

PRELIMINARY STUDIES ON THE TRADITIONAL PROCESSING OF KUNDI, AN INTERMEDIATE MOISTURE MEAT (IMM).

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ABSTRACT - Kundi, an intermediate moisture meat product, conventionally produced from Camel Meat (CM) in northern Nigerian. There is a dearth of scientific information regarding the physical, chemical, nutritional attributes, production, microbiological status and eating qualities of Kundi. Research was conducted in a completely randomized design to evaluate, chemical compositions and sensory properties of Kundi manufactured from CM and beef. Semimembranous muscles of White Fulani and camelus dromedarius of (2-3) males were used for study. Results showed that CM had significantly lower moisture and higher protein content compared to beef. Kundi made with CM was lower in moisture and higher in protein when compared to kundi made with beef. For sensory attributes kundi from CM was rated higher for flavor while beef Kundi was rated higher for colour, juiciness, tenderness and overall acceptability. Beef Kundi, could be an alternative product, to consumers to help increase protein intake consumed by the populace.

Key word : Beef, Camel meat, Kundi.

I. INTRODUCTION.

Intermediate Moisture Meat (IMM) products are shelf - stable by reducing moisture content, water activity and are plastic enough for eating without further hydration, need no refrigerator, facilitating the production of processed food in many developing countries like Nigeria. It is principally made from camel meat. Beef can also be used when they are old or physically unfit for production. The product developed as a

means of preserving meat, with no refrigeration by Northern people of the country. Kundi, is a popular product both in rural and urban areas in Nigeria, and is sold in all the markets both local and capital market. It is frequently consumed by the low salary earners and largely produced in places like Sokoto, Borno, Kano, Kaduna, Maduguri, Bauchi, and Kastina state. These sites have favorable weather conditions, high consumer demand, for Kundi and more than 70% of the Nigerian camel and cattle population Alaku [1]. Kundi is a ready - to - cook, convenience meat product. Since camel is limited to the northern part of Nigeria, beef could be substituted in other areas of the country. The objective of the study was to evaluate the chemical composition and sensory properties of conventionally processed Kundi manufactured from beef and camel meat.

II. MATERIAL AND METHODS.

Fresh semimembranous muscle (5kg) from two – three White Fulani and Camelus dromedaries, males animals were used. Samples were cut into pieces of 7 - 4 cm long and 60 – 80 g in weight, stored at 4 °C for 24 h.

Kundi preparation:

Fresh samples from each meat type were boiled separately at 100 °C for 20minutes and allowed to cool at room temperature. Meat was drained and samples were allowed to air-dry for 1 h in the Meat Science Laboratory.

Dry process.

Cooked and air dried samples were smoked over a glowing fire for 4-5 hours at 200 – 270 °C temperature in a smoking kiln, using coal as the heat source.

Chemical composition

Moisture, fat, protein and ash of both raw meat and kundi was determined following AOAC [2] methods.

Sensory Status

Kundi products were evaluated separately, the panelist (male, n=20 and female, n=20) ranged in age from 30 – 35 years. The panelists were randomly allocated to the panelists. Each bite size from each treatment were coded and served in odourless plastic container. Each samples bite is 3cm by 3cm in dimension. The panelists rated the samples on a 9-point hedonic scale for colour, flavour, texture, tenderness juiciness and overall acceptability.

Statistical analysis

Data was analyzed by SAS using the PROC ANOVA and means were separated using Duncan's Multiple range test.

III. RESULTS AND DISCUSSION

TABLE 1: Proximate composition of fresh beef and camel meat (g/100gDM)

Proximate Analyses	Camel meat	Beef	SEM
Moisture	70.98 ^b	76.11 ^a	0.64
Protein	21.28 ^a	18.27 ^b	0.03
Ash	4.24 ^a	2.03 ^b	0.05
Ether extract	3.52 ^b	4.60	0.27

^{ab}: Means in the same row with different superscript are significantly (P<0.05).

TABLE 2: Proximate composition of Kundi made from beef and camel meat (g/100gDM)

Proximate Analyses	Camel meat	Beef	SEM
Moisture	68.89 ^a	62.27 ^b	0.25
Protein	23.13 ^a	21.01 ^b	0.42
Ash	5.82 ^a	4.09 ^b	0.21
Ether extract	4.20 ^b	7.93 ^a	0.65

^{ab}: Means in the same row with different superscript are significantly (P<0.05).

TABLE 3: Sensory properties of kundi products.

Sensory Properties	Camel meat	Beef	SEM
Tenderness	5.70 ^b	6.50 ^a	0.16
Flavour	5.90 ^a	3.80 ^b	0.54
Colour	3.50 ^b	6.30 ^a	0.43
Juiciness	5.01 ^b	6.53 ^a	0.38
Texture	5.01 ^b	6.30 ^a	0.22
Overall acceptability	5.90 ^b	7.00 ^a	0.03

^{ab}: Means in the same row with different superscript are significantly (P<0.05).

Hedonic scale used are taste panel score form, under the heading of sensory properties with 9 rows of difference traits to distinguish the samples tasted.

In table 1, fresh camel meat had significant lower values for moisture and ether extract content, but had higher values for ash and protein content while beef had higher significant lower protein and ash content and higher values for moisture and ether extract content respectively. The differences observed in the chemical composition could be as a result of difference in species of the animal used for this study. The chemical composition obtained for camel meat agreed with the founding's of Babiker [4], Kadrim *et al*, [5], Hedrick *et al*, [6] and Exekwe *et al*, [7]. They reported protein content of red meat, ranges from 18.23 – 22.6%, moisture content to be 65 – 80 %, ether extract to be 2.54 – 10.23% and ash content 1.40 - 1.60 %.

The values obtained from kundi products manufactured from camel meat and beef were significant. Protein and ash content were significantly higher in kundi made from camel meat and significantly lower moisture and ether extract than values obtained for beef. The values obtained for moisture content, fell within the ranges of 21.6 - 26.8 % observed for Majoran sausage and salami, Fernandez *et al*, [8] for both products.

It was observed that there was drastically reduction in moisture content of both meat product compared with fresh meat, these could be due to the treatment used (smoking) which was notified by Okonkwo *et al*, [9] that it could caused a marked decrease in moisture content and are shelf stable under tropical climatic conditions without refrigeration. It was observed that the fat content obtained in this studies were however lowered than 10.9 - 0.29 % for Alheria products, Venia *et al*, [11] while values obtained for protein content were also lower than 69.8 – 72.1% for loin roasted pork. Increased in protein ash and ether extract content and decreased in moisture content of both products may be attributed to accumulation of nutrient resulting from moisture reduction, this also agreed with the findings of Okonkwo *et al*, [9], they concluded that intermediate moisture meat are meat low in moisture content but contain three to four times their raw protein equivalent and hence they are less bulky.

Sensory properties scored by the panelists indicated that beef products were more preferable than camel meat products. It was observed that the panelist scored beef with significant higher scored in tenderness, colour, juiciness, texture and overall acceptability than camel meat. While camel meat had significantly higher value in flavour than beef. Beef kundi had significant higher values in tenderness than camel kundi, and tenderness is the case with which teeth sink into the meat when chewed, having less connective tissues, muscle fibers and more lipid content. As seen in table 1 and 2 with beef having higher fat than camel meat contributing to it tenderization in meat. The results obtained were in agreement with 5.71 - 6.70 % reported for sausage products, Caceres *et al*, [13]. Flavour in sensory attributes is affected by the smoking compound in smoke component and Omojola *et al*, [15] reported 5.03 – 6.58 %

for flavor of kilishi a Nigeria meat product. Colour of kundi could be influenced by myoglobin nature of the meat, composition and state of muscle and meat structures. Perlo *et al*, [16] reported 3.00 – 6.91 % for colour reported for deboned chicken meat. Meat products changes in colour under chemical reaction by transforming the unstable pigment of the fresh meat into stable read pigment and also when meat are smoked, phenols in smoked compound contributed to desirable colour and flavor of the products. Juiciness in table 3 also had significant higher values for beef than camel meat. Cross *et al* [17] noticed that juiciness of meat is directly related to intramuscular lipid and moisture content of meat. In this study, beef had the higher juiciness scored which is as a result of moisture content and fat in table 1 and 2. The values obtained were in agreement with 3.70 – 6.305 reported for smoked and un-smoked products of cured pork, Solomon *et al* [14]. Juiciness and texture of meat products plays a vital role in overall acceptability and in table 3, beef had the higher juiciness and texture and both attribute to the general overall acceptability by the panelists.

IV. CONCLUSION

Though camel meat had higher protein and ash content for both treatments yet kundi from beef were generally accepted by the panelists because of it higher values in fat and moisture which contributed to high receptive in acceptability of a product. It then indicated that kundi which is conventionally produced from camel meat initially, could also be manufactured from beef, making kundi a readily and available, since Nigerians are beef eaters. Kundi is a ready – to – cook, and could be modify to ready – to – eat, which could help to reduce the prevalent malnutrition in the country and then better the life of the people.

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VI. REFERENCES

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