

DETERMINATION OF MAJOR MINERALS IN BAT (*Chiropterans disambiguation*)

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ABSTRACT

This study was carried out to verify the major minerals present in bat obtained at Akure, Southwest of Nigeria. The major mineral content in the various parts of bat (Head, Spleen, Heart, Diaphragm, Lungs, Intestine, Skin, Hair, Liver, Bone, Muscle, Ear and Nail) were determined using flame photometer (Na and K) and atomic absorption spectrophotometer (Mg and Ca). Results shows that all bats accumulate good quantity of these minerals. (Na: 320 – 520 mgkg⁻¹, Ca: 200 - 925 mgkg⁻¹, K: 70 - 275 mgkg⁻¹ and Mg: 250 - 655 mgkg⁻¹). The major minerals in bats should be harnessed by Nigerians.

KEYWORDS: Bat, hunting, avian, bush meat, Southwest, spectrophotometry

INTRODUCTION

Bush meat are group of animals that exist in the forest reserves. The major species in Nigeria include, primate, pholidota, rodent, carnivores, hydra, reptiles and avians among others. The task of hunting these animals is either simple or difficult like in the case of bat, but depending on the hunter. They either use gun or rubbers in hunting for bush animals and in some cases, traps are introduced. Human activities like farming and felling of trees are on the increase in Nigeria and other neighbourhood, and these have affected the population of such animals.

The inadequate supply of minerals in developing countries has been attributed to inadequate production and high cost of conventional sources of minerals (poultry, fisheries, meat and goat) hence an average Nigerian consumes about a quarters of his minimum – daily mineral requirement.

To meet this end, there has been an increase in the consumption of bush meat. This increase has bridged the supply and demand for minerals. (Abulude 2004). Adeduntan (2005) and Abdullahi (2000) have reported on different species of farm animals in Nigeria.

A bat is a mammal in the order chiroptera. Their most distinguishing feature is that their fore-limbs are developed into wings making it the only class of mammals in the world capable of flight. The word chirp, comes from Greek word cheir “hard and pteron “wing” as the structure of the wing is very similar to an outspread human hand with a membrane. (Twilton, 1999).

A measure of the success of bat is their estimated total population of about 1,100 species worldwide accounting for about 20% of all mammals species. About 70% of bats are insectivores whereas most of the rest are fructivores with a few species being carnivores. Bats are present throughout the whole world. They perform a vital ecological role in the pollination of some flowers and also have an important role in seed dispersal (Twilton, 1999).

Despite the importance of the known convectional meats in the diet of the people, with low income, in the development countries, lack of availability and high price have reduced frequency of their consumption.

Efforts should be directed toward determination of the potentials of the lesser-known and under-utilized animals which are indigenous to Africa for increased mineral production for humans and livestock. While bats are consumed, no serious effort have been made to quantify their nutritional and associated anti-nutrient compositions.

The aim of this study was to estimate the composition of the major minerals present in bats, so that effort could be made at increasing the rearing of bats at home or cultured in the bushes, in order to increase the mineral supplement of the body.

MATERIALS AND METHODS

The sample of bats used for the work were obtained early in the morning within the hours of 7 and 10am of July 11th 2008.

The collection was done within the school premises of Federal College of Agriculture, Akure, Ondo State. The samples were cleaned, dissected into its various parts, oven dried at 100^oC for eight days. After drying, they were ground into powered form using mortar and pestle, stored inside different container and labeled.

Each sample (0.5g) was measured into a clean crucible. The crucibles were then placed into the furnace set at 550^oC and ashed sample for 3h.

The ashed samples were dissolved in 20cm³ of dilute HCl, filtered, made up to 50cm³ with HCl and transferred into specimen bottles. The major metals were determined using an atomic absorption spectrophotometer (Ca and Mg) and flame photometer (Na and K) following manufacturer's specification and procedures.

All determinations were in triplicate. Statistical analysis was performed using SPSS (Window 10.0).

RESULTS AND DISCUSSION

Sodium

The range of sodium varied between 320 mg/kg in liver and 520 mg/kg in head (Table 1 and Fig 1). All results depicted high sodium contents. This mineral was very significantly higher in the parts compared to others. The amount of Na obtained in this report suggest that samples could provide a significant portion of Nigerian food administration for Na. Meat is the richest source of Na in the diet and supplies one-third to half of the total Na intake of bat eaters. A large amount of evidence support the view that Na is an essential nutrient as well as other

Fig 1: Major Minerals of bats analysed (mgkg⁻¹DM, n=3)

Samples	Na	K	Ca	Mg
1 Head	520 ± 1.25	124 ± 1.25	320 ± 1.25	400 ± 1.25
2 Spleen	487 ± 1.25	130 ± 1.25	240 ± 1.25	328 ± 1.25
3 Heart	325 ± 1.25	116 ± 1.25	200 ± 1.25	310 ± 1.25
4 Diaphragm	330 ± 1.25	126 ± 1.25	210 ± 1.25	275 ± 1.25
5 Lungs	400 ± 1.25	108 ± 1.25	320 ± 1.25	280 ± 1.25
6 Intestine	410 ± 1.25	75 ± 1.25	340 ± 1.25	278 ± 1.25
7 Skin	380 ± 1.25	70 ± 1.25	280 ± 1.25	250 ± 1.25
8 Hair	350 ± 1.25	79 ± 1.25	345 ± 1.25	335 ± 1.25
9 Liver	320 ± 1.25	112 ± 1.25	260 ± 1.25	288 ± 1.25
10 Bone	375 ± 1.25	275 ± 1.25	925 ± 1.25	625 ± 1.25
11 Muscle	325 ± 1.25	75 ± 1.25	310 ± 1.25	262 ± 1.25
12 Ear	400 ± 1.25	100 ± 1.25	275 ± 1.25	250 ± 1.25
13 Nail	338 ± 1.25	125 ± 1.25	675 ± 1.25	655 ± 1.25

DM – Dry matter, n – No of determinations

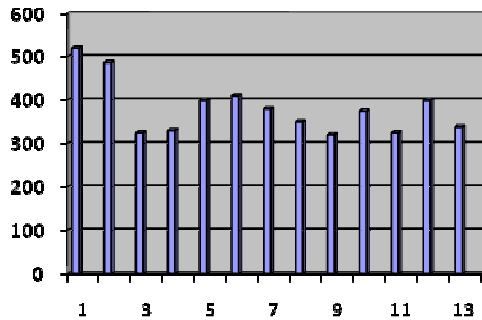


Figure 1: Sodium content of bat sample (Numbers 1 - 13 represent the parts in Table 1)

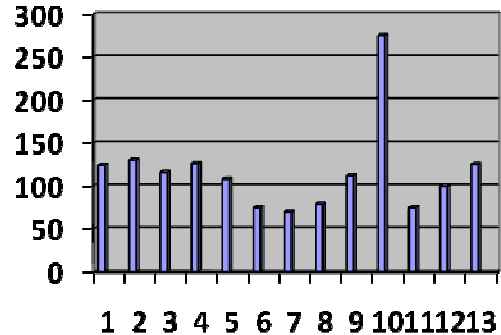


Figure 2: Potassium content of bat sample (Numbers 1 - 13 represent the parts in Table 1)

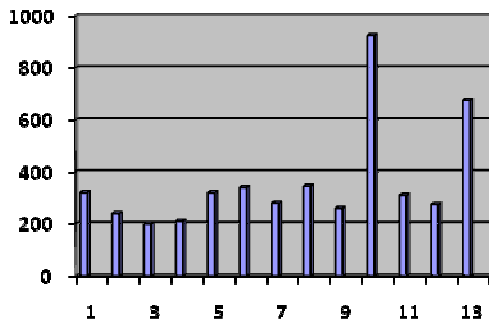


Figure 3: Calcium content of bat sample (Numbers 1 - 13 represent the parts in Table 1)

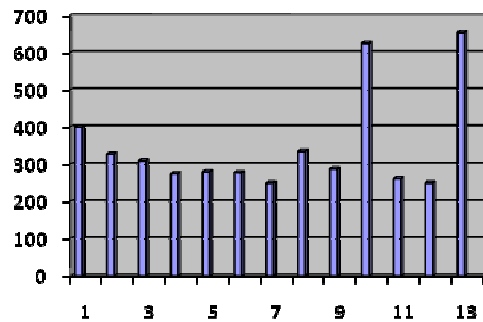


Figure 4: Magnesium content of bat sample (Numbers 1 - 13 represent the parts in Table 1)

mineral discovered-in the body. Sodium is a constituent of saliva, gastric juices and intestinal fluids and helps in the digestive process (John, 2005). Sodium has the tendency to increase blood pressure and so useful in treating low blood pressure but harmful to high blood pressure patients. Foods rich in sodium are milk, yogurt, cheese, whole grains and spinach. Sodium deficiency may impair hearing (Anhwange *et al.*, 2005). Excess sodium consumption may lead to high blood pressure and may cause body water retention hence moderation is the key (John, 2005).

Potassium

Bone exhibited higher Potassium content (275 mg/kg) than other parts of the sample and the skin produced 70 mg/kg (Table 1 and Fig 2) Foods with the highest nutrient density for K and Mg are animal sources (John, 2005). Potassium helps water retention in cells. It ensures proper working of all muscles including heart. Both low and excess amounts of potassium is harmful affecting cardiovascular functions and may prove fatal hence supplements should not be taken without doctor's advice. It helps in transmission of nerve impulses (Onibon *et al.*, 2007)

Calcium

Bone exhibited higher content of calcium (925 mg/kg) than others parts, while heart was the least (200 mg/kg) (Table 1 and Fig 3). High concentrations of Ca are important because of its role in bones, teeth, muscles system and heart functions and studied plants show satisfactory level of Ca accumulation. Sources of calcium are calcifood, catalyn and cetaplex. Symptom, of calcium include, cardiovascular disease, heart attack and general body illness. Ca performs various functions in the body it combines with phosphorus to strengthen bones and also crucial for nerve conduct ion. (Fleming, 1999).

Magnesium

The magnesium content ranged between 250 mg/kg in skin and ear and 625 mg/kg in bone (Table 1 and Fig 4). The result showed that the studied animal parts have high content of magnesium. Mg in meat is well absorbed (about 15.30%). It also enhances the absorption of magnesium from other sources (Adeyeye, 2000). Lack of adequate Mg in the diet is associated with poor learning and decrease cognitive development (John, 2005). Magnesium (Mg); An Imbalance of calcium and magnesium many contribute to stone formation. This vitamin mineral relationship may explain the beneficial effect of vitamins B6 helping to reduce the incidence of kidney stone formation. Sources of Mg include, calcium lactate, magnesium lactate, chlorophyll complex, cataplexy and catelyn. Symptom of Mg include; Decreased blood flow to the brain, diabetes and general body illness. (John, 2005). Dietary Mg is not toxic to humans because intake are usually at low level and also because our body can regulate magnesium storage through boiling excretion. Magnesium deficiency symptoms are appetite loss and vomiting. Magnesium is vital for transmission of nerve impulses. Foods rich in magnesium are green leafy vegetables, whole grains and nuts.

This edible meat parts appear to be good source of Na, K, Mg and Ca. The differences in mineral contents of the sample may be due to the environmental conditions and rate of assimilation of minerals by each parts. In general, this bush meat is rich in major mineral nutrients and the availability of these minerals are guaranteed to bush meat eaters.

Economically, bats may be one of the cheapest under-utilized source of animals minerals in Nigeria, the conventional sources of animal mineral nutrient are mainly from livestock.

CONCLUSION

The present result showed that bat has high valuable minerals, Ca, Mg, K, Na which are essential in the body. It was observed that the bats are one of the bush meat animals that provide cheap source of animal protein. Their nutritional qualities compared to the conventional meat – pork, beef, mutton and poultry. Their mineral nutritional qualities such as Na, Mg, K and Ca are very essential in the chemistry of food. It is therefore advisable for people to take advantage of the minerals present in them.

RECOMMENDATION

From the result above, it is therefore recommended that further analytical work should be carried out to evaluate the nutrient and anti-nutritional compositions.

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Afolabi O.O *et al.*: Continental J. Food Science and Technology 3: 14 - 18, 2009

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