

SENSORY RATING OF CAMEL MEAT KILISHI PRODUCED FROM GRADED LEVELS OF GROUNDNUT SLURRY

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ABSTRACT

This study evaluated the sensory attributes of *camel meat Kilishi* produced using different inclusion levels of groundnut slurry (340 g, 350 g, and 360 g). The aim was to determine the effect of varying groundnut slurry concentration on the overall acceptability and sensory quality of *Kilishi*. Meat samples were marinated in the respective slurry formulations, dried, roasted, and subjected to sensory evaluation by a 10-member trained panel using a 5-point hedonic scale. Parameters assessed included colour, aroma, taste, mouth-feel, and overall acceptability. Results revealed significant ($p < 0.05$) differences in most sensory attributes among treatments. *Kilishi* produced with 340 g slurry recorded the highest scores for aroma (4.10) and acceptability (3.70), while 360 g slurry improved taste (3.60) and mouth-feel (3.80). Colour scores decreased with higher slurry inclusion levels. The findings suggest that a moderate slurry inclusion (340–350 g) yields optimal aroma and overall acceptability, whereas higher slurry inclusion (360 g) enhances taste and texture. Thus, adjusting slurry levels can help processors tailor *Kilishi* quality to consumer preferences.

Keywords: *Kilishi*, camel meat, groundnut slurry, sensory evaluation, acceptability

DESCRIPTION OF PROBLEM

Kilishi, a popular traditional dried meat delicacy in Nigeria and other parts of West Africa, is valued for its unique taste, extended shelf life, and cultural significance [1]. Traditionally made from beef, there is growing interest in exploring alternative meat sources such as camel meat due to its high protein content, low fat and cholesterol levels, and favourable amino acid profile. Camel meat offers a healthier option that aligns with current nutritional and economic demands, especially in arid regions where camels are more readily available than cattle [2]. Groundnut slurry, commonly used as a coating ingredient in *kilishi* production, enriches the product with additional protein and fat while improving flavour and texture. However, the quantity of slurry applied can significantly influence the sensory attributes of the final product. Hence, the study evaluates sensory attributes of camel meat *kilishi* coated with different levels of groundnut slurry.

MATERIALS AND METHODS

The study was conducted in the Animal Products Processing Laboratory of the Department of Animal Science, Ahmadu Bello University, Zaria, Nigeria. Zaria is located within the Northern Guinea Savannah Zone of Nigeria, with latitude $11^{\circ} 09' 01.78''$ N and longitude $7^{\circ} 39' 14.79''$ E at an altitude 671m above sea level. The climate is relatively dry with a mean annual rainfall of 700-1400mm. the rain starts at between late April and early May to mid-October. The dry season begins around the middle of October, with cold weather that ends in February. This is followed by relatively hot weather between March and April just before the rain begins. The mean minimum daily temperature is from $14-24^{\circ}\text{C}$ during the cold season while the mean maximum daily temperature is from $19-36^{\circ}\text{C}$ during the hot season. The mean relative humidity during the dry and wet seasons is 21% and 72%, respectively [3].

Processing of Kilishi

The camel meat (3 kg) was obtained and divided into 1 kg each where each kg was used for each level of the slurry material. The meat was cut in to pieces which was then sliced into sheets of about 0.20 cm thick of average length of 5-10 cm using sharp knife. The thin sheet was spread on rack made of sorghum stalk to reduce the moisture content. This was allowed to stay for about 18- 24 hours. The sheet was then cut into 2 x 2 cm to have uniform cut for the panellists. The dried meat was coated with a slurry made by forming a paste of three levels of Groundnut, mixed with other ingredients (dried ginger, *masoro*, *kanunfari*, pepper, onions, table salt (NaCl) and water), each level of paste material served as treatment. The infused samples was spread once more on a rack made of sorghum stalk for at least 2 hours to dry, then followed by roasting on low burning fire for about 4-6 minutes, and allowed to cool according to the method of Abubakar *et al.* [4]. Finally, edible oil was sprinkled and the product was packaged and stored in brown envelope until when needed.

Sensory Evaluation

A ten member panel comprised of staff and students of Faculty of Agriculture, Department of Animal Science, Ahmadu Bello University, Zaria, constituted the taste panel (assessors). They were trained and screened to adjudge the Kilishi samples for Colour, Aroma, Taste, Mouth-feel and overall acceptability using a five-point Hedonic scale; corresponding to 5- like very much, 4- like slightly, 3- neither like nor dislike, 2- dislike slightly, and 1- dislike very much. Each panelist was served 5g of each of the treated meat samples to taste. Water and biscuit were provided for each panelist to rinse his/her mouth after each bite to eliminate the taste of the previous meat sample. Data generated were analysed using the general linear model procedures of SAS [5], means

were separated using Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The sensory scores of *camel meat Kilishi* produced with varying levels of groundnut slurry are presented in Table 1. Groundnut slurry inclusion had a significant ($p < 0.05$) effect on colour, aroma, taste, and overall acceptability, but no significant effect on mouth-feel. Colour ratings decreased slightly as slurry level increased, with the highest value recorded at 340 g (2.90) and the lowest at 360 g (2.60). This suggests that higher slurry concentrations may darken the product surface during drying and roasting due to Maillard reactions, resulting in reduced visual appeal. Aroma scores were highest at 340 g (4.10) and declined with increasing slurry levels, implying that excessive groundnut paste may mask the meaty aroma characteristic of *Kilishi*.

Taste ratings improved with higher slurry inclusion, increasing from 3.30 at 340 g to 3.60 at 360 g, indicating that the nutty flavour and oil content in the groundnut slurry enhanced the palatability of the product. Similarly, mouth-feel scores showed a positive trend with slurry level (3.50 - 3.80), possibly due to the higher fat content providing a smoother texture and improved chewiness [1]. However, overall acceptability declined slightly at 360 g (3.10) compared to 340 g (3.70), reflecting that excessive slurry may produce an oily surface or overpower the traditional *Kilishi* taste. These results align with earlier findings that moderate incorporation of fat-rich slurries improves flavour and tenderness but excessive inclusion can reduce consumer preference due to changes in appearance and greasiness [1,4]. Overall, the sensory responses indicate that balancing slurry quantity is crucial for optimizing *Kilishi*'s sensory and consumer appeal.

Table 1: Sensory rating of camel meat Kilishi produced from graded levels of groundnut slurry

GNS Inclusion Levels (g)	Colour	Aroma	Taste	Mouth-feel	Acceptability
340	2.90 ^a	4.10 ^a	3.30 ^b	3.50	3.70 ^a
350	2.70 ^{ab}	3.90 ^{ab}	3.50 ^{ab}	3.60	3.50 ^a
360	2.60 ^b	3.70 ^b	3.60 ^a	3.80	3.10 ^b
SEM	0.14	0.13	0.11	0.17	0.12

^{ab} Mean values bearing same superscript within a row are not significantly different ($P < 0.05$), GNS = Groundnut Paste Slurry, SEM = Standard Error of Mean.

Ratings: 1: Dislike very much, 2: Dislike, 3: Intermediate (neither like nor dislike), 4: Like, 5: Like very much

CONCLUSION AND APPLICATION

The study demonstrated that varying the level of groundnut slurry significantly influenced the sensory properties of *camel meat Kilishi*. The 340 g inclusion level produced the most preferred *Kilishi* in terms of aroma and general acceptability, while the 360 g level improved taste and mouth-feel but reduced colour appeal and acceptability. Therefore, moderate slurry inclusion (350 g) is recommended to achieve a desirable balance between aroma, taste, and overall product quality.

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