

Effect of Replacing Back Fat of Cattle with Abdominal Fat on Quality Characteristics of Beef Sausage

Olufunke Dele, M.Sc.*; Olajide Sogunle, Ph.D.; Tinuke Saka, M.Sc.;
and Samuel Abiola, Ph.D.

Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria.

*E-mail: deleolufunke@yahoo.com

ABSTRACT

A study was concluded in which abdominal fat replaced back fat at level 0% and 10% in two batches of beef sausage. The cooking weight loss and sensory properties of the sausages were determined in a meat processing laboratory. There were significant differences in the results obtained from the cooking loss and sensory properties of the sausages. The first batch of sausage containing back fat had a higher percentage cooking loss of 1.26% while the second batch containing abdominal fat had a lower percentage cooking loss of 0.89%. Sausage containing back fat had a higher appearance value of 5.30 while the second batch containing abdominal fat had a lower value of 4.00 for appearance. For flavor, the first batch had a higher value of 4.30 while the second batch had a lower value of 4.10. Beef Sausage containing back fat had a higher value of 4.50 for juiciness while the sausage with abdominal fat had a lower value of 3.20. For tenderness the first batch of sausage had higher value of 4.40. Overall higher acceptability was observed in sausage with back fat.

(Keywords: abdominal fat, back fat, beef sausage, food science)

INTRODUCTION

The long search to meet the food demands of the growing world population is becoming alarming and a global concern, which requires urgent attention. Several forms of food exist among which are the numerous meat products formulated to meet the dietary demands of large populations at much more affordable price than other meat products.

Sausage is a convenient food available in a great number of varieties and flavors. It is considered an excellent source of high quality protein containing almost all essential amino acids in appropriate quantity necessary for growth, maintenance, and tissues repairs. It also provides significant amount of vitamins and minerals (Martin and Juile, 1998).

Fat has been considered an integral part and nutrient source of human diet, following its numerous contributions to the body, even as a flavor precursor. It exerts a balance effect on the aroma profile (Schieler-Keller, *et al.*, 1994). Back fat (subcutaneous fat) is found under the skin and it is an important ingredient and over the years, it has been utilized in sausage production.

This study investigated the possibility of replacing back fat of cattle which is commonly used in sausage production with the abdominal fat of cattle. This stems from the limitation associated with the consumption of back fat as it relates to human health.

MATERIALS AND METHODS

The experiment was carried out at the Meat Processing Laboratory, Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria. The equipment used was Kenwood Multipurpose Machine, water bath, artificial casings, bowls, and plates.

Preparation of Beef Sausage

Two batches of beef sausages (2kg per batch) were prepared using lean meat from the thigh muscles of cattle carcasses. The beef for each treatment was chopped and then run through a 5mm plate in a Kenwood Mincing Machine

(Hampshire, U.K.) together with the back fat. Other ingredients such as wheat flour, seasoning, and water were added to each batch of beef sausage. Another batch of lean beef and abdominal fat was also produced using the same procedure. The compositions of sausage recipe are presented in Table 1.

Table 1: Composition (%) of Beef Sausage.

Ingredients	Batch 1	Batch 2
Beef	55	55
Back fat	10	-
Abdominal fat	-	10
Wheat Flour	20	20
Seasoning	3	3
Water	12	12
Total	100	100

Determination of Cooking Loss of Beef Sausage

Three replicates each per treatment sample were cooked, immersed in a water bath for 20 minutes at 70°C, and the losses were determined as follows:

Cook loss (g) = Weight before cooking - Weight after cooking

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

Sensory Evaluation

Sensory Evaluation of samples of cooked beef sausages was assessed by ten (10) trained panelists. Some meat qualities estimated were appearance, flavor, juiciness, tenderness, and overall acceptability. Bite size portions of 10g of meat samples were each served at room temperature to 10 trained panelists who awarded scores using a 9 point Hedonic scale of ; 1=Dislike extremely; 2=Dislike very much; 3=Dislike moderately; 4= Dislike slightly; 5= Intermediate; 6=Like slightly; 7=Like moderately; 8= Like very much; and 9= Like extremely (Cross, *et al.*,1975). All data obtained were subjected to a t- test at 5% level of significance (SAS,1999).

RESULTS AND DISCUSSION

Cook weight Loss of Beef Sausages

Table 2 show the significant effect ($p < 0.05$) in cooking weight losses in all measured parameter. The first batch of sausage containing back fat had a higher percentage cooking loss of 1.26% while the second batch containing abdominal fat had a lower percentage cooking loss, this might be attributed to the high dry matter content in the sausage with back fat. Mittal and Blaisdel (1993) reported that moisture is inversely proportional to the fat -protein ratio of the product because fat is hydrophobic and offers resistance to the diffusion of moisture.

Table 2: Showing the Cooking Weight Loss of Beef Sausages Formulated with Back Fat and Abdominal Fat of Cattle.

Parameters	BATCHES	
	1	2
Initial weight(g)	50.00±0.00	50.00±0.00
Final weight(g)	49.37±0.00 ^b	49.55±0.05 ^a
Weight loss(g)	0.63±0.00 ^a	0.44±0.05 ^b
Weight loss(%)	1.26±0.00 ^a	0.89±1.03 ^b

^{a,b} : Means in the same row with difference superscripts are significantly different ($p < 0.05$)

KEY: Batch 1:Sausage containing Back fat, Batch 2:Sausage containing Abdominal fat

The results of cooking loss recorded in this study is in line with the report of Hughes, *et al.* (1997) that decreasing fat content increases cooking losses in processed meat. The low values recorded for the cook loss indicates good quality sausage as stated by Gerard (1976) that fresh sausage which on cooking gives a weight loss of under 10% is produced with good ingredients and satisfactory production techniques. Sabel and Bratzler (1957) reported that some of the weight loss during cooking could be due to the loss of fluid fat, while some could be due to the method, time and temperature of cooking.

Results of sensory properties of the beef sausage as presented in Table 3 showed that the first batch of sausage containing back fat had a higher value of 5.30 while the second batch containing abdominal fat had a lower value of 4.00 for appearance. There were significant

($p < 0.05$) differences in the result obtained for the appearances of the sausages.

Table 3: Sensory Properties of Beef Sausages formulated with Back Fat and Abdominal Fat of Cattle.

Parameters	BATCHES	
	1	2
Appearance	5.30±0.42 ^a	4.00±0.39 ^b
Flavor	4.30±0.37	4.10±0.35
Juiciness	4.50±0.22 ^a	3.20±0.39 ^b
Tenderness	4.40±10.52	3.90±0.46
Overall Acceptability	5.1±0.28 ^a	3.90±0.46 ^b

^{a,b} : Means in the same row with difference superscripts are significantly different ($p < 0.05$)

KEY: Batch 1: Sausage containing Back fat, Batch 2: Sausage containing Abdominal fat

For flavor, the first batch had a higher value of 4.30 while the second batch had a lower value. Abiola and Adeggbaju (2001) stated that high fat content is traditionally associated with succulence and flavor. The flavor and quality of the sausage produced depends on the emulsification of the fat content. Beef sausage containing back fat had a higher value of 4.50 for juiciness, while the sausage with abdominal fat had a lower value of 3.20.

For tenderness the first batch of sausage had higher value of 4.40 while the second batch had a lower value of 3.90. Schweigert and Price (1971) indicated that water and fat the emulsifying capacity of meat and influences palatability by contributing to tenderness of the finished sausage.

The overall acceptability score was said to be higher in the first batch with a value of 3.90, this could be as a result of higher fat content because reduction of fat in comminuted meat products results in rubbery dry textured products (Giese, 1996).

CONCLUSION

From the results obtained, it could be concluded that back fat of cattle is suitable as formulation ingredient in beef sausage. Sausage with back fat produced better results in terms of appearance, juiciness, and overall acceptability.

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ABOUT THE AUTHORS

Olufunke Dele, holds an M.Sc. in Monogastric Animal Production. She is a registered member of Nigerian Society for Animal Production. She has keen interest in meat science and processing.

Dr. Olajide Sogunle, is a Senior Lecturer in the Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria. He is a registered member of Nigeria Institute of Animal Science. He specializes in monogastric production.

Saka, Tinuke holds her M.Sc. in Monogastric Animal Production. She is a registered member of Nigerian Society for Animal Production. Her research interest is in monogastric animal production.

Dr. Samuel Abiola, is a Professor in the Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria and is a fellow of the Nigerian Institute of Animal Science, Nigeria. He specializes in animal products and processing.

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