers, followed by external characteristics and texture (Ostojic et al., 2005). Serbia has a long meat industry tradition of producing

high quality products. Consequently, meat processing facilities have a strong position on the CEFTA (Central European Free Trade Agreement) market (RAS, [www.ras.gov.rs](http://www.ras.gov.rs)). The most famous meat company from Serbia, Zlatiborac, has been developing traditional recipes and the process of natural meat drying and smoking over beech wood and in fresh mountain air, in the pristine natural surroundings of Mačkat on Mount Zlatibor, since 1885. A leading company in our region in the field of dried meat production, Zlatiborac offers a wide range of durable processed meat products from pork, beef and chicken meat ([www.zlatiborac.com](http://www.zlatiborac.com)). Their products are widely available in all retail chains, not only in the Balkan region but also in Russia, Belarus, etc. Meat and meat products form a significant part of human diets in Serbia.

They are important due to their desirable taste, high nutritional value, high level of production and large variety of products. For most Serbian people, pork meat and poultry are primary sources of protein and nutrients. This study was carried out to elaborate consumers' perception and acceptance of selected meat products from Serbia.

The main objectives of this study were to: 1 evaluate chicken salami, homemade salami and beef salami by consumers in three retail stores in Belgrade, Serbia; 2 present the combined results of sensory evaluation of meat products from Serbia, evaluated between 2009 and 2016 by "Deutsche Landwirtschafts-Gesellschaft" (German Agricultural Society; DLG) and "Bundesanstalt für Fleischforschung" (BAFF), for example, Former Federal Centre for Meat Research in Kulmbach, Germany. Both centres have experts in DLG tests; 3 determine the main deficiencies of meat products of Serbian origin in order to improve their quality.

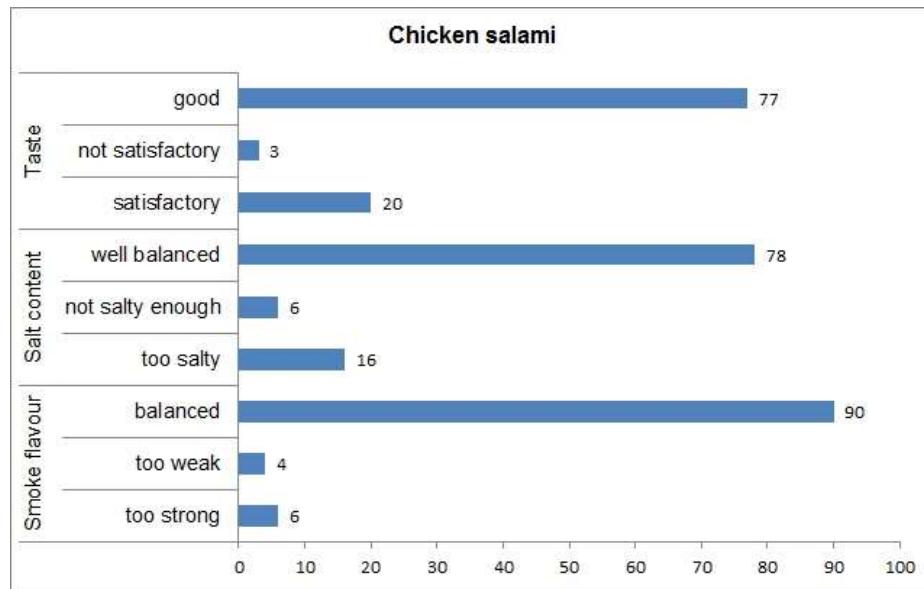


Figure 2. Sensory evaluation of chicken salami by consumers (n=521, [%]), in Belgrade, Serbia.

## MATERIALS AND METHODS

Consumer testing in Serbia was performed in January 2016, in three large retail stores (Delhaize, DIS and Mercator S) in Belgrade. Consumers (n=1157) were males and females older than 18 years of age. The highest percentage of consumers were between 40 and 49 years old (34.5%) and between 50 and 65 years old (34.4%). They evaluated chicken salami, homemade salami and beef salami produced by Zlatiborac, but the origin and market name of the products were unknown to the consumers. They were asked the following questions: (1) Which type of meat has been processed? (The offered answers were: pork, beef, poultry, mixture); (2) Rate the taste (The offered answers were: good, satisfactory, unsatisfactory); (3) Rate the salt content (The offered answers were: balanced, not salty enough, too salty); (4) Rate the smoke flavour (The offered answers were: balanced, not strong enough, too strong). A total of 1,157 consumers were participated in one day during the period from 10 a.m. to 4 p.m. DLG is the oldest food testing institution in Europe, and has been organizing quality tests since 1885. It is the key organization for assessing the quality of foods and has well-regarded experience, expertise and credibility. Around 30000 foodstuffs from Germany and abroad are evaluated every year in the DLG Test Center Food.

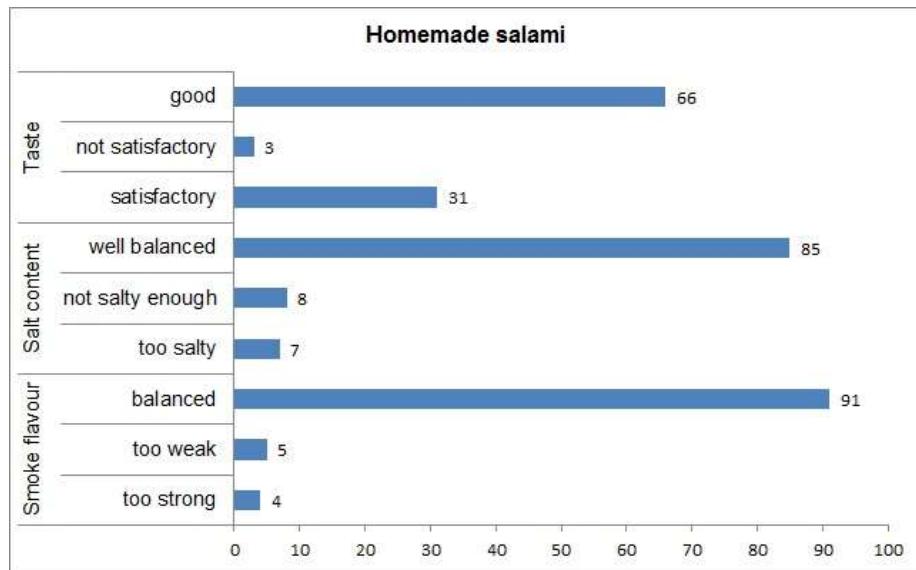
In the DLG Quality Test for Ham and Sausage, each product is tested in accordance with scientific quality standards (DIN EN ISO/IEC 17065, 2015) and an expert report, certified in accordance with DIN EN ISO/IEC 17024 (2015). Meat products that pass the DLG tests receive a "DLG award winner" medal in Gold, Silver or Bronze. DLG medals are ambassadors for good taste

and high quality foods. Sensory evaluation of the products was assessed in accordance with the DLG-5-points-scheme, which is a descriptive sensory analysis with scales on the basis of assessment by experts. Analysis included visual (appearance/exterior), haptic (consistence/texture), olfactory (odour) and gustative (taste) criteria of the meat products. The quality standard in these criteria is defined by the DLG Expert Commission for each product (DLG certification Unit, 2014). A product wins a DLG Award in Gold if it is free of faults in the sensory test and satisfies all further quality parameters (5.00 points). If DLG points are between 4.60 – 4.99 and 4.10 – 4.59 points, products win the DLG Award in Silver and DLG Award in Bronze, respectively. Sensory evaluation of 165 meat product from Serbia was conducted in accordance with the DLG-5-points-scheme, between 2009 and 2016, by DLG Test Centre Food and BAFF experts in DLG tests.

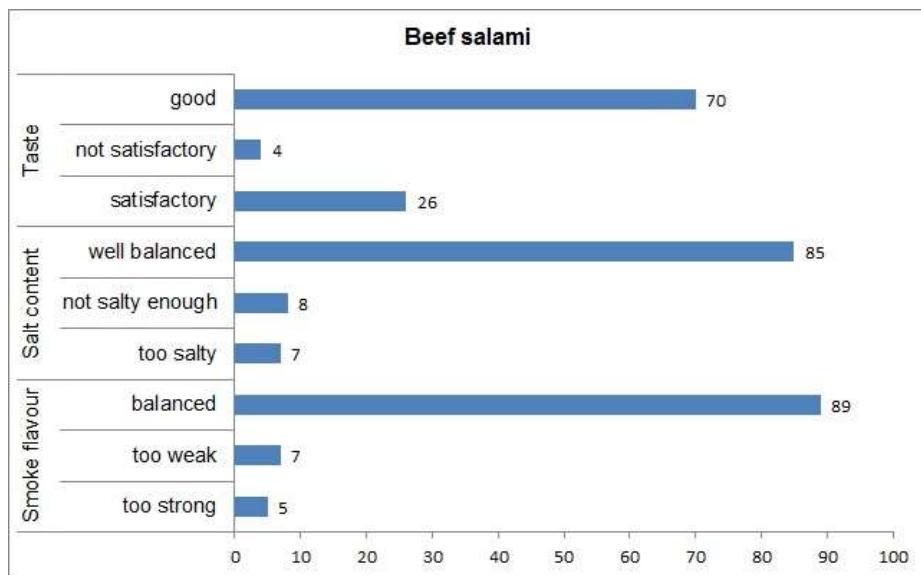
## RESULTS AND DISCUSSION

### Sensory Evaluation of Meat Products by Consumers in Serbia

The results of sensory evaluation of chicken salami, homemade salami and beef salami by consumers in three retail stores in Belgrade, Serbia, are shown in Figures 2 to 4 and Table 1. Sensory evaluation of the three types of salami showed that consumers were satisfied with their taste, salt content and smoke flavour. More than 70% of consumers evaluated the taste of chicken salami as good and the salt content as well-balanced; 90% of consumers rated the smoke flavour as



**Figure 3.** Sensory evaluation of homemade salami by consumers (n=636, [%]), in Belgrade, Serbia.



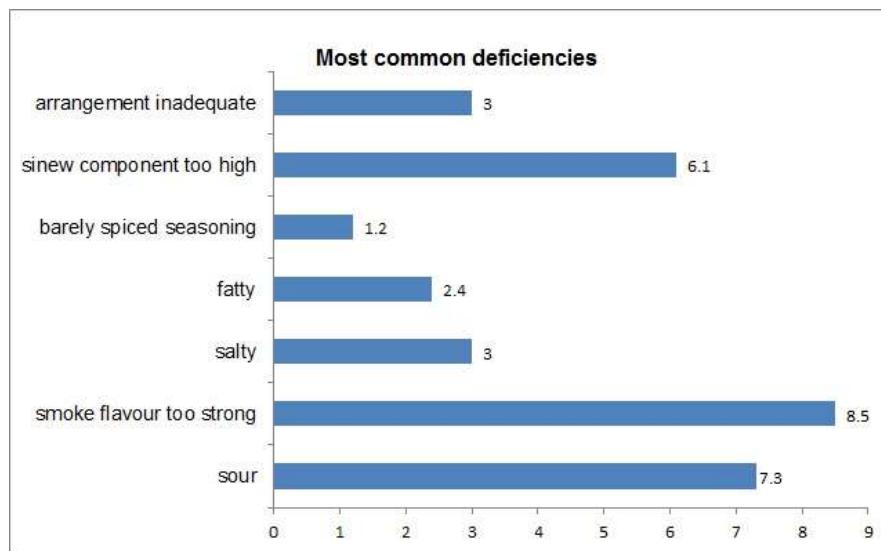
**Figure 4.** Sensory evaluation of beef salami by consumers (n=521, [%]), in Belgrade, Serbia.

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

| Type of Meat                | Salami    |           |           |
|-----------------------------|-----------|-----------|-----------|
|                             | Chicken   | Homemade  | Beef      |
| Beef                        | 11        | 10        | <b>73</b> |
| Mixed (poultry and chicken) | 31        | <b>36</b> | 8         |
| Poultry                     | 31        | 49        | 13        |
| Chicken                     | <b>27</b> | 5         | 6         |

balanced (Figure 2). Homemade salami was evaluated as good (66%), well-balanced (85%) and balanced

(91%), concerning taste, salt content and smoke flavour, respectively, (Figure 3). In the case of beef salami,



**Figure 5.** The most common deficiencies of meat products of Serbian origin examined in Germany (DLG, [%]).

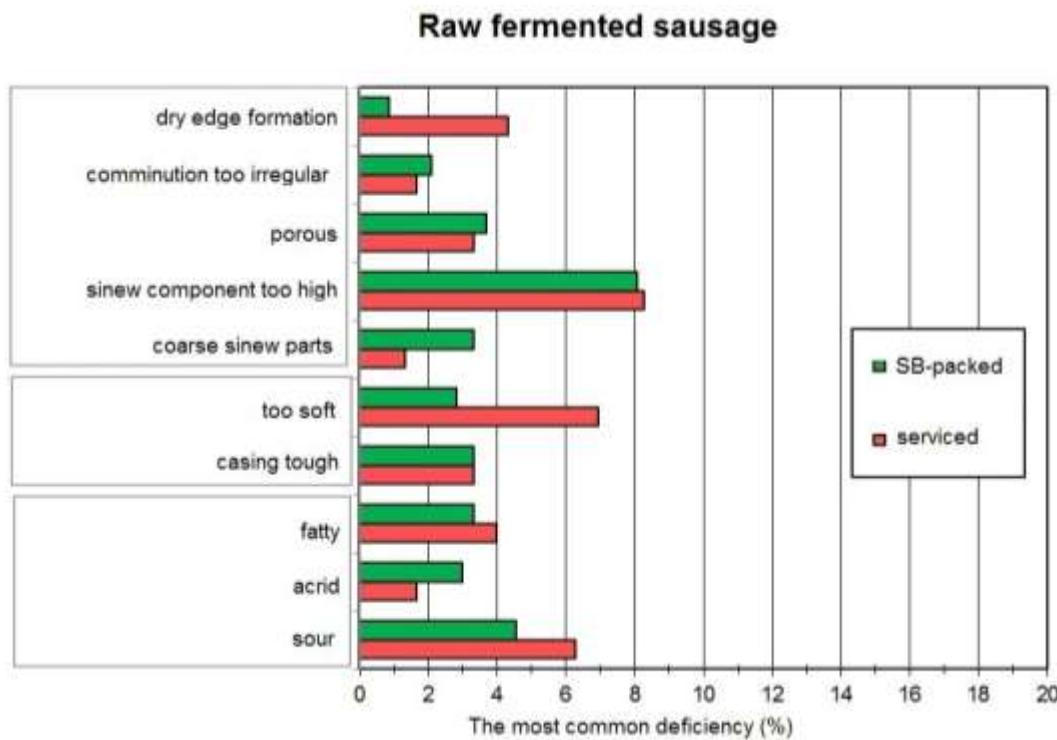
consumers evaluated its taste, salt content and smoke flavour with the highest percentage of the best offered answers, among the three salami types (Figure 4). Less than 8% of consumers were dissatisfied with the sensory properties of the analysed meat products, except for chicken salami, which 16% of consumers evaluated as being too salty. Consumers were also asked to identify which animal species they thought the meat incorporated in the salamis was from (Table 1). Only 27 and 36% of consumers recognized that the chicken and homemade salamis were prepared from chicken and mixed (chicken and poultry) meat, respectively. However, 90% of consumers correctly identified the beef meat used for beef salami.

#### Sensory Evaluation of Meat Products from Serbia by Experts in Germany

The DLG-5-points-scheme was used to analyse the following range of Serbian meat products (n=165): raw fermented sausage, raw cured ham, small cooked sausages and sausages from cooked meat. These products were manufactured according to old, traditional recipes that are well-known in Serbia. All analysed meat products passed the DLG tests and receive "DLG award winner" medals. DLG awards for the products were as follows: 57% received gold, 31% silver and 12% bronze. The most common deficiencies of the ham and sausages are shown in Figure 5. The main deficiencies were related to their consistency, odour and taste. Some products had a smoke flavour which was too strong (8.5%), were sour (7.3%) or with a sinew component rated as too high (6.1%). Such rating of deficiencies

could be very helpful for meat producers from Serbia in order to improve quality of their product, with the aim of increasing the production of meat products with good quality and sensory properties acceptable for consumers. Currently, the DLG evaluation and its medals strongly indicate that there are good marketing opportunities for the meat industry from Serbia to place products on the EU market. Considering the international meat products that were evaluated in DLG Test Center Food during 2015, similar deficiencies were established (Stiebing et al., 2015) as we determined in meat products of Serbian origin. Figure 6 shows the most common deficiencies of all fermented sausages evaluated in 2015 at the DLG Test Center Food.

It was shown that, due to slow ripening, products of Italian origin were softer and less sour, which also applied to products from Switzerland. Raw ham from Slovenia was strongly cured, whereas raw ham from Switzerland suffered from an increased dry edge formation as well as hard fat being visible on the surface. Another dominant deficiency was 'sinew component too high' (8%), which was lower than the rating for this achieved by raw fermented sausage of Serbian origin. In contrast, the percentage of fermented sausages judged to be sour was lower for international products (3.6%) compared to products of Serbian origin. Data were similar for 'smoke flavour too high' (6.2 and 8.5% for sausages from other countries and from Serbia, respectively), (Stiebing et al., 2015). In total, 2,682 meat products from Serbia and abroad were subjected to a critical evaluation by experts in 2015, which revealed that standards remained on a solid high level (Dederer, 2016). With regard to the deficiencies of cooked sausages, most of



**Figure 6.** The most common deficiencies of international meat products examined in Germany (Stiebing et al., 2015).

the objections were for appearance, colour and defective meat selection. For texture, too soft, too firm, and gum-like were named. Concerning taste barely spiced and non-balanced seasonings were the main deficiencies. Altogether, 56.5% of the cooked sausages met the strict standards completely and were awarded Gold (30.4% Silver, 10.01% Bronze), while 3% failed (Stiebing et al., 2015).

## CONCLUSIONS

Sensory evaluation of chicken salami, homemade salami and beef salami produced by Zlatiborac Meat Company showed that consumers in Serbia were satisfied with the taste, salt content and smoke flavour of the products. Chicken salami received the highest evaluation. In Germany, all analysed meat products of Serbian origin passed DLG tests and received "DLG award winner" medals, of which 57% were gold, 31% silver and 12% bronze. The main deficiencies established by DLG experts were related to the meat products' consistency, odour and taste. These established deficiencies could be very helpful for meat producers and their drive to satisfy consumers' needs and respond to their concerns and expectations. The DLG medals strongly indicate that there are good marketing opportunities for the meat

industry from Serbia to place meat products on the EU market.

## ACKNOWLEDGEMENTS

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

## REFERENCES

- Akpan SJ (2016). The influence of cultural factors on consumer buying behaviour (a case study of pork). *Br. J. Market. Stud.*, 4(6):44-57.
- Andersen HA, Oksbjerg N, Young JF, Therkildsen M (2005). Feeding and meat quality-a future approach. *Meat Sci.*, 70: 543-554.
- Dederer I (2016). The standard remains stable at a high level. DLG quality inspection for brewed sausages. *Meat Industry*, 96(2): 60-64.
- DFV (2016). Press and media service. <http://www.fleischerhandwerk.de>. (Access 1 March 2017)
- DIN EN ISO/IEC 17024 (2015). Conformity assessment-General requirements for bodies operating certification of persons.
- DIN EN ISO/IEC 17065 (2015). Conformity assessment-Requirements for bodies certifying products, processes and services.
- DLG Certification Unit (2014). Test Regulations 7th edition, Frankfurt, Germany (for the award year 2015).
- Elzerman JE, Hoek AC, van Boekel MAJS, Luning PA (2011). Consumer acceptance and appropriateness of meat substitutes in a meal context. *Food Qual. Prefer.*, 22: 233-240.
- FAOSTAT, Food and Agriculture Organization of the United Nations (2014). <http://faostat.fao.org/site/610/default.aspx#ancor>. (Access 2

April 2014)

Font-i-Furnols M, Guerrero L (2014). Consumer preference, behavior and perception about meat and meat products: An overview. *Meat Sci.*, 98: 361-371.

Grunert KG, Bredahl L, Bruns K (2004). Consumer perception of meat quality and implications for product development in the meat sector-A review. *Meat Sci.*, 66: 259-272.

Issanchou S (1996). Consumer expectations and perceptions of meat and meat product quality. *Meat Sci.*, 43S1:5-19.

Ostojic D, Bogdanovic V, Petrovic MM, Aleksic S, Miscevic B, Pantelic V (2005). Criteria of consumers when purchasing beef in retail stores. *Biotech. Anim. Husb.*, 21(5-6): 263-268.

RAS.Development Agency of Serbia. [www.ras.gov.rs](http://www.ras.gov.rs). (Access 29 November 2016)

Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, De Haan C (2006). Livestock's long shadow: Environmental issues and options. LEAD/FAO.Rome, Italy.

Stiebing A, Lautenschläger R, Hillgärtner K (2015). Share of self-packaged products continues to rise. DLG quality inspection 2015 raw sausages and raw cured products. *Meat industry*, 95(10): 64-70.

Troy DJ, Kerry JP (2010). Consumer perception and the role of science in the meat industry. *Meat Sci.*, 86:214-226.

USDA Foreign Agricultural Service, GAIN (Global Agricultural Information Network) Report, Number: RB1310; Date: 12/23/2013.

Williamson CS, Foster RK, Stanner SA, Buttriss JL (2005). Red meat in the diet. *Nutr. Bull.*, 30:323-55.

[www.zlatiborac.com](http://www.zlatiborac.com) (Access 6 March 2007)