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Organoleptic Characteristics and Meat quality of Matured Broiler and Indigenous Fowl

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Abstract

This study was conducted to evaluate the organoleptic characteristics and carcass qualities of broilers and indigenous chickens. The study revealed that crude protein, ash, ether extract and moisture content, were significantly higher for broiler but lower in carbohydrate, and kilocalories when compared to the values recorded for indigenous chickens. But there was no significant difference between the values recorded for crude fiber. For minerals the values obtained for the phosphorus and manganese were significantly higher in broilers but lower in calcium, magnesium and sodium when compared to the ones recorded for indigenous chickens. However, there were no significant differences between the values recorded for zinc and potassium. The Organoleptic investigations revealed that there were no significant differences between the texture, tenderness and color of the meats of the broiler when compared to what was obtained for the indigenous chickens, but the flavor, toughness and taste values of the broiler breast meat were significantly lower when compared to the breast meat of the indigenous chickens. However, both chicken samples were accepted but indigenous chicken was preferred and more accepted by the panelists. Findings showed that higher nutrients and acceptable meat can be gotten from broiler and indigenous chickens.

Keywords: *organoleptic, indigenous, carcass, indigenous and fowl*

Introduction

Meat is animal flesh that is eaten as food, it is a nutrient-dense food and its products are important source of wide range of nutrients (Lawrie and Ledward, 2006). According to the analysis of the FAO the overall consumption of white meat between 1990 and 2009 has dramatically increased, for example poultry meat has increased by 76.6% per kilo per capital and pig meat by 19.7% etc. However, humans have limited and killed animals for meat since prehistoric times. The advent of civilization allowed the domestication of animals such as chickens. Pigs, sheep and cattle. This eventually led to their use in meat production on an industrial scale with the aid of slaughter houses.

Considering the plentiful supply of food products in the world today, the concept of quality of particular importance being a complex concept. Chicken meat quality is understood in various ways and thus it is difficult to define conclusively. Chicken meat quality is made up of its safety nutritive values and sensory characteristics. The nutritional quality of poultry meat depends on the content of high value protein, unsaturated fatty acids, vitamins, macro and micro nutrients, cholesterol and other biological active compound.(Ojedapo, *et al.,* 2008). Meat color, aroma and flavor (organoleptic characteristics) are essential sensory traits simply put, it can be stated that chicken meat is of good quality if it fully meets consumer's expectation.

Modern consumers seek meat that is low in fat, tender, juicy, good flavor and aroma (Grunert *et al*., 2004 and Castellini *et al.*, 2008). Carcass qualities are affected among others by genetic factors such as appropriate choice of breed or commercial hybrid (broiler) and the sex of birds *(Rizzi et al., 2007)* .poultry meat quality is also influenced by the rearing system adopted.(*Fanatico et al., 2005).* Another important determinant of meat quality is the slaughter age of birds *(Fanatico et al., 2006).*

The world production meat is based on raising fast growing broiler chicken, the intensive breeding works together with optimized feeding and housing conditions have considerably shortened by the rearing period of fast growing chicken but a problem arisen with maturity of meat and its sensory and

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technological quality *(*Mikulski ., 2010 and Dou *et al.*, 2009*).* The development of single purpose production of chicken has marginalized dual-purpose production this supplanting native chicken breeds. Today with the growing demand of poultry products from extensive system, an opportunity arises to increase the importance of raising native chicken breeds which are particular suitable for free range and organic farming because of their good adaptation to the local conditions . (Beriain *et al*., 2009). This is confirmed by experience of many countries in which is in increasing demand *(*Fanatico *et al.*, 2007*).*

In practical production of meat under extensive system were initially produced using native chicken breeds almost exclusively (Ekeudo *et al.*, 2005). For example, in Spain was made of native meat type chicken which was 10 months of age, reach a baby weight of about 4-5kg and a dressing percentage in excess of 80% (Fanatico *et al.*, 2009) today meat from extensive farming is mainly obtained from hybrids of native breeds and fast growing lines compared to the native breeds such hybrid are characterized by higher rate of growth, better feed conversion and greater dressing percentage while being well adapted to the local environment, which is of particular importance on free range system, consumer interest in flavor some meat from slow growing chicken increasing in many countries of the world despite its relatively high price. Production of the native breed in china is estimated to increase by 5-10% each year. Compared to fast growing broiler, native chicken shows lower weight gain and a smaller proportion of breast muscle in the carcass compared to fast growing broiler, but their meat has many quality characteristics value by modern consumer (Fanatico *et al.*, 2007).Hence, the need to evaluate the organoleptic characteristics of matured broilers chicken and indigenous chicken.

Materials and Methods

This study organoleptic characteristics and carcass qualities of matured broiler and indigenous fowl was carried out at Akanu Ibiam Federal Polytechnic Unwana, Afikpo North, Ebonyi state, Nigeria. While the Laboratory analysis was carried out at NRCRI Biochemistry Laboratory, Michael Okpara University, Umudike. Six birds of broiler and indigenous fowl were purchased from meat market Abakaliki, Ebonyi state Nigeria. The birds were slaughtered by decapitation of the neck; Scalding was done by immersing the slaughtered birds in hot water of about 60°c for easy removal of feather, followed by evisceration which was done manually. The breast muscle meats of both samples were cut into small sizes, seasoning with salt only and boiled for forty five minutes, the samples were allowed to cool.

Determination of sensory characteristics of chicken meat by the consumers

The cooled samples were identified by three digit random number codes and presented to ten panelists who were familiar with both samples. Each of the judges was also presented with portable water for rinsing the mouth. This was conducted in a class where each of the panelists was positioned in a separate seat to avoid interference. The samples were rated on the following attributes: color, taste, flavor, texture, tenderness and toughness using a 6-point hedonic scale range from like extremely to dislike extremely as described by Ihekoronye and Ngoddy (1985) while some parts of the samples were cut and taken to laboratory for the quality evaluation .Proximate analyses were carried out according to the methods prescribed by AOAC (2005). Carbohydrate was determined by the manual Clegg Anthrone method. Mineral elements composition of the sample such as potassium was determined using the modified method of AOAC (2004), magnesium and zinc were determined using Atomic Absorption spectrophotometer (AAS Model Sp9) while Vanadomolypdate reagent (Calorimertic method) was used to determine the phosphorus level.

Results

Tables 1, 2 and 3 present the results of the proximate composition. Mineral values and organoleptic characteristics of matured broiler chicken and indigenous fowl.

Table 1: Proximate Composition of Broiler and Indigenous Chicken.

Parameters	Broilers	Indigenous chicken	LSD
Ash content	3.86a	2.11b	0.254
Crude fiber	0.21	0.51	N.S
Carbohydrate	50.62a	58.39b	0.635
Crude protein	29.77a	20.09b	0.317
Ether extract	10.44a	3.62b	0.317
Kilocalorie	354.22a	407.90b	1.588
Moisture content	12.11a	8.44b	0.381

[ab]Row means with different superscript are significantly different ($p<0.05$)

Table 2. Mineral Composition (Mg/100g) of Broiler and Indigenous Chicken.

Parameters	Broilers	Indigenous Chicken	LSD
Calcium (Ca)	340.33[a]	413.13[b]	0.190
Potassium (K)	504.13	474.23	N.S
Manganese (Mn)	184.02[a]	116.16[b]	0.063
Magnesium (mg)	281.30[a]	361.12[b]	4.066
Sodium (Na)	318.12[a]	367.82[b]	0.063
Phosphorus	41.04[a]	30.62[b]	0.063

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(P)			
Zink (Zn)	21.04	39.10	N.S

[ab]Row means with different superscript are significantly different (p <0.05)

Table 3: Organoleptic Characteristics of Broiler and Indigenous Chicken.

Parameter	Broiler	Indigenous chicken	LSD
Colour	5.00	5.00	NS
Taste	3.33[a]	5.00[b]	0.710
Flavour	2.50[a]	5.33[b]	1.021
Texture	3.33	3.33	NS
Tenderness	3.33	2.33	NS
Toughness	2.50[a]	5.00[b]	0.930

[ab]Row means with different superscript are significantly different (p <0.05)

Discussion

The proximate composition such of the experimental birds as (c p) Crude protein, Ash, (EE) Ether extract and moisture content as revealed in table 1 were significantly higher (P>0.05) for broiler than the values obtained for the indigenous chicken. This could be attributed to the balance diets fed to broiler birds coupled with the method of rearing (Intensive system) and age of the birds. This is in line with Gondwe and Wollny 2015 who reported that limited supply of nutrients significantly restricts the productive potential of local birds. This is also in line with (Fanatico, *et al*., 2017) who argued that poultry meat quality can be influenced by the genetic factor such as appropriate choice of breed, sex of breed, rearing system and age of the birds. However, the higher values obtained for the kilocalories, carbohydrate and fiber contents of indigenous fowl could be attributed to the longer maturity period of indigenous birds usually between six to eight months coupled with free range system of production. This agrees with *(*Shahin and Elazeem, 2005*)* who reported that feeds and feeding of the birds coupled with age can influence the quality of the poultry meat. Furthermore, the results of the mineral composition of the broiler and indigenous chicken as revealed in table 2 indicated that the values obtained for Manganese and phosphorus (P) were significantly higher (P< 0.05) in broiler than what was recorded for indigenous chicken. However, the values obtained for calcium (Ca) magnesium (Mg) and sodium (Na) were significantly lower in broiler when compared to what was recorded for indigenous chicken. This is an indication that chicken contains an appreciable amount of some minerals which can be beneficial to man. This is in line with Souza *et al*. (2011*)*, who reported that meat contains fairly good amount of minerals. There was no significance difference (p>0.05) between the values recorded for potassium (K) and Zink (Zn) in both chickens. This suggests that these two minerals are not being influenced by any factor such as breed, sex or system of rearing.

Finally, the results of the organoleptic characteristics of boilers and indigenous chicken as presented in table 3 revealed that there was no significant difference (p>0.05) between the values recorded for the color, texture and tenderness of the birds. This is an indication that the three parameters did not influence the acceptability of both meats. That is, both meats were acceptable by the panelists and none was preferred to the other based on these parameters. However, the results showed higher values for the taste, flavor and toughness indigenous fowl than what was recorded for broiler meat. This is an indication that the indigenous fowl meat was preferred in terms of these parameters. This disagrees with Rizzi *et al., (*2007) who argued that the modern consumers seek meat that is tender, juicy, good flavor and aroma.

Conclusion and Recommendation

The study showed that indigenous and broiler chickens have appreciable quality of nutrients which are needed for human health and development. There is need for consumer's awareness program on the nutritional importance of both meats. This will go a long way to improve acceptability of the broiler. Furthermore, the poultry farmers should be encouraged to go into intensive system of production of indigenous chicken so as to improve the general performance of the birds and also meet the consumer's demands.

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