DEANSHIP OF SCIENTIFIC RESEARCH

The Cooking loss of Fresh and Sausages of Camel, Beef and Goat meat

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ABSTRACT

The study was conducted to evaluate the cooking loss of fresh and processed camel, beef and goat meat. The result showed that the cooking loss was with high significant different (P< 0.01) among the three types of meat. Cooking loss of fresh camel meat was the highest, followed by goat meat and beef as 36.3 of 34.15 & 31.75% respectively. The result showed that cooking loss was with high significant different (P< 0.01) among the three types of sausage. Camel sausage cooking loss was higher (24.12%) compared to beef and goat sausages as 21.45 and 22.0% respectively. The results showed that types of meat used for sausages making were not significantly different (P> 0.05) among the three types of sausages for cooking loss. The type of fillers used for sausages making affected significantly (P<0.01) the cooking loss percent, sweet potato filler showed high percent of cooking loss compared to bread crumbs filler. Using sweet potato filler reduced the size of sausage fingers and diminished the weight.

INTRODUCTION

Cooking loss is one of the most important properties of sausage products as it is related to water holding capacity. There is variation in water holding capacity among different types of meat from different animal and muscles (Lawrie, 1991). Kannan *et al.,* (2001) stated that cooking loss was highest in leg cuts, intermediate in shoulder/arm cuts, and lowest in loin/rib cuts. Siham (2008) reported that cooking loss was lower in camel meat compared to beef. Babiker *et al.*, (1990) reported that chevon had lower cooking loss compared to lamb. James and Berry (1997) stated that consumer and trained sensory panels found similar juiciness, flavour, and tenderness in patties with less than 40 percentage chevon and more than 60 percentage beef, but increased levels of goat meat in patties decreased cooking loss percentage. Gadiyaram and Kannan (2004) stated that cooking loss percent was lower in chevon sausages (5.5%) compared to beef. Cooking loss depends also on water-holding capacity as

stated by Henckel *et al.*, (2000). These differences are due to molecular differences or to variation in the architectural distribution of the connective tissue in different meats as reported by Dawood (1995). Such differences in cooking loss due to several factors including the rate of thawing as reported by Uttaro and Alhus (2007) and cooking temperature as reported by Jeremiah and Gibson, (2003). Cooking loss was affected by many factors such as surface and internal temperature of meat as stated by Panea et al., (2008). Abubaker et al., (1986) reported that tenderness and color scored highest in sausages containing faba-bean and chick pea while color was acceptable in sausages containing lentils and lupine seeds. The Objectives of this study were to:

1. Determine the cooking loss of camel, beef and goat fresh and processed meat.

2. Evaluate the addition of sweet potato as filler in sausage processing as alternative for bread crumbs.

MATERIALS AND 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 during January 2014.

Meat samples:

Twenty 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. The meat was trimmed to small pieces and ground through 0.5 cm plate using meat grinder.

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. The Sausage consisted of minced meat to which salt (NaCl), garlic, coriander, cinnamon, black pepper, nutmeg, fat, cold water, skim milk and filler were added. The whole mixture was mixed well in a chopper after adding skimmed milk powder to the dough. The mixture was stuffed in casings using piston stuffer, then linked, placed in polythene bags, labeled and frozen at $-20^{o}C$ until used.

Cooking Loss Determination in Fresh and Sausages of Camel, Beef and Goat meat:

Meat samples were thawed at $5C^{o}$ for 24 hrs. Then cut into samples of equal dimensions and weighed Samples were cooked in deep fat frying for 3-4 min., then dried from oil and reweighed. The cooking loss percentage of fresh and sausages of camel, beef and goat meat was also determined by oven. Frozen samples randomly selected were used for determining cooking losses and thawed for 24 hours in 4oC refrigerator. Two fingers from each treatment were weighed separately and rapped by aluminum foil, then cooked by oven at 160c for 25-30min. Samples allowed to cool at room temperature, then reweighed. Cooking losses were determined by weight difference between raw and cooked sausage. The cooking losses were determined according to Ziprin et al., (1981). Cooking loss was determined as the loss in weight during cooking and expressed as a percent of pre-cooking weight as follows:

$$\text{Cooking loss\%} = \frac{\text{Weight before cooking - weight after cooking}}{\text{Weight before cooking}} \times 100$$

Statistical analysis:

The data collected were subjected to statistical 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)

RESULTS:

Cooking loss of fresh camel, beef and goat meat:

As shown in table (1) the mean values of the effect of type of cooking methods on cooking loss of meat are presented. Results showed that no significant difference (P>0.05 among the treatments of deep fat frying and oven for cooking losses. Similarly the type of meat (camel, beef and goat meat) not affected by cooking methods.

Cooking loss of camel, beef and goat sausages:

As shown in Table (2) the mean values of the effect of of type of cooking methods on cooking loss %of sausages ar presented. Results showed that the types of meat were not significantly different (P> 0.05) among the treatments for cooking loss. The type of fillers affected significantly (P<0.01) on cooking loss percentage. These results indicated that, sweet potato filler showed high percent of cooking loss compared to bread crumbs filler. Using sweet potato filler reduced the size of sausage fingers and diminished the weight

Table 1: Mean values (±SD) of cooking loss (%) of camel, beef and goat fresh meat cooked in vegetable oil (deep fat frying) and in oven (160 C$^{°}$ for 25-30min)

Factors		Parameter
Meat type	Cooking method	Cooking loss %
Camel meat	Deep fat frying	38.52±6.10
	Oven	39.36±3.81
Beef	Deep fat frying	32.96±5.13
	Oven	28.71±2.98
Goat meat	Deep fat frying	38.99±6.70
	Oven	32.78±8.71
Main effect		
Meat type		
Camel meat		38.94
Standard Error		30.84
Significant level		35.88
Cooking method		2.4
Deep fat frying		N.S
Oven		
Standard Error		36.83
Significant level		3.62
Meat type × cooking method		1.96
Significant level		N.S

* = Significance different P<0.05
** = Significance different P<0.01
NS = No significant

Table 2: Mean values (± SD) of cooking loss (%) of camel, beef and goat sausages (with bread crumbs and sweet potato) Cooked in oil (deep fat frying for 3-5 min)

Factors		
Sausage types	Filler type	Cooking loss % ±SD
Camel sausage	Bread crumbs	28.29±5.45
	Sweet potato	43.45±0.51
Beef sausage	Bread crumbs	26.71±5.40
	Sweet potato	38.2433±3.20
Goat sausage	Bread crumbs	28.86±6.19
	Sweet potato	39.8767±0.93
Main effect		
Meat type		
Camel sausage		35.87
Beef sausage		32.48
Goat sausage		34.37
Standard Error		1.74
Significant level		NS
Bread crumbs		27.95
Sweet potato		40.52
Standard Error		1.42
Standard Error		**
Significant level		
Mea type × Cooking method		
Significant level		NS

* = Significance different P<0.05
** = Significance different P<0.01
NS = No significant

DISCUSSION

In the present study the results showed that the cooking loss the demonstrated high significant difference (P<0.01) when applied to the three types of meat (camel, beef and goat meat). Cooking loss percent of camel meat was higher followed by goat meat and beef (36.3, 34.15 and 31.75%) respectively. However, this different may be due to moisture content differences in the three types of meat studies. The cooking loss in camel meat in thes study was (36.3%) which higher than the findings of kadim *et al.*, (2006) as (29.88%). The present result is in agreement with the findings of Siham (2008) who reported that cooking loss percent in camel meat was (35.6%). Cooking loss in beef in this study 31.75% was lower than the result reported by Siham, (2008) (38.6%). Cooking loss was lower in beef muscle than

camel meat, probably due to the lower content of intra-muscular fat of camel meat as stated by Kadim *et al*., (2006). The goat meat in this study showed higher cooking loss (34.15%) than the findings of Wattanachant *et al*., (2008) who reported that the cooking loss percent in goat meat in both studies (27.77%). Also the present result was higher than the result of Madruga *et al.,* (2008) who reported values ranged from (26.5 to 29.2%). The cooking loss percentage in goat meat in this study is in line with the result reported by Elkhidir *et al*., (1998) as (34%).

In this study the result showed that cooking loss was with high significant difference (P< 0.01) among the three types of sausage (camel, beef and goat sausages). Cooking loss percent of camel sausage was higher

compared to beef and goat sausages as 24.12, 21.45 and 22.0% respectively. Camel sausage in this study recorded cooking loss percent as 24.12% which is inline with the result reported by Nafiseh *et al.,* (2010) as (24%). Beef sausage in this study had cooking loss percent as (21.45%) which was slightly similar to that reported by Ali (2012) as (22%). The present result showed that camel and goat sausages were recorded higher cooking loss compared to beef sausage which disagrees with the findings of Ali, (2012) who reported that goat sausage had lower cooking loss as (16.64%) compared to beef sausage which showed (22.07%). The value of goat cooking loss in this study was higher than the findings of Gadiyaram and Kannan, (2004) as (5.52%) and in beef sausage as (19.88%). The present result disagreed with the findings of Nafiseh, *et. al*., (2010) who reported that the camel sausage lower cooking loss than beef sausage as 24.2 and 30.2% respectively. The difference in cooking loss could be attributed to the denaturation temperature of protein and the difference in chemical properties and types of meat as stated by Dawood, (1995) and Nafiseh *et al.,* (2010).

CONCLUSION

In the present study results showed that the cooking loss was with high significant difference (P<0.01) among the three types of meat (camel, beef and goat meat). Cooking loss percent of aamel meat was the highest followed by goat meat and beef. The result showed that cooking loss was with high significant difference (P0.01<0.01) among the three types of sausage. Camel sausage had higher cooking loss (24.12%) compared to beef and goat sausages.

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