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# ANALYSIS OF THE PHENOTYPIC CHARACTERISTICS OF DOMESTIC CHICKEN PRODUCTION IN DELTA STATE, NIGERIA

**KPEREGBEYI J. I.**

*Department of Agricultural Technology, School of Agriculture, Delta State Polytechnic, Ozoro.*

## Abstract

*This study was carried out using field data to qualitatively characterize local chicken under traditional system in Delta State. Traits considered were plumage colour, comb colour, wattle colour, earlobe colour, eye colour and shank colour respectively. Data obtained were subjected to statistical analysis to determine percentage distributions of the traits. Results obtained showed a percentage distribution of 68 %,, 40 % and 41 % for red comb colour, red earlobe colour and yellow shank colour, respectively. Twelve (12) plumage colour variants were observed with black and brown predominating with 17 % and 16 %, respectively. The white and yellow colours were the least and constituted 1 % of the population. Two comb colour variants were identified among the local chickens. Sixty - eight (68 %) of the comb colour were red.*

***KEYWORDS:***
*Qualitative Trait,*
*Local Chicken,*
*Chicken Production*

## Introduction

In Nigeria, two chicken production systems are notable, being the traditional and commercial. Commercial system is further divided into three distinct sectors such as small, medium and large – scale production systems. Large – scale production systems in Nigeria are few. The traditional local chicken production is based on free – range systems where the birds mostly scavenge for feed picking on food scraps, insects, worms, and vegetables around the households (Moreki, 2000; Aganga *et al.*, 2003). In this system, mostly indigenous strains of chickens are kept (Horst, 1990) with little or no controlled breeding. It is usually the most aggressive, strong and dominant cock, which sires most offspring



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in the neighbourhood. Gueye (1998) reported that indigenous chickens represent an important reservoir of genetic variation that should be conserved. They are also subjected to challenging selection pressure due to the poor management conditions under which they are kept. Thus they are a potential source of hardiness genes or traits that should be conserved for future use. Mc Ainsh *et al.,* (2004) reported that indigenous chickens are not classified into specific breeds. Rather, they are heterogenous in phenotype and probably also in genotype. However, Gueye (1998) asserts that even though there are reports of breeds of chickens in Africa it might be that these so – called breeds are just phenotypic descriptions. Local chickens are characterized by small size and low egg production (30 – 80 small eggs per hen per year) (Lombrou 1993). This system is described as a low input – low output system where birds are given limited amounts of feed to supplement what they scavenge (Mc Ainsh *et al.,* 2004).

There is little information on phenotypic characteristic of local chickens in Delta State. This study was therefore carried out to qualitatively characterize local chicken in Delta State and identify ways of improving their production system.

**Materials and Methods**

The study area covered the three (3) senatorial districts (Delta South, Central and North) in Delta State of Nigeria. On average a total of thirty (30) communities were randomly chosen per Local Government Areas.. The climate is forest and mangrove zones with high annual rainfall (ranging from 2500 mm in the South to 3000 mm in the North). The state has a tropical climate characterized by two district seasons. The wet and dry seasons with average temperatures of 24°C in the wet season and about 27°C in the dry season. (FRN, 2007). The study focused on the resource poor farmers who raised indigenous chicken in fifteen (15) Local Government Areas in Delta State (Figure 1).The sampling for this study was done using a cross – sectional research approach to obtain desired data.

A multistage sampling procedure was carried out. The first stage involved a random selection of fifteen (15) Local Government Areas (LGAs) in the State. The second stage involved a random selection of two communities from each LGA. Thirty communities were selected as shown in Table 1. The third stage involved a snowball sampling of twenty (20) indigenous chicken producers from each community. A total of 600 indigenous chicken producers were surveyed. Data were collected for a period of three months (September to November, 2016). The questionnaires were designed to be able to elicit information on colour variance.


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Data obtained were subjected to descriptive statistical analysis to determine percentage distributions.

**Results**

Twelve (12) plumage colour variants and two comb variants were observed. Majority (80 %) of the indigenous chicken in the study area possessed red eye colour variants; while 20 % of them had yellow eye colour. Three earlobe colour variants were observed with majority (40 %) of them having red colour. Wattle colour variants observed were black, red and white, with red colour showing highest frequency of 68 %, while white colour is almost extinct with just about 1 % frequency. Three shank colour variants were observed. Majority (41 %) of the indigenous chickens had yellow shank colour, followed by Ash colour (31 %) and 28 % were black. Morphological variables generally had high coefficient of variation (39.33 to 87.00 %). Highest coefficient of variation of 87 % was recorded for beak length and the least was observed for comb length (39.33 %).

**Discussion**

The major plumage colour observed in the study were Black (17 %), Brown (16 %), White, Yellow or Brown laced with other colours (30 %) (Figure 2), are for some layers and cockerels. Such colour specificity in indigenous and functional identification in indigenous chicken was reported by Adebambo *et al.* (1999), that colour specificity in breed and or strain development have been practiced in chicken in advance countries. Dana *et al.,* (2010) also reported that developing countries like Ethiopia, chicken genotyping based on plumage colour have been practiced. Breed classification and breed development based on feather colour is therefore a potential possibility for indigenous chicken found in Delta State. The multi-colour feather and wide variation in plumage colour observed in indigenous chicken population is an adoptive and survival feature as reported by Odubote (1994). Adebambo *et al.* (1999) had earlier reported that Nigerian poultry exhibited a wide range of plumage colour. Nwosu and Omeje (1985) observed that multi-colour variation is as a result of lack of conscious selection or breeding programmes directed towards choice of colour. Odubote, (1994) corroborated this, by reporting that large variation in colour is indicative of a traditional population where no conscious selection effort had been practiced. The Nigerian indigenous chicken is therefore still under the influence of natural selection. The result of this study has also, further confirmed the absence of selection, with a


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focus on plumage colour in indigenous chickens. Selection in a breeding population with the aim of developing breeds and or strains with synthesized colour code is very viable in indigenous chicken Nigeria. Put together the high frequency of occurrence of white laced with black spot (12 %), yellow laced with black spot (14 %) and brown laced with white spot (10 %) confirmed high variability in the plumage colour of indigenous chicken. Black and brown plumage colour found in the current study is not in agreement with previous reports by Missohou *et al.* (1998) in indigenous chicken population in Senegal. In Southern Ethiopia, Melesse and Negesse (2011) reported 20.7 % of the chicken population having black plumage, which is comparable with the current findings. Dana *et al,* (2010) reported black as the most prevalent plumage colour in those chicken populations from Southern part of Ethiopia (Konso and Sheka areas). In the literature, large variations in plumage colours across regions were found, which might be due to geographical isolation as well as periods of natural and to some extent, artificial selections (Melesse and Negesse, 2011).

Only two colours of comb (red and black) and three colours of wattle (black, red and white) with red being predominant were observed in this study. However, indigenous chicken populations possessing a high proportion of red comb and wattle colour were reported in other countries (McAinsh, et al., 2004; Badubi et al., 2006;). According to Badubi et al. (2006) about 80% of the indigenous chickens in Botswana had red comb, whereas very low proportion of black (20%) comb and wattle colour were observed. This report is in agreement with the present findings. If the comb and wattle are responsible for about 40% of total sensible heat loss by the chicken (FAO, 2012) then the red colour must play a very vital role which could be attributed to the postulation of Oluyemi and Roberts (2003) that says red colour of earlobe was as a result of the unmasked vascularization of the cutaneous tissue.. Oluyemi and Roberts (2003) had observed that red earlobe colour was attributed to the unmasked vascularization of the cutaneous tissue.

Nevertheless, as illustrated in Figure 7, it appears that there is a high proportion of indigenous chickens showing red earlobe (40 %) which is slightly lower than those reported by Melesse and Negesse (2011). The same authors reported a large proportion of chicken with white earlobes, which is lower than those found in the current study. However, the about 35 % of white earlobe observed in this study was lower than the observation of Egahi et al. (2010) who reported a high proportion of about 73 % in Nigeria. According to Ssewannyana et al. (2008) the proportions of white and red earlobes in indigenous chickens in Uganda was


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almost the same (48 and 47 %). It is apparent that earlobes colour is a breed-specific trait, although it could be affected by nutritional status of the birds (Melesse and Negesse (2011). All standard chicken breed that originated from Mediterranean regions (such as leghorn or Aneoma) exclusively possess white earlobes, whereas other breeds such as Rhode Island Red and new Hamphire have earlobes with red colour. The discrepancies of colours observed in the current study may be due to the differences in the breed of local fowls and environment. Dana et al. (2010) reported yellow shanks as the most prevalent trait in indigenous chicken populations. If this is true the current study observed the predominance of yellow shank. According to Ssewannyana et al., (2008), 42 % of the indigenous chickens in Uganda had yellow shank, which is comparable to the present findings. Moreover, Dana et al. (2010) reported 28 per cent of indigenous chickens with white shanks, which is in line with the present findings (31 per cent). However, Faruque et al., (2010) reported white shank (35 per cent) as the most predominant colour in Bangladesh native chickens. Melesse and Negesse (2011) reported 13.9 % of indigenous chickens with black shanks, which is contrary to the present findings (28 %). Moreover, 42.2 % of Nigerian indigenous chickens had a black shank (Egahi et al., 2010). The shanks and most of the feet are covered with scales of various colour (Bell, 2000).Yellow colour could be attributed to the dietary carotenoid pigments in the epidermis when melanic pigment is absent. Varying shades of blacks are the result of melanic pigment in the dermis and epidermis (Bell 2000). When there is black pigment in dermis and yellow in epidermis, the shanks have greenish appearance. In the complete absence of both of this pigment, the shanks are white. The predominance of white shanks was also observed in some part of the region surveyed such as Patani, Bomadi and Ugborodo (Escravos) where there is shortage of scavengable feed resources in the swamp agro-climatic zone of the region, which might be a possible explanation for the predominance of white shank in this agro-climatic zone.

**Conclusion and Recommendations**

There were varied plumage colours but black (17 %) and brown (16 %) colours were in majority. Out of the three different shank colours (black, yellow and ash) observed, yellow (41 %) was prevalent among the indigenous chicken. Based on the findings and conclusions drawn from the study it is recommended that from the field survey study, the indigenous chicken producers should practice selection or breeding programmes directed towards choice of colour.



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**TABLE 2: MEAN MORPHOLOGICAL CHARACTERISTICS OF INDIGENOUS CHICKEN IN THE STUDY AREA.**

| MORPHOLOGY | MEAN ± SE | SD | CV(%) |
|---|---|---|---|
| Plumage length | 6.973 ± 0.21 | 5.05 | 72.46 |
| Comb length | 2.367 ± 0.04 | 0.93 | 39.33 |
| Wattle length | 2.408 ± 0.04 | 0.96 | 39.95 |
| Beak length | 3.070 ± 0.11 | 2.67 | 87.00 |
| Earlobe length | 3.213 ± 0.06 | 1.54 | 47.90 |
| Shank length | 4.555 ± 0.12 | 3.06 | 67.27 |
| Wing length | 6.953 ± 0.21 | 5.03 | 72.34 |
| Breath length | 4.473 ± 0.13 | 3.29 | 73.93 |
| Hacked length | 7.032 ± 0.21 | 5.20 | 73.93 |
| Saddle length | 7.03 ± 0.21 | 5.20 | 73.98 |

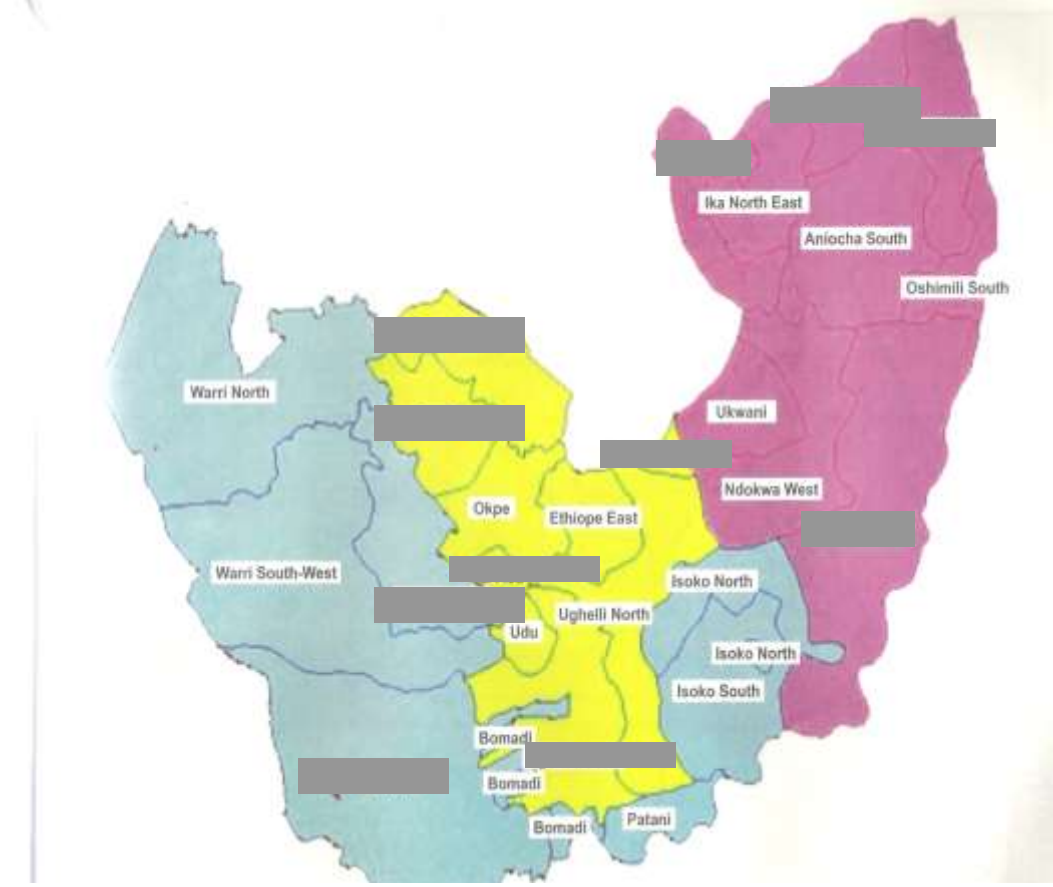



**Fig. 1: A map of Delta State showing the study area**
**Source: FRN (2007)**



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