Nutritive Value of of Emu, *Dromaius novaehollandiae* [Le Souef 1907] Managed under Tropical Conditions

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ABSTRACT- The use of and trade in wildlife species is believed to be one of the greatest direct causes of the decline of wild animal populations in many part of Africa. However, it is also a valuable source of protein and income for many human populations struggling for survival amidst endemic poverty. Emu, *Dromaius novaehollandiae*, the second largest bird after Ostrich in the world, started its domestication in United States in early 1980s and the present trend in the production of emu in U.S. could be compared with cattle industry. Emu husbandry is a valuable source of lean meat. 20 emus at the age of 20 months were domesticated under semi-intensive system at Ajanla Farms, Ibadan, Oyo State, Nigeria for 24 months. 2kg of the chest and drum stick of emu meats were used for the study. The meats were trimmed of bone, nerves, blood vessels, connective tissues and external fat and were kept at 4^0 C for 24 hours. The study assessed the nutritive value of emu meat compared with Ostrich meat and conventional meat like beef. Fat content obtained was highest ($p< 0.05$) in beef with a value of 6.4% as against values of 1.00%, and 2.10% for emus and ostrich meat. Protein content was highest in emu meat and ostrich meat with 24.00% and 22.90% and 18.95% of beef. The results also showed that emu meat had the lowest cholesterol level of 54.7mg/100g compared to 63mg/100g, and 86 mg/100g for ostrich and beef. The results showed that emu's meat is very low in fat, cholesterol and is very high in protein content.

Keywords: **Nutritive value, Emu, Lean meat, Wildlife, Birds**

INTRODUCTION

Health conscious consumers around the world, who love meat, are rejoicing! Why? Because they have discovered Emu meat! The 98% fat free red meat is rich in protein and iron. Yet low in cholesterol. Emu *Dromaius novaehollandiae* is the second largest extent bird native to Australia and the only extant member of genius Dromaius. It is the second largest bird in the world after its ratite relative ostrich. Its meat is tender, juicy and highly flavored. It is low in fat and very nutritional compared to other meats, poultry and fish. Emu meat rank high in iron and protein and low in cholesterol (Linda et al, 2007).

Sanni (2005) observed that emu meat is an economical buy; meaning lean meat, having no fat, skin or bone. He also noticed that it has very little shrinkage when cooked and the tenderness and texture of emu meat enable it to be prepared in a variety of ways. It requires shorter cooking time and lower temperature.

Meat particularly red meat, is commonly identified as a major source of dietary cholesterol. It is often the first food that medical doctors advise should be reduced in the diets of their hypercholesterolemia patients.

A high blood serum cholesterol level is a risk factor for cardiovascular disease. A build up of cholesterol stop blood flow and bring on a heart attack. Due to increase of cardiovascular diseases, the teeming population of the world tends to be cautious of the amount of animal fat they consume. This had in turn led to a lower demand for high fat food or meat

Cholesterol is an important building block, especially in membranes of cells. It's one of the major parts of bile salts that the body produces to help digest fats, in which fat in the diet signals the body to produce more bile salts. To do this, more cholesterol must be synthesized. The synthesis and utilization of cholesterol must be tightly regulated so as to prevent it's over accumulation and abnormal deposition within the body. Therefore it is highly necessary to decrease cholesterol intake in our diet especially the low density lipoprotein (LDL) and saturated fats. Emu meat which is also a red meat and lean, has 43% monounsaturated fat which helps to lower the 'bad' LDL cholesterol in the human body. It is therefore the aim of this study to identify the nutritional values of emu meat to Ostrich and beef.

MATERIAL AND METHODS

Source of meat

A total of 20 emu bird *Dromaius novaehollandiae* of both sex with average weight of 60 kg, were used for this study. Meats were gotten from slaughtered birds, were evaluated for proximate composition and nutritional qualities.

Muscle cholesterol

Cholesterol was extracted from the meat, after saponification with saturated methanolic KOH, according to the procedure of Naeem et al, (1995) except that 3extractions with cyclohexane were used Ponte et al, (2004). Cholesterol was separated and quantified by normal phase HPLC (column Zorbax rxSil, 4.6mm i.d x 250mm, 5m particle size, Chompack, Bridgewater, N. J.) with an HPLC system (HP 1000series, Hewlett-Packard, Palo Alto, CA) equipped with an auto sampler and diode array detector adjusted at 206nm, a solvent (3% is of propanol in n-hexane) flow rate of lml/min, and injection volume of 30 L. Total cholesterol content of each meat sample was calculated in duplicate based on the external standard technique from a standard curve area vs concentration.

Proximate composition

Protein, ash, moisture and fat content were performed according to the method of AOAC (2000).

Minerals evaluation

Calcium and Iron levels in meat was carried out after complete digestion using a microwave laboratory system type Milestone 1200 MDR. With a maximum temperature of 200 C in closed polytetrafluoroethylene (PTFEO bombs, according to the procedure of Kadim et al, 2006).

Statistical Analysis

Data obtained were subjected to analysis of variance and statistical significance was observed, the means were compared using Duncan's Multiple Range (DMR) test. The SAS Software was used for all statistical analyses.SAS (2000)

Table 1: NUTRITIVE VALUE OF EMU MEAT, OSTRICH AND BEEF

Properties	Emu Meat	Ostrich Meat	Beef	SEM
Water	4.00	75.00	73.42	0.64
Fat	1.00	1.00	1.00	0.04
Protein	24.00	22.90	18.95	0.03
Ash (g)	1.30	1.30	1.40	0.04
Cholesterol (mg)	54.70	63.00	86.00	0.50
Iron (mg)	4.00	3.40	2.40	0.27
Calcium	5.00	5.20	9.00	0.23
Calories	164.00	175.00	255.00	1.34

RESULTS AND DISCUSSON

Results on the compositional analysis of Emu meat,Ostrich and beef are presented in Table 1. Beef muscle were seen to be richer in fat content {P<0.05} than those of the muscle of ratite family. Beef muscle has 6.34% of fat content as against 1.00 for emu and ostrich meat. It was observed by these results that Emu and Ostrich meat are very low in fat content and values obtained were both similar in percentage. The high fat content observed in beef is common to all red meat because it has a very high saturated fat which has led to very low consumption of red meat which is associated to cardiovascular diseases, hypertension and arthritis in human.

Due to such health diseases and conveniences of alternative meat products, consumption of beef has declined among consumer and many tend to go for less fat meat like snail and rabbit. The value 6.34% obtained for beef is comparable to 6.30 – 8..30% fat reported by Kadim et al,, (2006), 3.58, 2.97, and 1.49/100g for chicken meat reported by Omojola and Adesehinwa (2006) for scalded, singed and skinned muscle of rabbit. However, Dadim et al., (2006) reported 6.40% for fresh camel muscle which was similar to the value gotten for beef in this study. Though fat in food provides flavour, aroma and texture as well as increasing the feeling of satisfaction after meal but high percentage of saturated fat may led to a lot of diseases. It was reported by William (2007) that saturated fatty acid comprise on the average 40% of the total fatty acids in the lean component and 48 % in the fat component of red meat.

In meat approximately half of the saturated fatty acid in both lean and fat component of red meat is palmitic

acid (16.0) and about one third is stearic acid (18.0) (Williams, 2007). Emu meat in this study was observed to have the lowest fat and can therefore be substituted to beef or other red meat. Protein content in this study showed that Emu and Ostrich meat has higher protein percentage than beef. Meat of ratite meat are red meat with 24.00 and 22.90 protein content higher than 20.1 (kj), 20.2(kj),16.6 (kj), and 19 (kj), reported by Linda, (2007).Emu meat had ($p>0.05$) higher protein content compared to Ostrich and beef which indicated hat as a red meat it contain high biological value protein and important micronutrients that are needed for good health throughout life. Williams (2007) stated that red meat, contains around 18-25 g protein / 100g.He also noted that protein from meat provides all essential amino acids (lysine, threonine, methionine, phenylalanine, tryptophan, leucine, isoleucine and valine) and has no limiting amino acids. Protein Digestibility Corrected Amino Acid Score (PDCAAS) is a method of evaluating the protein quality, with a maximum possible score of 1.0. Animal meat like beef score about 0.85 while emu meat score approximately 1.0, compared to the values of 0.5 – 0.7 for most plant foods (Schaafema, 2000). Therefore emu meat is evaluated to have higher protein quality with all essential amino acids, which are good to maintain life.

Cholesterol values observed in this study shows that beef had the highest ($p<0.05$) cholesterol value of 86.00(mg) than emu meat with 54.7 (mg). The high cholesterol content in beef had chased most customers from purchasing beef to muscles of other animals. It should be noted that cholesterol a waxy, fat-like substance needed for cell building manufacturing hormones and vitamin d and other functions, and if no cholesterol is taken in food, the body can make all the cholesterol it needs.

Blood cholesterol levels are affected by several factors, including heredity, sex, age and mostly to a vary degree by the amount of cholesterol eaten in foods. Sandra (2007)stated that not more than 200mg of cholesterol per day should be consumed . Omojola et al, (2009) noticed that cholesterol can be obtained directly from the diet and can also be synthesized in cells from 2-carbon acetate grip[s pf acetyl-coenzyme A. Therefore intake of food rich in cholesterol should be minimized; meat particularly red meat is commonly identified as a major source of dietary cholesterol. It is of ten the first food that medical doctors' advice should reduce in the diets of their hypercholesterolemia patients (Farnworth, 2002) Beef is known to be high in cholesterol especially its organs like heart, kidney and brain where the concentrations are much higher (Chizzolini et al., 1999). However, the amount of cholesterol in lean meat is low when compare to how much we produced in our body each day (Farnworth, 2002). Emu meat is very lean, having 98% fat free, a red meat, similar to beef in appearance, in appearance, with higher protein, vitamin, iron and lower in cholesterol when compared to chicken and other red meat muscles, so it give red meat lovers what they want and health conscious consumers what they need. In fact, the American Heart Association recognizes emu meat as a healthily alternative to beef (Sanni,2005). The values obtained for emu meat in this study 54.7 is greater than 51.7 reported by Sanni (2005) for emu meat and was lower than 80.0 for chicken, 85.0 for lean pork, 73.0 for lamb and 58.0 for catfish.

Ash is the total amount of minerals in meat, and the values obtained in this study for all the meat had no ($p<0.05$) different between them. Showing that all were red meat and contain approximately the same mineral content, like zinc, selemium e..t,c. While sodium and potassium content is lower in meat. Iron content of emu meat appeared to be ($p<0.05$) higher than Ostrich meat and beef. Iron which is part of the protein hemoglobin carries oxygen in the blood and part of the protein myoglobin in muscles, which make oxygen available for muscle contraction which is also important for energy metabolism. Iron is a nutrient that is often lacking in diet especially among young children, expectant women, nursing mothers, premenopausal women and athleted who have an increased need for iron. It should be noted that dietary iron occurs in two forms – heme and non heme. Heme iron is found bound to hemoglobin in blood and myoglobin in muscle tissue. Heme iron is found only in meat, fish and poultry and is most easily absorbed by the body than non-heme (Sandra, 2007) Iron in red meat are mostly heme iron, its absorption from meat is enhanced by meat protein, Williams (2007).Ash is the total amount of minerals in meat, and the values

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CONCLUSION

Most consumers now are making food choices on fat, calories and cholesterol while demanding products that are appetizing. Due health issues and convenience of alternative meat products consumption of beef has declined among consumers especially Americans. Emu meat is a high quality red meat, pleasing to the palate. It has finer texture, tender, juicy, flavorful and lean qualities than beef. It is two to three times higher in Iron content, has 98% free fat, less calories per 100g and low in cholesterol. Therefore consumer looking for a healthy, low fat meat, with distinctive taste – emeu meat is the perfect choice.

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