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EVALUATION OF PROXIMATE COMPOSITION AND ORGANOLEPTIC PROPERTIES OF SOME DISAPPEARING HERITAGE MEAT PRODUCTS OF KEBBI STATE, NIGERIA

Muhammad Kabiru Bahago, Mohammed Ibrahim Ribah*, Muáwiya Jibir
[1]*Department of Animal Science, Faculty of Agriculture,*
Kebbi State University of Science and Technology, Aliero, PMB 1144, Birnin kebbi, Nigeria
[1]*Department of Animal Science, Faculty of Agriculture,*
Kebbi State University of Science and Technology, Aliero, PMB 1144, Birnin kebbi, Nigeria
[2]*Department of Animal Science, Faculty of Agriculture, Usmanu Danfodiyo UniversitySokoto, PMB 2346, Sokoto, Nigeria*
***Corresponding Author:** Mohammed Ibrahim Ribah*

----------ABSTRACT----------
Disappearing meat products (DMPs) are heritage/ethnic meats products that have disappeared or at the risk of disappearing. Different ethnic groups have their peculiar cuisines especially meat products. This study investigated proximate composition and organoleptic qualities of some disappearing ethnic heritage meat products in Kebbi state. Three heritage dehydrated meat products (Gade, yawara and karmami) were prepared according to the cultural methods. Samples were subjected to proximate and sensory analyses. Data was analyzed using ANOVA at 5% level of significance. Results of proximate composition indicated that there is significant differences (P<0.05) in respect to moisture content, Ash, protein, Nitrogen, and CHO of DMPs and also shows no statistical differences from (P>0.05) on Lipid. Results of Sensory Properties of some DMPs indicated that, the panelist sensory judgment established significant differences (P<0.05) on juiciness and flavor while aroma and tenderness shows no significant differences (P>0.05) across the DMPs. However, acceptability scores fall between of 5.5 and 8.7 on a 9 point hedonic scale, with the acceptable limits of 5.5. Gade, yawara and karmami were ranked, 1st, 2nd and 3rd, respectively. It was concluded that the products performed better in optimizing proximate and eating qualities. The production of the identified DMPs especially the popular ones should be revived encouraged and harnessed owing to their comparable nutritive and eating qualities.

KEYWORDS: *proximate, organoleptic, heritage, meat products*----------

1. INTRODUCTION

According to Laranjo *et al.* (2017) heritage meat products are high sensory quality foods, usually with high nutritional value, produced in a small scale, using ingredients and procedures from ancient times. Nayar *et al*. (2021) reported that traditional meat products with their unique sensory attributes have known to hold tremendous mass appeal, usually with high nutritional value. One of the importance of heritage food/meat is that, they are safe and authentic. Heritage food has gained attention and recognition by locals as a cultural identity and by tourists as a new food experience. Two important intrinsic quality attributes of heritage food encompass safety and authenticity. Szafrańska *et al.* (2021) heritage meat products play an important role in preserving the tradition and this traditional dishes acquire specific taste values, which cannot be recreated in other parts of the country and that, heritage food/meat, prepared according to traditional recipes serves as a link handed down from generation to generation. Çekiç (2023) reported that, traditional culinary practices have the ethnic codes of the societies they belong to in terms of form and content features. These codes, which are shaped by many factors such as migration, war, famine, disaster, drought, social interaction, and religion from past to present, are also social indicators that separate cultures from each other. In traditional cuisine, there are many specific products that distinguish one society from other societies. One of them is the desserts made with meat. Thus, traditional meat products include food products derived from both meat and fish meat. All over the world, different processes are used to preserve meat and the particular know-how of people livingin different regions gave rise to a great diversity of meat products according to their traditions and historic use Laranjo *et al*. (2017).

Despite the vast importance of meat and its products, some very important heritage foods and meat products are victims of extinction or are on the verge of extinction. Many concerns have been raised on the issue of

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disappearing meats and food products from the dishes of households (Nuwer, 2014; Nico, 2018; Joan, 2019 and Suthon, 2020).

Little attention have been paid to conservation of cultural cuisines like food and meat products, despite the importance of meat products in human and animal nutrition. UNESCO (2017) made a recommendation for the international community as a whole to participate in the protection of the cultural and natural heritage. In Nigeria there are many processed meat products which includes *balangu, tsire, guru, kilishi, dambun nama, banda* which were reported to be highly appreciated because of their characteristic taste, texture and storage stability (Ribah *et al.,* 2018). Apart from the more popular meat products, there are products that are not popular because their production and consumption is restricted to certain localities and their utilization is influenced by socio-cultural affiliations which makes such products vulnerable to disappearance.

2. OBJECTIVES
A study by Ribah *et al.* (2023) identified and documented several disappearing meat products from different ethnic groups in Kebbi State. The objective of this study was to evaluate the proximate composition and organoleptic properties of some disappearing ethnic heritage meat products identified in Kebbi State, Nigeria.

3. METHODOLOGY
Laboratory procedures were used to produce the meat products as describe by Ribah *et al.* (2023).

4. TREATMENTS
The treatments for the study comprised of three heritage dehydrated meat products identified by including *Gade, yawara* and *karmami* meat products which were found to be highly cherished by their ethnic localities.

5. SAMPLE PREPARATION
Three (3 kg) of boneless beef were purchased for each product from Jega slaughter slab. The collection of the raw meat was done under optimum hygienic condition, using disposable hand gloves, clean polythene bags and clean containers. The samples for the study were prepared according to the description by the expert respondents transcripted by Ribah *et al.* (2023) as follows:

5.1 Preparation of *Yààwárá* meat product
The processing method for the *yaawara* meat product is described in the flow chart (Figure 1).

5.2 Preparation of *Gadee* product
The processing method for the *gadee* meat product is described in the flow chart (Figure 2).

5.3 Preparation of *Karmami* meat product
The processing method for the *karmaami* meat product is described in the flow chart (Figure 3).

The meat samples for each product were divided in to thirteen (13) piece cuts containing 220g each. After eight weeks of storage at room temperature, ten (10) samples of each product were used for organoleptic analysis and three (3) samples of each product were used for proximate analysis.

6. DETERMINATION OF PROXIMATE COMPOSITION
The data collection for the proximate composition were obtained through proximate analysis, The manufactured samples of each product was bagged, label and stored in a -8°C freezer until analyzed for proximate using the AOAC (2011) procedure.

7. DATA ANALYSIS
Analysis of variance (ANOVA) using the procedure of (SPSS, 2007) was used to analyze all data obtained from proximate and organoleptic analyses. Significant means were separated using Tucky test at %5 confidence level

8. RESULTS AND DISCUSSION
Table 1 shows the results of proximate composition of some disappearing meat products in Kebbi State after eight (8) weeks of storage. Result indicated that there are significant differences ($P<0.05$) in respect to all proximate parameters measured across the meat products.

The moisture content of the three products were recorded as having 8.00, 7.83 and 6.83% for *karrmami, yawara* and *gade,* respectively. *Yawaraa* and *karmami* have significantly the same moisture content higher than gade. The

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moisture of the products in the current study were found to be lower. This could obviously be as a result of the dehydration process the product were subjected to. By the nature of the products, they were intended for storage for future use, hence the lower moisture content. Similar values for dried meat products were reported in previous research such as Balarabe *et al.* (2018) who processed *danbunnama* from different meat types and recorded 9.9%, 6.44%, 2.8%, 10.6%, and 9.75% for beef, mutton, chevon, camel, and broiler chicken respectively. Similarly, Jegede *et al*. (2018) reported 4.97% for kundi, 9.75% was recorded for *kilishi* by Idowu *et al*. (2010), Akinola *et al.* (2019) also recorded 7.16 % for *suya*.

The ash content of the products recorded 18.67, 17.67 and 15.67% for *karmami*, *yawara* and *gade* respectively. This result however shows higher ash content when compared to previous research works on different dried meat products. For instance Unzil *et al.* (2021), Oladimeji *et al.* (2022), Nady *et al*.(2021), Ajai *et al.* (2018), Balarabe *et al*.(2018), Jegede *et al*. (2018), Idowu *et al.*(2010), Akinola *et al*.(2019), Ogunsola and Omojola (2008) and Adeniyi *et al.*(2011) all reported ash content values of between 0.41% to 8.78% for intermediate moisture and dried meat products in their works which is still lower than the current result. However, Precica (2023) reported that ash content of dry meat products can be up to 12%. The Ash content values of current study were found to be up to 18%. This could probably be due to the degree of dryness of the products and type of meat used to prepare the products. The higher amounts of ash content signifies that the products will be high in minerals.

As for the lipid content of products, karmami, gade and yawara recorded 12.8, 9.00 and 3.0%, respectively.These results were found to be similar to other dried meat products reported by previous research. For instance Jegede *et al.* (2018) 15.15% for *suya*, Albert *et al*, (2021) recorded 8.75% for *suya* and Akinola *et al.* (2019) also recorded 14.04 % for *suya*.

The protein content of yawara, gade and karmami recorded 63.37%, 49.47% and 40.10%, respectively. The reason why yawara, karmami and gade had the higher protein content could not be unconnected to the fact that the products were dried. As moisture content is reducing, protein content becomes more concentrated. Mediani *et al.* (2022) reported that, the concentration of protein will be more in dry meat than intermediate moisture meat. Similar values of higher protein content for dried meat products were reported in previous research such as Balarabe *et al*, (2018) recorded 58.0% for *danbunnama*, Jegede *et al*,(2018) reported 70.66% for kundi, 57.02% was recorded for killishi by Idowu *et al*,.(2010), Ogunsola and Omojola (2008) recorded 60.33% and 59.41% for beef and pork killishi respectively. On the contrary, higher values for crude protein in dried meat samples were reported by Adeniyi *et al*,.(2011) who recorded 92.75% and 92.21% for beef and broiler meat, although it was based on dry matter basis.

The CHO *gade, karmami* and *yawara* recorded 9.67%, 8.67% and 3.4%, respectively. Nady *et al.* (2021) reported 5.00% for beef sausage, Albert *et al*,.(2021) recorded 2.45% for suya.

Table 2 shows the results of sensory properties of some disappearing meat products in Kebbi State. Result indicated that, the panelist sensory judgment established significant differences ($P<0.05$) on juiciness and flavor while aroma and tenderness shows no significant differences ($P>0.05$) across the DMPs. However, all the panelists agreed that the products exhibited the good sensory qualities of tenderness, juiciness, flavor and aroma because all the scores fall between of 5.5 and 8.7 on a 9 point hedonic scale, with the acceptable limits of 5.5.with regards to total score, danbutari, gade, yawara and karmami were ranked 1st, 2nd, 3rd and 4th, respectively.

It can be observed that *gade* had the highest acceptability score in all the sensory parameters evaluated. In Juiciness, gade had higher score of 7.6. Since juiciness is the amount of water retained by a product, gade by its nature, is a relatively karge chunk of dried meat which is able to absorb enough moisture because of its surface area and microfibrils. Similarly, flavor values shows that *gade*, *yawara* and *karmami* had 7.8, 7.1 and 6.5 respectively. The results of the current research were found to be similar with previous research works. For instance on juiciness Abubakar *et al*. (2021) recorded 7.45 for fried beef, Balarabe *et al.* (2018) recorded 7.37 for *danbunnama* and Abubakar *et al*. (2010) recorded 8.7 for processed non ruminant meat. On flavor this results was found to be similar with Abubakar *et al.* (2021) recorded 7.50 for fried beef and Abubakar *et al*. (2010) recorded 8.5 for processed non ruminant meat. On tenderness this results was found to be similar with Balarabe *et al*. (2018) recorded 7.45 for *danbunnama* Abubakar *et al.* (2021) recorded 6.85 for fried beef and Abubakar *et al*. (2010) recorded 8.6 for processed non ruminant meat. While on aroma this research was found to be similar with the previous research of Balarabe *et al*. (2018) which recorded 7.39 for *danbunnama* and Abubakar *et al*. (2021) which recorded 7.95 for fried beef.

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9. SUGGESTIONS

Given the nutritional and eating values observed in the studied meat products, it is suggested that other ethnic groups in other states should be explored in order to come up with such valuable meat products. This could greatly help in filling the protein shortage gap that is currently bedeviling Nigerians. The production of the identified meat products, especially the popular ones should be revived encouraged and harnessed owing to their comparable nutritive and eating qualities.

10. CONCLUSION

In conclusion, the findings of the study had proven that the ethnic meat products in the study area that have disappeared or on the verge of disappearing have high nutritive value of crude protein of 40.10 - 63.37% which is quite comparable to the conventional meat products. Similarly, the products were found to exhibit positive sensory properties by recording 5.5 - 8.7 on a 9 point hedonic scale, with the acceptable limits of 5.5 on all the sensory indices measured.

11. FIGURES, TABLES AND REFERENCES

Fig. 1 Flow chart for *Yàáwárá* meat product.

Plate 1: Fresh strips of lean beef meat

Plate 2: Finished *Yàáwárá* product

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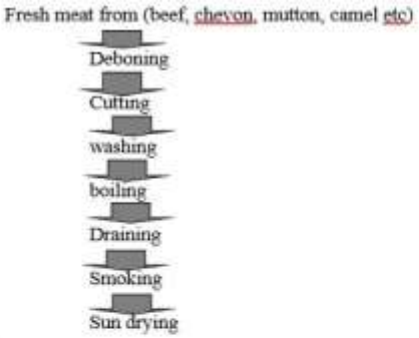

Fig. 2 Flow chart for *Gàdèé* meat product.

Plate 3: Fresh cuts of lean beef chunks

Plate 4: Finished *gadee* product

Fig. 3Flow chart for *karmami* meat product.

Plate 5: Fresh sliced lean beef

Plate 6: Finished *karmami* product

Table 1 Proximate Composition and pH of some stored processed disappearing meat products in Kebbi State

Products	Proximate Properties				
	Moisture (%)	Ash (%)	Lipid (%)	Protein (%)	CHO (%)
Gade	6.83^{b}	15.67^{b}	9.00^{b}	49.47^{b}	9.67^{a}
Karmami	8.00^{a}	18.67^{a}	12.8^{a}	40.10^{c}	8.67^{ab}
Yawara	7.83^{a}	17.67^{a}	3.0^{c}	63.37^{a}	3.47^{b}
SE	0.056	0.333	0.361	1.682	4.327

abc= means with different superscripts along columns differ significantly ($p<0.05$)

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Table 4.4 Sensory properties of some disappearing meat products in Kebbi State.

Products	Sensory parameters				Acceptability	Rank
	Tenderness	Juiciness	Flavor	Aroma		
Gade	7.4	7.6^{a}	7.8^{ab}	7.8	7.65	1^{st}
Karmami	6.1	5.8^{b}	6.5^{c}	7.4	6.45	3^{rd}
Yawara	5.5	7.4^{ab}	7.1^{bc}	7.0	6.75	2^{nd}
SE	0.67	0.45	0.31	0.54		

abc= means with different superscripts along columns differ significantly ($p<0.05$)

REFERENCES

1. *Abubakar, M. M., Bube, M. M., Adegbola, T. A. and Oyawoye, E. O. (2021). Processing and evaluation of dambu, tsire and balangu from non-ruminant animals Animal Production Programme, Abubakar Tafawa Balewa University, Bauchi, Nigeria.*
2. *Abubakar, S., Ribah, M. I. and Muftau, M. A. (2021). Effect of Some Natural Additives and Forms of Application on Organoleptic Properties of Fried Beef. International Journal of Food Nutrition and Safety, 12(1): 41-46.*
3. *Adeniyi, O.R., Ademosun, A.A and Alabi O.M. (2011). Proximate composition and economic values of four common sources of animal protein in south-western Nigeria. Zootecnia Trop., 29(2):231-234.*
4. *Ajai, A.I., A. Inobeme, N. Nwakife and N. A. Abubakar. (2019). Proximate and essential mineral composition of fresh and smoked catfish and beef sold in Minna, Niger State.*
5. *Akinola, T.O Fatummibi, O.O Alakeo, T. Asagbra, A.E and Onawolao. O. (2019). Proximate and mineral composition of locally sourced suya spices sold in agege area of Lagos state. World Journal of Innovative Research (WJIR), 6(4): 49-54.*
6. *Albert O. Fasogbon, J.O., Odewade, L. O. Odewade, O. (2021). Proximate Analysis and Mycological Assessment of Suya Sold in Kabuga, Kano State. Equity Journal of Science and Technology, 8(1): 49 – 53*
7. *AOAC. (2011). Official Methods of Analytical Chemists. Association of Official Analytical Chemists International, Gaithersburg.*
8. *Idowu, A.O., Omobuwajo, T.O. and Falade, K.O. (2010). Production proximate analysis and shelf life studies of ready-to-eat rice and kilishi. African Journal of Food Science, 4(5):264- 268.*
9. *Jegede, O. B., Ogunwole, O. A. and Omojola, A. B. (2018). Quality attributes and safety of processed meat products in Ibadan, Nigeria. Nigerian Journal of Animal Production, 45(4), 2018:210 – 221.*
10. *Laranjo, M., Talon, R., Laukova, A., Fraqueza, M.J and Elias, M. (2017). Traditional meat products: improvement of quality and safety. Hindaw Journal of Food Quality. p. 2.*
11. *Nady, K., Mohamed, K. and Mohamed, A.K. (2021). Proximate Composition Analysis of Beef Sausage. Aswan University Journal of Environmental Studies (AUJES), 2(3):155- 161.*
12. *Nico, C.M. (2018). Our traditional food and street foods are disappearing. Accessed on 15th November, 2023 from https://www.linkedin.com*
13. *Ogunsola, O.O. and Omojola, A. B. (2008). Qualitative evaluation of kilishi prepared from beef and Pork. African Journal of Biotechnology, 7(11):1753-1758*
14. *Oladimeji S. T., Azeez, A. A., Ezenwogene, R. C., Onatola, I. T., Ugama, E. E., Ate, J. T. and Ajekiigbe, D.A. (2020). Analysis of the Proximate Composition and Microbial Load of Chicken as Influenced by Oven. Nigerian Journal of Agricultural Economics (NJAEC). 10(1): Pages 40-50.*
15. *Precica (2023). Ash content analysis in food. Accessed on 4th December, 2023 from: https://www.precisa.com/blog/ash-content-in-food-analysis/#:~:text=Pure%20oils%20and%20fats%20can,contain%20up%20to%2012%25%20ash*
16. *Ribah, M. I., Jibir, M., Bashir, Y.A and Manga S.S. (2018). Safety assessment of traditional ready-to-eat meat products vended at retail outlets in Kebbi and Sokoto states, Nigeria. International Journal of Nutrition and Food Engineering, 12(8):6-14.*
17. *Ribah, M.I., Bahago, M.K. and Jibir, M. (2023). Documentation and Quality Evaluation of Disappearing Ethnic Heritage Meat Products in Kebbi State, Nigeria. International Journal of Research and Innovation in Applied Sciences (IJRIAS), 8(11):169-185.*
18. *Suthon,S.(2020).Disappearing dishes. Retrieved on 1st December 2023 from*
19. *https://www.bangkokopost.cm/life/social-and-lifestyle/1942100/disappearing-dishes*
20. *Szafraska, J. O., Stasiak, D. M. and Soowiej, B. G. (2021). Promotion of cultural heritage. Regional and traditional meat products. Theory and practice of meat processing, 6(4):368-374.*
21. *UNESCO. World Heritage Centre - Convention Concerning the Protection of the World Cultural and Natural Heritage 16-NOV,2017. Accesed on 28th December, 2022 from https://whc.unesco.org/en/conventiontext/10/10*
22. *Unzil, N.A., Azlan A. and Sultana S. (2021). Proximate composition analysis of chicken burgers from night market and selected fast-food restaurants. Food Research, 5(1): 471 - 477.*