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MORPHOMETRIC EVALUATION OF ARBOR ACRE PARENT STOCK BROILERS REARED IN SOUTH-SOUTH NIGERIA

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ABSTRACT
Economic importance of morphometric parameters such as live weight and body measurements per weeks are quantitative as well as complex with continuous variability in chicken hence this present studies. A total of 140 unsexed day old parent stock broiler chicks (Arbor Acre strain) were used for this present study. They were completely randomized and divided into four treatment groups of 35 birds per group. Each group had five replicates of 7 birds per replicates. The parameters measured were body weight (BW), BODY length (BL), Wing span (WS), Wing length (WL), Breast girth (BG) and Shank length (SL). Correlation matrix between body weight and the linear body measurements were positive and highly significant (r = 0.510 – 0.765, P < 0.01). The linear regression model with a coefficient of determination (R^2) value of 60.30 included forecast indices such as BL, WS, WL, TL, BG and SL. The regression could be used to predict the body weight of the birds and also for selection purposes.
Key words: *Morphometrics, Evaluation, Arbor Acre, Parent stock Broilers*
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INTRODUCTION

Livestock in Nigeria are a very important national resource, and contribute tremendously to the nation's wealth. Traditionally, animals are judged through visual examination, which is a subjective method of judgment (Abanikande and Leigh, 2002). Therefore, the development of objective means (morphometric evaluation) for describing and evaluating body size and conformation characteristics would overcome many of the problems involved with visual assessment, (Essien and Adesope, 2003).

At this time of economic diversification by the Federal Government of Nigeria from oil to agriculture, poultry species with short generation intervals would provide a veritable option in ameliorating shortage of protein intake among the population in Nigeria (Muthukumar and Dev Roy, 2005). In view of the importance of this small stock, it is important to initiate development programs that can genetically improve the birds for efficient and effective productivity. Morphometric evaluation of body traits (Oke *et al*. 2004) provides useful information on the performance, productivity and carcass characteristics in animals. Body measurements reflect primarily the length of the long bones of the animal and when taken over a period of time, they generally indicate the way in which the animal body is changing shape and it has been helpful for predicting of live weight and carcass characteristics (Oke *et al*. 2004). In addition, correlations between body weight and linear body measurements are helpful not only in predicting body weight but also play a role in genetic improvement strategies such as breed characterization, evaluation of breed performance and prediction of live weight gain among other benefits. (Searle *et al.,* 1989; Ozkaya and Bozkurt, 2009). The most comprehensive measurement of growth available is still the bodyweights of live animals despite their being susceptible to short-term changes. Morphometric evaluation could be used as an indicator of weight changes and maturing rate in livestock such as poultry, cattle and sheep, (Mgbere *et al*. 2005).

There are scarcity of information in literature about the effect of age on live weight and linear body measurements of Arbor Acre breeder cocks in South-South Nigeria. This study, was therefore designed to determine the relationship between age and live weight of Arbor Acre Parent stock reared in South-South Nigeria.

MATERIALS AND METHODS

The experiment was conducted at the poultry unit of the Research Centre of the Faculty of Agriculture, Teaching and Research Farm, Delta State University, Anwai Campus, Asaba. Anwai is located at 60^0 45 East and 60^0 12 North, and has an annual rainfall range of 1800 – 3000mm and a maximum day temperature range of 28.0 – 31.00^0C (Federal Ministry of Aviation; (2014)**.** The experiment lasted for 10 weeks from 4^{th} June, 2014 to 15^{th} August, 2014. A total of 140 Arbor Acre parent stock broiler chicks were purchased from a reputable hatchery in Ibadan, Oyo state. The birds were checked against defect and they were given anti – stress medication on arrival. During the brooding period, the birds were fed with broiler starter diets; clean drinking water was made available at *ad libitum.* To avoid adverse effects of heat, proper ventilation was provided as from 8^{th} day, the 140 broiler chicks were randomly allotted into four groups of 35 birds per group, and each group were further replicated into 5, with 7 birds per replicates. Each group of birds were housed in a separate deep litter pen at day old, brooded for four weeks and reared up to 10 weeks of age using standard management procedures as described by Oluyemi and Robert (1979). The birds were vaccinated against Newcastle disease at day old and 4 weeks of age, and treated against gumboro disease at 2 weeks of age. Vitality, a vitamin supplement was occasionally given to enhance productivity. The body weights of the birds were taken on weekly basis, while the feed intake was taken on daily basis. The feed conversion ratio was calculated as feed intake divided by weight gain. The linear body measurements (body length, wing span, thigh length, shank length, wing length, kneel length and breast girth) were taken weekly using a measuring tailor tape**.** Data collected on each of the parameters were subjected to one way analysis of variance in a completely randomized design.

The following statistical model was used in the analysis.

yij = u + xi + eij

Where

yij = The observation (body weight etc.), made on the jth individual belonging to the ith group of broilers.

u = Overall estimate of the population mean.

xi = effect of the ith treatment (I = 1,2,3,4)

eji = Random error associated with each measurement.

RESULTS AND DISCUSSION

Variation in live weight and linear body measurements with age of Arbor acre parent stock broiler chicken are presented in Table 1. Live weight generally increased significantly (P < 0.05) with age and ranged from 256.98±17.**69** to 653.90 ± 48.86g in the first 28 day of age. It also ranged from 1692.31 ± 76.34 to 3073.08 ± 184.98 g in 29 to 70 days of age. The results of the experiment also showed significant variation in linear body measurements of the birds with age. The live weight and linear body measurements of the birds equally increased with age. This result is in consonant with earlier reports by Momoh *et al.* (2008), Rusted *et al.* (2006) and Roque and Soares (1994). Body length and every other body trait studied were all measures of growth. Growth is a fundamental property of biological systems and it can be defined as an increase in body weight and other body parameters (size) per unit time (Schylze *et al;* 2001, Lawrence and Fowler, 2002).

As ages increased, the linear body parameters also increased, and ranged from 31.00 ± 0.71 to 31.27 ± 0.73, 34.77 ± 2.02 to 37.23 ± 2.0, 13.00 ± 0.28 to 13.35 ± 0.23 and 8.62 ± 0.13 to 8.85 ± 0.15 for body length, wing span, thigh length and shank length respectively in the first 28 days of age. It became 31.31 ± 0.33 to 38.00 ± 0.47, 36.39 ± 1.72 to 51.69 ± 0.78, 13.85 ± 0.21 to 18.77 ± 0.44 and 8.35 ± 0.17 to 9.35 ± 0.27 respectively at 29 – 70 days. Although, the observation was positive and significant (P<0.05) at later age (i.e 5 weeks to the end of the experiment). The increment is moored between 6 to 10 weeks of age. This observation is in agreement with those of Mani *et al;* (1991) and Kashoma *et al*., (2011) who observed that linear body measurements of N'dama cattle increased with age in a similar manner from birth to 30 months of age.

It was noticed that the live weight increased with age. This observation can be expected since increase in body size and weight of animals arises from laying down of body tissues and growth of skeletal structure are directly related to age (Hall, 1991 and Orheruata and Olutogun 1994).

The result of the linear regression is shown Table 2. There it can be seen that independent variable jointly explained up to 60 percent of the variability in the dependent variable (body weight) since the R^2 is equal to 60.30%. This proportion of dependent variable explains that f statistic is equal to 60.30 is significant at 1 percent.

Journal of Agriculture and Food Sciences **Philip Okpako Akporhuaho**
Volume 15 Number 1, April 2017 pp. 21 - 27.

The results of the correlation coefficients of the linear measurements to one another and to the live weight are presented in Table 3. The linear measurement of Body length (BL), Wing span (WS), Weight length (WL), Thigh length (TL), Kneel length (KL) and Breast girth (BG) were highly correlated and positive with live weight. This result also agrees with earlier reports (Orheruala and Olutogun, 1994; Lesosky *et al*; 2013). Body length had the highest correlation coefficient with thigh length (R^2 = 0.765) while the correlation coefficient between body weight and breast girth was the least (R^2 = 0.510)

CONCLUSION

Phenotypic correlation showed that body weight was positively and significantly correlated with all of the traits studied in Arbor Acre parent stock broiler chickens.

The implication is that body weight of Arbor Acre parent stock broiler chickens could be estimated accurately using body measurements such as Body length, wing span, wing length, thigh length and kneel length. Selection and improvement of these traits will significantly improve the body weight of Arbor acre parent stock broiler chickens.

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Journal of Agriculture and Food Sciences **Philip Okpako Akporhuaho**
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Table 1. Effect of age on live weight and linear body measurement parameters in Arbor Acre parent stock broiler chicken

	AGE				
Traits cm	**0 -14**	**15 -28**	**29 – 42**	**43 – 56**	**57 -70**
Body weight	256.98 ± 17.69^{e}	653.90 ± 48.86^{d}	1692.31 ± 76.34^{c}	2084.62 ± 63.90^{b}	3073.08 ± 184.98^{a}
Body length	31.00 ± 0.71^{c}	31.27 ± 0.73^{cd}	30.31 ± 0.33^{d}	34.46 ± 0.39^{b}	38.00 ± 0.47^{a}
Wing span	34.77 ± 2.02^{b}	37.23 ± 2.0^{b}	36.39 ± 1.72^{b}	48.00 ± 0.59^{a}	51.69 ± 0.78^{a}
Thigh length	13.00 ± 0.28^{c}	13.35 ± 0.23^{c}	13.85 ± 0.21^{c}	16.62 ± 0.35^{b}	18.77 ± 0.44^{a}
Shank length	8.62 ± 0.13^{b}	8.85 ± 0.15^{b}	8.35 ± 0.17^{ab}	8.85 ± 0.22^{ab}	9.35 ± 0.27^{a}

abcd, means within the same row with different superscripts are significantly ($P<0.05$) different.

Table 2 Regression

Bwt = - 1103.49 +64.90. BL – 10.95 WS +16.58 WL + 49.17 Th L + 14.71 KL +1.12 Bg

R2 = 60.30

Table 3 Correlation matrix of live weight and body measurements of Arbor Acre parent stocks

Bodywt	**Body L**	**Wings**	**Wing L**	**Thigh L**	**Kneel L**	**Breast g**
Body L	0.685**					
Wings	0.540**	0.761**				
Wing L	0.561**	0.708**	0.772**			
Thigh L	0.630**	0.765**	0.737**	0.734**		
Kneel L	0.542**	0.718**	0.725**	0.690**	0.647**	
Breast g	0.510**	0.688**	0.663**	0.693**	0.606**	0.712**

**Correlation is significant at 0.01 level