



## MORPHOMETRIC DESCRIPTION OF LOCAL PIGEONS IN BAUCHI METROPOLIS

<sup>1</sup>Mijinyawa, A., <sup>1</sup>Abdullahi, U., <sup>1</sup>Sambo, U. S., <sup>1</sup>Adamu, S., <sup>1</sup>Nuhu, S. H., <sup>1</sup>Mohammed, A.,  
<sup>1</sup>Iliya, B., <sup>2</sup>Shuibu, A., <sup>3</sup>Yerima, J. and <sup>4</sup>Ahmed, B.

<sup>1</sup>Tetfund Centre of Excellence for Integrated Farming System and Department of Animal Health and Production  
Technology, Federal Polytechnic, Bauchi

<sup>2</sup>Department of Animal Production, Federal University, Kashere, Gombe

<sup>3</sup>Department of Animal Science, Faculty of Agriculture University of Maiduguri, PMB 1069 Maiduguri Borno State,  
Nigeria

<sup>4</sup>Department of Animal Science, Umaru Musa Yar'adu University P.M.B 2218, Katsina State

Correspondence Email: [aminumijinyawa@fptb.edu.ng](mailto:aminumijinyawa@fptb.edu.ng).

GSM: +2348088277833

### ABSTRACT

The study was conducted in Bauchi Metropolis to characterize local pigeons using the morphometric traits. A total of one hundred mature pigeons of mixed sexes were used for the research. The experimental animals (local pigeons) were randomly selected at poultry unit of Muda-lawal Market of Bauchi among the pigeon sellers. Live weight and some morphometric traits such as body length (BL), girth circumference (GC), wing length (WL) and shank length (SL) were measured. Data generated for these traits were subjected to descriptive statistics, independent sample t-test and Pearson's product moment correlation (PPMC) of SPSS version 23 (2016). The result of the finding showed that the coefficients of variation of morphometric traits varied widely among the local pigeons, male were significantly ( $P < 0.01$ ) higher on most of the traits recorded and the correlation coefficients among the variables observed (morphometric trait or morphometric measurements) were mostly low and non-significant ( $P > 0.01$ ). It can be concluded from the study that male had higher value for morphometric traits than female and the relationship among the traits showed that they can indicate each other. The study recommends selective improvement of local Pigeon should be encouraged because the major driving force in selection (variation) is large and farmer should be encouraged to used body girth and length during selection since they indicate body weight and they are very easy to measure.

**Key words:** *Correlation, Metropolis, Morphometric and pigeons*

### INTRODUCTION

Pigeons (*Columba livia domestica*) are gaining renewed attention in Nigeria for their potential in meat production, genetics, and research. While past literature (e.g., Ishaq, 2000) suggested that pigeons were the second most numerous poultry species in Nigeria, recent studies do not clearly support this claim. However, they are still widely kept, mainly for home consumption, with a small portion sold as meat or breeding stock. Squab meat is rich in protein and lipids and has less connective tissue compared to other poultry, making it suitable for people with digestive issues. Studies report squabs can grow from ~17 g at hatch to over 340 g in 30 days, indicating a promising growth rate (Adamu *et al.*, 2023).

Pigeons are also recognized for their complex behavior and intelligence. Although they do not fully pass the mirror self-recognition test, research shows that they can distinguish between their reflection and unfamiliar conspecifics, indicating a degree of visual self-awareness (Wittek *et al.*, 2021). They excel in visual categorization tasks, recognizing letters and images, and have demonstrated learning abilities comparable to simple AI models (Levenson *et al.*, 2023).



Additionally, pigeons show remarkable navigation skills, using visual landmarks, roads, and even magnetic fields for orientation.

Despite these attributes, pigeons remain underutilized in Nigerian agricultural research. Their limited productivity in terms of meat and egg yield may have contributed to this neglect. However, recent studies have highlighted significant genetic diversity among Nigerian pigeons, offering potential for selective breeding and conservation (Salaudeen *et al.*, 2025). Both sexes produce a nutrient-rich crop milk to feed their chicks, regulated by prolactin and other pathways (Zhang *et al.*, 2023). To unlock the species' full potential, systematic phenotypic and genetic characterization, alongside improved management practices, are essential for sustainable utilization. The squab is highly nutritious with smaller proportion of connective tissue; therefore, the meat is good for invalids and people with digestive disorders (Ishaq, 2000). Pigeon are incredibly complex and intelligent animal, they are one of only number of species to pass the 'mirror' test- a test of self-recognition. They can also recognize each letter of the human alphabet, differentiate between photographs and even distinguish different human within a photograph.

Pigeon are renowned for their outstanding navigational activities. They use a range of skills, such as using a sign as a guide as an internal 'magnetic compass. A study shows they can use landmarks as sign post and travel along man-made roads and motorways even changing direction at junctions. Pigeon made for life and tend to raise two chicks at the same time. Both female and male pigeons share responsibility of caring for and raising young. Both sexes take turn incubating the eggs and both feed the chicks 'pigeon milk'- a special secretion from the lining of the crop which both sexes produce.

Despite the attributes of pigeons, it had been neglected as a potential genetic resource in all fields of agricultural researches. The reason for this could be attributed to the poor performance of the bird in term of meat and egg production. As a lead up to the improvement of the species, different phenotypic traits of the birds need to be identified and characterized accordingly and to conserve biodiversity of this specie. The broad objective of the study was to describe the morphometric characteristics of local pigeon in Bauchi metropolis, while the specific objectives are to:

- (i) describe the morphometric traits of local pigeons.
- (ii) determine the effect of sex on morphometric traits of local pigeons.
- (iii) estimate the relationship among the morphometric traits of local pigeons.

## MATERIALS AND METHODS

A total of one hundred 100 (50:50) males and females matured Pigeons of mixed sexes were sourced from Muda Lawal market and used for the measurement of morphometric traits. The traits measured were body weight, body length, girth circumference, wing span and shank length. They were measured centimeters (CM) as follows:

**Body length:** This was measured from the tip of the break to the oil gland of the bird.

**Girth circumference:** This was measured as the circumference of the chest.

**Wing span:** This was measured from the tip of one wing to another when fully stretched.

**Shank length:** This was estimated as the distance from hock to the pad of the shank.

**Body weight:** This was estimated as the weight of the bird when on digital weighing scale in grams.

### Data Analysis

Data generated were analyzed using the T-test option of SPSS version (2019) to determine the effect of sex on parameters measured. The relation or the correlation coefficients between the traits were estimated using Pearson's Product moment correlation of the same software. The model utilize is as shown below:

$$Y_{ij} = U + S_i + e_{ij}$$

$Y_{ij}$  = Observation on depended variable (morphometric traits)

$U$  = Overall mean

$S_i$  = Effect  $i^{\text{th}}$  Sex (1,2)

$e_{ij}$  = Random error

### RESULTS AND DISCUSSION

Descriptive Statistics of morphometric traits of local Pigeons are shown in Table 1. The coefficients of variation (CV) observed were mostly high and ranged from 6.67 to 40.40 for body weight and shank length. The descriptive statistics of morphometric traits observed in the present study were mostly high, this indicates that local Pigeon in this area (Bauchi Local Government) were unimproved (genetic improvement of any livestock or poultry species tends to uniform any group of animal economic important trait). This observation was similarly reported by Essam (1997) who recorded higher coefficient of variation on linear body measurement of Jalali Pigeons native to Indonesia. Benerjee (2013) also reported higher CV on linear body traits of Pigeons and asserted that in any livestock species, economic important traits such as linear body measurement remain unimportant in the absence of any selective improvement program. Azad (2009) in his work on local chicken stressed linear body traits and other economic important traits related to reproduction varied widely. They attributed this variation to traditional method of animal husbandry where no any selective improvement or breeding program is established. Observed that local species of livestock remain the major reservoir of animal resources because they varied widely on all traits controlled by many genes (quantitative traits), this is due to lack of genetic improvement.

**Table 1: Descriptive statistics of Morphometric traits of Local Pigeons**

Variables	$\bar{X}$	$\sigma$	CV (%)
Body Weight (g)	304.47	20.31	6.67
Body length (cm)	16.77	5.94	35.42
Girth Circumference (cm)	18.10	7.11	39.28
Wing Length (cm)	44.69	11.90	26.63
Shank Length (cm)	3.08	1.26	40.90

CV= Coefficient of variability

### Effects of sex on morphometric traits of local Pigeon

Table 2 shows the effect of sex on morphometric traits of local Pigeons, the Males were significantly higher for body weight ( $P < 0.01$ ), body length ( $P < 0.01$ ), girth circumference and wing length ( $P < 0.05$ ) (310.33g, 17.36cm, 17.22 cm and 44.27cm, respectively) than females. However, non-significant ( $P > 0.05$ ) effect of sex on shank length was noticed. The fact that sex had effect on morphometric traits of local Pigeons as observed in the present in line with work of Parvex *et al.* (2016) who observed that male Pigeons had significantly higher body measurements (body trait) than females and notice this trend is maintained across all age groups. Similar assertion was made by Darwati *et al.* (2010) that Pigeon and other poultry, poultry species are sexually dimorphic in

most linear body traits. The authors recorded significantly higher mean values in male than females. Further report by Essam (1997) who showed that male pigeons at all ages were significantly higher in linear body traits and other quantitative measurements than the female counterpart. They attributed these difference to sex chromosomes, which differs in the two sexes. In addition, Benerjee, (2013) concluded that the sexual dimorphism that existed among livestock and poultry species could be as a result androgen (a male reproductive hormone) variation.

**Table 2: Effect of sex on morphometric traits of local Pigeons**

Variables	Male	Female	LOS
Body Weight (g)	310.33	298.61	**
Body length (cm)	17.36	16.17	**
Girth Circumference (cm)	18.97	17.22	**
Wing Length (cm)	45.11	44.27	**
Shank Length (cm)	3.10	3.06	NS

NS= No Significance, \*\*= Significance

### **Correlation among the morphometric traits**

Table 3 present the correlation matrix of morphometric in local Pigeons. Most of the coefficients observed were low and non-significant, except between body weight and body length (0.67 gm) and body weight and girth circumference (0.88 cm) were high, positive and significant ( $P < 0.01$ ) coefficients were recorded. Most of the correlation coefficients observed among the morphometric traits were low and non-significant; this is in line with the work of Parvez, (2016) who noticed that linear body traits of local Pigeon had low relationship with body weight. This shows that they cannot indicate live weight with higher accuracy. Benerjee (2014) worked on local Pigeon native to Indonesia and realized that morphometric traits are poor indicator of body weight, the author attributed this result to varied age of the experimental materials (local Pigeon) and poor sample size of the study. However, several investigators (Daikwo, 2015; Benerjee, 2013) worked on other livestock and poultry species and found that morphometric characteristics were highly correlated with body weight. The further reported that this concept was used from the construction of weighing that is applicable to most livestock and poultry species.

**Table 3: Correlation coefficients among the morphometric traits of local Pigeon**

Variables	1	2	3	4	5
Body Weight (g)	1	0.67**	0.88**	0.31*	0.22*
Body length (cm)		1	0.51*	0.16 <sup>NS</sup>	0.19 <sup>NS</sup>
Girth Circumference (cm)			1	0.17 <sup>NS</sup>	0.06 <sup>NS</sup>
Wing Length (cm)				1	0.11 <sup>NS</sup>
Shank Length (cm)					1

NS= No significance, \*\*= Significance

### **CONCLUSION AND RECOMMENDATIONS**

The study conducted that, the result of the study shows widely variation and male were significantly higher than female on variables observed. Furthermore, the correlation coefficients measured were mostly low and non-significant, except between the body weight and body length and girth circumference. The study recommends

- Selective improvement of local Pigeon should be encouraged because the major driving force in selection (variation) is large.
- Farmer should be encouraged to use body girth and length during selection since they indicate body weight and they are very easy to measure.



## ACKNOWLEDGEMENTS

We Acknowledged the effort of TETFund Centre of Excellence for Integrated Farming System, Federal Polytechnic Bauchi, Nigeria for sponsorship towards making this research a reality.

## REFERENCES

- Adamu, S. M., Hamidu, A. B., Mohammed, A. A. and Yusuf, A. (2023). Body weight and linear body measurements of squabs at different age intervals in Maiduguri, Borno State, Nigeria. *Nigerian Journal of Animal Production*, **50**(3):145–153. <https://www.njap.org.ng/index.php/njap/article/view/4562>
- Azad, M. A. K. (2009). Nutrient availability and body composition of semi scavenging Gola, Pigeon and meat yield of their squab. MSc. Dissertation, Department of Poultry Science., Bangladesh
- Benerjee, S. (2013). Morphological traits of Duck and Geese breeds of West Bangal. *Journal of Animal Genetic Resources*, **5**(2):1-16.
- Cleophas, T. J., Aeilko, H. Z. and Springer, W. (2016). Special Package for Statiscal Sciences. (SPSS). SPSS for Starter and 2<sup>nd</sup> Levelers.
- Darwati, S., Martojo, H., Sumantri, C., Shombing, D. T. H. and Mardiasuti, A. (2010). Productivity, Repeatability of Productive and Reproductive Traits of Local Pigeon. *Journal of Indonesian Tropical Animals in Agriculture*, **35**(4):28-274
- Daikwo, S. I., Dike, N. A. and Dim N. I. (2015). Discriminant Analysis of Morphological Differences in the Normal Feathered Chickens of North Central Nigeria. *Agro-Science*, **14**(3):12-25.
- Essam, J., Brak, R. and Alowczarek, J. (1997). Directed Vesicles Near and Attractive Wall. *Journal of statistical physics*, **1**(2):1-11.
- Ishaq, N. (2000). Phynotypic Characterization of Domestic Pigeon Resources in the Northern Region of Ghana. Udspace. Uds. Edu.gh.
- Levenson, R., Wasserman, E. A. and Freedman, D. J. (2023). Pigeons rival artificial intelligence in solving some complex categorization tasks. *The Guardian*. <https://www.theguardian.com/environment/2023/oct/26/pigeons-smart-ai-learning>
- Salaudeen, A. F., Onasanya, G. O. and Okpeku, M. (2025). Genetic diversity and population structure of domesticated pigeons (*Columba livia domestica*) in Nigeria using mitochondrial DNA. *KWASU Institutional Repository*. <https://kwasuspace.kwasu.edu.ng/items/0dfca43c-07f6-42b8-a14f-e6facb86d21a>
- Liang, G., Fu, W., Wang, K. and Burns, T. (2019). Analysis of t-test misuses and SPSS Operations in Medical Research. Academic. Oup.Com.
- Wittek, N., Waciewicz, S. and Osvath, M. (2021). Do pigeons pass the mirror test? Mirror-induced behavior suggests the use of mirrored cues but not self-recognition. *Frontiers in Psychology*, **12**, 649097. <https://doi.org/10.3389/fpsyg.2021.649097>
- Zhang, Y., Li, Y., Liu, Y. and Wang, Q. (2023). Advances in research on the formation and function of pigeon crop milk. *Life*, **13**(9):18-26. <https://doi.org/10.3390/life13091866>