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Effect of Used Meat Type on some Quality Attribute of Chevon and Beef Sausages

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Abstract

The study was conducted to evaluate the effect of meat type on some quality attribute of chevon and beef sausages. Three sausage types' chevon, mixed (chevon/beef) and beef sausages with no added fat or preservation agents were prepared and stored at -18°C. Data were collected on proximate analysis, physico-chemical properties, colour measurements and sensory evaluation traits. The results revealed that chevon sausage was the highest (P<0.01) in protein, fat and ash among the three sausage types as 18.01, 4.99 and 1.46 respectively. Also water holding capacity (0.26) associating with cooking loss (16.64%) was the highest (P<0.01) in chevon sausage while pH value 5.80 was the lowest. Sensory evaluation tests were insignificant difference (P>0.05) in the three sausage types however chevon sausage showed the highest records. From these results it can be concluded that chevon sausage had slightly differences with beef in some proximate compositions, physico-chemicals and colour parameters. Sensory attributes were not differing in chevon and beef sausages.

Keywords: Chevon sausage, Proximate composition, Lightness, Organoleptic evaluation.

Introduction

Sudan has the biggest population of animals in Africa and Arabic countries. Recently the estimation of animal population to be around 108.2 million heads, Goats formed 29.3% of the total livestock population and the total goat meat production for local consumption and export was about 118 thousand tons (MAR, 2018). Goat is broadly found around the world and its considered as the main source of animal protein in several tropical countries in North African, Middle Eastern countries, Southeast Asia and the Caribbean (Webb et al., 2005).

(AMGA, 2008) define chevon as meat of older goat kids slaughtered at 6 to 9 months of age and weighing 50-75 pounds (23-34 kg). Chevon is described as low fat content and high processing properties. It is dark red colour with little coarse texture, the fat are sparse and in white in colour beside goat meat is a healthy food due to high ratio of polyunsaturated to saturated fatty acids (Yagoub and Babiker, 2016). In a comparison study between goat meat and lamb Babiker *et al.*, (1990) found that goat meat was lower in cooking loss, juiciness, flavour and juiciness, while it was higher in

water holding capacity and muscle connective tissues. Also they found that tenderness and overall acceptability were similar between the two species.

Sausage is an old meat product processed from comminuted meat through different processing methods to formulate acceptable organoleptic and preserve properties (FAO, 1985). Chevon sausage scored the highest records in lightness (L^*), redness (a^*) and yellowness (b^*) among camel and beef sausage (Siham, 2015[a]). Hiding the poor characteristics of goat meat particularly flavour, texture by adding values in form of non-meat ingredient could increase the desires of consumers to have a low fat red meat product. The objective of this study is to evaluate the quality attributes of manufactured sausage with different levels of goat meat.

Materials and methods

The trail was conducted at the laboratory of Meat Science and Technology, College of Animal Production Science and Technology, Sudan University of Science and Technology using goat meat obtained from three carcasses of Nubian goats (≤12 months old) with no added. Beef used in this study were purchased from Kuku local market.

Preparation of samples

Goat meat and beef were minced separately through 3.5 mm-plate, 1950g from minced goat meat and beef were used to formulate goat and beef sausages. A mixed sausage with equal quantity of minced beef and goat meat (975g for each) was prepared, Blending seasoning agents and other non-meat ingredients were added to formulate the final products for the three sausage types as showed on table 1. Then it was stuffed into natural sheep casings. Finally the three sausage types were packed, chilled and storage for different storage periods (0, 15 and 30 days) in a deep freezer (-18 °±2 C) until analyses.

Proximate chemical analyses

Proximate analysis parameters including moisture, crude protein (CP), ether extract (Fat) and ash contents for each sausage samples were conducted according to AOAC (1995) procedure.

Water holding capacity (WHC)

WHC determination for all sausage samples was done according to method described by (Grau and Hamm, 1953).

Cooking loss percentage

Determination of cooking loss was conducted as the method described by according to (Honikel, 1998).

pH determination

10 gm of each sausage sample were blended with 100 ml distilled water in a blender jar at high speed for one minute before pH measurement on laboratory pH meter (Okerman, 1981).

Objective colour measurements

All sausage samples were subjected to measure colour parameters including lightness (L^*), redness (a^*) and yellowness (b^*) using Hunter lab Tri-stimulus colour meter Model D 25 M. 2 optical sensor machine.

Sensory evaluation

Ten semi-trained panellist were carried out the sensory evaluation of cooked sausage samples to evaluate colour, tenderness, juiciness, flavour, and overall acceptability using 8-point (hedonic scale) sheet (Cross *et al*., 1978) where score 8 being extremely desirable and 1 being extremely undesirable.

Statistical analysis:

Statistical analysis was done with SPSS v. 16 statistical programme to determine the effect of meat type on quality attributes of sausage as complete randomized design using Analysis of variance followed by least significant difference test (LSD) to determine any significant difference between mean values at 0.05 level of significance.

Table 1: Ingredients and proportion of processed sausages

	Sausage type		
Ingredient (%)	Chevon	Mixed	Beef
Minced chevon	65	32.5	-
Minced beef	-	32.5	65
Cold water (ml)	10	10	10
Potatoes	7.2	7.2	7.2
Bread crumbs	4.8	4.8	4.8
Soy bean	10	10	10
Salt	1.5	1.5	1.5
Cinnamon	0.3	0.3	0.3
Black pepper	0.3	0.3	0.3
Nutmeg	0.3	0.3	0.3
Coriander	0.3	0.3	0.3
Garlic	0.3	0.3	0.3
Total	100 %	100 %	100 %

Final product =2 kgs

Results and discussion

The presented results in Table (2) showed that (moisture, crude protein, fat and ash) content decreased with storage period. Type of meat was significantly (P<0.0) affected proximate analysis values. Moisture percentage of chevon sausage was (65.35) which are differed from findings of Dharmaveer et al., (2007) where it was 55.48% in smoked chevon sausage from four years age goats and packed under vacuum conditions, it was lower than results reported by Agnihotri and Rajkumar (2004) as 68.81%. Nearby results was reported by Agnihotri and Pal (2000) as (66.71%). Chevon sausage had the highest crude protein content (18.01%) while beef sausage was the lowest (17.33%). Gadiyaram, and Kannan, (2004) reported higher protein contents in chevon sausage (20.00%) and beef sausage (20.47%), also Dharmaveer *et al.,* (2007) reported higher overall protein content (18.36%) but Jihad et al (2009) reported 12.8%. In this study no fat was added hence fat content were 4.99% and 2.26% in chevon and beef sausage respectively make it the lowest to those of Agnihotri and Rajkumar (2004) 10.76%, Dharmaveer *et al.,* (2007) 17.05% and Jihad et al., (2009) 16.7% however it was higher than Mohamed et al., (2013) 3.02%. Ash percentage in chevon sausage was the highest (1.46%). Dharmaveer *et al.,* (2007) reported (2.27%) and Jihad et al., (2009) as (3%) while Siham (2015[b]) found 1.12%.

Table 2. Effect of meat type on proximate analysis (%) of different types of sausage

	Proximate analysis parameters			
Meat type	Moisture	Protein	Fat	Ash
Beef	68.21[a]	17.33[b]	2.26[c]	1.39[b]
Mixed	65.99[b]	17.89[a]	3.08[b]	1.31[c]
Chevon	65.35[c]	18.01[a]	4.99[a]	1.46[a]
SE±	0.058	0.042	0.067	0.015
Significant	**	**	**	**
Overall mean	66.51	17.74	3.45	1.39
SE±	0.033	0.025	0.039	0.009

N=3, **=Significance different P<0.01
Different superscript letters in the same column are significantly different at (P≤0.05)

Physico-chemical properties and colour parameters were significantly (P<0.01) affected by type of meat (Table 3). As the method used in calculating water holding capacity (WHC), chevon sausage was the highest WHC (0.27) reflecting in lowest cooking loss % (16.64) while beef sausage showed (0.80, 22.07) for WHC and cooking loss% respectively. Similar results were reported by Babiker *et al.,* (1990); Lawrie (1991); Gadiyaram, and Kannan, (2004) and Siham, (2015[a]). Superior water holding capacity in chevon was associated with its lower cooking loss. Chevon sausage record the lowest (P<0.05) pH (5.80) while beef sausage was the highest (5.93). Agreed results were found by Dharmaveer *et al.*, (2007) as (6.44) and Abbas, (2009) as (5.61). Chevon sausage showed the highest lightness, redness and yellowness (P<0.05) among beef and mix sausage. Babiker *et al*., (1990). mentioned that goat meat had darker red colour than lamb also harmony results were found by Siham, (2015[a]).

Table 3. Effect of meat type on physico-chemical and colour measurements of different sausage types

	Physico-chemical properties			Colour parameters		
Meat type	WHC	Cooking loss (%)	pH	Lightness (L^*)	Redness (a^*)	Yellowness (b^*)
Beef	0.80[a]	22.07[a]	5.93[a]	30.98[b]	10.36[c]	7.22[c]
Mixed	0.37[b]	17.13[b]	5.83[b]	31.51[a]	10.93[b]	7.36[b]
Chevon	0.27[c]	16.64[b]	5.80[c]	31.41[a]	11.31[a]	7.4[a]
SE±	0.009	0.654	0.005	0.094	0.056	0.029
Significant	**	**	**	**	**	**
Overall mean	0.483	18.928	5.854	31.3	10.867	7.326
SE±	0.005	0.378	0.003	0.054	0.032	0.017

WHC=water holding capacity
N=3, **=Significance different P≤0.01
Different superscript letters in the same column are significantly different at (P≤0.05)

Table 4. Effect of meat type on sensory evaluation of studied sausage

	Panel tests traits				
Meat type	Colour	Tenderness	Juiciness	Flavour	General appearance
Beef	6.10	5.73	5.30	5.83	5.9
Mixed	5.77	5.57	5.37	5.63	5.73
Chevon	6.23	6.37	5.93	6.07	6.23
SE±	0.216	0.269	0.214	0.214	0.184
Significant	NS	NS	NS	NS	NS
Overall mean	6.03	5.89	5.53	5.84	5.96
SE±	0.125	0.155	0.123	0.124	0.106

N=3
NS=no significant differences (P>0.05)

Meat type shows no significant differences (P>0.05) in panel tests traits (table 4), however chevon sausage records the highest values of the studied panel tests traits. Inline findings were found by James and Berry, (1997) who found similar juiciness, flavour, and tenderness records in chevon and beef patties. Siham *et al*., (2015) reported that chevon sausage was higher than beef sausage in colour, juiciness, flavour and overall acceptability.

Conclusion The results of this trail were concluded that meat type affected some proximate compositions, physic-chemicals and colour parameters where chevon records the highest values except cooking loss % and pH. Chevon and beef sausages are not differing in subjective tests.

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أثر نوع اللحم المستخدم على بعض صفات الجودة لسجك الماعز والبقر

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المستخلص

أُجريت هذه الدراسة لتقييم أثر نوع اللحم على بعض خصائص جودة سجك لحم الماعز وسجك لحم البقر. تم تصنيع ثلاثة أنواع من السجك وهي سجك لحم الماعز، سجك خليط (لحم ماعز/لحم بقر) وسجك لحم البقر دون إضافة دهن أو أي مواد حافظة وحفظت الأنواع الثلاث في درجة حرارة −18°م. تم أخذ بيانات التحليل التقريبي، الخصائص الفيزيو−كيميائية، قياسات لون اللحم وصفات التقييم الحسي. أثبتت النتائج أن سجك لحم الماعز هو الأعلى ($P<0.01$) في البروتين، الدهون والرماد من بين أنواع السجك الثلاث حيث سجل 18.01، 4.99 و1.46 على التوالي. كما كانت قابية حمل الماء (0.26) وإرتباطها بفاقد الطبخ (16.64%) الأعلى ($P<0.01$) في سجك لحم الماعزبينما كانت قيمة الأس الهيدروجيني 5.80 هى الأقل. كانت إختبارات التقييم الحسي غير معنوية ($P>0.05$) في أنواع السجك الثلاث لكن كان سجك لحم الماعز هو الأعلى قيماً. يمكن أن نخلُص من هذه النتائج بأن سجك لحم الماعز يختلف إختلافات طفيفة عن السجك البقري في بعض نتائج التحليل التقريبي، الخصائص الفيزيو−كيميائية وقياسات لون اللحم. خصائص الحسية لا تختلف بين سجك لحم الماعز والسجك البقري.