PROXIMATE ANALYSIS OF DOG MEAT IN RELATION TO NUTRITION AND PUBLIC HEALTH SIGNIFICANCE

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Abstract
In Nigeria many people eat dog meat without knowing its nutrient composition. This work evaluated the proximate composition of fresh heart, intestine, kidneys, liver, lungs and muscle of dog meat bought from indigenous dog sellers. One way ANOVA in Paleontological Statistics Software Version 2.17 was used to analyze data. The results revealed moisture content of 80.10% in intestine, lungs 79.35%, muscle 74.38%, heart 72.66%, and kidney 71.31%, liver 70.70%. Crude protein 26.15% in liver, heart 20.21%, muscle 18.42%, lungs 18.05%, intestine 14.54% and 12.84% in kidney. Others include Crude fiber 1.12% in heart, liver 1.05%, intestine 0.79%, muscle 0.70%, kidney 0.58% and lungs 0.49%. Crude fat 12.75% in kidney, muscle 5.69%, heart 5.27%, intestine 2.55%, liver 1.32% and lungs1.20%. Ash 2.49% in kidney, muscle 0.78%, intestine 0.75%, heart 0.71%, lung 0.60% and liver 0.40% . Others include free nitrogen (1.27%), calcium (0.18%) and phosphorus (0.21%) highest in the muscle and lungs. Statistical significant difference existed in the composition of the different parts of the meat ($p<0.05$). It is concluded that dog meat has the entire vital nutritional components requisition of man and the different parts may have health implications for the aged, children, and diabetic and hepatitis B patients.

Key words: Proximate Analysis, Dog Meat, Nutritional, Health Significance

Introduction
Background
In Nigeria, many people eat dog meat but how many know the nutrient composition of the dog meat? Many works have been done on proximate analysis of beef, chicken, turkey and ostrich meats, but with none on dog meat in Nigeria. Domestic dogs have been selectively bred for millennia for various behaviors, sensory capabilities, and physical attributes. Modern dog breeds show more variation in size, appearance, and behavior than any other domestic animal. Dogs are predators and scavengers, and like many other predatory mammals, the dog has powerful muscles, fused wrist bones, a cardiovascular system that supports both sprinting and endurance, teeth for catching and tearing (Dewey and Bhagat, 2002).

Being the oldest domesticated animal, its long association with people has allowed the dog to be uniquely attuned to human behavior, as well as thrive on a starch-rich diet which would be inadequate for other canine (Axelsson *et al.*, 2013).

Dogs perform many roles for people, such as hunting, herding, pulling loads, protection, assisting police and military, companionship, and, more recently, aiding handicapped individuals. This impact on human society has given them the nickname "man's best friend" in the Western world and in some cultures; however, dogs are a source of meat (Wingfield-Hayes, 2002).

Meat is the fleshy, edible part of the skeletal muscle of animals and it has been a major source of protein all over the world, including Nigeria (Holzman, 2003;

Olaoye, 2011). Dog meat has been consumed since ancient times, presently, dogs and cats are mainly consumed by countries like Cambodia, China, Mexico, Rome, South Korea, Switzerland, Poland, Thailand, Vietnam, India, Indonesia, as well as in Africa including Cameroon, Ghana and Nigeria (Schwabe, 1979). The practice of eating dogs and cats in some countries, including United States of America and United Kingdom, where the animals are mostly kept as pets has been reported (Podberseek, 2009).

Historically, human consumption of dog meat has been recorded in many parts of the world, including East and Southeast Asia, West Africa, Europe, Oceania and the Americas (Schwabe, 1979). Today, a number of cultures view the consumption of dog meat to be a part of their traditional and day-to-day cuisine, while Western culture consider consumption of dog to be a taboo, although they have been consumed in times of war and/or other hardships. Furthermore, religion and culture plays vital role in the practice of eating or not eating dog meat.

In Nigeria, dogs are kept for several reasons, including hunting, guarding, source of income, as pets, and as a source of meat (Aiyedun and Olugasa, 2012). Dogs are eaten by various groups in some states of Nigeria, including Akwa Ibom, Cross River, Plateau, Ondo, Taraba and Gombe states of Nigeria. They are believed to have medicinal powers (Schwabe, 1979). Of recent, other Nigerian states including Bauchi, Kaduna, Federal Capital Territory Abuja, Niger, Kebbi, Nasarawa have queued in, in the consumption of dog meat.

Although initially thought to have originated as a manmade variant of an extinct canine (variously supposed as being the golden jackal, or gray wolf), dogs diverged from an extinct wolf-like canid in Eurasia 40,000 years ago (Axelsson *et al.*, 2013). According to Seebold, (2002) the dog, gray wolf and the extinct taymyr wolf diverged around 27,000 to 40,000 years ago. However Archeology about Education (2016) stated that wolf and dogs split into different species around 100,000 years ago. The domestication of dogs, in addition to the companionship, might be based on a human need for help with herding and hunting, for an early alarm system, and for source of food. According to Krishna, (2014) domestication of dogs has been traced to between 9,000 and 34,000 years ago before the advent of agriculture around 10,000 years ago.

Dog trading is a common practice in Nigeria and has become a source of livelihood for some people. Stray and free-roaming dogs are usually captured by dog charmers and are transported from the northern parts of Nigeria to the southern states. Dog swapping is being done in the northern parts of Nigeria; these dogs are not sold but exchanged by owners for mobile phones, iron, radio sets, cutlasses etc. The dogs are then sold by the middle men to the traders, and they are eventually transported in large overcrowded trucks where they are kept in tight cages to southern Nigeria (Ehimiyein *et al.*, 2014).

Dog trade and consumption have continued to attract dogs from different parts of Nigeria and neighbouring countries (Office International des Epizooties, 2012). The practice of dog consumption has been accepted in some parts of Nigeria as a culture and norms. Eating of dog has strengthened relationships among dog eaters such that trade by Bata is implored for palm oil is given in exchange for dogs in plateau and Calabar/Akwa Ibom. Some people eat dog for its medicinal purposes. Conversely, in some states particularly the Muslim dominated states in the northern part of Nigeria, dog consumption is forbidden. In

Islam, dogs are viewed as unclean because they are viewed as scavengers. However, in Christianity, dogs represent faithfulness. In Asian countries such as China, Korea, and Japan, dogs are viewed as kind protectors. The role of the dog in Chinese mythology includes a position as one of the twelve animals which cyclically represent years (Sherman, 2008). Nevertheless, some individuals that belong to the sect that forbid eating of dog meat eat dog meat in secret. According Acts 10:9-15, found in the Holy Bible man is not supposed to condemn any creature of God Almighty.

Nutritional Value of Dog Meat

Dog meat as a delicacy has been reported to contain about 44.4 mg/100 g of cholesterol probably the lowest cholesterol as compared with other animal meat (Lee, 1578). According to Ehimiyein *et al.*, (2014) it is nutritious containing the many essential nutrients including carbohydrates, fat, protein, vitamins A, B1, B2, B3, C, calcium, iron, phosphorus, potassium and sodium; eaten for different reasons, including rituals, as a delicacy, source of food in times of war, as well as for its medicinal values with an estimated population of 25 million people worldwide who consume dog meat each year.

MATERIALS AND METHODS

Jos-South is the second most populated Local Government Area in Plateau State which lies in the Niger – Benue trough (Nigerian Middle- belt). Its vegetations are generally Guinea Savannah with the capital in Bukuru. Its bearing are $9^{o}40^{'}$N $9^{o}52^{'}$E and has an area of about 5,104 square kilometers with an estimated total population of around 306,716 people. It is bounded by Jos- North and Jos- East LGAs - to the northeast, Bassa LGA- to the northwest, Riyom LGA - to the southwest and Barkin Ladi LGA - to the southeast (NIPOST, 2009). Jos is linked by road, rail, air to the rest of the country. It has an altitude of 1,217m (4,062 feet) above sea level with an average monthly temperatures range from 21^{0}C to 25^{0}C (Office Internatironal des Epizooties, 2012).

Process of Slaughtering Dogs

In Nigeria, dogs are either clubbed or strangled to death before the blood is properly drained out by cutting the jugular vein while others restrain and slaughter them the normal other animals are slaughtered. Humane Society International (2017), in Yulin dogs are bludgeoned over the head and have their throats cut open or beaten to death before they are dressed. From Process of slaughtering dog?-image results, (2017) in established abattoir dogs are stunned and special machines used to cut their throats before dressing.

Sample Collection and Analysis

Six different parts of fresh dog meat (the heart, intestine, kidney, liver, lung and muscle) were bought from indigenous dog sellers. The samples were taken to the biochemistry laboratory of the National Veterinary Research Institute, Vom. Each meat sample was separately ground into fine fiber fragments in a meat homogenizer after which they were packaged in cellophane bags, labeled and stored in a frostless freezer at about -10°C. Proximate analysis was carried out within 24 hours of storage with the methods of analysis described by (AOAC, 1990).

Laboratory Analysis

The standard procedures of Association of Official Analytical Chemists (AOAC) (1990) was adopted to analyze the proximate composition, using macro-kjeldahl technique to determine crude protein, crude fiber, crude fat, moisture, ash and phosphorus by spectrophotometer

and atomic absorption spectrophotometer for calcium.

Determination of moisture

The aluminum dish was heated in the cabolite oven at 105°C for about 5minutes to eliminate any possible residual moisture from the dish. The aluminum dish was then removed and cooled in the desiccators. The weight of the cooled empty aluminum dish was taken and recorded appropriately. 2g of the sample was added and the weight of dish plus sample was recorded. The dish containing the sample were placed in the cabolite oven at 105°C and allowed to stay overnight. It is then removed, cooled in the desiccators and weighed. The new weights of dish containing the dried sample were recorded and the moisture content calculated

Weight of moisture = weight of sample and dish – weight of dried sample and dish

$$\% \text{ Weight of moisture} = \frac{\text{weight of moisture}}{2} \times 100$$

Dry matter = 100 – % weight of moisture

Determination of crude protein

2g of the sample was weighed accurately into 500ml digestion flask. The catalyst was added into flask, followed by 15ml of Conc. H_2SO_4 and the digestion beads. The flask was placed on an electric heater in a fumed chamber. The mixture boiled at first until turn blacked in colour, heat was then increased as solution clears and heating continued for 1 hour after the solution was cleared. Persistent black spots in the neck of the flask were indication of incomplete digestion. The flask was allowed to cool, the neck is rinsed down with distilled water and the content heated until all spots disappeared. After cooling, the content was transferred with several washing into 250ml volumetric flask and is made up to the mark after cooling. The flask is shaken thoroughly.

Distillation

Steam was passed through the makham distillation apparatus for about 10 minutes, 5ml of boric acid indicator is placed in a 100ml conical flask. The conical flask was placed under the condenser in such a way that condenser tip is under the liquid. 5ml of the diluted digest is placed in the distillation apparatus and rinsed down with distilled water. The cap is closed with rod and 5ml of 50% NaOH is put in slowly. This is let in carefully, leaving behind a little to prevent ammonia escape; steam is then let in through for about 2-3mins (until the amount of liquid in conical flask is about twice what it was at the beginning of distillation). The beads acid distillate indicator is titrated with 0.01N HCl to end point. The result obtained was multiplied by 2.19 to obtain the value of protein in 100 samples.

Determination of lipids (fat)

2g of the sample was weighed and wrapped in a filter paper and placed in the pre-weight aluminum beakers of the Selecta extractor. The sample was transferred into thimble and fixed unto the machine accordingly. The aluminum beakers were filled with about 50ml petroleum ether and placed under the fixed thimble containing the sample in the extraction chamber. The thimble was lowered into the aluminum beaker containing the petroleum ether using the adjustment knob. The water tubing was connected to water sources, ensuring the adequate flows of water into the condenser of the machine, with the tap of condenser opened. The machine was powered on and allowed for 10minutes for boiling and extraction to take place. The thimble was raised for another 10minutes for rinsing down of the extracted fat into beaker. The tap of the condenser was closed for 10minutes for the recovery of the used petroleum ether. The aluminum beakers

containing the extracted fat were removed and paced in the oven for the evaporation of the remaining petroleum ether for about 5minutes. It was cooled in the desiccators and weighed. The values obtained were used to calculate the lipid content.

Weight of fat = weight of extract and beaker – weight of empty beaker

$$\% \text{ weight of fat} = \frac{\text{weight of fat}}{2} \times 100$$

Determination of crude fibre

1g of the defatted sample was weighed accurately and transferred quantitatively into a 250ml conical flask and about 50ml of the digestion mixture was added and placed on the heater in the fumed cupboard. The sample was heated at 300°C for 45minutes for proper digestion. The digested sample was filtered; dried and weighed ashless filter paper and the residue were washed with several changes of water until adequately clean. The filter paper containing the residue was dried overnight at 100°C in the oven to constant weight. Ash residue was weighed in a crucible at 600°C for 5hours in the furnace, the ash was weighed and crude fiber content calculated.

Weight of residue = (weight of filter paper + residue) – (weight of filter paper)

Weight of ash = (weight of ash + crucible) – (weight of empty crucible)

Weight of crude fiber = weight of residue – weight of ash

$$\%\text{weight of crude fiber} = \frac{\text{weight of crude fiber}}{2} \times 100$$

Determination of ash

2g of the sample was added into empty crucible. It was placed inside the furnace and ash at about 580-600°C for 2-4 hours. It was removed and placed in the desiccators to cool, the new weight of crucible plus ash was weighed and recorded. Calculate weigh of ash as follows:

Weight of ash = (weight of crucible + ash) – (weight of crucible)

$$\% \text{ wt of ash} = \frac{\text{weight of ash}}{2} \times 100$$

Determination of calcium

The empty crucible was weighed and recorded, 2g of the sample was added and the weight was recorded. It is then taken to the furnace and ashed at 600°C for about 2-4 hours, then it was removed, weighed and transferred into 100ml beaker quantitatively and the crucible is rinsed with distilled water and poured into the beaker. 8.5ml of 25% HCl and 3 drops of conc. Nitric acid were added, and allowed to boil for 10minutes on the hot plate at 70°C, allowed to cool. It was filtered into 100ml volumetric flask and diluted to mark with distilled water. It was thoroughly mixed and about 50ml was transferred into clean sample containers. 4ml of sample was dispensed into test-tube and 3ml of ammonium oxalate was added, boiled in a beaker containing water on a hot plate at 70°C for 10minutes and allowed to cool. It was centrifuged at 3000 rpm for 5minutes, the supernatant was decanted and the tubes inverted on a tissue to drain. The supernatant was re-suspended with 2% ammonium hydroxide and centrifuged, decanted and drained. 2ml of 20% H_2SO_4 was added and boiled. 10ml of 0.1N potassium per manganate (KMnO4) was pipetted into a 100ml measuring cylinder and made up to mark with distilled water to give 0.01N KMnO4. The boiling sample was titrated with the 0.01N KMnO4 until end point was reached (persistent colour). The volume of the 0.01N KMnO4 used was recorded and multiplies by 0.25 (factor) to give the calcium value of the sample.

Determination of phosphorus

2g of the sample was weighed in a crucible and burned in a furnace at 600°C for 2-4hours. The ash was removed and transferred into 100ml beaker, weighed

and the weight of the crucible was also taken and recorded. 8.5ml of 25% HCl and 3 drops of conc. Nitric acid were added, boiled for 10minutes on the hot plate at 70°C and allowed to cool. It was filtered into a 100ml volumetric flask and the filtrate was diluted to mark with distilled water. It was mixed thoroughly and about 50ml was transferred into clean sample containers. 1ml of the ash solution was taken and 19ml of distilled water was added to it in another container. 5ml of molybdovanadate was added to it and was allowed to stand for 10 minutes. A blank solution was prepared by adding 5ml of the molybdovanadate to 20ml of distilled water and the solution was used to zero (calibrate) spectrophotometer. The absorbance of the solution was measured in the spectrophotometer at the wavelength of 470nm, the values obtained were recorded. The values were multiplied by 2.08 (phosphorus factor) to give the phosphorus value of the specimen per 100g.

Determination of carbohydrate (difference)

The total carbohydrate was determined by difference. The sum of the % moisture, ash, crude protein, crude lipids and crude fiber was subtracted from 100.

Data Analysis

The data generated were analyzed using One way ANOVA in Paleontological statistics Software Version 2.17 (PAST).

RESULTS

The result of this study revealed that intestine of dog has the highest percentage of moisture (80.10%), lung (79.35%), muscle (74.38%), heart (72.66%), kidney (71.31%) and the liver has the lowest (70.70%). Crude protein is higher in liver (26.15%), followed by the heart (20.21%), muscle (18.42%), lung (18.05%), intestine (14.54%) and lowest in the kidney (12.84%). The heart has the highest percentage of crude fiber (1.12%), liver (1.05%), intestine (0.79%), muscle with (0.70%), kidney (0.58%) and lung has the lowest (0.49%). The crude fat is higher in kidney (12.75%) followed by muscle (5.69%), heart (5.27%), intestine (2.55%), liver (1.32%) and lowest in the lung (1.20%). The kidney has the highest percentage of ash (2.49%) followed by muscle (0.78%), intestine (0.75%), heart (0.71%), lung (0.60%) and liver has the lowest (0.40%). Calcium was high in the liver (0.20%) followed by muscle and lung (0.18%), intestine and heart (0.15%) and lowest in the kidney with (0.13%). Phosphorus was found high in lung (0.21%) followed by muscle (0.012%), heart (0.01%), liver (0.008%), intestine (0.006%) and lowest in the kidney (0.004%). The percentage of Nitrogen Free Extract showed that intestine has the highest value (1.27%) followed by liver (0.38%), lung (0.31%), and lowest in the muscle, heart, kidney (0.03%) respectively.

Table 1: proximate analysis of dog meat

Sample.	Moisture.	Cp.	Cf.	C Fat.	Ash.	Nfe.	Calcium.	Phosphorus.
Intestine	80.10	14.54	0.79	2.55	0.75	1.27	0.15	0.006
Lung	79.35	18.05	0.49	1.20	0.60	0.31	0.18	0.21
Kidney	71.31	12.84	0.58	12.75	2.49	0.03	0.13	0.004
Heart	72.66	20.21	1.12	5.27	0.71	0.03	0.15	0.01
Liver	70.70	26.15	1.05	1.32	0.40	0.38	0.20	0.008
Muscle	74.38	18.42	0.70	5.69	0.78	0.03	0.18	0.012

Cp= Crude Protein, Cf= Crude fiber, C Fat= Crude fat, Nfe= Free nitogen
χ^2=0.9247 df=47 p=5.305E-22

DISCUSSION

The total percentage of crude protein of dog meat (110.21%) in this study is higher compared to that of beef (92.75%) as reported by Adeniyi *et al.,* (2011) and contrasts the reports of Lawrie, (1981) and Hamilton (1982) who ranked fish and chicken above beef. These variations may be due to differences in age, sex, genetic and environmental factors which can serve as determinant of meat. Similarly, the 28.78% total lipid content of dog meat is high compared to that of beef (4.59%), broiler meat (4.34%) reported by Adeniyi *et al.,* (2011). Statistical significant difference existed in the composition of the different part of the meat ($p<0.05$). The different parts of dog meat may have health implications for different categories of persons such as the aged, children, diabetic and hepatitis B patients.

Conclusion

Dog meat in general has the entire vital nutritional components requisition of man.

Recommendation

Diabetic patients are recommended to eat the lung and liver and at worst, the intestine, but may not be recommended to eat the kidney, muscle and heart because of the relatively high quantity of crude fat. A hepatitis B patient can be excluded from eating the liver which contains high crude protein which could increase heart rate action. Older people can be recommended to eat more of the heart and liver of dog meat with relatively high composition of crude fibre. The lung and the liver can be recommended for children as well as older people for high constituent of calcium which could help in bone formation and prevent osteoporosis. As the result of the vital components of dog meat, recommendation is made for global acceptance and incorporation of dog among worldwide accepted animals for consumption by the general populace.

References

Act 10:9-15. Peter has a Vision. *Holy Bible: Contemporary English Version (CEV).* e-Sword electronic Bible.

Adeniyi, O. R., Ademosun, A. A. and Alabi, O. M. (2011). Proximate composition and economic values of four common sources of animal protein in South-western Nigeria *Zootecnia Trop., 29(2):* 231-234.

Aiyedun, J. O and Olugasa, B. O (2012). Identification and analysis of dog use, management practices and implications for rabies control in Ilorin, Nigeria. *Sokoto Journal of Veterinary Sciences 10:* 1-6.

Archeology about Education (2016). Dog History – How and Why Dogs Were Domesticated. Available at *http://archeology.about.Com/od/domestications/qt/dogs.htm* (Accessed August 26, 2016)

Association of Analytical Chemists (1990**)**. *Official Methods of Analysis.* Association of Analytical Chemists, 15th ed., Washington D. C. USA. 1121 – 1180.

Axelsson, E., Ratnakumar, A., Arendt, M. L., Maqbool, K., Webster, M. T., Perloski, M., Liberg, O., Arnemo, J. M., Hedhammar, A and Lindblad-Toh, K (2013). "The genomic signature of dog domestication reveals adaptation to a starch rich diet". *Nature 495 (7441),* 360–364.

Dewey, T. and Bhagat, S (2002). "Canis lupus familiaris". Available at *http://animaldiversity.ummz.umich.edu/site/accounts/information/Canis_lupus_familiaris.html*

Ehimiyein, A., Audu, S. and Ehimiyein, I. (2014). The role of dog trading and slaughter for meat in rabies epidemiology with special reference to nigeria- a review. *Journal of Experimental Biology and Agricultural Sciences, 2(2):* 2320 – 8694.

Hamilton, C.I. (1982). A personal view of Teaching Nutrition. *Nutrition and food science, 75:*6-10.

Holzman, D. (2003). Meat eating is an old human habit. *New Scientist Life, 179*: 19-40.

Humane Society International, (2017). Days Ahead of A Chinese Dog Meat Festival Dogs and Cats are Stuffed in Cages, Ready For Slaughter. Available at http://www.viralspell.com/days-ahead-of-a-chinese-dog-meat-festival-dogs-and-cats-are-stuffed-in-cages-ready-for-slaughter/ (accessed January 24, 2017).

Krishna, J. (2014). Study Narrows Origin of Dogs. *Cornell Chronicle.* Available at http://www.news.cornell.edu/stories/2014/01/study-narrows-origin-dogs

Lawrie, R.A. (1981). *Nutrient variability due to species and production practices. In: meat in Nutrition and Health*. An international symposium pp. 17-21.

Lee, Si-jin (1578). Effectiveness of dog meat. *Chinese medical encyclopedia, Bonchogangmog.*

NIPOST, 2009. "Post Offices-with Maps of Local Government Areas". Retrieved Pp. 10-20. Available at http://en.wikipedia.org/wiki/Plateau_State

Office Internatironal des Epizooties (2012). Immediate notification report, retrieved from http://www.oie.int/wahis-2/temp/reports/en-imm-0000012363-20121012-172956.pd

Olaoye, O. A. (2011). Meat: An overview of its composition, biochemical

changes and associated microbial agents. *International Food Research Journal 18:* 877-885.

Podberseek, A.L. (2009). Good to pet and eat: The keeping and consuming of dogs and cats in South Korea. *Journal of Social issues 65(3):* 615-632.

Process of slaughtering dog?-image results, (2017). Available at https://images.search.yahoo.com/search/images;_ylt=A0LEVy83OYdYgv8AwFJXNyoA;_ylu=X3oDMTExb2dlZTF1BGNvbG8DYmYxBHBvcwMxBHZ0aWQDREZENl8xBHNlYwNzYw?p=Process+of+Slaughtering+Dogs%3F&fr=moz35

Schwabe, C. W. (1979). *Unmentionable cuisine*. University of Virginia Press, Pp. 168-173. ISBN 978-0-8139-1162-5

Seebold, E. (2002). *Kluge. Etymologisches Wörterbuch der deutschen Sprache*. Berlin/New York: Walter de Gruyter, Pp.207.

Sherman, J. (2008). Storytelling: *An Encyclopedia of Mythology and Folklore. Sharpe Reference*, Pp. 118–121.

Wingfield-Hayes, R. (2002). *"China's taste for the exotic"*. Available at http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/2074073.stm

Yong-Geun, A (1999). "Dog Meat Foods in Korea", Table 4. Composition of dog meat and Bosintang (in 100g, raw meat). *Korean Journal of Food and Nutrition 12(4)*: 397 – 408 (1999).

APPENDIX 1: Laboratory Proximate analysis of dog meat

BIOCHEMISTRY SECTION
NATIONAL VETERINARY RESEARCH INSTITUTE VOM

Ref. NTR/141-146/06/2016
24th June, 2016

REUBEN EZRA DASHE
FCAH&PT

RESULT OF SAMPLE ANALYSIS
Please find below the result of analysis of your samples

WEIGHT (g) per 100 grams of sample

SAMPLE	MOISTURE	CRUDE PROTEIN	CRUDE FIBRE	CRUDE FAT	ASH	NFE	CALCIUM	PHOSPHORUS
Intestine (Dog)	80.10	14.54	0.79	2.55	0.75	1.27	0.15	0.006
Lung (Dog)	79.35	18.05	0.49	1.20	0.60	0.31	0.18	0.21
Kidney (Dog)	71.31	12.84	0.58	12.75	2.49	0.03	0.13	0.004
Heart(Dog)	72.66	20.21	1.12	5.27	0.71	0.03	0.15	0.01
Liver	70.70	26.15	1.05	1.32	0.40	0.38	0.20	0.008
Muscle	74.38	18.42	0.70	5.69	0.78	0.03	0.18	0.012

Date of Report: 24th June, 2016

Sectional Head: ....

Date of Dispatch 24th June, 2016

Analysis Coordinator: ....

Head of Department: ....

BIOCHEMISTRY DIVISION
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