Chemical Composition of different types of Sausage

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Abstract: This study aimed to evaluate the chemical composition of Different types of sausages. The result showed the moisture content showed significant (P< 0.05) different among the three types of sausage. The moisture percent in this study was (73.45, 70.32 and 71.0%) in camel, beef and goat sausages respectively. Camel and goat sausages had higher moisture content compared to beef. Whereas, Beef sausages had higher protein content (18.53%) compared to camel (16.0%) and goat sausages (18%). The fat content was highly significant (P< 0.01) among the treatment sausages. However, the fat content of beef sausages was the highest followed by goat and camel sausages as (3.45, 3.0 and 2.31%) respectively. Ash content was highly significant (P< 0.01) different among the three types of sausage. Camel sausages had the highest amount of ash followed by beef and goat sausages as (2.0, 1.33 and 1.12%) respectively. The non-protein-nitrogen was not significantly (P> 0.05) different among the three type of sausages. Their values were (6.47, 6.23 and 5.89%) respectively.

Keywords: Moisture, protein, ash, fat of, different types of sausages

I. INTRODUCTION

Sudan is situated in northeast Africa between latitudes 4° and 22° north and longitudes 22° and 38° East. In recent years there has been an increased demand for convenience meat and meat products requiring minimal home preparation (Stubbs et al., 2002). Meat processing is the manufacture of meat products from meat, animal fat and certain non meat additives. The additives are used to enhance product flavor, appearance and to increase product volume. Recently, more attention has been paid to the nutritional value of camel meat, with the aim of creating additional value for various camel meat products (Ulmer et al., 2004). Mansour and Ahmed (2000) reported that the camel meat is used for human consumption in several countries. The acceptability of camel meat products increases with an increase in the duration of processing (smoking, frying and cooking) indicating that the products should be fully processed to gain maximum acceptability. Sande et al., (2005) reported that goat meat, commonly referred to as ‘chevon’ or ‘cabrito’, is, however, the most popular meat product in the world and is often served in specialty dishes centered on festival or holiday events. Processing is a mean for extending the product, improving shelf-life and producing an upgraded value added product (Kalalou, et al. 2004; Kalalou, Zerdani and Faid, 2010). Mansour and Ahmed (2000) had used advanced technology to process sausage from camel meat and the products showed similar chemical composition to beef products; however thecamel meat products were higher in moisture (73.6%) and ash (4.13%). The Objective of this study is:

1. To determine the chemical composition of camel, beef and goat sausage.

II. MATERIAL & METHODS

This study was conducted at the laboratory of Meat Science and Technology, College of animal Production Science and Technology, Sudan University of Science and Technology (SUST).

Meat samples: Thirty kg of fresh deboned camel, beef and goat meat was obtained. Camel meat was purchased from “Soug Elnaga” local market, west Omdurman, beef from kuku research centre, and goat meat from local market.

Samples of Fillers of sausages: Bread Crumbs filler was used after being ground through plate of 0.5 cm diameter. Sweet Potato filler was cooked under pressure for 10 minutes and ground through plate of 0.5 cm diameter.

Samples for chemical analysis: Moisture content, crude protein, Fat and Ash, were determined according to AOAC (2000). One gm of minced meat from camel, beef and goat sausage were used for analysis.

Crude protein: Kjeldahl method was used to determine nitrogen. The crude protein was determined by multiplying the amount of nitrogen times 6.25. The fresh meat sample was minced and one gm was digested in kjeldahl flask by adding mercury tablets as catalysts and 25 ml conc.H2SO4. The mixture was heated for 3 hr. The digested samples were cooled and transferred to volumetric flasks. Nitrogen was distilled from the flask in
40% of NaOH solution and received in 4% boric acid. The mixture was titrated against 0.1 N HCl solutions. The formula used for calculation of crude protein was as follows:

\[
\text{Crude protein } \% = \frac{T \times 0.1 \times 14 \times 100 \times 6.25}{\text{Weight of sample} \times 1000}
\]

\( T = \) Titration volume

**Moisture Determination:** Moisture content was based on weight loss of five gm of sample (5 cm length and one cm thickness). The fresh samples were put in an oven at 100°C for 24 hrs. Consequently the samples were cooled in desiccators and their weights were determined. The moisture content was calculated according to the following equation:

\[
\text{Moisture } \% = \frac{\text{Fresh sample weight} - \text{dried sample weight}}{\text{Fresh sample weight}} \times 100
\]

**Fat Determination:** Fat was determined by the ether extract. Tow gm from the sample were taken to soxhlet apparatus. The sample was subjected to continuous extraction with ether for 5 hrs. The sample was then removed from the extractor and allowed to dry for 2 hr at 100°C in drying oven till no traces of ether remained. The sample was then cooled and weighed for ether extraction determination as following:

\[
\text{Fat } \% = \frac{\text{Fat weight}}{\text{Sample weight}} \times 100
\]

**Ash Determination:** Two grams of fat free sample were placed into dried crucible of known weight. The crucible was placed inside a muffle furnace at 150°C. The temperature was increased gradually till it reached 600°C for 3 hrs. Then the crucible was taken out, cooled into desiccators and weighed. The ash percentage was calculated by the following formula:

\[
\text{Ash } \% = \frac{\text{Weight of crucible before ashing} - \text{weight of crucible after drying}}{\text{Sample weight}} \times 100
\]

**Sausages preparation:** Three types of sausages were manufactured using two types of fillers (bread crumbs and sweet potato). The ingredients were added equally to the treatments as shown in (Table 1). The Sausage consist of minced meat to which salt (NaCl), garlic, coriander, cinnamon, black pepper, nutmeg, fat, cold water, skim milk and filler 15% were added. The whole mixture was mixed well in a chopper after adding skimmed milk powder to the dough. The mixture was stuffed in sheep casings using piston stuffer, then linked, placed in polythene bags, labeled and frozen at -20°C to wait the following tests.

**Table (1)**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fillers (bread crumbs or sweet potato)</td>
<td>15</td>
</tr>
<tr>
<td>Ice water</td>
<td>20</td>
</tr>
<tr>
<td>Salt</td>
<td>2</td>
</tr>
<tr>
<td>Black pepper</td>
<td>0.5</td>
</tr>
<tr>
<td>Coriander</td>
<td>0.5</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.5</td>
</tr>
<tr>
<td>Garlic</td>
<td>0.3</td>
</tr>
<tr>
<td>Skimmed milk powder</td>
<td>0.3</td>
</tr>
<tr>
<td>Cinnamon</td>
<td>0.1</td>
</tr>
</tbody>
</table>

(All ingredients are percentage from the formulated products)

**Statistical analysis:** The data collected were subjected to statistical analysis by using complete randomized design used to analyze the results obtained from this study and subjected to ANOVA followed by Least significant difference test (LSD) using the (SPSS, Version 17.0, 2008).

**III. RESULTS**

Table (1) and figure (1) shows the mean values (±SD) of chemical composition of camel, beef and goat sausages. The moisture content showed significant (P< 0.05) different among the treatment sausages. Camel and goat sausages had higher moisture content than beef. Protein content was highly significant (P< 0.01) different among the three types of sausages. Beef had higher protein content compared to camel and goat sausages. Fat
content was highly significant (P< 0.01) different among the treatment sausages. However, the fat content of beef sausages was the highest followed by goat and camel sausages. Ash content was highly significant (P< 0.01) different among the three sausages type. Camel sausages had the highest amount of ash followed by beef and goat sausages respectively. Non-protein-nitrogen was not significantly (P> 0.05) different among the three type of sausages.

Table (1): Mean values (±SD) of chemical composition of camel, beef & goat sausages:

<table>
<thead>
<tr>
<th>Meat type Parameters</th>
<th>Camel sausages</th>
<th>Beef sausages</th>
<th>Goat sausages</th>
<th>Significant level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture %</td>
<td>73.45 ± 0.71*</td>
<td>70.32 ± 1.12*</td>
<td>71.0 ± 1.0#</td>
<td>*</td>
</tr>
<tr>
<td>CP %</td>
<td>16.0 ± 0.30c</td>
<td>18.53 ± 0.25b</td>
<td>18.0 ± 0.41#</td>
<td>**</td>
</tr>
<tr>
<td>Fat %</td>
<td>2.31 ± 0.22c</td>
<td>3.45 ± 0.23b</td>
<td>3 ± 0.20#</td>
<td>**</td>
</tr>
<tr>
<td>Ash %</td>
<td>2.0 ± 0.20#</td>
<td>1.33 ± 0.35b</td>
<td>1.12 ± 0.20#</td>
<td>*</td>
</tr>
<tr>
<td>NPN %</td>
<td>6.47 ± 0.45</td>
<td>6.23 ± 0.40</td>
<td>5.89 ± 0.11</td>
<td>NS</td>
</tr>
</tbody>
</table>

* = (P< 0.05)
** = (P< 0.01)
N.S. = No significant difference between the two means.

Figure (1): Proximate analysis of camel, beef and goat sausages

IV. DISCUSSION

In the present result the moisture content showed significant (P< 0.05) difference among the three types of sausage. The moisture percent in this study was (73.45, 70.32 and 71.0%) in camel, beef and goat sausages respectively. This result showed that the camel and goat sausages had higher moisture content compared to beef. The moisture percent in beef sausage in this study was (70.32%) which was higher than the value reported by Agnihotri and Pal, (2000) as (66.71%) and Nafiseh, et. al., (2010) as (48.7%). Moisture in camel sausage in this study was (73.45%) higher than the findings of Nafiseh, et. al., (2010) as (51.3 %). Protein content in the present study was highly significant (P< 0.01) among the three types of sausage. Beef sausage had higher protein content compared to camel and goat sausages. In the present study protein percent in camel sausage was (16.0%) which was similar to the findings of Nafiseh, et. al., (2010) as (15.9%). The protein percent in beef sausage as (18.53%) which was in line with the result reported by Nafiseh, et. al., (2010) as (18.8 %). Protein percentage of goat sausage was (18.0 %) which similar to the findings of Dharmaveer, et. al., (2007) as (18.36%). The protein values were 18.53 and 18.0% for beef and goat sausages respectively, which was less
than the result reported by Gadiyaram, and Kannan, (2004) as (20.00 and 20.47%) in goat and beef sausages respectively. Fat content in this study was highly significant (P< 0.01) among the treatment sausages. However, the fat content of beef sausages was the highest followed by goat and camel sausages as (3.45, 3.0 and 2.31%) respectively. Fat content in camel sausage was (2.31%) which was lower than the value reported by Nafiseh, et. al., (2010) as (13 %). The fat percent in beef sausage was (3.45%) which far lower than the findings of Nafiseh, et. al., (2010) who reported value as (16.8%). The fat content of goat sausage in this study was (3.0%) which was far less than that reported by Dharmaveer, et. al., (2007) as (17.05%) and Jihad, et. al., (2009) as (16.7%) that might be due to the added fat. The fat percent in goat sausage was in agreement with the result of Gadiyaram and Kannan, (2004) that reported the fat level as (2.29%) in goat sausages but disagreed with their result in beef sausage as (7.07%) in beef sausages. In this study the low fat content in goat sausage compared to beef sausage was in line with the findings of Gadiyaram and Kannan, (2004). Ash content in the present study was highly significant (P< 0.01) among the three types of sausage. Camel sausage had the highest ash content followed by beef and goat sausages as (2.0, 1.33 and 1.12%) respectively. The ash content in the present study in goat sausage as (1.12%) which was lower than that reported by Dharmaveer, et. al., (2007) as (2.27%) and Jihad, et. al., (2009) as (3%). The present result showed the non-protein-nitrogen was not significantly (P> 0.05) different in the three type of sausages. The NPN in this study was (6.47, 6.23 and 5.89%) for camel, beef and goat sausage respectively. This result agreed with the findings of Ali, (2012) who reported that the NPN of beef sausage was (6%) and slightly lower value reported of goat sausage as (4%).

V. CONCLUSION

In this study Results was showed that camel meat could be utilized in comminuted meat products with reduced fat content in the final product.

REFERENCES


