

CHEMICAL COMPOSITION OF BROILER CHICKEN MEAT FLOSS FED DIETS CONTAINING VARYING ENERGY LEVELS

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ABSTRACT

This study was designed to investigate the chemical composition of meat floss prepared from broiler chickens fed diets containing varying energy levels. A total of 270 day old broiler chicks were weighed and randomly allocated to three treatments (A, B and C) of ninety birds per treatment, each treatment having three replications of thirty birds. Three experimental diets comprising three energy levels of 2, 400 (A); 2, 600 (B) and 2, 800 ME Kcal/Kg (C) were formulated and fed to the chickens. The crude protein of the starter and finisher diets were fixed at 24 and 20%, respectively. At the end of 8th weeks, 3 birds were randomly taken from each replication which were used for the preparation of meat floss. Triplicate samples of the raw and chicken meat floss were analysed for moisture, crude protein, ash and ether extract. Data obtained were subjected to Analysis of Variance (ANOVA) using the General Linear Model Univariate Procedure of SPSS 17.0 and significant differences of means were compared using LSD at 5% level of probability. Results showed that the raw meat of broiler chickens fed diet containing 2, 800 Kcal/kg has the highest values of ash and crude protein while that fed diet containing 2, 400 Kcal/kg has the highest ether extract value. Meat floss of birds fed diet containing 2, 400 Kcal/kg has the highest mean values of ash and moisture. In conclusion there was noticeable increase in the nutrient profile of the chicken meat floss over their raw counterparts.

Key words: Broiler Chicken, Meat Floss, Diets, Energy Levels and Chemical Composition

INTRODUCTION

Meat is defined by the *Codex Alimentarius* as all parts of an animal that are intended for use and have been judged as safe and suitable for human consumption (FAO, 2006). It is the term used for the flesh of the animals used for food, especially that of cattle, sheep, goat and swine, as distinct from game, poultry and fish: sometimes it is inclusive of all animal flesh (Muhammad *et al.*, 2012). FAO (2007) reported that meat and meat products contain significant levels of protein, vitamins and minerals which are essential for human growth and development.

Dambun-Nama (Meat Floss) is a Nigerian traditionally spiced, cooked, pounded, shredded and dried meat product which is commonly prepared using chicken meat, beef, chevon, mutton or camel meat and is popularly consumed in the Northern parts of Nigeria. The product was developed as a means of preserving meat in the absence of facilities for refrigerated storage by the early Fulani and Hausa herdsmen (Sanwo *et al.*, 2011). The aim of the research is to examine the minerals contents of *Tsire* offered for sale at Hadejia Metropolis.

MATERIALS AND METHODS

The research was conducted at the Poultry Demonstration Farm of the Department of Animal Health and Production, Binyaminu Usman Polytechnic, Hadejia, Jigawa State. A total of 270 day old broiler chicks of Zartech strain were purchased from an accredited distributor. The chicks on arrival were weighed and randomly allocated to three treatments (A, B and C) of ninety birds per treatment, each treatment having three replications of thirty birds. The birds were managed under deep litter system with wood shaving as litter materials. Three experimental diets comprising three energy levels of 2, 400 (A), 2, 600 (B) and 2, 800 MEKcal/Kg (C) were formulated and fed to the chickens. The crude protein of the starter and finisher diets were fixed at 24 and 20%, respectively.

The floss was prepared following the method described by Eke *et al.* (2012) as showed in Figure 1.

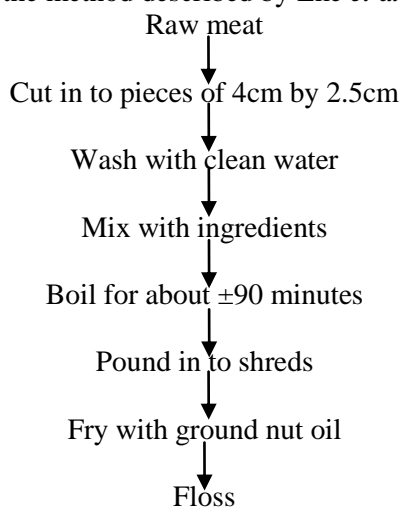


Figure 1: Chicken meat floss preparation. Source: Eke *et al.*, 2012

Triplicate samples of the raw and chicken meat floss were taken to Biochemistry Laboratory of Bayero University, Kano for the proximate analysis. The meat floss samples produced from broiler chickens fed different energy levels were assessed for moisture, crude protein, ash and ether extract according to the procedure of AOAC (2007). Moisture content was determined gravimetrically (Oluwatosin *et al.*, 2007) by drying 6 g of meat at 105°C. Crude protein was determined by Kjeldahl method according to the NF V 04-407 norm and using a Kjeltac Auto Sampler System 1035 Analyzer. The total ash content was determined according to the NF V 04-404 French standard method, about 6 g of samples were ashed in an oven maintained at 550°C to determine ash content. The fat content was determined by Soxhlet method according to the NF V 04-402 standard ISO 1443: 1973, using petroleum ether at 40-60 °C. Each analysis was repeated twice.

Data obtained were subjected to Analysis of Variance (ANOVA) using the General Linear Model Univariate Procedure of SPSS 17.0 and significant differences of means were compared using LSD at 5% level of probability.

RESULTS AND DISCUSSIONS

The chemical composition of raw meat prepared from broiler chickens fed diets containing varying energy levels is presented in Table 1. Results showed that the raw meat of broiler chickens fed diet containing 2, 800 Kcal/kg has the highest values of ash and crude protein. The raw meat of broiler chickens fed diet containing 2, 400 Kcal/kg has the highest ether extract value. There is significant ($P < 0.05$) differences in all the parameters (ash, moisture, crude protein and ether extract) measured across the three treatments.

Table 2 shows the chemical composition of meat floss prepared from broiler chicken fed diets containing varying energy levels. Results showed that there were significant ($P < 0.05$) differences across treatments. Chicken meat floss of birds fed diet containing 2, 400 Kcal/kg has the highest mean values of ash and moisture.

Table 1: Chemical Composition (%) of Raw Broiler chicken Meat Fed Diets Containing Varying Energy Levels (Kcal/kg)

Parameter (%)	Energy Level (Kcal/kg)			SE
	2 400	2 600	2 800	
(±)				
Ash	3.05 ^c	3.53 ^b	4.30 ^a	0.02
Moisture	69.02 ^a	68.82 ^b	68.90 ^b	0.05
Crude Protein	11.29 ^c	12.07 ^b	12.97 ^a	0.01
Ether Extract	16.47 ^a	15.58 ^b	13.79 ^c	0.01

Means along the same row having different superscripts (P<0.05) differ

Table 2: Chemical Composition (%) of Meat Floss Prepared from Broiler Chickens Fed Diets Containing Varying Energy Levels

Parameter (%)	Energy Level (Kcal/kg)			SE
	2 400	2 600	2 800	
(±)				
Ash	7.47 ^a	7.75 ^a	6.00 ^b	0.00
Moisture	9.03 ^a	8.75 ^c	8.88 ^b	0.05
Crude Protein	58.57 ^b	59.40 ^a	58.75 ^b	0.00
Ether Extract	24.92 ^b	24.10 ^c	26.37 ^a	0.00

Means along the same row having different superscripts (P<0.05) differ

Abubakar *et al.* (2016) reported crude protein value of raw meat as 15.68 ± 0.01 which agrees with the findings (11.29 to 12.97%) of this work. Huss (1988) observed that the chemical composition of animals varies from species to species as well as from individual animals depending on age, sex, environment and season. Proteins are powerful compounds that build and repair tissues; it also helps to maintain the body's structure. Protein speeds up chemical reaction in the body, serves as chemical messenger, fight infection and transport oxygen from the lungs to the body tissue. Poultry broiler chickens have recently been shown to fall into a group of high-protein foods that can help keep post-meal insulin levels within a desirable range (Nwosu *et al.*, 1980). There was noticeable increase in the nutrient profile of the chicken meat floss over their raw counterparts (Tables 1 and 2).

Prasanna and Sahitya (2014) reported fat values of raw meat from 13.74 ± 18 to 22.39 ± 91 , which is similar to that reported in this work. Valsta *et al.* (2005) documented that appropriate manipulation with broiler chicken diet could modify fatty acid profile in meat and increase its nutritional value, which is in agreement with the work of Castellini *et al.* (2012), who stated that chemical composition of meat depended on type of the diet. The crude fat determined was 16.27% for birds fed diet containing 2, 400 Kcal/kg, 15.58% for birds fed 2, 600 Kcal/kg and 13.79% for birds fed diet containing 2, 800 Kcal/kg, which were within the range (3.70 to 18.06%) reported by Ogunmola *et al.* (2013). Birds fed diet containing 2, 800 Kcal/kg has the least crude fat percentage followed by those fed diet containing 2, 6000 Kcal/kg and the highest value was determined in birds fed diets containing 2, 400 Kcal/kg, thus, there was progressive increase in fat content as the energy level decreases. Possible reason for the high fat content from broiler chickens fed diet containing 2, 400 Kcal/kg may be as a result of high feed intake at both starter and finisher stages. Fats play an important role in building the membranes that surround our cells, in helping blood to clot. Also, presence of fat in the right proportion in the body helps the body to absorb certain vitamins and also to prevent the body from extreme cold and heat.

Ash value ranged (6.00 to 7.75%) for chicken meat floss of this study is in conformity with the work of Abubakar *et al.* (2014) who reported 6.2, 6.3 and 7.1% for shredded meat prepared from beef,

mutton and chevon, respectively. Similar results (4.87 ± 0.11 to 5.60 ± 0.14) were reported by Bulus and Ibe (2016). Eke *et al.* (2012) reported ash values of 5.76 ± 0.02 (Laboratory *Dambun-Nama*) and 4.90 ± 0.04 (Traditional *Dambun-Nama*) which were within the range obtained in this study. The same authors reported crude protein values of 46.51 ± 0.03 (Laboratory *Dambun-Nama*) and 39.19 ± 0.03 (Traditional *Dambun-Nama*) which were similar with the result of this findings. Ash in food determines largely the extent to which the dietary minerals would be available in a particular food sample. It also determines the rate at which food substances would make available the amount of energy locked in it (Nwosu, 1979).

The moisture content of the chicken meat floss obtained in this study was within the range values of intermediate moisture products reported by Ogunsola and Omojola (2008). Differences in moisture content may be related to water holding capacity and lipid content of the samples.

REFERENCES

- Abubakar, M. M., Bube, M. M., Adegbola, T. A. and Oyawoye, E. O. (2014). Assessment of Four Meat Products (*Kilishi, Tsire, Dambu and Balangu*) in Bauchi Metropolis. *ACT-Biotechnology Research Communications*, 1:140-148.
- Abubakar, M., Adamu, A.K., Abdullahi, S.A. and Shika, S.T. (2016). Proximate Composition of Raw and Steamed Chicken Intestine. In: Proceedings of the 40th Conference and Annual General Meeting of the Nigerian Institute of Food Science and Technology held at Coronation Hall, Government House, Kano, Nigeria.
- AOAC (2007). Association of Official Analytical Chemist. Official Methods of Analysis. 18th Edition Benjamin Franklin Station, Washington DC, USA.
- Bulus, D. and Ibe, U.O. (2016). Quantity Assessment of *DambuNama* Produced from Different Meat Sources. In: Proceedings of the 40th Conference and Annual General Meeting of the Nigerian Institute of Food Science and Technology held at Coronation Hall, Government House, Kano, Nigeria.
- Castellini, C., Mugnai, C. and Dal Bosco, A. (2012). Effect of Organic Production System on Broiler chicken Carcass and Meat Quality. *South African Journal of Animal Science*, 42(4): 2319-2380.
- Eke, M.O., Ariahu, C.C. and Okonkwo, T.M. (2012). Production and Quality Evaluation of *Dambun-Nama*- A Nigerian Dried Meat Product. *African Journals Online*, 2(30):57-66.
- FAO (2006). Food and Agriculture Organisation. Corporate Document Repository, Meat and Meat Products in Human Nutrition in Developing Countries. Rome.
- FAO (2007). Food and Agricultural Organisation. Meat and Meat Products in Human Nutrition in Developing Countries, Rome. 97pp.
- Huss, H.H. (1988). Fresh Fish Quality and Quality Changes. FAO Fisheries Series No. 29, Rome, Italy. 276pp.
- Muhammad, B.F., Ibrahim, S.L, Salisu, A.A. and Inusa, S.K. (2012). Carcass Characteristics and Organoleptic Properties of Japanese Quai (*Corturnix cortunix japonica*) and Pigeon (*Columba livia*) meat processed into *Dambu*. In: Proceedings of the 46th Annual Conference of the Agricultural Society of Nigeria held at Faculty of Agriculture, Bayero University, Kano, Nigeria.
- Nwosu, C.C. (1979). Characterization of the Local Chicken in Nigeria and its Potential for Egg and Meat Production. Proceedings of the 1st National Seminar on Poultry Production, Ahmadu Bello University, Zaria, Nigeria. pp: 187-210.
- Nwosu, C.C., Obioha, F.C., Fred, G., Belonwu, T. C., Onuora, G.I. and Omeje, S.S.I. (1980). A Study of the Growth Pattern of Local and Exotic Chickens. *Nigerian Journal of Animal Production*, 7:38-48.
- Ogunmola, O. O., Taiwo, O., F. and Ayankoso, A. S. (2013). The Nutritive Value of the Meat Quality of Locally Breed Chicken, Exotic Chicken and Turkey. *Journal of Applied Chemistry*, 3 (6): 46-50.
- Ogunsola, O. O. and Omojola, A. B. (2008). Qualitative Evaluation of *Kilishi* Prepared from Beef and Pork. *African Journal of Biotechnology*, 7(11):1753-58.

- Oluwatosin, O., Olawoyin, E., Agiang, A., De Neji, C. and Iso, E. (2007). Nutritional Evaluation of the thigh and breast muscles of four cockerel strains. *African Journal of Animal and Biomedical Sciences*, 2(2): 26-31.
- Prasanna, R.K. and Sahitya, R.M. (2014). Chemical Composition of Chicken of Various Commercial Brands Available in Market. *Journal of Agriculture and Veterinary Science*. 7(7): 22-26.
- Sanwo, K.A., Olayiwola, J.A., Iposu, S.O. and Adegbite, J.A. (2011). Effects of Different Boiling Temperatures on Meat Quality of Beef and Turkey Meat. In: Proceedings of the 36th Annual Conference of the Nigerian Society for Animal Production held at University of Abuja, Nigeria.
- Valsta, L. M., Tapanainen, H. and Mannisto, S. (2005). Meat Fats in Nutrition, In. *Meat Science*. (70): 525-530.