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## Phenotypic characterization of indigenous chicken population in Gwer-West, Benue State, Nigeria

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### ABSTRACT

This study was carried out to characterize native chickens of Gwer-West Local Government Area of Benue State, Nigeria, based on some phenotypic traits. A total of seven thousand and ninety-one (7091), 4624 females and 243 males, mature native chickens were randomly sampled from the study area. The study covered eleven (11) council wards (North Bank I, Wadata, Modern Market, Wala-mayo, Central South Mission, Bar, Fiidi, Agan, Clerk Mission, Mbalagh and North Bank II). The study was conducted between June and August 2012. Parameters examined include live body weight, body length, feather types, head shape, plumage colour, shank colour, beak colour, comb type ear-lobe colour and wattle colour. Majority of the chickens sampled are female (65.21%). The most predominant feather type, head shape, plumage colour, shank colour, beak colour, comb type, ear-lobe colour and wattle colour were normal (88.49%), plain (92.42%), complete brown (29.01%), white (41.19%), single (88.49%), white (79.37%) and white (68.02%) respectively. Mean live body weight of males (1.38 kg  $\pm$  0.20) was significantly ( $p < 0.05$ ) heavier than the mean live body weight of females (1.23 kg  $\pm$  0.19). Males were also superior to females in terms of body length (53.77 cm  $\pm$  6.01 and 49.05 cm  $\pm$  5.40 respectively). The study revealed that most of the parameters measured revealed distinctive variations, providing the basis for further characterization of native birds breeds, therefore future study can be concentrated on selection for qualitative traits of interest.

**Keywords:** Characterization; chicken; native; variations; morphometry

## 1. INTRODUCTION

Domestic fowl was found to have originated from the wild ancestor of jungle fowl *Gallus domesticus* from the southeastern Asia around year (2000-3000 BC). During this period, four species of jungle fowl are found which includes red jungle fowl (*Gallus gallus*), Ceylonese Jungle fowl (*Gallus lafayetti*), gray jungle fowl (*Gallus sonnerati*) and the black or green jungle fowl (*Gallus varius*), and they are still in existence (Atteh, 2004).

Chickens play very significant socio-cultural and economic roles in most African societies. Native chicken production is vital in the livelihood of many house-holds member in the country, especially the resources for poor rural farmers providing nutrition for the family (good source of protein), a small cash flow reserve for times of celebrations or need and in some areas contribute to religious ceremonies and recreation (Emuron *et al.*, 2010 and Roberts, 1995). Domestic fowl are important in the available market in the country given their organic way of being raised (Angel, 2010). There are no cultural or religions taboos of any kind relating to the consumption eggs and poultry meat.

Presently, food production is changing from being producers-driven to consumers-driven. The demand for certified products such as meat and eggs has emerged. The focus is now on local indigenous breeds or species (Ohwojakpor, *et al.*, 2012)

Native chicken constitutes 80% of the poultry birds in Nigeria (Fayeye, *et al.*, 2006). According to Sonaiya (1990), more than 80% of the total poultry population are found in the rural house-holds.

In Nigeria, chickens are the most widely distributed of all livestock species with a population of 166 million birds (FAOSTAT 2007). The local chickens constitute the majority of these poultry types, numbering about 103 millions (RIM, 1992). Native chickens are widely distributed in the rural areas of tropical and sub-tropical countries, majority of which are found in the hand of the rural dwellers (Ajayi, 2010). Among the major advantages of native chickens are general hardiness, ability to adapt to harsh environments, capable to survive on little or no inputs, in terms of feed, medications, shelter (Ajayi, 2010). Native chickens are generally self-reliant, hardy, capable to withstand the harsh climate, minimal management, and inadequate nutrition (Apuno, *et al.*, 2011). They survived largely on grasses, seeds, insects and other kitchen and farm wastes (Vietmeyer *et al.*, 1991).

The indigenous poultry chickens represent valuable resources for livestock development especially in the rural poors, this is because of their extensive genetic diversity which allows for rearing of poultry under varied environmental conditions. (Ajayi, 2010).

Recent works revealed that the different ecotypes can be grouped into two major categories on the basis of body sizes and body weight as heavy ecotype and light ecotype (Momoh *et al.*, 2007).

The heavy ecotype is found in the dry savannahs (Guinea and Sahel Savannah) montane regions and cattle kraals of the North and weigh about 0.9-2.5kg at maturity. The light ecotypes are those chicken types from the swamp, rainforest and derived Savannah agro-ecological zones whose mature body weight ranges between 0.68-1.5kg (Ajayi, 2010).

Several research works have been reported on the unique adaptive features of Nigerian local chicken which include small body size, multicoloured plumage colour, presence of major gene affecting feather structure and feather distribution (Adebambo *et al.*, 1999; Orheruata *et al.*, 2004).

Despite the importance, little is known about its genetic diversity regarding the different types and local population sizes.

The knowledge on Variation in Quantitative and Qualitative Traits in Nigerian Local Chickens and their effects on the performance of the birds can be of tremendous help to providing information for breeding strategies for genetic improvement programmes.

Many studies have been conducted on native chickens in various parts of the country (Sonaiya *et al.*, 1998; Mbap and Zakar, 2000). However, there are have been no efforts made towards characterising the native chickens in the remote areas such as Gwer-west local government area of Benue state, Nigeria. It is believed that in remote areas, genetic originality may still be found (Daikwo, *et al.*, 2011).

This study is therefore aimed at identifying and providing comparative information on the variations that exist in quantitative and qualitative traits among the native chickens in Gwer-West local government area of Benue state.

## **2. MATERIALS AND METHODS**

### **Description of study location**

The study was carried out in Gwer-west of Benue state, Nigeria. Gwer-west is located within the guinea savannah region of Nigeria. The location lies within the warm humid climate of the North Central zone.

Gwer-west local government area is one of the local government area in Benue state of Nigeria. It was established in 1991 with its headquarters in Naka. It is located between latitudes 7° 38' 56'' North and longitudes 8° 13' 60'' East and 122m above sea level (Atlas.com)

### **Experimental animal**

Seven thousand and ninety-one (7091) native chickens, comprising of 2,467 males and 4,624 females, were randomly sampled from the study area. Animals used for this study were reared semi-intensively, with little feed supplementation, from the owners, with kitchen wastes and were partly sheltered in the night. Sample were selected across the study area.

### **Data collection analysis.**

The study covered eleven (11) council wards (North Bank I, Wadata, Modern Market, Wala-mayo, Central South Mission, Bar, Fiidi, Agan, Clerk Mission, Mbalagh and North Bank II). Data were collected on seven thousand, seven hundred and twenty-two (7722) native chickens. Data collection was carried out between June and August 2012. Simple weighing balance was used to measure the live body weight of the chickens while simple tape rule was used to take body linear measurements. Data on qualitative traits were taken by observation. Data were collected according to the method described and adopted by Ige, *et al* (2012) and Daikwo *et al.*, (2010). Data collected were subjected to simple descriptive analysis using SPSS statistical package.

### 3. RESULTS AND DISCUSSION

Table 1 below shows the sex distribution of native chickens in the study area. The result obtained showed that 2,467 (34.79%) are male chickens, while 4,624 (65.21%) are females. The result suggests that majority of the chickens found in the study area were females while few of them are males. This pattern could be as a result of preference for females for production or multiplication, over males. This informed the sex ratio, males were sold or slaughter. This result is in agreement with the report of Olawunmi, *et al* (2008) and Gueye, (2003).

**Table 1.** Distribution of chickens in the study area by sex.

| Sex     | No. of Observations | Percentage (%) |
|---------|---------------------|----------------|
| Males   | 2,467               | 34.79          |
| Females | 4,624               | 65.21          |
| Total   | 7091                | 100            |

Table 2 revealed the live body weights and body length of the native chickens in the study area. Female chickens had lower live body weight (kg) than the male chickens (1.23 kg  $\pm$ 0.19 and 1.38 kg  $\pm$ 0.20 respectively). This report is close to the reports of Ajayi and Agaviezor, (2009) who reported that indigenous male chickens were also bigger in sizes than their female counterparts (1.50 kg  $\pm$ 0.06 and 1.29 kg  $\pm$ 0.04 respectively). Idris, *et al.*, (2014) also reported similar result in native chickens (3.33 kg  $\pm$ 0.14 and 2.25 kg  $\pm$ 0.05 for males and females respectively) in Dogwa LGA of Kano state. It was found that male gain more live body weight than females.

**Table 2.** Distribution of the Qualitative Traits of native chickens in the study area

| Parameters       | Distribution | Means ( $\pm$ SD) |
|------------------|--------------|-------------------|
| Body Weight (kg) |              |                   |
|                  | Female       | 1.23 $\pm$ 0.19   |
|                  | Male         | 1.38 $\pm$ 0.20   |
| Body Length (cm) |              |                   |
|                  | Female       | 49.05 $\pm$ 5.40  |
|                  | Male         | 53.77 $\pm$ 6.01  |

The mean live body weight recorded for males and females in this study is in agreement with the range of 0.9-1.8 kg reported by Williamson and Payne (1982). The live body weight obtained in this study also showed that the local chickens in the study area are of the light ecotype class, as described by Atteh (1990).

Sexual dimorphism with respect to body weight was also expected due to differential growth rates of the males and females. The sexual dimorphism is explained by the differences in level of male sex hormones which is responsible for greater muscle development in males than in females.

The table also showed the mean body length (cm) for males and females. In the results, males are found to be 53.77 cm  $\pm$ 6.01 while females are found to be 49.05 cm  $\pm$ 5.40. The result was higher than the reported values obtained by Badubi, *et al*, (2006), who recorded 18.00 cm and 20.00 cm as average body length for male and female local chickens in Botswana.

Table 3 revealed qualitative traits distribution among the native chickens in the study area. The reports show that three feather types were observed, normal feather, frizzled feather and naked neck (88.49%, 5.31% and 6.20% respectively). Majority of the chickens in the study area had normal feathers (88.49%). This result is in agreement with the result obtained by Ajayi and Agaviezor, (2009), who also observed three feather types normal, frizzled and naked neck feather (91.8%, 5.2% and 3.0% respectively) in Bayelsa state, Nigeria. Preferences are mainly placed on the normal feathered chickens in the study area. Sonaiya (2003) also reported that Naked Neck and frizzled father chickens are majorly used for social and traditional purposes, useful in rituals and sacrifices in some parts of the country. Sonaiya and Olori (1990) equally opined that farmers see frizzled and Naked Neck chickens as ugly and irritating and that Naked neck chickens are to be raised only by old people and for occult purposes.

**Table 3.** Percentage distribution of the phenotypic parameters among the native chickens in the study area.

| S/N | Parameters     | Distribution     | Percentage (%) |
|-----|----------------|------------------|----------------|
| 1   | Feather types  |                  |                |
|     |                | Normal Feather   | 88.49          |
|     |                | Frizzled Feather | 5.31           |
|     |                | Naked Neck       | 6.20           |
| 2   | Head Shape     |                  |                |
|     |                | Plain            | 92.42          |
|     |                | Crested          | 7.58           |
| 3   | Plumage Colour |                  |                |
|     |                | Complete White   | 12.89          |

|   |                |                          |       |
|---|----------------|--------------------------|-------|
|   |                | Complete Brown           | 29.01 |
|   |                | Complete Black           | 10.05 |
|   |                | Brown with Spotted Black | 15.55 |
|   |                | Black with Spotted White | 12.71 |
|   |                | White with spotted Black | 19.79 |
| 4 | Shank Colour   |                          |       |
|   |                | White                    | 41.16 |
|   |                | Yellow                   | 27.23 |
|   |                | Black                    | 31.61 |
| 5 | Beak Colour    |                          |       |
|   |                | White                    | 41.19 |
|   |                | Yellow                   | 27.24 |
|   |                | Black                    | 31.56 |
| 6 | Comb Types     |                          |       |
|   |                | Single                   | 88.49 |
|   |                | Rose                     | 7.03  |
|   |                | Pea                      | 3.90  |
|   |                | Buttercup                | 0.32  |
|   |                | Cushion                  | 0.26  |
| 7 | Earlobe Colour |                          |       |
|   |                | Red                      | 20.63 |
|   |                | White                    | 79.37 |
| 8 | Wattle Colour  |                          |       |
|   |                | Red                      | 31.98 |
|   |                | White                    | 68.02 |

The table also revealed observation of types of head shapes. Two types of head shapes were observed, plain and crested types (92.42% and 7.58% respectively). Majority of the

chickens observed showed plain head shape type (92.42%). Bogale, (2008) reported similar results for plain and crested head shape types (48.82% and 51.18% respectively). Egahi *et al.*, (2010) also obtained 82.05% for plain head shape type for native chickens in Makurdi.

Six plumage colours types (complete white, complete brown, complete black, brown with spotted black, black with spotted white and white with spotted black, with 12.89%, 29.01%, 10.05%, 15.55%, 12.71% and 19.79% respectively) were observed in the native chickens in the study area. The results showed that complete brown colour occurred highest (29.01%) while complete black plumage colour occurred least (10.05%). This result is in agreement with other authors (Odubote 1994; Ozoje *et al.*, 1999; Adebambo *et al.*, 1999 and Duguma, 2006). Duguma (2006) reported very diverse plumage colouration in indigenous chickens of Ethiopia and he concluded that diversity in plumage colour is a feature for camouflaging, adaptability and survival. Odubote (1994) reported similar observation in Nigerian indigenous chickens that diverse plumage colour is an adaptability and survival feature. However, Nwosu, (1979) had earlier reported that wide variation in colouration is as a result of lack of conscious selection breeding programmes targeted at choice of colour in Nigeria native chickens. However, plumage colour heterogeneity is among the traits that characterize Nigeria native chickens and thus regarded as reservoir of gene pool for conscious selection and breeding programme for a desired trait.

From the result, three shank colours were obtained, white colour occurred highest (41.16%) followed by black colour (31.61%) while yellow colour occurred least (27.23%). Egahi *et al.*, (2010) reported black shank colour is highest (42.22%) among the native chickens in Makurdi. Halima, (2007) reported yellow shank colour as highest in Ethiopian native chickens. On the contrary, Mancha (2004) observed pink, dark-ash, ash and light yellow as the commonest shank colour in Plateau State.

Three beak colour were obtained, white (41.19%), yellow (27.24%) and black (31.56%). Beak colour showed a similar result to shank colour with white beak colour dominating followed by black and yellow.

Five comb types, single, rose, pea, buttercup and cushion, were observed to occur in the order 88.49%, 7.03%, 3.90%, 0.32% and 0.26% respectively. This result is similar to the one reported by Badubi *et al.*, (2006), who recorded the following result; 90.40%, 1.00%, 4.90%, 1.30%, and 2.00% for single, pea, rose, walnut, other combs respectively.

Two types of earlobe colour (red and white) were identified among the native chickens in the area. Red colour had higher percentage (79.37%) than white colour (20.63%). This result agreed with the result obtained by Egahi, *et al.*, (2010), who reported 20.63% and 73.02% for red and white earlobes colour respectively. Egahi *et al.* (2010) reported result similar to this study. Morathop *et al.* (2007) noted that red earlobe colour dominated in the native chickens populations in Thailand.

Two wattle colours were observed in this study, with white colour having higher value (68.02%) than red colour (31.98%).

According to Nesheim *et al.*, (1979), the size and colour of the combs and wattles are associated with gonad development and secretion of sex hormones. Large combs and wattles and long legs are important morphological traits that allow better heat dissipation in the tropical hot environment. This result is also in support of Nesheim *et al.* (1979) who noted that these specialized structure makes up about 40% of the major heat losses, by radiation, convection and conduction of heat produced from body surfaces. Horst (1989) noted that gene coding for these traits are not major genes but the result of multiple genes and their

interactions could be considered for incorporation into the development of local ecotypes for the tropical hot environments.

#### **4. CONCLUSION**

The study showed wide variations among the traits considered among the native chickens in the study area. The study reveals phenotypic variability which is affected by both genetic and environmental factors. Considering the hardy nature and productive performance of these chickens they have vast potential for subsequent breeding works.

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