Colour and fat content as intrinsic cues for consumers attitudes towards meat product quality

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, Kačanskog 13, 11000 Belgrade, Serbia
3 Zlatiborac Company d.o.o., Mojkovačka 58, 11136 Belgrade, Serbia

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

Abstract. The aim of this study was to evaluate consumers’ attitudes towards sensory properties of chicken, royal and beef salami, meat products from Zlatiborac Meat Company. Sensory evaluation was performed by Serbian consumers (n=1018) in four retail stores (Delhaize) in Belgrade. Consumers were asked for their preference concerning the colour and fat of three selected salami and then completed questionnaire of socio-demographic information including eating behaviour. Selected smoked meat products were evaluated in the DLG Test Center Food, Germany. Consumers, at all education levels and in all age groups, evaluated colour as good and fat as sufficient with a significantly (p<0.05) higher percentage in comparison with other offered answers. All smoked products passed the DLG tests and received “DLG award winner” medals in Gold (73%) or Silver (27%).

1. Introduction
Consumers’ evaluation of meat and meat products is becoming the critical issue for the meat industry because it has direct influence on its profitability. Many studies point out that consumers’ perspectives are complex and include many factors in determination of meat quality and its acceptance [1-3]. Consumers first evaluate and then purchase. Meat must look good to consumers before satisfying their palate when they decide to buy it. Appearance has a great influence on how meat is valued by the consumers. The quality and width of the sensory evaluation were significantly influenced by traditional eating habits [4]. Response of the consumer is based on sensory properties of the meat and meat products [5], but it is also associated with other factors, such as the habits of a particular region, nationality, age and gender, religion, education, socio-economic status, psychological motives (symbolism of food, advertising, brand name, etc.) and physiological motives (thirst, hunger, deficit, health condition, etc.) [3,6].

Consumer perception on meat has traditionally been largely based on intrinsic cues like colour of the meat, the visible fat and fat. Colour and colour stability are the most important attributes of meat quality and various commercial approaches have been used to meet consumers’ expectation [7]. Colour of meat and meat products is the first impression that consumers have of any meat product. It is the single most important factor of meat products, and it influences consumer buying decision and affects their perception of the freshness of the product. Colour and colour stability are the most important attributes of meat quality and various commercial approaches have been used to meet
consumers’ expectation [8]. From the consumers’ point of view, fat content is not a good predictor of meat quality and, in the research area of healthier meat products, a possible trend is to replace high energy density fat in formulations with substances providing less energy than fat [9]. According to German Agricultural Society (Deutsche Landwirtschafts-Gesellschaft, DLG), [10] the most important characteristic of meat products during sensory evaluation are appearance, colour, colour maintenance, composition and taste, and so evaluations of these characteristics are multiplied by three and have the most influence on the final assessment of the products. Figure 1 shows the most common deficiencies for international smoked meat evaluated by DLG experts [11]. The main deficiencies were related to their external preparation, colour, consistency, door and taste.

### Figure 1. Most common deficiencies for smoked meat evaluated by DLG experts (%), [11].

For the meat industry, it is very important to fully understand consumers’ cues because they have a direct influence on profitability. Thus, science and innovation play an important role between the industry and consumer concerns and expectations [12] in order to enhance these cues in existing or new products. To the best of our knowledge, consumer acceptance data is very limited for all meat products produced in Serbia. This pilot study aimed to investigate consumers’ attitudes and acceptability towards colour and fat of three types of salami (chicken, royal and beef) of Serbian origin. On the other hand, the results obtained were compared with results of sensory evaluation of selected smoked meat products from Serbia, evaluated by DLG experts in Germany in March 2017.

### 2. Materials and Methods

Chicken, royal and beef salami were prepared in meat industry (Zlatiborac, Mačkat, Serbia) by using the in-house production protocol. To conduct comparative evaluation of these products, an equal number of samples of chicken, royal and beef salami were manufactured. Chicken salami consisted of chicken breast meat (72.3%) and solid fat (22.8%); royal salami consisted of pork (81%) and solid fat (17%); beef salami consisted of beef (71.8%) and beef tallow (24%). The origin and market name of the products were unknown to the consumers.

Consumer testing was performed in four large retail stores (Delhaize) in February 2017, in Belgrade. A total of 1018 consumers were participated in six days during the period from 10 a.m. to 4 p.m. Consumers were males (37%) and females (63%) older than 18 years of age. For each type of meat product, consumers were asked to express their perception of colour and fat. They were asked to consume all types of salami and answer the following questions: (1) Rate the colour (the offered answers were: good, too pale, too dark); (2) Rate the fat content (the offered answers were: sufficient, too fatty). The authors prepared a questionnaire, modifying a version of DLG-5-points-scheme [10].
The questionnaire, covering general socio-demographic information related to ages and education levels including eating behaviour, was then put to the participants.

The DLG [10] is the oldest food testing institution in Europe. Around 30000 foodstuffs from Germany and abroad are evaluated every year in the DLG Test Center Food by applying the DLG Quality Tests which are accordance with scientific quality standards [13] and an expert report [14]. Sensory evaluation of eleven smoked meat products from Zlatiborac Meat Company was conducted by DLG experts in Germany, in March 2017 and assessed in accordance with the DLG-5-points-scheme (DLG Quality Test for Ham & Sausage). The DLG-5-points-scheme is a descriptive sensory analysis which included visual (appearance/ exterior), haptic (consistency/texture), olfactory (odour) and gustative (taste) criteria of the meat products. 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. 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.

Statistical evaluation of the data was conducted by applying ANOVA analysis [15].

3. Results and discussion

3.1. Consumers’ evaluation

Results for consumers’ attitudes in relation to education and age are shown in Tables 1 and 2.

Table 1. Consumers’ attitudes (%) in relation to education

(The questions were: rate the colour and fat content).

| Education                  | Perception of | The offered answers | Chicken | Salami type | Royal | Beef |
|----------------------------|---------------|----------------------|---------|-------------|-------|------|
| BS-Basic School            | Colour        | Good                 | 96.4    | 98.8        | 72.3  |
|                            |               | Too pale             | 3.6     | 1.2         | -     |
|                            |               | Too dark             | -       | -           | 27.7  |
|                            | Fat           | Sufficient           | 98.8    | 78.3        | 95.2  |
|                            |               | Fatty                | 1.2     | 21.7        | 4.8   |
|                            |               | Good                 | 96.5    | 99.0        | 92.2  |
| HS-High/secondary School   | Colour        | Good                 | 96.9    | 97.9        | 89.8  |
|                            |               | Too pale             | 2.6     | 1.9         | 0.7   |
|                            |               | Too dark             | 0.5     | 0.2         | 9.5   |
|                            | Fat           | Sufficient           | 90.3    | 83.6        | 96.4  |
|                            |               | Fatty                | 9.7     | 16.4        | 3.6   |

Table 1 shows that consumers of all education levels evaluated colour of Royal salami with the highest percentage of the best offered answers, among the three salami types (chicken, royal and beef). Consumers with Basic School evaluated fat content of chicken salami as sufficient (98.8%) with the highest percentage in comparison with royal (78.3%) and beef (95.2%) salamis. On the other hand, participants with High secondary School and Bachelor degree evaluated fat of beef salami as sufficient with the highest percentage (96.3% and 96.4%, respectively). Noticeably, 27.7% of consumers with basic school education evaluated colour of beef salami as too dark, while consumers with higher education levels evaluated colour as too dark with around 3-3.5-fold lower percentages (HS – 7.8% and BD – 9.5%). Consumers, at all education levels, evaluated colour as good and fat as sufficient with significantly (p<0.05) higher percentage in comparison with other offered answers.
The youngest consumers (18-29 years), (Table 2) evaluated colour of chicken and royal salami as good (97.6%), while fat of chicken and beef salami was evaluated as sufficient (95.1%) with the highest percentage. Older consumers, in the remaining four age groups (Table 2), evaluated royal salami as salami with good colour (98%-100%) and fat of beef salami as sufficient (94.1%-98.4%) with the highest percentage. Around twice the percentage of the oldest age group of participants evaluated fat content of chicken and royal salami as fatty (11.3% and 23.2, respectively) in comparison to the youngest participants (4.9% and 11.6%, respectively). Age (i.e. experience) and interest of older population in healthier lifestyles could be a reason for these results. Consumers, in all age groups, evaluated colour as good and fat as sufficient with significantly (p<0.05) higher percentage in comparison with other offered answers.

**Table 2.** Consumers’ attitudes (%) in relation to age
(The questions were: rate the colour and fat content).

| Age (years) | Perception of Colour | The offered answers | Chicken | Royal | Beef |
|------------|----------------------|---------------------|---------|-------|------|
| 18-29      | Good                 | 97.6                | 97.6    | 90.2  |
|            | Too pale             | 1.8                 | 2.4     | 0.6   |
|            | Too dark             | 0.6                 | -       | 9.1   |
|            | Sufficient           | 95.1                | 88.4    | 95.1  |
|            | Fatty                | 4.9                 | 11.6    | 4.9   |
|            | Good                 | 96.7                | 99.0    | 88.5  |
| 30-39      | Good                 | 96.7                | 98.0    | 90.6  |
|            | Too pale             | 2.4                 | 1.0     | -     |
|            | Too dark             | 1.0                 | -       | 11.5  |
|            | Sufficient           | 88.5                | 84.7    | 96.7  |
|            | Fatty                | 11.5                | 15.3    | 3.3   |
|            | Good                 | 96.9                | 98.2    | 87.8  |
| 40-49      | Good                 | 94.6                | 98.2    | 87.8  |
|            | Too pale             | 2.7                 | 1.2     | 0.8   |
|            | Too dark             | 0.4                 | 0.8     | 8.6   |
|            | Sufficient           | 89.0                | 85.9    | 98.4  |
|            | Fatty                | 11.0                | 14.1    | 1.6   |
|            | Good                 | 98.2                | 100.0   | 91.1  |
| 50-59      | Good                 | 98.2                | 100.0   | 91.1  |
|            | Too pale             | 5.0                 | 1.4     | -     |
|            | Too dark             | 0.5                 | 0.5     | 12.2  |
|            | Sufficient           | 88.3                | 82.4    | 94.1  |
|            | Fatty                | 11.7                | 17.6    | 5.9   |
|            | Good                 | 98.2                | 100.0   | 91.1  |
| 60 and older | Good                 | 11.3                | 23.2    | 3.6   |

3.2. DLG evaluation

As in previous years (2009-2016), in March 2017, Zlatiborac Meat Company analysed smoked meat products in the DLG Test Center Food. All products passed the DLG tests and receive “DLG award winner” medals in Gold (73%) or Silver (27%). The deficiencies of smoked meat products win the DLG Award in Silver were marked as “dry edge formation”, “not regularly cut off” and “appearance of cut unclear”. All these deficiencies were related to their appearance but not to their quality. In Dederer and Hillgärtner’s study [16], Zlatiborac’s meat products, as the only Meat Company from Serbia, were assigned as non-EU members (as well as products from South Korea, Japan and Thailand), with good DLG evaluations. The DLG evaluation and its medals presented in this study and earlier [17] strongly indicate that Zlatiborac Meat Industry has good marketing opportunities for placement of products on the EU market.
4. Conclusion
This study has contributed to display transparency to the public; it made it possible to gather reliable data on the acceptance and attitudes of consumers towards specified sensory properties of the meat products examined. As the results showed, consumers were satisfied with colour and fat of chicken, royal and beef salami. Also, it was observed that older consumers were likely more aware of health aspects of food products they purchase, which was reflected in their sensory evaluation of meat products. By providing direct transparency from producer to consumers, the meat industry will be able to effectively satisfy consumer needs.

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