Quality of cooked goat meat sausages incorporated with goat tripe

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ABSTRACT

Cooked sausages from goat meat (GM) with 20, 25 and 30 % levels of goat tripe (GT) were prepared and their quality evaluated. Cooked sausages prepared with 100% GM were used as control. Significant (p<0.05) increase was observed for pH, diameter shrinkage, drip loss, protein and fat contents in GT incorporated cooked sausages than control. However, significant (p< 0.05) reverse trends were observed for product yield and moisture content. Sensory evaluation scores for appearance and colour, flavor, tenderness, juiciness, binding and overall acceptability were highest for 20% GT incorporated cooked sausage, followed by 25% and 30% GT incorporated cooked sausages. Physico - chemical and sensory evaluation scores of 20 % GT incorporated cooked sausages were comparable with control goat meat sausage and the values did not differ significantly between them. Thus, it can be concluded that 80% GM and 20% GT can be used for preparation of cooked goat meat sausages without affecting quality and acceptability.

Key words: Acceptability, Cooking, Goat, Meat, Quality, Sausages, Tripe.

INTRODUCTION

Food animals are slaughtered mainly for meat and the byproducts that come from slaughtered animals are also of good value. Rumen musculature otherwise known as ‘tripe’ and colloquially called as ‘potti’, is one of the important edible offal of goat and accounts for 1.3 % of slaughter weight. Tripe is one of the high protein by product obtained from slaughter house. The yield of goat tripe (GT) ranges from 0.28 to 0.77 with a mean value of 0.53 kg in goats. Some attempts have also been made to utilize tripe as partial substitute for lean meat in the preparation of comminuted meat products (Anjaneyulu and Kondaiah 1990; Krishnan and Sharma, 1990; Anna Anandh et al., 2008).

Sausage is a product that can be prepared from various types of meat. Fresh comminuted skeletal meats and ingredients used as raw materials in the formulation can be modified to yield desirable organoleptic and keeping qualities of the product. Meat sausage can be prepared from skeletal meat using other ingredients like salt, fat, spices, condiments, binder and extender. The product will have a pleasant taste, excellent flavor and increased juiciness. At present, competition is forcing the meat processing industry to use meat more efficiently and produce products at lower costs (Jochen et al., 2010). Meat sausages are widely consumed throughout the world. But the prices of the sausages are so high in developing countries where even the middle class people cannot afford to buy these products. Hence as an alternative, there is an increasing interest now in the use of various animal by products as functional ingredients in the manufacture of cheap and quality meat products. Hence, the present study was undertaken to develop and evaluate the acceptability of cooked goat meat sausages incorporated with different levels of goat tripe (GT).

MATERIALS AND METHODS

Goat Tripe (GT): Fresh GT was obtained from local goat meat stall. Before GT was made in to pieces, the fat and adhering extraneous materials on the surface were removed by knife. The GT had typical off – odour reminiscent of ingesta. For deodorization, the tripe was immersed in 5% tri-sodium phosphate solution for 30 min as per Anna Anandh et al., (2008). The deodorized GT chunks were sectioned into uniform pieces of 2–3 cm and frozen for 1-2 h to ensure easy mincing. The GT chunks were minced twice through the meat mincer (Mado, Germany) using 5 mm plate. The minced GT was used in the preparation of cooked goat meat sausages.

Goat meat (GM): Fresh goat skeletal meat was purchased from local goat meat stalls. It was cut into small chunks and frozen for 1-2 h to ensure easy mincing. The GM chunks were minced twice through the meat mincer (Mado, Germany) using 5 mm plate. The minced GM was used in the preparation of cooked goat meat sausages.

Casings: Cellulose casings with diameter of 25 mm (Viskase, USA) were purchased from the local meat processing equipments dealer. The casings were soaked in slightly warm water, about 32± 2°C for 30 min before filling the sausage mix.

Cooked sausage formulation: The basic control goat meat sausage recipe consisted of 100% GM. The GM was replaced

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at 20, 25 and 30% level with GT in the formulation. Each formulation also contained sodium tri-poly phosphate (0.5%), salt (2.0%), fat (5.0%), maida (4.0%), mashed cooked potato (35.0%), condiments mix (5.0%) - onion, garlic and ginger in the ratio of 3:2:1, spice mix (3.5%) and ice flakes (10.0%).

**Product preparation:** The minced goat meat and goat tripe along with sodium tri-poly phosphate and salt were chopped in a bowl chopper (Scharffen, Germany) for 1 min and fat were added and chopped for another 2 min and then added spice mix, green condiments and water in the form ice flakes and chopped for few min. At the final step cooked mashed potato and maida was added and chopped for another 1.5 min. Emulsion was then stuffed in cellulose casing of 25 mm diameter (Viskase, USA), using a Hydraulic Sausage Stuffer (Dadaux, France) and linked manually. Stuffed sausages were kept in refrigerator (4 ± 2°C) for 1 hr to ensure proper setting. Sausages were then cooked in water bath at 80 ± 2°C for 15 minutes so as to reach core temperature of 75 ± 2°C. Total of four batches of sausages were prepared. The sausages prepared were packed in polyethylene bags and kept in refrigerator (4 ± 2°C). The cooked sausage samples were then analysed for various physico – chemical characteristics and sensory quality attributes.

**Physico – chemical analysis:** Digital pH meter was used for pH measurement. The weight of each cooked goat meat sausage was recorded before and after cooking and the product yield was calculated (product yield = weight of cooked sausage / weight of raw sausage × 100) and expressed as percentage. The diameter of cooked sausages were measured before and after cooking with a digital vernier caliper at 3 random locations. Reduction in diameter shrinkage was expressed in percentage. Drip loss was determined by reweighing blotted slices of cooked sausage following one week storage at 4±1°C (drip loss = weight loss / initial weight × 100). The moisture, protein and fat contents of cooked sausages were determined by using hot air oven, Kjeldahl’s assembly and Soxhlet ether extraction apparatus respectively (AOAC 1995).

**Sensory evaluation:** Slices of cooked goat meat sausage were served to an experienced panel consisting of faculty and students to determine sensory characteristics. The sensory attributes like appearance and colour, flavour, juiciness, tenderness, binding and overall palatability were evaluated on 8 - point descriptive scale as suggested by Keeton (1983) where in 1 is extremely undesirable and 8 is extremely desirable.

**Statistical analysis:** The experiment was repeated 4 times. The data generated from each experiment were analysed statistically by following standard procedures (Snedecor and Cochran 1989) for comparing the means and to determine the effect of treatments.

**RESULTS AND DISCUSSION**

**Physico – chemical characteristics:** Results of physico – chemical parameters of cooked goat meat sausages incorporated with GT are presented in Table 1. The pH values of cooked goat meat sausage increased with increasing levels of GT. The pH value of 30% GT incorporated cooked sausage was significantly (p<0.05) higher as compared to other GT incorporated cooked goat meat sausages and control cooked sausage. However, no significant difference was observed between control, 20 and 25% GT incorporated cooked sausages. Tsai et al. (1998) also observed similar pH changes in restructured beef. It might be due to higher protein contents of GT incorporated cooked sausages and protein denaturation during cooking. The present results are in agreement with reports of Sofos et al. (1979) and Buchanan (1986). The mean product yield of cooked sausage decreased with increasing levels of GT. The product yield was significantly (p<0.05) higher for control and 20% GT incorporated cooked sausage, but the value did not differ significantly between them. The product yield of 25% and 30% GT incorporated cooked goat meat sausage also did not differ significantly between them. Low product yield of GT incorporated cooked sausage might be due to low Water Holding Capacity, poor functional and binding properties of GT and low levels of extraction of proteins (Kondaiah et al. 1986). Minced skeletal meat increased protein availability which results in greater solubilization of muscle proteins during emulsification process and thus leads to increased product yield in control cooked goat meat sausage as compared to GT incorporated cooked sausages. Lin and Keeton (1994) also reported increased product yield in

<table>
<thead>
<tr>
<th>Physico – chemical characteristics ( n = 4)</th>
<th>Levels of minced goat tripe (%)</th>
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</thead>
<tbody>
<tr>
<td>pH</td>
<td>25</td>
</tr>
<tr>
<td>6.3 ± 0.04a</td>
<td>6.4 ± 0.14a</td>
</tr>
<tr>
<td>98.1 ± 0.14a</td>
<td>92.6 ± 0.12b</td>
</tr>
<tr>
<td>11.4 ± 2.14a</td>
<td>12.3 ± 0.10a</td>
</tr>
<tr>
<td>2.5 ± 0.10a</td>
<td>2.9 ± 0.12a</td>
</tr>
<tr>
<td>68.3 ± 1.12</td>
<td>67.1 ± 1.18</td>
</tr>
<tr>
<td>18.4 ± 0.14</td>
<td>18.7 ± 0.12</td>
</tr>
<tr>
<td>12.2 ± 0.22</td>
<td>12.4 ± 0.20</td>
</tr>
</tbody>
</table>

Means bearing same superscripts row-wise do not differ significantly (p<0.05).
Table 2: Effect of incorporation of different levels of goat tripe on sensory characteristics of cooked goat meat sausages

<table>
<thead>
<tr>
<th>Sensory Characteristics** (n= 20)</th>
<th>Levels of minced goat tripe (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Appearance and colour</td>
<td>7.4 ± 0.44</td>
</tr>
<tr>
<td>Flavour</td>
<td>7.4 ± 0.44</td>
</tr>
<tr>
<td>Juiciness</td>
<td>7.2 ± 0.02</td>
</tr>
<tr>
<td>Tenderness</td>
<td>7.2 ± 0.05</td>
</tr>
<tr>
<td>Binding</td>
<td>7.1 ± 0.02</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>7.2 ± 0.02</td>
</tr>
</tbody>
</table>

Means bearing same superscripts row-wise do not differ significantly (p<0.05).

**Sensory attributes of cooked goat meat sausages were evaluated on a 8 – point descriptive scale (wherein 1 = extremely undesirable; 8 = extremely desirable.

The protein and fat contents increased whereas, moisture content decreased with increasing levels of GT. However, the moisture, protein and fat contents between control and GT incorporated cooked sausage did not differ significantly. The addition of GT only slightly affected the composition of the final product, which was in agreement with Meullenet et al., (1994) who reported a small dilution effect in chemical analysis with the addition of collagen rich materials in the formulation of chicken frankfurters.

Sensory characteristics: Results of sensory evaluation scores of cooked goat meat sausages incorporated with GT are presented in Table 2. Among treatments, the sensory scores for appearance and colour, flavour, juiciness, tenderness, binding and overall palatability were significantly (p<0.05) higher for 20% GT incorporated cooked sausage, followed by 25% and 30% GT incorporated cooked sausage. The sensory scores for appearance and colour, flavour, juiciness, tenderness, binding and overall palatability between control and 20% GT incorporated cooked sausage did not differ significantly. The lower appearance and colour scores for GT incorporated cooked sausage could be attributed due to lower total pigments of GT then the goat skeletal meat. These results are in agreement with the findings of Anna Anandh et al., (2008). They reported that increasing the amount of tripe decreased the binding, juiciness and acceptability of the comminuted meat products. Anjaneyulu and Kondaiah (1990) also reported that addition of tripe was significantly reducing the acceptability of comminuted meat products.

CONCLUSION

The GT can be used for development of value added cooked sausage of acceptable quality by using 80% GM with 20% GT. Thus, finding of this study has shown that the goat tripe can be effectively used for preparation of a cooked goat meat sausage food of an acceptable quality with substantial value addition to the material.

REFERENCES


