

# Morpho-Biometric Characterization of the "Kolonto" Local Chicken Ecotype in Gaya Area

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**Abstract:** The morpho-biometric characterization of local chicken "Kolonto" ecotype was undertaken in the department of Gaya. The objective of this study is to promote the breeding of the "Kolonto" ecotype in Niger. A sample of 111 hens and 35 roosters was photographed, described and measured individually. This sample was collected in 15 localities distributed in the 6 communes that count the department of Gaya. The results of this study show that there is a great diversity of plumage in the local chicken "Kolonto" ecotype. The predominant plumage is the mille fleur (16%), the white and the mottled (14%), the partridge (13%), the red (12%) and the golden cuckoo (9%). The average weight of the chicken "Kolonto" ecotype is 1346,5g against 1641,2g and 1253,5g respectively for the males and the females because of the sexual dimorphism highlighted by means of ANOVA carried out on the basis of the various quantitative parameters. The high variability of the local chicken "Kolonto" ecotype demonstrated by this study is an opportunity for a poultry breeding program.

**Keywords:** Local Chicken, "Kolonto" Ecotype, Characterization, Family Poultry

## 1. Introduction

Family poultry is practiced by more than 80% of the population in Africa, mostly rural, and plays an important role in the economy in rural, urban and peri-urban areas [11]. Family poultry requires low levels of inputs, contributes significantly to food security [7] fight against poverty and represents a source of employment for farmers in the disadvantaged groups [12, 13]. The incorporation of Animal source foods into the diets of young children can improve dietary quality and nutrition outcomes [16-18].

In Niger, poultry breeding is dominated by family poultry, which accounts for 96% of all local breeds combined, compared with 3% for modern breeds. In the total of indigenous poultry Chicken represent 55% [23]. This activity contributes to the food security of populations, particularly in rural areas where it is the main source of animal protein [14], and contributes also to the reduction of poverty in the peri-urban and rural areas by providing substantial income for

producers [1].

However, Nigerien poultry resources, especially the local chicken, lack characterization studies. This prevents to know the requirements of the keeping of each local chicken ecotype. The characterization of the local chicken is undertaken in several countries including Algeria [20], Cameroon [10], Togo [8], Ethiopia [2], Côte d'Ivoire [22], Libya [9] and Central Africa [3]. Like these countries, the aim of this study was to make the phenotypic characterization of the "Kolonto" local chicken ecotype population in the Gaya area.

## 2. Materials and Methods

### 2.1. Characteristics of the Study Area

The department of Gaya, part of our study, is located in the southwestern tip of Niger Republic between 3°6 "and 3°51" East longitude and between 11°42 "and 12°56" North latitude (Figure 1). It covers an area of approximately 2556 km<sup>2</sup> [25]

and is limited to the North-East by the Dioundiou Department, to the North-West by the Dosso Department, to the East and South-East by the Federal Republic of Nigeria, to the South-West by the Republic of Benin. The department of Gaya is composed of six communes: Bana, Bengou, Tanda, Tounouga, Yelou and urban commune of Gaya (figure 1).

Yelou and urban commune of Gaya (figure 1).

The climate of the Gaya area is the kind of North-Sudanese type with a rainfall between 600 and 1000 mm. The floristic composition is dominated by a large dense combretaceae population in the plateau zone [5].

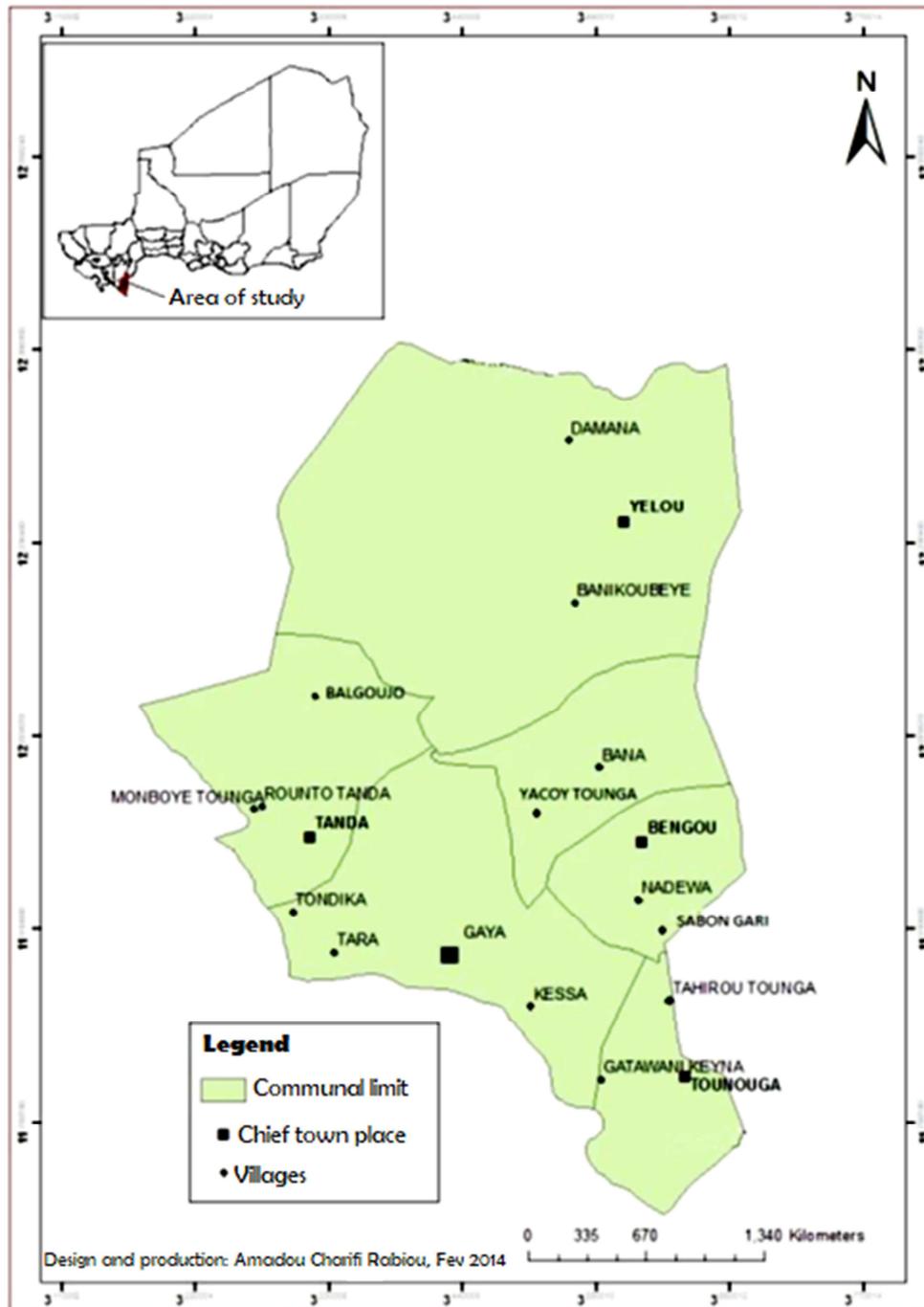


Figure 1. Location of the study area.

## 2.2. General Provisions

A survey was carried out in 15 villages distributed in the 6 communes that count the department of Gaya. The villages are chosen according to the number of local chicken farmers in each village. The study lasted 2 months (August-

September 2013).

## 2.3. Measures

A total of 146 "Kolonto" local chicken ecotype (111 hens and 35 cocks) were observed and measured. Visual

characteristics included feather color and distribution, foot coloring, beak coloring, eye color, barb staining, and ridge type. Biometric characters were determined from body weight and body measurements (body length, beak length, tarsal length, wing length, thoracic perimeter, barb length). The live weight was determined using an electronic balance of 5kg range and accuracy 1 gram. The measurements were made using a measuring tape graduated to the millimeter.

**2.4. Statistical Analysis of the Data**

The data collected during this study were processed using the Excel 2007 software with which the descriptive analysis of the qualitative data was done. Variance analysis and descriptive analysis were carried out using the R software.

**3. Results**

**3.1 Biometric Characteristics of the "Kolonto" Local Chicken Ecotype**

The average weight of the local chicken "Kolonto" ecotype is 1346.47g with a standard deviation of 338.32g and a coefficient of variation of 25%. The average length of the tarsi of the "Kolonto" ecotype is 9.4 cm with a thoracic perimeter of 31.1 cm (Table 1).

ANOVA with sex as a source of variation showed very highly significant differences for all parameters studied. The Newman-Keuls average test confirmed this difference between male and female of "Kolonto" ecotype. Thus the "Kolonto" cocks have a 1641.2g average weight significantly greater than that of "Kolonto" hens which is 1253.5g (Table 1).

*Table 1. Mean values by sex of various parameters measured.*

Measured parameters	Cock (n=35)		Hen (n=111)		Together (n=146)		P value
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)	
LW (g)	1641,2±360 <sup>a</sup>	22	1253,5±275 <sup>b</sup>	23	1346,5±338	25	< 0,0001
TL (cm)	11,2 ±1 <sup>a</sup>	12	8,9±1 <sup>b</sup>	13	9,4±2	17	< 0,0001
BL (cm)	45,5±4 <sup>a</sup>	8	39,6±3 <sup>b</sup>	8	41,0±4	10	< 0,0001
TP (cm)	33,2± 3 <sup>a</sup>	8	30,4±3 <sup>b</sup>	9	31,1±3	09	< 0,0001
TT (cm)	4,4± 1 <sup>a</sup>	16	3,6±0 <sup>b</sup>	12	3,8±1	16	< 0,0001
LW (cm)	22,5± 1 <sup>a</sup>	6	19,5± 2 <sup>b</sup>	8	20,2±2	10	< 0,0001
Lba (cm)	3,8± 1 <sup>a</sup>	39	0,7± 0 <sup>b</sup>	64	1,4±1	89,7	< 0,0001
Lbe (cm)	3,6±0,4 <sup>a</sup>	12	3,2± 0 <sup>b</sup>	9	3,3±0	11	< 0,0001

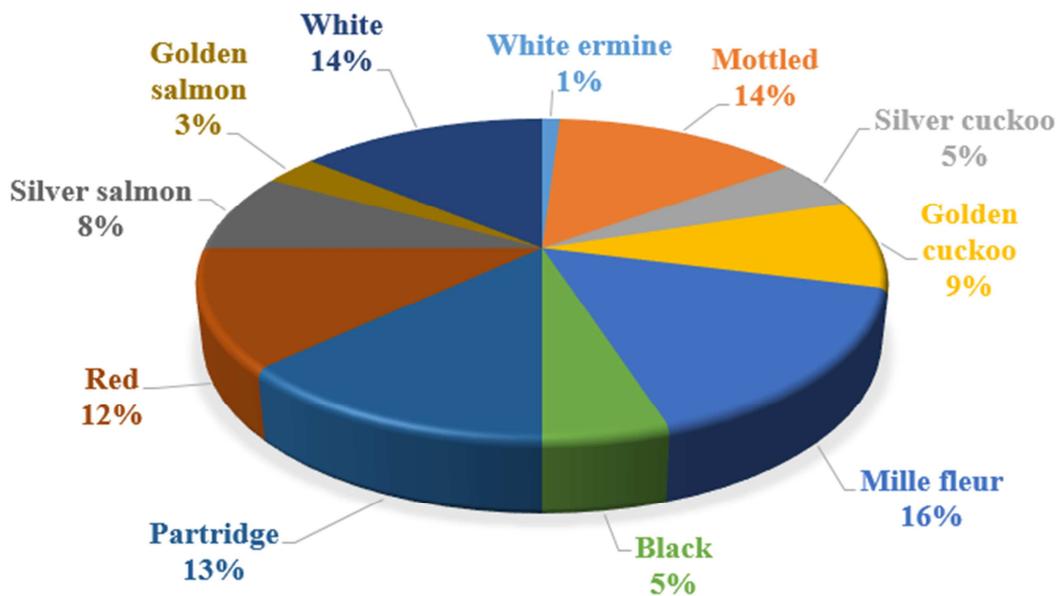
a, b: on the same line, the same letter is given to the values showing no statistically significant difference between them at risk alpha = 0.05; LW = live weight; TL = tarsal length; BL = body length; TP = thoracic perimeter; TT = tarsal tower; LW = length of the wing; Lba = length of the barbel; Lbe = length of the beak; CV = coefficient of variation.

**3.2. Morphological Description**

*Color and distribution of the feathers.* A total of eleven (11) plumage colors were identified in the "Kolonto" local chicken ecotype (Figure 2). The most common of the color are the mille fleur (16%), the white and mottled (14%), the partridge (13%), the red (12%) and the golden cuckoo color

(9%) (figure 3).

The distribution of the feathers of the "Kolonto" ecotype is normal for all individuals. It is normal, which mean distributed throughout the body. It should be noted that the tarsi of the "Kolonto" local chicken ecotype are bare (absence of feathers).



*Figure 2. Plumage color of the "Kolonto" local chicken ecotype in the department of Gaya.*



Figure 3. The colors most often encountered in the "Kolonto" local chicken ecotype.

Color of the tarsi. Four types of tarsus coloration were observed in the "Kolonto" local chicken ecotype. But the predominant color is white (57%) (Figure 4).

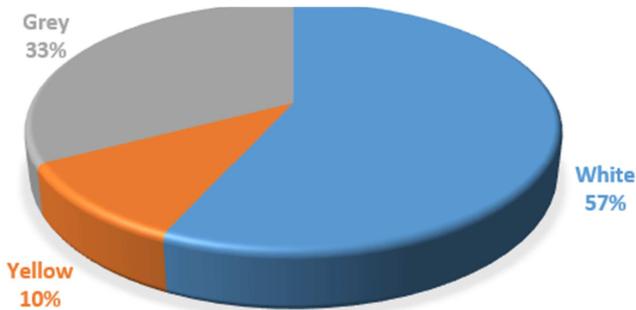


Figure 4. Color of the tarsi of the "Kolonto" local chicken ecotype in the department of Gaya.

Color of the beak. Four (4) types of beak color were observed in the "Kolonto" local chicken ecotype. They are brown (32%), white (31%) and grey (29%) which are the most common types of color (Figure 5).

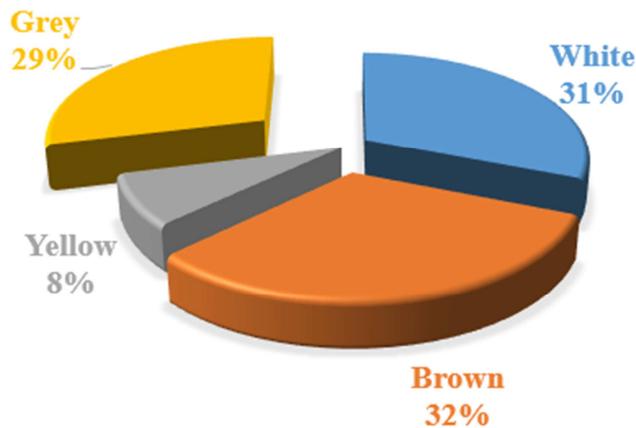


Figure 5. Color of the beak of the "Kolonto" local chicken ecotype in the department of Gaya.

Eye color. In the "Kolonto" local chicken ecotype, three (3) types of eye color were observed (Figure 6). The color of the

orange eyes is the most common (90%).

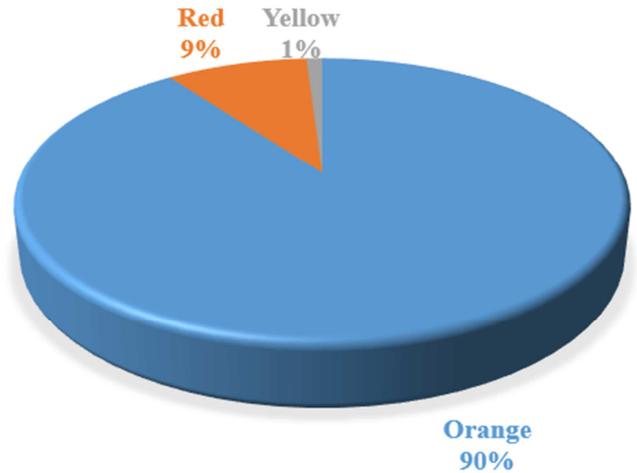


Figure 6. Eye color of the "Kolonto" local chicken ecotype in the department of Gaya.

Color of the barb and type of ridges. The barbels observed in the "Kolonto" local chicken ecotype are red. For ridges, the entire "Kolonto" ecotype has a simple or normal ridge (Figure 7).



Figure 7. Normal ridge of the "Kolonto" local chicken ecotype in the department of Gaya.

### 4. Discussion

The sample of this study is representative since according to the characterization standards [4], it takes about 100 hens and 30 cocks for a phenotypic characterization study of animal populations.

Measurements made on the "Kolonto" local chicken ecotype revealed significantly higher values in males than in females. These results are in agreement with other work on local chickens in Cameroon of [21] and in Mauritania [23].

In general, "Kolonto" ecotype are large local chickens. It is even the main criteria that distinguishes them from other local chicken ecotype. Based on their high weight, we can qualify the "Kolonto" ecotype by "traditional broiler". The "Kolonto" local chicken ecotype are heavier than local chicken found in Trarza in Mauritania [23]. But the local chicken found in Tchad are heavier than "Kolonto" ecotype [15].

There is a great diversity of plumage coloration of the "Kolonto" local chicken ecotype. This multiplicity of colors is consistent with what has been reported earlier in Cameroon [10], in Mauritania [23], in Algeria [19], [20] and in Togo [4], all of whom worked on the local chickens. The presence of this multitude of plumage colors testifies to the probable existence of a great genetic variability in the "Kolonto" ecotype. These chickens have feather distributions that allow their better adaptability to local conditions. The distribution of plumage encountered in the "Kolonto" local chicken ecotype is probably due to the genotype-environment interaction. Thus, the normal distribution of feathers widely represented would probably be the consequence of a relative homogeneity of the climatic conditions of the Gaya region. In Central African, the normal plumage prevails with 83.8%, followed by the crested one (10.6%) [3].

The color of the tarsi which prevails in the "Kolonto" ecotype is the white color. The presence of yellow-colored tarsi may reflect the degree of penetration of exotic genes into the local chicken population [19]. In Ethiopia, almost 90% of the studied flocks were of the red-colored simple comb type [6].

In the "Kolonto" ecotype there is also a great diversity of coloration of the beak. The most predominant color of the beak is brown. In Togo, local chickens with the white beak are the most predominant [4].

## 5. Conclusion

The present study is the first of its kind on the "Kolonto" local chicken ecotype in Niger. The characteristics found in this study show a great diversity in the "Kolonto" ecotype. This variability is present both in terms of morphology and biometric characteristics. The "Kolonto" local chicken ecotype is characterized by its large size with a high weight.

Molecular analysis through the use of microsatellite markers would help to better assess genome diversity in "Kolonto" local chicken ecotype and compare it with results obtained in other populations with the same markers. The results of the molecular analysis and the phenotypic characterization will make it possible to create efficient strains, adapted to the conditions of local production, while having the characters desired by the breeder and offering to the consumer products appreciated.

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## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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