

## **DETERMINATION OF PROXIMATE COMPOSITION AND MINERAL ANALYSIS OF GOAT KIDNEY, PIG HEART AND THEIR BROTH**

**LUKMAN BIDEMI BELLO<sup>\*</sup>, OLUSAYO JOSEPH OGUNYEMI<sup>\*</sup>, OLUWAYEMISI  
MOJISOLA APO<sup>\*</sup>, OLUWATOSIN EMMANUEL DARAMOLA<sup>\*</sup>**

### **ABSTRACT**

The edible byproduct of goat's kidney and pig's heart and their broth was studied in term of their proximate and mineral composition. The moisture content of the goat kidney and pig heart and their broth ranged between  $9.93 \pm 2.40$  and  $23.39 \pm 0.31$ . The meat and their broth shows a high crude protein value ranging between  $35.66 \pm 0.86$  and  $68.88 \pm 0.64$ . This high protein value indicate that both byproducts are rich sources of protein. The mineral composition shows that both edible byproducts and their broth are rich in sodium, calcium and potassium, which are essential minerals in food. However, the pig heart is richer in these three minerals in term of comparison to the goat kidney. The concentration of trace elements (Ni and Pb) were below critical limit. Hence, it was concluded goat kidney, pig heart and their broth are highly nutritive and safe for human consumption.

**KEYWORDS:** Goat Kidney, Pig Heart, Broth, Proximate And Mineral Composition.

### **INTRODUCTION**

Over the years, foods obtained from animal sources have been a major part of human diets. In the last few decades, global meat production has increased. Rich in it nutritional composition, meat plays a huge role in human nutrition. Currently, a lot of emphases have been placed on the nutritional consumption of goat meat and pig meat, as well as the differences in their polyunsaturated fatty acid ratio. It has been shown that lean goat meat is high in unsaturated fatty acid which possesses hypocholesteremic properties, but low in fat and saturated fatty acid [1]. Also, the percentage of saturated fat in goat

meat is reported to be relatively lower than that obtained in lamb, chicken and pork [2]. One important feature influencing the qualitative characteristic of pig meat is the proportion of intramolecular fat (IMF) which influences the tenderness, juiciness and taste. An IMF content that is lower than the recommended range of 2.5 – 3% reduces the quality and affect the consumer acceptability of the meat due to the increased visibility of fat. The internal organs of edible meat by-products includes lungs, kidney, liver and heart.

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<sup>\*</sup>Chemistry Department, Federal University of Technology, PMB 704, Akure, Nigeria.

**Correspondence E-mail Id:** editor@eurekajournals.com

These internal organs constitutes a significant ratio of the live weight of the animals, and the yields varies depending on the animal type [3]. Effort have been made to increase the marketable value of edible meat by-products such as liver, kidney, and heart. Over the years, studies have been made on the physiochemical properties of muscle meat from various animal species. However, there are no previous research on the nutritive value of goat kidney, pig heart and their broth. Therefore, the objective of this study is to investigate the proximate and mineral composition of goat kidney and pig heart and their broth which is increasingly been used for food and food condiment in most countries.

## MATERIALS AND METHOD

### SAMPLE PREPARATION

The samples (Goat kidney, Pig heart) were washed thoroughly and boiled separately for 10 minutes. The resulting broth were separated from the boiled meat samples, decanted, evaporated to dryness and finally placement into an air-tight container. The boiled samples were cut into a smaller size and spread on the tray, sundry for 24 hours and grind into powdered form using mortar and pestle and subsequently placed in an air-tight container and kept under low temperature in the refrigerator.

## DETERMINATION OF PROXIMATE ANALYSIS

Proximate analysis is the routine analysis of food. It involves the determination of moisture, crude fibre, fat, protein, ash content, and carbohydrate. These analyses for the meat sample and their broth were carried out in triplicate using methods described in [4].

## MINERAL ANALYSIS

The ash of each sample obtained was digested by adding 5 ml of 2 M HCl and heated to dryness on a heating mantle. Then, 5 ml of 2 M HCl was added, heated and filtered through filter paper into a 100 ml volumetric flask. The filtrates were made up to mark with deionized water and corked, ready for reading. The minerals were determined using Atomic Absorption Spectrometer (AAS), and the minerals determined include determine the following Na, K, Pb, Fe, Mg, Ca, Zn, and Ni. The standard for each metal was fixed. All the metals analyzed for used hollow cathode lamps and air acetylene flame. The standard for each metal was aspirated into the flame as well as the samples and their respective concentrations in mg/L were read for each sample, while the absorbance of the standard was also noted. Deionized water was used to avoid any other metal interfering with the metals of interest in the sample as this can occur if distilled water is used.

**Table 1. Proximate Composition of Meat Samples**

SAMPLE CODE	MOISTURE	CRUDE PROTEIN	CRUDE FAT	CRUDE FIBER	ASH	CARBOHYDRATE
	12.05±1.17	68.88±0.64	15.60±4.15	0.01±0.02	3.36±0.60	0.10±0.01
<b>B</b>	9.93±2.40	63.81±0.67	22.81±1.84	0.15±0.01	3.18±0.07	0.12±0.02
<b>C</b>	23.39±0.31	49.98±1.40	21.46±3.86	0.02±0.01	5.01±2.16	0.14±0.01
<b>D</b>	19.38±0.05	35.66±0.86	40.32±0.70	0.03±0.02	4.57±1.98	0.04±0.02

Where A = Goat's Kidney sample; B = Pig's heart sample; C = Goat's kidney broth and D = Pig's heart broth.

## DISCUSSION

### PROXIMATE COMPOSITION OF THE MEAT SAMPLES

The proximate composition of the goat kidney, pig heart and their broth is shown in Table 1.

From the table, it was observed that the moisture content is highest in goat's kidney broth (23.39 ± 0.31) and lowest in pig heart (9.93 ± 2.40). The moderately low moisture content of both edible by product indicate their storability at ambient temperature. However, the goat kidney have a

higher moisture content in comparison to the pig heart. The crude protein value of the goat kidney and the pig heart and their broth are relatively high, and this shows that both edible by product is a rich source of protein. The goat kidney and it's broth has a protein value of  $68.88 \pm 0.64$  and  $49.98 \pm 1.40$  respectively, which is higher in comparison to that of the pig heart  $63.81 \pm 0.67$  and it's broth  $35.66 \pm 0.86$ . It is also important to consider the fat content which is highest in Pig's heart broth ( $40.32 \pm 0.70$ ) and lowest in the goat

kidney ( $15.60 \pm 4.15$ ). This moderate fat content of the meat samples and the broth is an indication that they contain low cholesterol, which makes them healthy for consumption. The ash content is highest in goat's kidney broth ( $5.01 \pm 2.16$ ) and lowest in pig heart ( $3.18 \pm 0.07$ ). The ash is the inorganic composition of a sample. However, the crude fiber and carbohydrate content is observed to be very insignificant in the meat samples and their broth and are therefore negligible.

**Table 2. Mineral Composition of Meat Samples (Mg/Kg)**

Sample Code	Na	Ca	K	Mg	Zn	Mn	Fe	Ni	Cu	Pb
A	141.00	23.40	160.00	5.74	0.81	0.40	13.00	0.01	0.25	0.30
B	262.00	40.00	202.00	2.88	0.87	0.42	12.00	0.01	0.28	0.30
C	161.20	18.00	91.50	3.01	0.95	1.22	19.00	0.01	0.32	0.30
D	163.00	30.50	243.00	3.44	1.06	1.39	15.00	0.02	0.16	0.20

Where A = Goat's Kidney sample; B = Pig's heart sample; C = Goat's kidney broth and D = Pig's heart broth.

### **MINERAL COMPOSITION OF MEAT SAMPLES (MG/ KG)**

The mineral composition of the goat kidney and pig heart as well as their broth is expressed in Table 2. The sodium, calcium and potassium content is 141.00 mg/kg, 23.40 mg/kg, and 160.00 mg/kg for the goat kidney; 262.00 mg/kg, 40.00 and 202.00 mg/kg for the pig heart; 161.20 mg/kg, 18.00 mg/kg, and 91.50 mg/kg for the goat's kidney broth and 163.00 mg/kg, 30.50 and 243.00 mg/kg for the pig's heart broth. The pig heart is observed to contain the highest sodium, calcium and potassium content. The presence of these minerals shows that the meat product can play a huge role in nerve impulse transmission, as well as the development of the teeth and bones. The iron content of meat products are similar, and this indicates their potency in blood formation, normal functioning of the nervous system and energy metabolism in the body. The value of the copper and zinc is 0.25 mg/kg and 0.81 mg/kg for the goat kidney; 0.28 mg/kg and 0.87 mg/kg for pig heart; 0.32 mg/kg and 0.95 mg/kg for the goat's kidney broth and 0.16 mg/kg and 1.06 mg/kg for pig's heart broth. Copper and Zinc in

trace concentrations are very important for the physiological functions of living tissues and they also help in the regulation of many biochemical processes in the body. Also, the Ni and Pb content of the meat products are below permissible limit of 0.5 mg/kg for Ni and Pb [7]. Hence, it can be inferred that the meat products are safe for human consumption. The mineral contents of the chicken giblets have been reported to be higher than meats and edible byproducts of different farm animal [5]. The mineral content in tissue may be dependent on factors such as sex, health, animal types and how they are housed, tissue type and how they are slaughtered [6].

### **CONCLUSION**

Based on the findings from this study, it was observed that the meat samples and their broth possess low carbohydrate content but contain considerable high level of protein and moderately high fat content which indicate their potential as serving as protein supplement so as to balance human nutrition. Also, the study showed that the meat products are good source of K, Ca and Na and are highly recommended for patients which

have deficiency of these important minerals in their body. The presence of lead (Pb) at an allowable limit affirms that all the food products are safe for consumption.

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