

DETERMINATION OF MINERALS COMPOSITION OF RAW MEAT AND BALANGU OFFERED FOR SALE AT RETAIL OUTLETS IN HADEJIA LOCAL GOVERNMENT AREA OF JIGAWA STATE, NIGERIA

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ABSTRACT

The study was carried out to assess the minerals composition of raw meat and *Balangu* offered for sale at retail outlets in Hadejia Local Government Area of Jigawa State. Triplicate raw meat and *Balangu* samples sold in three different locations namely: Atafi (T1), Yayari (T2) and Yan-Koli (T3) were purchased using simple random sampling method. The samples were collected fortnightly from 3rd to 17th April, 2018 given a total of fifty four samples. The samples were immediately packaged in Ziploc bags and transported to Soil Science Laboratory, Bayero University, Kano for minerals analysis. Data obtained on Calcium (Ca), Magnesium (Mg), Copper (Cu) Iron (Fe) and Zinc (Zn) using Atomic Absorption Spectrophotometer (Buck Scientific Model 210 VGP), and Sodium (Na) and Potassium (K) using Flame Photometer 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 *Balangu* obtained from T2 has highest values for Mg (2.50 mg/kg), Cu (20.47 mg/kg), Fe (4.88 mg/kg) and K (1.16 mg/kg) while lowest values for Ca (2.71 mg/kg), Mg (0.83 mg/kg), Na (1.58 mg/kg) and K (0.78 mg/kg) were reported from T3. It was concluded that higher values of Mg and Fe were reported at T2 for both raw and processed meat.

Key words: Raw Meat, Minerals, *Balangu*, Outlet and Hadejia

INTRODUCTION

Meat is an animal flesh that is eaten as food. Humans have hunted and killed animals for meat since prehistoric time (FAO, 2006). The advance of civilization allowed the domestication of animals such as cattle, goats, sheep and chickens and eventually their use in meat production at industrial scale (Abubakar *et al.*, 2016). Meat is mainly composed of protein, fat, minerals and water. It is normally eaten after cooked and mixed with spices for better taste. Unprocessed meat is easy to spoilage within hours or days as a result of infection with or decomposition by some microbes such as bacteria and fungi (Singh *et al.*, 2014). Meat can be broadly classified as red meat such as beef, mutton and chevon while that from chicken, turkey, duck and goose are considered as white meat (Williams *et al.*, 2006).

In the content of nutrition, a mineral is chemical element required as an essential nutrient by organisms to perform functions necessary for life (Wilcox, 2005). Mineral is one of the six groups of essential nutrients, the others are carbohydrates, fat, protein, vitamin, and water (Yasmine, 2009). Minerals are classified into two groups which are major or macro minerals (Wan Zabri and Wahid, 1985) such as Calcium (Ca), Phosphorous (P), Potassium (K), Sodium (Na), Magnesium (Mg) and Sulphur (S), while the second group is micro or trace minerals such as Iron (Fe), Manganese (Mn), Copper (Cu), Iodine (I), Zinc (Zn), Cobalt (Co), Fluorine (F) and Selenium (Se). The body needs large amount of macro minerals and small amount of micro minerals (Yasmine, 2009).

Meat is produced by killing an animal and cutting flesh out of it, these procedures are called slaughtering and butchering, respectively. Meat is cooked and processed into difference ways such as *Balangu*, *Kilishi*, *Tsire*, and *Dambun-Nama*. The aim of the research is to determine the minerals contents of *Balangu* offered for sale at Hadejia Metropolis.

MATERIALS AND METHODS

The research was conducted at Hadejia Local Government Area of Jigawa State. Hadejia is one of the oldest Local Government Areas created since 1975, from the then Kano State (now Jigawa State) of the northern Nigeria. Hadejia Emirate comprises of Hadejia, Mallam-Madori, Kafin-Hausa, Birniwa, Guri, Kaugama, KiriKasamma and Auyo Local Government Areas. It is 6,880 square kilometer and

located in the Northern Sudan Savannah Zone of Nigeria. It lies approximately between longitude 10.00° E and latitude 12.25° N. The population of the study area was 47,400 (NPC, 2006). The major tribes of the town are Hausa, Fulani and Kanuri. The town is served by Federal Truck linking it to Nguru in the East, Kano in the North, Katagum in the South and Dutse (capital of the state) in the South-West. It is bounded on the immediate south by Hadejia River. The railway line from Kano to Nguru passes through the Kaugama, Mallam-Madori and Birniwa at the Northern sector of the town. The area is covered by palatable grasses, shrubs and legumes which gave a quality land for good grazing. It has an annual rainfall ranging from 100-110mm which is accompanied by heavy wind. The temperature ranged from 31 to 40°C. There are two seasons in a year, it has about 6-8 months of dry season and the rainy season lasts for about 4 months.

Balangu is prepared basically from boneless meat of animal which may be cattle, sheep, goat or camel. The flesh meat from hind limbs (*Longissimus dorsi*) is commonly used (Abubakar *et al.*, 2014). The flesh meat is washed with clean water and sliced into thin sheets of not less than 1 cm in thickness, then placed over fire on a wire mesh and continuously turned over until it was well roasted. Groundnut oil, salt and spices were sprinkled during roasting to bring out the taste.

Triplicate raw meat and *Balangu* samples sold in three different locations namely Atafi (T1), Yayari (T2) and Yan-Koli (T3) in Hadejia metropolis were purchased using simple random sampling method. Three samples from each outlet were collected fortnightly from 3rd to 17th April, 2018. A total of fifty four meat samples as shown in Table 1 were collected. The samples were immediately packaged in Ziploc bags and transported to Soil Science Laboratory, Bayero University, Kano for minerals analysis.

One (1g) gram from both raw and processed meat products (*Balangu*) were collected from the three different treatments for minerals determination. The minerals determined were Ca, Mg, Cu, Fe and Zn using Atomic Absorption Spectrophotometer (Buck Scientific Model 210 VGP), and Na and K using Flame Photometer. The experiment was laid in a Completely Randomized Design (CRD). Each location serves as a treatment. 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.

Table 1: Total Number of Samples Collected for Minerals Assessment

S/No.	Type of meat	Number of Samples
1	Raw	27
2	<i>Balangu</i>	27
	Total	54

RESULTS

The result of the minerals composition of raw meat (mg/kg) offered for sale at Hadejia Metropolis is presented in Table 2. There was significant difference ($P < 0.05$) in Ca, Mg, Cu, Fe, Zn, Na and K between the three treatments. Highest values for Ca (3.54 mg/kg), Na (8.53 mg/kg) and K (3.57 mg/kg) were observed in T3 while lowest values for Ca (2.29 mg/kg) and Zn (8.16 mg/kg) were determined from T2.

Table 3 presents the minerals composition of *Balangu* (mg/kg) offered for sale at Hadejia Metropolis. There was significant difference ($P < 0.05$) in Ca, Mg, Cu, Fe, Zn, Na and K between the three treatments. Highest values for Mg (2.50 mg/kg), Cu (20.47 mg/kg), Fe (4.88 mg/kg) and K (1.16 mg/kg) were realized in T2 while lowest values for Ca (2.71 mg/kg), Mg (0.83 mg/kg), Na (1.58 mg/kg) and K (0.78 mg/kg) were reported in T3.

Table 2: Minerals Composition of Raw Meat (mg /kg) Offered for Sale at Hadejia Metropolis

Mineral	Treatment			
	T1	T2	T3	SE(±)
Ca	2.71 ^b	2.29 ^c	3.54 ^a	0.005
Mg	1.25 ^b	1.27 ^a	1.25 ^b	0.003
Cu	1.57 ^a	1.42 ^b	1.27 ^c	0.011
Fe	0.64 ^b	0.93 ^a	0.54 ^c	0.012
Zn	13.46 ^a	8.16 ^c	10.20 ^b	0.005
Na	3.66 ^c	6.10 ^b	8.53 ^a	0.004
K	7.14 ^a	1.79 ^b	3.57 ^a	0.004

a, b and c means on the same row having different superscripts are significantly different at P<0.05

Table 3: Minerals Composition of *Balangu* (mg/kg) offered for sale at Hadejia metropolis

Mineral	Treatment			
	T1	T2	T3	SE(±)
Ca	3.96 ^a	3.33 ^b	2.71 ^c	0.000
Mg	1.67 ^b	2.50 ^a	0.83 ^c	0.001
Cu	13.63 ^c	20.47 ^a	17.53 ^b	0.000
Fe	1.79 ^b	4.88 ^a	4.88 ^a	0.001
Zn	1.79 ^c	3.57 ^b	5.36 ^a	0.001
Na	1.87 ^a	1.72 ^b	1.58 ^c	0.001
K	1.09 ^b	1.16 ^a	0.78 ^c	0.001

a, b and c means on the same row having different superscripts are significantly different at P<0.05

DISCUSSIONS

Zapata *et al.* (1988) reported Ca values of 4.71 and 5.69 mg/100g in broiler chicken light meat and dark meat, respectively. These means values are slightly higher than those found in this study. Lower level of Ca in chicken meat compared to this was found by Hamm and Searcy (1981). Similar to the studies of Grzeskowiak *et al.* (2011) and Polawska *et al.* (2011) P and K content are lower.

Calcium is responsible for strong bones and teeth. It also helps in the transmission of nerves impulses, contractions of muscle, blood clotting, activation of enzyme reactions and secretion of hormone. The Recommended Daily Allowance (RDA) value for Calcium is 50 mg, this indicates that *Balangu* is rich in calcium and should be consumed by both young and old people.

The iron content as reported by Asibey (1974) in the meat of Wild Grass-cutter (4.36 mg/kg), Domesticated Grass-cutter (3.75 mg/kg), Mutton (3.10 mg/kg) and pork (3.10 mg/kg) were similar to the values obtained in this work.

CONCLUSION

Higher values of Mg and Fe were reported at T2 for both raw and processed meat.

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