Sensory and nutritive quality of fermented dry sausages produced in industrial conditions

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Abstract. The paper investigates the sensory and nutritional quality of two groups of dry sausage produced in industrial conditions. The first group was produced with the addition of the nitrite salt and glucono delta lactone (GDL) and fibres and another group with the addition of nitrite salt starter culture. Analysis of the results obtained in this study it was found that better quality sausages had tea sausage produced with the addition of a GDL. As for the quality nutritive no statistically significant differences with both groups of sausages.

Keywords: tea sausage, industrial production quality, chemical composition, starter culture

Introduction

Before about a quarter of the century in the Balkans with different success people began to use different products such as glucono delta lactone (GDL), Tiel 77 which is mixture of GDL salt vitamin C and starter cultures. It is known that these agents are used in the production of quickly fermented raw sausages whose structure and organoleptic properties depend on the character and degree of fermentation, which today are produced in controlled industrial conditions with accelerated processes to high temperatures to 22°C. So today's fast raw fermented sausages in some way for the application of new additives have undergone changes in the qualitative properties of the finished product so today they are different from the raw sausages which were produced in a classical way. In Republic of Macedonia the production of raw dried permanent fastly fermented sausages in industrial conditions began about 20 years ago.

The sensory and nutritional quality and the other properties of fast fermented sausages depends on the choice and quality of basic ingredients, the metabolic activity of existing microorganisms, chemical and physical changes during drying and smoking, enzymes breakdown of protein and fat, external factors (temperature, relative humidity, air circulation), duration of ripening etc. (Wirth, 1986; Radetić, 1997; Toldra, 1998; Virgili et al., 1999; Vuković, 2006). The most famous sausage In our country of this group of sausages is tea sausage (Tojagic, 1996; Radetić, 1997; Kuzelov, 2008). Also many authors have studied the microbiological and nutritional quality of the permanent fast fermented sausages (Ambrosiadiás et al., 2004; Morettilla et al., 2005; Turubalovic et al., 2004; Cocolin et al., 2005; Gaspark-Reichardt et al., 2005; Karolyi et al., 2006; Turubalovic and Tadić, 2005; Veskovcić-Moračanin, 2007).

The aim of our examination is to determine the sensory and nutritional quality of the permanent sausages produced in industrial conditions.

Material and methods

As material for our examination we have served two groups of fast fermented sausages in the type of tea sausages. The first group of tea sausage (group A) is produced of beef - second category of meat, pork meat - second category of hard fat with addition of nitrite salt GDL and fiber and spices. The second group of tea sausage is produced from beef - second category, pork-second category hard fat with addition of nitrite salt, spices and starter cultures (group B).

First we put the chopped pieces of firmy fat tissue (TMT) in the cooler, than the cooled beef and pork - second category is added to previously chopped in smaller granulation of 20mm, nitrite salt for curing and other supplements and additives in sausage GDL group A and fiber and the sausage from the group B starter cultures. After achieving of the necessary granulation of the basic ingredients Ø - 8 mm and their homogenization mixture was stuffed into artificial wrappers Ø 34-36mm. The temperature of the mixture was 1.2°C. Sausages are hand steamed and attached to metal bars and carts. Then the sausages are smoked in classical smokers. The process of drying maturing and smoking lasted 19 days. After maturation chemical and sensory examination of both groups of sausages was made. The proteins were examined by the method of Kjeldahl, fat - by the method of Soxhlet, mineral substances after the mineralization of the samples in muffle oven in the temperature of 550-650°C and water by the method of drying.

Examination of the sensory properties of sausages (appearance, color appearance of the intersection, coherence, connection of muscle and fat tissue, odor, flavor, acidity, succulence, and overall acceptability) were determined using a 9 - degree scale developed by Moscow-VNIIMP.

The results obtained are processed using mathematical statistical computer program Statistica vol. 6 Stat Soft Exel Program 1997-2003.
Table 1. Chemical composition of the tested sausages

<table>
<thead>
<tr>
<th>Chemical indicators</th>
<th>Sausage Group A Mean ± SD</th>
<th>Sausage Group B Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>34.2 ± 0.5</td>
<td>34.52 ± 0.6</td>
</tr>
<tr>
<td>Fat</td>
<td>28.6 ± 1.2</td>
<td>29.2 ± 1.1</td>
</tr>
<tr>
<td>Protein</td>
<td>21.52 ± 1.7</td>
<td>20.22 ± 1.8</td>
</tr>
<tr>
<td>Mineral matter</td>
<td>1.52 ± 1.5</td>
<td>1.72 ± 1.6</td>
</tr>
</tbody>
</table>

Table 2. Sensory evaluation of sausages tested

<table>
<thead>
<tr>
<th>Sensory indicators</th>
<th>Sausage Group A Mean ± SD</th>
<th>Sausage Group B Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CV</td>
<td>CV</td>
</tr>
<tr>
<td>External appearance</td>
<td>6.10 ± 0.22</td>
<td>4.80 ± 0.45</td>
</tr>
<tr>
<td>Color cross section</td>
<td>6.10 ± 0.50</td>
<td>5.00 ± 0.00</td>
</tr>
<tr>
<td>Coherence</td>
<td>6.90 ± 0.22</td>
<td>5.90 ± 0.22</td>
</tr>
<tr>
<td>Consistency</td>
<td>7.90 ± 0.22</td>
<td>2.00 ± 0.00</td>
</tr>
<tr>
<td>Fragrance</td>
<td>7.90 ± 0.22</td>
<td>8.00 ± 0.00</td>
</tr>
<tr>
<td>Taste</td>
<td>6.90 ± 0.22</td>
<td>6.00 ± 0.90</td>
</tr>
<tr>
<td>Succulence</td>
<td>8.10 ± 0.50</td>
<td>5.1 ± 0.22</td>
</tr>
<tr>
<td>Acidity</td>
<td>6.20 ± 0.50</td>
<td>5.2 ± 0.22</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>6.20 ± 0.45</td>
<td>4.00 ± 0.00</td>
</tr>
</tbody>
</table>

Results and discussion

Results of nutritional analysis of the two groups examined sausages are given in Table 1. In terms of nutritional quality there was no statistically significant difference between the two groups examined sausages (p > 0.05). The results obtained are consistent with the results which were obtained by other authors who examined nutritional quality of permanent sausages (Radetic, 1997; Ambrosiadias et al., 2004; Morretta et al., 2004; Turubatovic et al., 2005).

The sausage produced with the addition of starter cultures had a few bacteria in the finished product from the sausage mixture with the addition of GDL. Regarding the examination of the sensory properties of sausages (appearance, color appearance of the section, coherence, connection of muscle and fat tissue, odor, taste, succulence, and overall acceptability) the sensory scores of tea sausage produced with the addition of GDL (Table 2). The averages grades in this sausage moved in a range from 6.10 to 7.90. The best average scores this sausage got in terms of consistency and odor indicators (7.90±0.22, 7.90±0.22) and lowest in terms of appearance and color of the section (6.10±0.22, 6.10±0.50). In terms of overall acceptability the sausage group A was better assessed (6.20±0.45). The difference between the two groups examined sausages in terms of overall acceptability between the two groups examined sausages (6.20±0.45; 4.00±0.0) was statistically significant, (p<0.01). The results obtained are consistent with the results obtained by some authors (Tojagich, 1966; Sinichich et al., 2006; Yeşkovcih – Morachatin, 2007).

Conclusion

In terms of nutritional quality there was no significant difference between the two groups examined sausages (p>0.05). The sausage produced with the addition of starter cultures there were a number of bacteria in the finished product from the sausage produced with the addition of GDL. Better grades in terms of sensory attributes received tea sausage manufactured with the addition of GDL. There is a statistically significant difference regarding the sensory indicator, overall acceptability between the two groups examined sausages (p<0.01).

References


