MORPHOLOGICAL CHARACTERIZATION OF INDIGENOUS CHICKENS IN SOME PARTS OF KANO STATE, NIGERIA

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ABSTRACT
A study was carried out to assess the quantitative traits of hens in Langel and Doka communities Tofa, Local Government Area, Kano state. A total of forty households were selected based on availability of the indigenous chickens in the study area. Bodyweight and linear traits of one hundred and thirty-four indigenous chickens were measured using weighing scale calibrated in kilogrammes (Kg) and flexible measuring tape calibrated in centimetres (cm). The linear traits measured are neck length, body length, tail length, wing length, breast circumference, thigh length, thigh circumference, shank length, foot length, head length, head width. The data collected were analysed using General Linear Model using SAS (version 6). The result revealed that bodyweight of hens ranged from 0.70kg to 2.0 kg with mean value of 1.56kg while the mean of the linear traits were NL (7.72cm), BL (17.68cm), TLL (11.25cm), WL (11.43cm), BC (21.12cm), TL (10.09), TL (6.45cm), SL (6.66cm), FL (6.09cm), HL (6.25cm), HW (9.58cm). Positive and significant ($p < 0.05$) values were observed among all the traits measured. Neck length, breast circumference and head width significantly ($p<0.05\%$) predicted bodyweight with R^2 value of 0.65. It could be concluded that traits such as neck length, breast circumference and head width can be used to predict bodyweight. The coefficient of determination (R^2) value shows that the predictive equation from the study could be used to predict bodyweight of hens using this regression model.

Keywords: *Indigenous Chickens, Linear traits, body weight,*

INTRODUCTION
Indigenous chickens are widely distributed in the rural communities of tropical and subtropical countries where they are kept by the majority of the rural people (Ajayi, 2010). They play important roles in the rural economies of the developing and underdeveloped countries (Padhi, 2016) supplying high quality protein and income to the poor and the marginalized section of the communities (Ayieko *et al*., 2015; Bekele *et al*., 2016). They constitute about 80% of the continent's poultry flock (Gueye, 1998) and represents about 80% of the 120 million poultry raised in Nigerian rural communities (RIM, 1992).

Nigerian Indigenous chicken is a dual purpose bird that is used for both meat and egg production in the rural and peri-urban areas of the country. They are found in large numbers distributed across different agro-ecological zones under traditional family-based scavenging management (Sonaiya and Olori, 1990). They are self-reliant and have the ability to withstand harsh weather conditions (Ajayi, 2010).

Knowledge of variation of morphometric traits in local genetic resources such as measurements has been discovered to be useful in comparing body size and shape of animals (Mckracken *et al*., 2000; Latshaw and Bishop, 2001). Such comparison may be used as the basis for selection and improvement programmes.

MATERIALS AND METHODS
Description of the Study Area
The study was carried out in Langel and Doka in Tofa Local Government Areas (LGAs) of Kano State. The state lies between longitude $9^0$30' and $12^0$30' North, and latitude $9^0$30' and $8^0$42' East. Kano has daily mean temperature of 30^o to 33^oC in the months of March, April and May. Lowest temperature is 10^0C during the months of September to February (K-SEEDS, 2004). The wet season is from mid-May to late September and dry season from October to April. Annual rainfall ranges between 787 and 960 mm (KNARDA, 2001). The area is conducive for varieties of livestock species

such as sheep, goats, cattle, camel, horse, donkey and lot of other domesticated animals and wildlife (Muhammad *et al*., 2009).

Sampling Procedure and Management

A total of 134 hens were selected within Langel and Doka communities. The households were selected based on ownership of more than five indigenous chickens. The birds were managed in semi-intensive system of production, where they roam freely during the day and return home in the evening for dietary supplementation, shelter against predators and protection from harsh weather conditions.

Data collection procedures

Age was not considered as a factor in this study as such only adults were considered for quantitative assessment of body weight and 11(eleven) linear body traits on each bird. A weighing scale calibrated in kilograms (kg) was used to obtain the body weight by placing the hens on the scale and allowing it to stabilize before taking the reading. Linear traits were measured using flexible measuring tape calibrated in centimetres (cm). The anatomical references were in accordance with standard zoometrical procedures (Gueye *et al*., 1998; Teguia *et al*., 2008). All measurements were taken by the same personnel to avoid individual variations. The linear traits measured were: **Body length**: the length between the base of the neck and that of the caudal end of the tail. **Shank length**: the distance from the shank joint to the extremity of the digitus pedis. **Wing length**: measured as the distance from the caput humeri to the third carpal digit. **Neck length**: the distance between occipital condyle and cephalic borders of the coracoids. **Breast circumference**: it was measured from the scapula-humerii joint through the anterior border of the breast bone crest and the thoracic vertebrae. **Thigh Circumference**: measured as the circumference at the widest point of the thigh. **Thigh length**: measured from the distance between the hock and pelvic joint. **Head length**: the distance between the end of the beak and the end of the occipital condyle. **Head width**: measured from the right orbital prominence to the left orbital prominence. **Tail length**: measured from the tip of central retrix to the point where it emerges from the skin. **Foot length:** measured as part of the ankle to the tip of the middle digit.

Statistical Analysis

Data collected were analysed using General Linear Model Procedure in SAS (2015). The effect of location on bodyweight and other morphometric traits were determined. The relationship among the variables were also established. The means were separated using SNK.

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics of the traits measured for hens. The result showed that bodyweight of indigenous chickens ranged from 0.70 kg to 2.0kg with mean bodyweight of 1.56kg. The mean value obtained from this study is higher than the value reported by Momoh and Kershima (2008), Yakubu *et al*. (2009) and Ukwu *et al*. (2014) but similar with the findings of Egena *et al*. (2014). This could be attributed to feed availability, environmental factors and the genetic makeup of indigenous chickens in the area in which the birds are reared. Ajayi et al. (2008) reported that an increase in body measurements will lead to a corresponding increase in the bodyweight of chickens. The coefficient of variability was high because probably there is wide genetic diversity within birds used in the study area. This shows that there is continuous introduction of foreign genes in the study area, thus, an opportunity for breeders to explore.

Table: 1 Descriptive Statistics of the traits measured for Hens

Variables	Mean	CV	Min	Max
BW (Kg)	1.56	27.11	0.70	2.00
NL	7.72	19.87	4.00	14.00
BL	17.68	19.71	7.00	27.00
TLL	11.25	23.85	5.50	23.00
WL	11.43	20.32	6.00	19.00
BC	21.12	18.34	8.00	30.00
TL	10.09	23.70	2.00	23.00
TC	6.45	27.36	3.00	12.00
SL	6.66	22.08	3.00	18.00
FL	6.09	71.38	3.00	65.00
HL	6.25	15.08	3.00	10.00

HW	9.58	13.72	5.00	13.00

BW: Bodyweight, NL: Neck length, BL: Body length, TLL: Tail length, WL: Wing Length, BC: Breast Circumference, TL: Thigh length, TC: Thigh Circumference, SL: Shank length, FL: Foot length, HL: Head length, HW: Head width, CV: Coefficient of Variability.

Table 2 depicts the correlation coefficients between bodyweight and linear traits of hens. The result revealed that values for bodyweight were high and positively related with all the measured traits with the exception of foot length which was not significant with all traits. The findings agrees with the work of Faruque et al. 2010 and Egena *et al*. (2014). The highest correlation recorded (0.70) was between bodyweight and breast circumference (BC) which was similar to the findings of Daikwo et al. (2011). Similarly, correlation between bodyweight with Thigh circumference and head width also recorded high and positive value of 0.60. The traits that are high and positively correlated could be useful for selection purposes and results to the improvement of bodyweight (Assefa and Melesse, 2018) of indigenous chickens.

Table: 2 Correlation coefficients between Bodyweight and Linear Traits of Hens

Variables	BW	NL	BL	TLL	WL	BC	TL	TC	SL	FL	HL	HW
BW	1											
NL	0.55**	1										
BL	0.51**	0.52**	1									
TLL	0.56**	0.57**	0.47**	1								
WL	0.50**	0.36**	0.38**	0.45**	1							
BC	0.70**	0.49**	0.58**	0.50**	0.400**	1						
TL	0.59**	0.59**	0.47**	0.39**	0.49**	0.53**	1					
TC	0.60**	0.47**	0.40**	0.39**	0.40**	0.47**	0.54**	1				
SL	0.51**	0.48**	0.10	0.47**	0.39**	0.47**	0.43**	0.42**	1			
FL	0.19	0.21	0.14	0.18	0.06	0.16	0.18	0.17	0.27	1		
HL	0.53**	0.39**	0.26	0.41**	0.36**	0.44**	0.34**	0.54**	0.53**	0.14	1	
HW	0.60*	0.52*	0.42**	0.43**	0.40**	0.47**	0.51**	0.48**	0.47**	0.24**	0.54**	1

BW: Bodyweight, NL: Neck length, BL: Body length, TLL: Tail length, WL: Wing Length, BC: Breast Circumference, TL: Thigh length, TC: Thigh Circumference, SL: Shank length, FL: Foot length, HL: Head length, HW: Head width.

Table 3 shows prediction of bodyweight from Morphometric traits measured in Indigenous chickens. The coefficient of determination was found to be 0.65 which shows that independent variables explain 65% of the total variation. Neck length, breast circumference and head width significantly ($p<0.05\%$) predicted bodyweight. The result also revealed that bodyweight has the highest coefficient of determination followed by neck length (NL) and body circumference (BC) while least of determination was observed for head width (HW) which differ with the findings of Egena *et al*. (2014). Further addition of body measurement in predicting equations made substantial improvement of R^2.

Table 3: Prediction of Bodyweight from Linear traits of Hens

Y	A	B	X	LOS
Bodyweight	- 0.046			
		0.04	NL	*
		0.03	BL	Ns
		0.01	TLL	Ns
		0.01	WL	Ns
		0.04	BC	*
		0.01	TL	Ns
		0.03	TC	Ns
		0.004	SL	Ns
		-00007	FL	Ns
		0.006	HL	ns
		0..05	HW	*

R^2 =0.65 Adj $R^{2 =}$ 0.65
General:
Y = a + bx

BW: Bodyweight, NL: Neck length, BL: Body length, TLL: Tail length, WL: Wing Length, BC: Breast Circumference, TL: Thigh length, TC: Thigh Circumference, SL: Shank length, FL: Foot length, HL: Head length, HW: Head width, $p < 0.05$, Y: traits measured, a: intercept, b: slope or regression coefficient

CONCLUSION

It could be concluded from the findings that traits such as neck length, breast circumference and head width can be used to predict bodyweight of indigenous hens.

Recommendation

It could be recommended from the study that the predictive equation from the study could be used to predict bodyweight of hens using the regression model.

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