

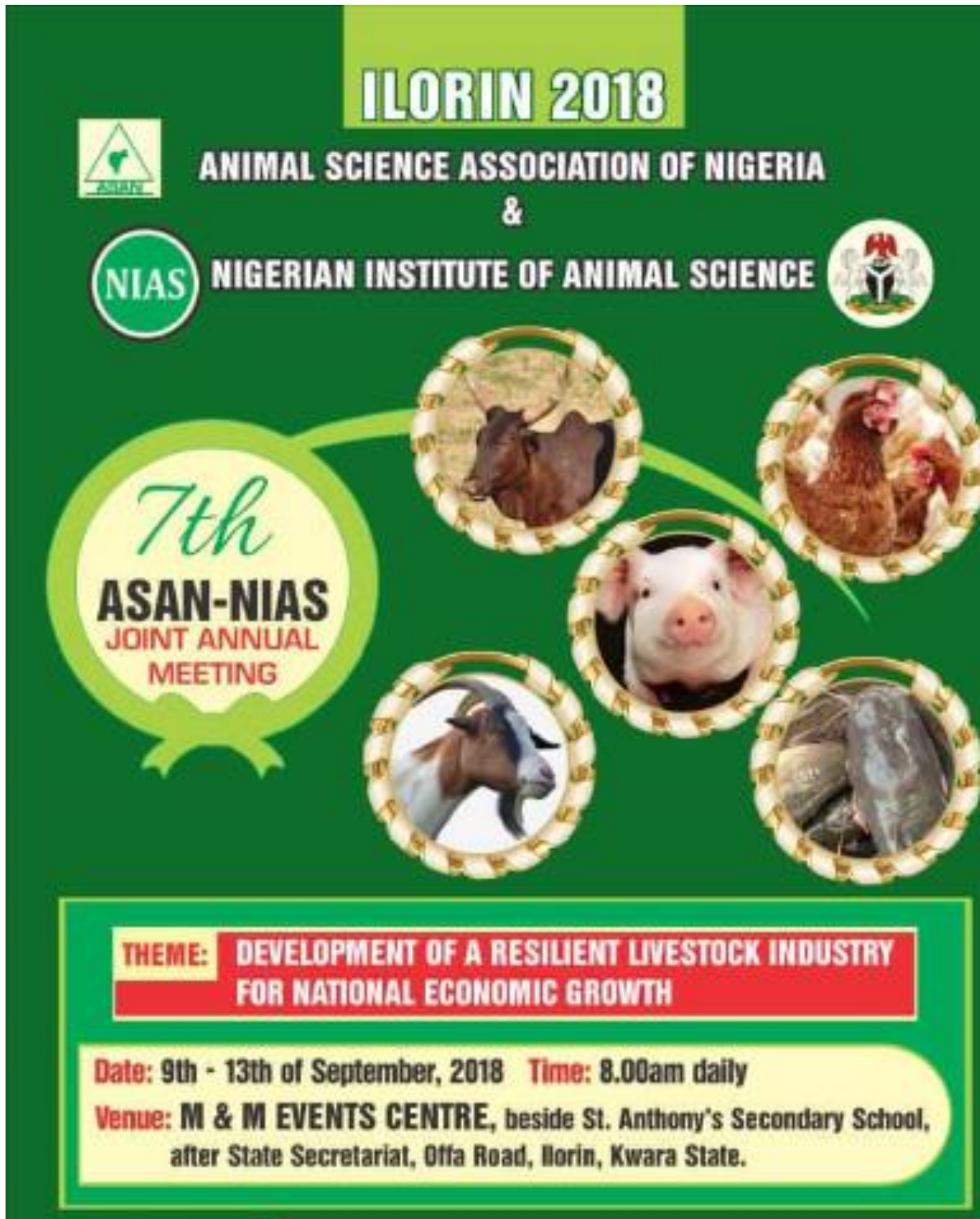
ILORIN 2018

ANIMAL SCIENCE ASSOCIATION OF NIGERIA
&
NIGERIAN INSTITUTE OF ANIMAL SCIENCE

7th ASAN-NIAS JOINT ANNUAL MEETING

THEME: DEVELOPMENT OF A RESILIENT LIVESTOCK INDUSTRY FOR NATIONAL ECONOMIC GROWTH

Date: 9th - 13th of September, 2018 **Time:** 8.00am daily
Venue: M & M EVENTS CENTRE, beside St. Anthony's Secondary School, after State Secretariat, Offa Road, Ilorin, Kwara State.



BOOK OF PROCEEDINGS

**ANIMAL SCIENCE ASSOCIATION OF NIGERIA
(ASAN)**

**PROCEEDINGS OF THE 23RD ANNUAL
CONFERENCE**

Theme:

**Development of a Resilient Livestock industry for
National Economic Growth**

Edited by

**Atteh, J. O., Belewu, M. A., Fayeye, T. R., Okukpe, K.M,
Alli, O. I and Adeyemi, K.D.**

9th- 13th September, 2018 Ilorin.

Copy Right 2018: Animal Science Association of Nigeria

All right reserved No part of this publication may be reproduced, stored in retrieval system or transmitted in any form or by means, electronic, electrostatic, magnetic tape, mechanical, photocopy, recording or otherwise, without the permission in writing from the Animal Science Association of Nigeria (ASAN), or the Nigerian Institute of Animal Science (NIAS)

ISSN: 9783477722

Publication by

The Animal Science Association of Nigeria (ASAN)

Proc. 23rd Ann. Conf. Animal Science Association of Nigeria 9-13, 2018/Ilorin

Trustees and National Executive Council of the Animal Science Association of Nigeria (ASAN)

Board of Trustees

Alhaji Azeez Bello

Professor A. O. Osinowo

Professor I. I. Dafwang

Professor S. O. Alaku

National Executive Council

S/N	Name	Post
1.	Mr. Adeoye Taiwo Adetoyi	President
2.	Prof. G.N. Akpa	1 st Vice President
3.	Elder N. Lawan	2 nd Vice President
4.	Dr. T.O. Ososanya	General Secretary
5.	Dr. (Mrs.) Olumide Martha Dupe	Assistant General Secretary
6.	Prof. G.S. Bawa	Editor-in-Chief
7.	Dr. A.O. Ladokun	Deputy Editor-in-Chief
8.	Dr. S.M. Yashim	Financial Secretary
9.	Dr. A.O. Owosibo	Treasurer
10.	Mr. Isaac Loveday	Publicity Secretary
11.	Mrs. M.O. Omotoso	Ex-Officio
12.	Prof. F.A.S. Dario	Ex-Officio
13.	Mr. Julius Nyameh	Ex-Officio
14.	Dr. Haruna Duwa	North East Coordinator
15.	Dr. (Alh.) I.F. Ayanda	North Central Coordinator
16.	Mallam Mohammed Lawal	North West Coordinator
17.	Dr. T.K.O. Obi	South East Coordinator
18.	Prof. A.A. Odunsi	South West Coordinator
19.	Dr. (Mrs.) I.P. Solomon	South South Coordinator

Members of the Local Organizing Committee of the 7th ASAN-NIAS Joint Annual Meeting, Ilorin 2018, 9th-13th September, 2018

Local Organizing Committee

Professor M. A. Belewu	Chairman
Professor D.F. Apata	Vice-Chairman
Mr. M.A Umar	2nd Vice-Chairman
Dr. F. E. Sola-Ojo	Secretary
Dr. O.I. Alli	Treasurer
Prof. Odunsi	Representative of ASAN
Dr. (Mrs.) Bisi Akinfolarin	Representative of NIAS

LOC Secretariat

Dr F.E Sola-Ojo	Chairperson
Dr. I.O.Opowoye	Secretariat Assistant/Secretary
Mr. Fatai Ismail Adewale	Member
Mr. Ibiwoye Demilade	Member
Mr K.P Ahmed	Member
Mr M. Yiosese	Member
Mr A. Olaoselu	Member
Mr Y. Mohammed	Member
Dr S. Olawoye	Member
Dr Y. Alabi	Member
Mr Ogundele	Member
Mr Adams	Member

Proc. 23rd Ann. Conf. Animal Science Association of Nigeria 9-13, 2018/Ilorin

Members of Sub-committee of the 7th ASAN-NIAS Joint Annunal Meeting, Ilorin 2018, 9th-13th September, 2018

Technical

Prof. J.O. Atteh	Chairperson
Dr. T.R. Fayeye	Secretary
Prof Oyawoye	Member
Prof. A.A Adeloye	Member
Prof. D.F. Apata	Member
Prof. M.A. Belewu	Member
Dr A.A. Annongu	Member
Dr. Mrs. Alabi	Member
Dr. Ogunbosoye	Member
Dr. A.T. Yusuf	Member
Mr Akanbi	Member
Dr Adeyina	Member
Dr. A. Toye	Member

Dr. K. Adeyemi Member

Venue, ICT & Publicity

Prof. S.A. Bolu Chairperson
Dr. Ogunsola Fisayo Member
Mr. Salako Member
Dr. K. D Adeyemi Member
Mr. Y. Mohammed Member
Mrs Raji Majidato Member
Miss Moyo Ibeun Member
Dr. M. Adesina Member
Mr. G. Oluwatosin Member
Mr. S. Abdul Member

Socials & Excursion

Dr. A.A. Badmos Chairperson
Mrs. Obayemi Member
Dr. Yahaya Member
Mr. Oyebanji, S.S. Member
Mr. S. Ajide Member
Mr. G. Oluwatosin Member
Dr. O. Ojo Member

Fund Raising & Exhibition

Mr. S. Opowoye Chairperson
Dr. O.I. Alli Member
Dr. I.O. Opowoye Member
Dr. T.A. Aderibigbe Member
Dr. Alabi Member
Mr. O.I. Jimoh Member
Alh. Yusuf Member
Mr. Lawale Member
Mr. Gawatti Member
Kenny Success Member
Mr. B. Akorede Member
Mr. Jimoh Aremu Member
Dr. Adeyemo A.A. Member
Dr. Ogunleye Member

Accommodation, Welfare and Logistics

Alh. Dr. I.F. Ayanda Chairperson
Dr. Sola-Ojo, F.E. Member
Dr. T.A. Aderibigbe Member
Dr. Alli Member
Dr. Chimezie Member
Mrs. M. Lawal Member
Dr. A.T. Yusuf Member
Oyeleke Mubo Member

Dr. A.A. Badmos	Member
A.T. Tella	Member
Mr. Fatai Ismail A.	Member
Mr. Jimoh Aremu	Member
Ibiwoye Demilade	Member
Ibeun Moyosore	Member
Zainab Ph.D	Member

Programme

Prof. A.A. Adeloje	Chairman
Dr. A.A. Toyé	Member
Dr. Ogunbosoye	Member
Mrs. K. Aliyu	Member
Mr. J. DeCampos	Member
Mr. Adeshina M.	Member

Security

Dr. A.A. Annongu	Chairman
Dr. T.H. Aliyu	Member
Mr. M. Adesina	Member
Mr. I.A. Ismail	Member
Mr. M. Abdulquadri	Member
Mr. Amaechi	Member
Mr. David Adeoye	Member

Proc. 7th Ann. ASAN-NIAS Joint Annual Meeting, 9-13, September, 2018, Ilorin

Reviewers

Professor J. O. Atteh
Professor A, A, Adeloje
Professor M. A. Belewu
Dr. A. A. Annongu
Dr. T. R. Fayeye
Dr. F. E. Sola-Ojo
Dr. Chimezie, V. O.
Dr. K. Okukpe
Dr. Mrs. Alabi
Dr. I. O. Alli
Dr. K. D. Adeyemi
Dr. A. T. Yusuff

pH of Beef Sausage as Affected by Time Postmortem on Yield and Keeping Quality of Sausage

Oshibanjo D. O.*¹, Adesope A. I.² and Abegunde Lawrence²

Department of Animal Production, University of Jos, Jos Plateau¹

Department of Animal science, University of Ibadan, Ibadan, Oyo²

*Corresponding author: oshibanjoo@unijos.edu.ng; +2348055438564

Abstract: Changes in pH affect storage and processing quality of meat and meat products such as sausage. Sausages are made from comminuted lean meat and fat mixed with salt, spices and other ingredients, then filled into a casing made of animal intestine or cellulose. Sausages are made from beef, veal, pork, lamb and poultry or from any combination of these meats. Without proper storage, the product quality reduced with time. There are needs therefore, to examine the effect of post-mortem time on spoilage of meat used in sausage production. The meat samples for sausage making were harvested and allotted to five groups viz; 0, 6, 12, 18, and 24 hours post-mortem, respectively. Each treatment group was replicated thrice in a factorial arrangement in completely randomized design. The sausage recipe used for all the treatment groups were Beef 65%, Lard 20%, Soybean binder 3.5% green spices 2.19%, dry spices 1.5%, ice water 4.5%, salt 2%, sugar 1%, Sodium nitrite 0.01% and phosphate 0.3%. The sausage was stored for 14days at $+4^{\circ}\text{C}$. Sausage prepared was subjected to pH and microbial count. Data were analysed using descriptive statistic and ANOVA at $\alpha_{0.05}$. There were significant ($P<0.05$) differences observed in pH value among the treatments and storage days. Similar result was obtained for the microbial count. As the time post-mortem and storage day increases, there was an increased in values obtained. 0 and 6-hour time post-mortem were recommended from this experiment to harvest meat for best yield and keeping quality of sausage.

Keywords: pH, Beef Sausage, Microbial Count, Keeping Quality, Time Post-mortem

INTRODUCTION

Many qualities of meat depend on its pH. Higher pH of meat is important with respect to maintaining color, holding water, and improving tenderness (Oshibanjo 2010). Generally, meat in the pH range of 5.4 to 5.6 has the most desirable properties for table cuts. Offer (1991) inferred that reduction in pH by 1 unit increased the rate of denaturation by 12 times. pH values as high as 6.9 result in several defects; the most obvious being its colour, which becomes progressively darker as pH increases (Young *et al.*, 2004). Acidic pH of meat is resulting into lower water holding capacity (WHC) with increased cooking and drip losses has also been reported to reduce the tenderness (Northcutt *et al.*, 1994) and result in PSE meat. Changes in pH, WHC, and rheological properties are reported to affect storage and processing quality of the meat (Oshibanjo 2010). The microbiological stability of high pH meat is poor, tenderness is more variable, and cooked flavour is inferior (Simmons *et al.*, 2000). This present study seeks to investigate the pH of freshly prepared and stored sausage as affected by time post-mortem.

MATERIALS AND METHODS

Location of the study: The experiment was carried out in the Meat Science Laboratory of Department of Animal Science, Faculty of Agriculture and Forestry, University of Ibadan.

Meat source: Semi-membranous muscle from matured (3 years old) bull was obtained immediately after slaughter before the onset of rigor mortis. The meat samples were allotted to five groups viz; 0, 6, 12, 18, and 24 hours post-mortem, respectively. Each treatment group was replicated thrice in a completely randomized design. Pig intestine and lard were purchased from Bodija abattoir. The meat samples, except for those of Zero (0) hour post-mortem were kept at 4°C until used at 6, 12, 18, 24 hours post-mortem, respectively.

Sausage making procedures: The sausages were prepared according to a standard commercial method, using the recipe as follows. Beef 65% Lard 20%, Soybean binder 3.5% green spices 2.19%, dry spices 1.5%, ice water 4.5%, salt 2% sugar 1%, Sodium nitrite 0.01% and phosphate 0.3%.

Parameter measured

pH: The pH was determined by using a digital pH meter model PHS- 25 Microfield instrument England according to the method described by AOAC (2000). The pH value of sausage samples was determined by weighing 10 grams of sample into a blender with 90ml of distilled water and homogenised until smooth slurry was formed. The digital pH meter was placed in a buffer solution in order to allow equilibrium for two minutes before placing it into prepared slurry. An average of three readings was taken, to determine the pH value.

Microbial Count: Microbial count was done using the pour plate water method (Harrigan and Macanee, 1976). A sterile pipette was used to measure 1ml out to the 10^{-3} and 10^{-5} dilution and this was pipette into sterile Petri dishes, molten agar at 45 °C was poured into it. It was swirled gently for even distribution. The plate was inverted and incubated in an incubator at 30 °C. The total plate count was carried out after 24 hours.

Statistical Analysis: Data obtained were subjected to analysis of variance using SAS (2010). The means were separated using Duncan's Multiple Range Test of the same procedure.

RESULTS AND DISCUSSION

Table 1 shows the pH values of beef sausage as affected by time post-mortem. There were significant differences ($P < 0.05$) in pH values observed between treatments and storage days. For day 0, it was observed that as time post-mortem increase, there was a decrease in pH value with 6 hours post-mortem having the highest value, followed by 0 hours, 12 hours and 18 hours with 24 hours having the lowest pH value. A similar result was reported by Oshibanjo *et al.* (2013) that prerigor meat have higher pH value compared with sausage from post rigor meat which could be probably due to the fact that salting of pre-rigor meat reduces the rate of glycolysis. The salting of post rigor meat was not expected to affect the pH of meat since the ultimate pH had been reached before salting. But as the storage days increases, there was an increasing value in pH as the time post-mortem also increases. Similar result was reported by Deva and Narayah (1988), that increase in pH value could be due to increase in microbial load. Results of this present study are in agreement with the above result.

Microbial plate count values obtained was significantly ($P < 0.05$) different. It was observed that, microbial load increases as the time post-mortem increased. Total plate count result obtained was in agreement with that of Agnihortri and Pal (2000) and Oshibanjo (2017). Higher values were reported by Dharmaveer *et al.* (2007). It was observed that as time post-mortem increase, total plate count increased. The result obtained could be due to increase in pH as the time post-mortem increased. The differences observed can be attributed to some eventual contamination and growth of microorganism in the postrigor meat.

Table 1: pH of Beef Sausage as Affected by Time Postmortem

Storage days	Time Postmortem (Hours)					SEM
	0	6	12	18	24	
0	6.35 ^{abj}	6.39 ^{aj}	6.37 ^{abk}	6.33 ^{abk}	6.29 ^{bk}	0.01
7	6.22 ^{dk}	6.34 ^{ck}	6.41 ^{bj}	6.44 ^{abj}	6.46 ^{aj}	0.02
14	6.54 ⁱ	6.58 ⁱ	6.55 ⁱ	6.61 ⁱ	6.67 ⁱ	0.01
SEM	0.05	0.04	0.03	0.04	0.06	

^{abcde} means with the same superscript on the same row are not significantly ($P > 0.05$) different

^{ijk} means with the same superscript on the same column are not significantly ($P > 0.05$) different

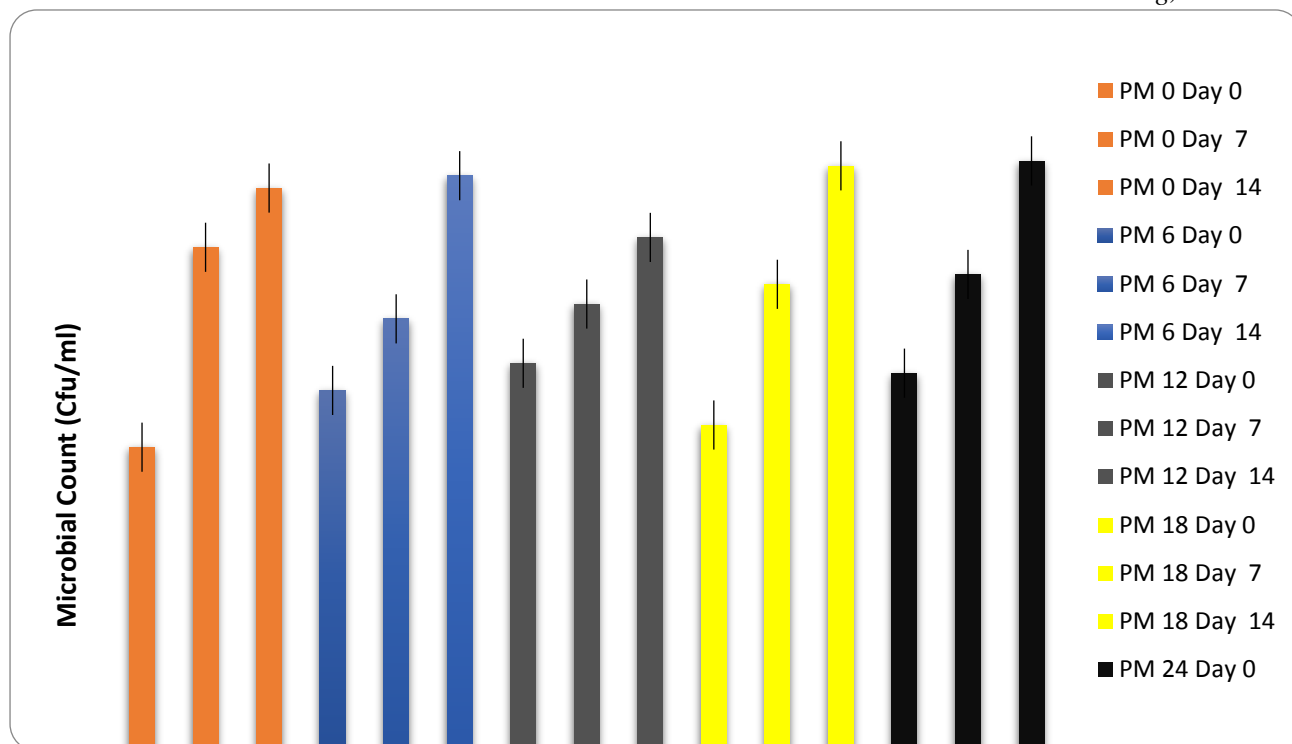


Figure 1: Microbial Count of Beef Sausage as affected by Time Post-Mortem
PM = Time Post-mortem

CONCLUSION

It is concluded from the results obtained in this study that the best time post-mortem to harvest meat for sausage making is between 0 and 6 hours to ensure its superior quality keeping and stability of shelf life.

REFERENCE

- A.O.A.C. (2000). Official Methods of Analysis of the Association of Official Analytical Chemists, W. Howritzed. West D, C
- Agnihortri M. K. and Pal U. K. (2000). Effect of Tetra sodium pyrophosphate (TSPP) on quality of chevon sausages. *Indian J. Anim Sci.*, 67:1000-1003
- Deva., A.K and Narayah, K.G (1988) bacillus sps in salami and Trekker. *Indian J Meat Sci Technol.*, 1:14-17.
- Dharmaveer, S., Rajkumar, V. And Mukesh, K.P. (2007) quality and shelf life of smoked chevon sausages packed under vacuum and stored at 4± °C. *Ame J. Of food Tech.* 2:238-247.
- Harrigan W. F and McCanee M. E. (1976). Laboratory methods in food and dairy microbiology, Academic Press, London, pp 17-68.
- Northcutt, J. K., Foegeding, E.A. and Edens, F. W. 1994. Water holding properties of thermally preconditioned chicken breast and leg meat. *Poultry science* 73: 308-316.
- Offer G (1991): Modeling of the Formation of Pale, Soft and Exudative Meat - Effects of Chilling Regime and Rate and Extent of Glycolysis. *Meat Sci* 30, 157-184
- Oshibanjo D. O. (2010). Yield and keeping quality of breakfast sausage as affected by time post-mortem. A master dissertation submitted to the Department of Animal Science, University of Ibadan.
- Oshibanjo D. O. (2017). Yield and quality characteristics of breakfast sausage prepared with different dietary flours, salts and oils. A PhD thesis submitted to the Department of Animal Science, University of Ibadan.
- Oshibanjo D.O, Omojola A. B. and Joel E. (2013) Yield and Keeping Quality of Freshly Prepared Breakfast Sausage as Affected by Time post mortem. Tropentag: International Research on Food Security, Natural Resource Management and Rural Development Agricultural development within the rural-urban continuum Pg 212
- SAS. (2000). SAS/STAT User's Guide (release 6.03) Statistical Institute. Cary, North Carolina.
- Simmons, N. J., Auld, M. M., Thomson, B. C., Cairney, J. M., and Daly, C. C. (2000). Relationship between intermediate pH toughness in the striploin and other muscles of the beef carcass. *Proceedings of New Zealand Society for Animal Production*, 60, 117-119.
- Young *et al.*, 2004

Assessment of Consumers Preference for Different Types of Meat in Kuje Area Council of FCT, Nigeria

Mustapha, Y., Jimoh, A., Babandi B., Shehu, B.

Regulatory Affairs Department, Nigerian Institute of Animal Science, Abuja, Nigeria

*Correspondence: babanfati82@gmail.com; +2348069611492

Abstract: The study was conducted with the aim of identifying the most preferred meat (fresh and processed) by consumers in Kuje Area Council of Federal Capital Territory (FCT). Structured sample survey interview papers were administered to randomly selected 100 respondents (Males and Females). Data collected include consumer's information, consumer's choice for meat preference among beef, mutton, chicken, fish, bush meat, pork, grass cutter and others (such as snail, turkey, goose, duck e.t.c). The data were analysed using simple percentage. Results show that majority of the respondents were males (55%) and females (45%) with most of the respondents within the age bracket of 25-40 years. The educational back grounds of the respondents were mostly tertiary education (45%), secondary school (19%), post degree (11%), primary school (5%) and none (11%). The results of the study show that consumers' preference is in the order beef (18%), chicken (18%), fish (17%), chevon (15%), mutton (14%), bush meat (7%), grass cutter (4%), rabbit (3%), pork (3%) and others (1%). The result also show that 24% of the respondents preferred each of *suya/balangu* and *kilishi* compared to stick meat/*Tsire* (20%), shredded meat/*dambunnama* (19%), and gas meat (11%). It is recommended that beef and chicken production and processing should be encouraged vis-avis the qualitative production of beef and chicken which will stimulate more customers and turn over.

Key words: Beef, *kilishi*, *Tsire*, mutton, Chevon and *Danbunnama*

INTRODUCTION

Animal production is very essential to food security and the development of any nation. Importance of animal production includes provision of foreign exchange, generation of employment for the citizens, source of protein which is essential for human nutrition and source of honour and prestige. Other reasons include source of income for the citizens (farmer), source of farm power (draught power) for farm operations and transportation, source of raw materials for the clothing and shoe industry and by-products can be used in various other industries such as the cosmetic industry (1). The major importance of Animal husbandry is to provide animal protein from the consumption of meat. Major meats demanded from agricultural farms and the meat market stations include chevon, mutton and beef produced from goats, sheep and cattle respectively (ruminants). According to (2) livestock production is growing rapidly, which is interpreted to be the result of the increasing demand for animal products. Since 1960, global meat production has more than trebled, milk production has nearly doubled and egg production has increased by nearly four times. This is attributed partly to the rise in population, as well as to the increase in affluence in many countries. Global production and consumption of meat will continue to rise, from 233 million metric tons (Mt) in the year 2000 to 300 million Mt in 2020, as well as that of milk, from 568 to 700 million Mt over the same period as reported by (3). Egg production will also increase further by 30%. Meat is one of the most valuable products obtained from livestock (4), It is a source of high quality protein (5). It is acceptable in most parts of Nigeria where it is either consumed after cooking or processed into other food like *Tsire*, *Kilishi* and *Suya* (6). Consumer's preference for meat could be influenced by geography, race, ethnicity, social background, family composition and household income (7).

Several studies on household meat demand have been carried out around the world but relatively few studies have been carried out on household demand in Nigeria (8, 9, 10 and 11). This study was conducted to assess the preference of consumers to different types of fresh and processed meat in Kuje Area Council, FCT.

MATERIALS AND METHODS

The study was conducted in Kuje Area Council, FCT. The coordinates of Kuje Area Council is located between longitude 8°53'47"N 7°14'35" E. 8.89639°N 7.24306°E. It lies wholly within the geo-political region referred to as the middle belt and it forms part of the Guinea Savannah ecological zone (12). The area has average annual rainfall of 1308mm with average temperature of 26.6°C. There are two major seasons in a year; rainy season which starts from April to October and dry season starts from November to March. The data were collected through sample survey using questionnaires administered to randomly selected 100 respondents (Males and Females). Data collected include consumer's personal information, consumers choice for meat preference among beef, mutton, chicken, fish, bush meat, pork, grass cutter and others (such as snail, turkey, goose, duck, e.t.c) and consumer's preference for processed meat (kilishi, *Tsire*, *Suya/balangu*, gas meat among others). The data obtained were then carefully collated and analyzed using simple percentage.

RESULTS

The results from personal data of the respondents were shown in Table 1. Results show that majority of the respondents were males with 55% and females were 45% and most of the respondents (61.36%) are within the age bracket of 25-40 years. The educational backgrounds of the respondents mostly were tertiary education (45%), secondary school (19%), post degree (11%), primary (5%) and none (11%).

Table 1: Distributions of Respondents Based on Gender, Age and Level of Education

Parameter	Frequency (%)
Sex:	
Male	55
Female	45
Age:	
Below 25 years	24
25-40 years	61.36
41-45	12.50
Over 55 years	2.3
Level of education:	
Post degree	19
Tertiary	45
Secondary	19
Primary	5
None	11

The results of respondents on meat consumption are presented in Table 2. Result shows that 95% of the respondents consumed meat while the remaining 5% of the respondent were not consuming meat. This could be as a result of health (3%) and financial reasons (1.2%) from the respondents.

Table 2: Distribution of Respondents Based on Consumption of Meat

Meat Consumption	Frequency (%)
Not consuming meat at all	5
Consumed meat	95

The result of respondents on most preferred type of meat is presented in Table 3. Results shows that preference for meat type by the respondents is in the order beef (18%), chicken (18%), fish (17%), chevon (15%), mutton (14%), bush meat (7%), grass cutter (4%), rabbit (3%), pork (3%) and others (1%).

Table 3: Distribution of Respondents Based on Type of Meat Consumed

Meat type	Frequency (%)
Cattle (Beef)	18
Chicken	18
Fish	17
Goat (Chevon)	15
Sheep (Mutton)	14
Bush meat	7
Grass cutter	4
Rabbit	3
Pork	3
Others (Turkey, Duck, Goose e.t.c)	1

DISCUSSION

Preference for beef and chicken as observed in this study could be due to family composition, household income and cultural inclination with individual's towards consumption of qualitative meat as reported by (13 and 7). This result is consistent with the findings of (14) who reported that occupation of the house hold head could be a determinant factor for beef preference in Maiduguri metropolitan, north eastern, Nigeria. Percentage of meat consumers in this study corroborates the findings of (5) who reported that meat is a source of high quality animal protein. Meat can give half of the protein needed per day and the amino acids profile of this protein is such that it compensates the deficiency in the protein of vegetable and other cereal products (15). Global consumption of meat will continue to rise from 233 million metric tons (Mt) in the year 2000 to 300 million Mt in 2020, as will that of milk, from 568 to 700 million Mt over the same period (3). Egg production will also increase further by 30% (3). The highest percentage of *kilishi* consumption in this study could be attributed to quality of the processed meat. *Kilishi* can be stored in room temperature for several months and has more ash and protein content with low moisture content compared to dried raw meat (6).

CONCLUSION

This study concludes that majority of the respondents preferred beef and chicken, this may be as the result of availability, health reason, affordability and quantity. Majority also preferred *Suya/Balangu* and *Kilishi*. In addition, farmers within the study area should be considering consumer's preference in their production which will translate to improvement in their income as well as livelihood. Meat can also be processed into *Suya/Balangu* and *Kilishi* to increase shelf life and nutritional quality.

ACKNOWLEDGEMENT

The authors appreciate the efforts of the leadership of Islamic Academy Kuje and Mrs. Mustapha Mariya who assisted in administering the questionnaires.

REFERENCES

1. Bamaiyi P.H. (2013): Factors Militating Against Animal Production in Nigeria. International Journal of Livestock Research, 3:54-66
2. Food and Agricultural Organization (F.A.O.) (2006): Animal production and consumption indices in Africa. Rome, Italy. PP. 50-68.
3. Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S. and Courbois, C. (1990):

Livestock to 2020. The Next Food Revolution. Food, Agriculture and the Environment. Discussion Paper 28. International Food Policy Research Institute, Food and Agriculture Organization of the United Nations and the International Livestock Research Institute, IFPRI, Washington, D.C.

4. Tsegary, H. (2012): Consumer Preference of Meat Types in Harar and Haramaya provinces. Ethiopia Journal of food science, 2: 47-58
5. Aduku, A.O. and Olukosi, J.O. (2000): Animal Products Processing and Handling in the Tropics. 2nd ed. GU Publications. Abuja, Nigeria.
6. Ogunsola, O.O and Omojola, A.B. (2007): Qualitative Evaluation of *Kilishi* prepared from Beef and Pork: African Journal of Biotechnology 7:1753-1758.
7. Gossard, M.H. and York, R. (2003): Social Structural Influences on Meat Consumption Human Ecology Review, Vol. 10.
8. Mba, A. U. (1983): Meat production in Nigeria: Prospects and Problems. In: Atinmo, T. and L. Akinyele (eds) Nutrition and food policy, National Institute for Policy and Strategic Studies.
9. Ademosun, A.A. (2000): Structured Adjustment and the Nigerian Livestock industry Support in infancy. Keynote Address Delivered at the Nigerian Society for Animal Production Conference held at University of Agriculture, Markudi.
10. Adeshinwa A.O. K, Okunola, J. O and Adewumi, M.K. (2004): Socio-economic characteristics of ruminant livestock farmers and their production constraints in some parts of South-western Nigeria. Livestock Research for Rural Development 16(8).
11. Ogunniyi, L.T., Ajiboye, A. and Sanusi, W.A. (2012): Analysis of Urban Household Demand for Poultry Products in Ogbomoso North and South Local Government Area of Oyo State, Nigeria. Tropical and Subtropical Agroecosystems, Vol. 15.
12. Mabogunje, A.L. (1977): Report of the Ecological Survey of the Federal Capital Territory, Vol. 1 The Environment Planning Studies Programme, University of Ibadan.
13. Fortomaris, P., Arsenos, G., Georgiadis, M., Banos, G., Stamataris, C. and Zygoiannis, D. (2006): Effect of meat appearance on consumer preferences for pork chops in Greece and Cyprus, Meat Science 72:688-696.
14. Gambo, B.G., Raufu, I.A. and Ambali, A. G. (2010): Residents in Borno state and their meat preference among ruminant species. African Journal of General Agriculture, 6: 53-58.
15. Brand, A.W. and Kunze, M.S. (1986): Sensory Evaluation of Lamb and Yearling Mutton, Flavour Journal of Food Science 4:123-132.