Evaluation of sensory characteristics and texture of an economic Buffalo meat (Bubalus bubalis) sausage and an economic beef (Bos indicus) sausage with addition of bovine hemoglobin powder

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Abstract

Iron deficiency is one of the 10 preventable disease risks; in Colombia are attributed 800000 deaths per year [1]. Currently, the highest consume of iron comes from vegetables and ferrous salts in food and also consume of heme iron is low, it comes from animal sources, and its found in hemoglobin structure [2]. Iron is an integral part of hemoglobin, chemical configuration of iron is the main factor of bioavailability [3]. The purpose adding bovine hemoglobin in an economic meat product (sausages) made from Buffalo and one from beef, was measuring influence of it on the sensory and texture characteristics of the final product. Three types of sausages were made with buffalo’s meat and 100 mg/kg (B1), 150 mg/kg (B2) and 200 mg/kg (B3) of hemoglobin and three with beef (R1, R2 and R3) and the same levels of hemoglobin. A sensory descriptive analysis test determines final acceptance by consumers. The sample R3 with 45% of preference, showed a color highest acceptance; for buffalo, B1 was the highest color acceptance with 35% of preference. The samples with greater acceptance in taste were R2 with 45% of preference and B3 with 35% of acceptance. R3, with 30%, and B3 treatment with 50%, were the samples with bite highest preference. Texture was evaluated by Volodkevich. It showed that there is a non significant difference between samples, and also that hemoglobin does not affect the texture of the samples made with buffalo meat (on average, a hardness of 22.89 N, and bovine samples obtained a hardness of 19.63 N). The study of iron contents showed that the samples with 200 ppm of both products were significantly higher values than those found as minimal by the ICBF, and the FAO[4] [5].

Keywords: Bovine hemoglobin; Volodkevich test; sensory characteristics; sausages; Buffalo meat.

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1. Introduction

Anemia is an illness caused by Iron deficiency. Low levels of Iron in the Diet of World’s population has allowed the development of fortified food products in order to supply these needs. The fortification of foods and the diversification of the diet are important strategies to prevent the lack of this mineral [2].

The target of this project was the validation of the quantity of dehydrated haemoglobin (hemoglobin powder) that should be added in sausages according Carrasco et al (2008) [7] and Rey et al. (2009) [8]. Additionally, texture and sensory properties were analyzed, as quantities of 100, 150 and 200 ppm were used for the formulation.

2. Materials and Methods

Meat products were processed applying Ranken’s procedures (2003) [6]. The meat was supplied by Bus Indicus (Colombian Supplier of Buffalo meat). Dehydrated haemoglobin was added during the Process in order to enrich the sausage with Iron given that organoleptic characteristics of final food product could not change.

Three sausages of buffalo meat (B1, B2 and B3) and three of bovine meat (R1, R2 and R3) were tested using 100 mg / kg, 150 mg / kg and 200 mg / kg, for both types of samples.

A descriptive Analysis was used with five ranking of scale, evaluated under Kruskal-Wallis and Dunnett Statistical Testing, which determine the final acceptance of the product according to color, flavor and bite force measurement (Volodkevich bite was used). Analytical values were determined in duplicate or triplicate. The data are presented as mean ± standard deviation. The differences were evaluated using a 95% confidence interval using the statistical package Excel (Microsoft Office Excel 2003 SP1 11.6355.6360 ® copyright 1985 to 2003 microsoft corp.). Analysis of variance (ANOVA) were performed with significance (P <0.05), the results were compared using the Tukey test (P <0.05) and a bilateral Dunnet test (ICS 95%). The latter statistical analysis was done using XLSTAT.

3. Results and Discussion

The sensory test determined that the panelists expressed preference in terms of color for beef treatment, especially R3 sample with 45% instead Buffalo samples with 35% of acceptance for B1 sample.

The Flavor preference was between R2 with 45% and B3 with 35%. Finally, was found that bite had a 30% of preference for R3 and 50% for sample B3. (Figure 1).The texture is linked directly to the sensory quality (bite and juiciness).

Texture analysis was performed to rule out a significant difference in the treatments with different amounts of hemoglobin. Statistically was proved that there is not significant difference for ANOVA (p <0.05) in terms of hardness (N), was determined that there is not a significant difference too, demonstrating that hemoglobin does not affect the texture.

Samples made with buffalo meat showed an average of hardness between 28.89 N and 19.63 N for beef meat samples, indicating a higher hardness in the sausages made from buffalo because the meat has more muscle in its conformation, which affects the texture of the product (Table 1).
Table 1. Volodkevich texture data.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beef</th>
<th>Buffalo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>R2</td>
</tr>
<tr>
<td>Hardness (N)</td>
<td>19,626±3,008</td>
<td>20,283±2,793</td>
</tr>
</tbody>
</table>

There is a higher hardness in the sausages made from buffalo because that meat has more muscle in its conformation, which affects the final texture of the product.

![Graphs of sensory evaluation in 5 scales, three products](image)

Fig. 1. Graphs of sensory evaluation in 5 scales, three products
4. Conclusions

Most sensory acceptance was focused on the treatment with 200 mg/Kg of haemoglobin for both cases. Also, the texture analysis showed no significant differences in two tested samples, being higher hardness in the buffalo sample.

The study have iron content showed signs buffalo and beef with 200 mg/Kg had higher values and significant as the minimum required by the ICBF [4], and the FAO [5].

Most sensory acceptance focused on the treatment of 200 mg/Kg for the two cases, although there were references in which the acceptance of two types of samples were identical, the criteria to choose a sample was the highest content of hemoglobin as inferred by higher contents of iron product. Also, the texture analysis showed no significant differences in the two samples tested, being higher hardness in the sample of buffalo.

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References


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