CORRELATION BETWEEN MORPHOLOGICAL TRAITS AND BODY WEIGHT OF ROSS 308 AND ARBOR ACRE BROILER CHICKEN DURING STARTER PHASE

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ABSTRACT
Components of growth such as body weight and morphometric measurements are important to both poultry breeders and meat processors. Morphometric traits are the quantitative analysis of the structure shapes and sizes of an organism. The derivation of body weight from the body measurement (ie morphometric traits) has been reported to be a practical and easy techniques especially among rural poultry farmers with lack of resources. The objective of this study is to compare the morphological traits of the two breeds of broiler using morphometric measurement and the body weight. The result of the study showed a high significantly ($P<0.05$) positive correlation among the morphometric traits with respect to body weight. The correlation ranged between 0.55 and 0.83 with the highest correlation of 0.83 found between wing length WL and breast width BRW. The relationship between morphometric traits and body weight of breeds of broiler can be used to predict the weight of broiler chicken.
Key word: Growth, trait, morphometric, measurement, correlation

INTRODUCTION
Growth is a complex and highly dynamic physiological process that begins after a zygote is formed and continues until maturity. Components of growth such as body weight and morphometric measurement are important to both poultry breeders and meat processors (Adeniji and Ayorinde 1990). Body weight plays an important role in the determination of market price in farm animals (Momoh and Kershima, 2008). Morphometric traits are the quantitative analysis of the structure, shapes and sizes of an organism. The derivation of body weight from the body measurement (ie morphometric traits) has been reported to be a practical and easy technique especially among rural poultry farmers with lack of resources (Semacula et al., 2011). Maciejowsk, and Zeiba (1992), reported that morphological traits such as shank length and circumference were indications of the leg development. Wing length indicates age of a bird, body girth was an indicator of breast development. Morphological traits can also be used to develop breeding strategy via optimum combination of body weight and economic returns. Phenotypic correlation estimate between body weight and morphometric traits can also guide the breeder in the choice of body size to incorporate into his selection index. Since Arbor-acre, Arbor Acre Plus and Ross 308 are closely related. It has been considered vital and useful for this study and the morphometric traits of the bird will be observed.

MATERIALS AND METHODS
Experimental Location
This study was conducted at the teaching, research and demonstration farm of the department of Agricultural Technology, AkanuIbiam Federal Polytechnic, Unwana in Afikpo North Local Government Area of Ebonyi State. Unwana is the tropical rain forest one of Nigeria and have air temperature of 21^0C – 32^0C with a total annual rainfall of above 3500mm per annual (Njoku *et al*., 2006).
Duration of the Study
This study lasted for 28 days (4 weeks)
Experimental animals
A total of 120 day old, broiler chicken,60 breeds of Arbor acre plus and 60 breeds of Ross 308 was used for this research.
Experimental Diet
Chukun commercial starter crumb was used for this research
Data Collection
The initial body weight and morphometric measurements i.e (head length, breast length and width, shank length and circumference, beak length, body length, wing length), were measured at the

commencement of the study using a tailors tape and a sensitive scale of 0.5g sensitivity. Another measurement was taken on the day 7, day 14 and day 21 of age of the birds.

Statistical analysis

The Pearson product-moment correlation coefficient (r), simply called the correlation coefficient, was used to examine the linear relationship between the morphometric traits.

$$r_{AK} = \frac{\sum_{i=1}^{N}\left(\hat{A}_i - \bar{\hat{A}}\right)\left(\hat{K}_i - \bar{\hat{K}}\right)}{\sqrt{\sum_{i=1}^{N}\left(\hat{A}_i - \bar{\hat{A}}\right)^2 \sum_{i=1}^{N}\left(\hat{K}_i - \bar{\hat{K}}\right)^2}} \qquad i = 1, \ldots, N$$

where $\bar{\hat{A}}$ and $\bar{\hat{K}}$ are the arithmetic means for the morphometric traits and estimated by using the procedure of CORR available in the SAS package (2003).

RESULTS AND DISCUSSION

Table 1 presented the correlations between the morphological traits of Ross 308. The result of the study showed a high significantly (P<0.05) positive correlation among the morphological traits with respect to body weight. The correlations ranged between 0.55 to 0.83 with the highest correlation of 0.83 found between WL and BRW. This showed that wing length, WL and breast width, BRW had the highest predictive ability for body weight of Ross 308 better than other morphometric traits.

Table 1: Correlation between body weight and morphological traits in Ross 308

Parameters	BH	BL	BRL	BRW	DSK	SL	TL	WL
BH								
BL	0.72*							
BRL	0.65*	0.80*						
BRW	0.77*	0.77*	0.77*					
DSK	0.56*	0.73*	0.76*	0.69*				
SL	0.72*	0.66*	0.75*	0.76*	0.68*			
TL	0.55*	0.66*	0.73*	0.72*	0.73*	0.70*		
WL	0.81*	0.82*	0.82*	0.83*	0.76*	0.77*	0.69*	

*P<0.05, BH = Body height; BL = Body length; BRL = Breast length; BRW = Breast width; DSK = Drumstick; SL = Shank length; TL = Thigh length

Table 2 presents the correlations between the morphological traits of Arbor acre. The result of the study showed a high positive correlation among the morphological traits with respect to body weight. The correlation coefficient are all significant at P<0.05. The result of the correlation showed a higher correlation of 0.89 between BRW and BL while the lowest of 0.57 was recorded between BH and TL. It is noted that the lower the correlation coefficient the weaker the predictive ability of the independent variable.

Table 2: Correlation between body weight and morphological traits in Arbor acre

Parameters	BH	BL	BRL	BRW	DSK	SL	TL	WL
BH								
BL	0.66*							
BRL	0.75*	0.80*						
BRW	0.79*	0.89*	0.72*					
DSK	0.60*	0.83*	0.66*	0.79*				
SL	0.74*	0.86*	0.75*	0.79*	0.70*			
TL	0.57*	0.76*	0.83*	0.70*	0.73*	0.80*		
WL	0.78*	0.82*	0.72*	0.80*	0.76*	0.84*	0.88*	

*P<0.05, BH = Body height; BL = Body length; BRL = Breast length; BRW = Breast width; DSK = Drumstick; SL = Shank length; TL = Thigh length, WL = ?

BL, WL,BRL and WL have same correlation coefficient, they also have high value, but not as high as WL and BRL. Other traits with high correlation value compare to the weight includes: BRW and BH, BRL & BL 0.80, and BRW &BRL =0.77, SL &BBL,=0.75, TL & BRL =0.72 TL & DSK =0.73. However there are some traits with low correction such as TL & BH =0.55 TL and BL 0.8 and SL & BL = 0.66.

CONCLUSION AND RECOMMENDATION

Arbor acre and Ross 308 chicken can adequately be characterized using morphometric traits. Morphometric traits such as breast width can be used to determine the weight of the birds. It is recommended WL and BRW for Ross 308 and Arbor acre be used to predict body weight.

REFERENCE

Adeniji, F. O. and Ayorinde, K. L. (1990). Prediction of Body Weight from Body measurement of chicken. Nigeria J. Anim. Prod. 17 42-47

Albert, N.A.T. (2012), The Response of Broiler Chickens to Dietary inclusion of Alternanthera sessilis leaf meal. AM.S.C Thesis. Submitted to the School of Graduate Studies Kwame Nkruma University of Science and Technology Kumasi Ghana.

Chinke, C. A. (2001). Interaction existing between Body Weight and Egg Production Traits in Olympia Black Layers. Nig. Prod., 28: 1 – 8.

Dziwornu and Sarpong (2014)

FAO Statistics Division (2009). Viahedellefermedlcsracalla, 00153 Rome, Italy. Food and Agricultural Organization (2010). Agribusiness Handbook Poultry Meat and Egg.

Ibe,S. N. (1989) Measurement of size and Confirmation in Commercial Broiler. *Journal of Animal Breeding and Genetics.* Vol.106 pp 461-469

Maciejowsk, J. and Zeiba, T. (1982). Genetics and Animal Breeding. Amsterdam-Oxford-New York, PWN-Polish scientific publishers, Warszama

Momoh, O.M. and Kershima, D.E. (2008). Linear body Measurement as Predictors of body Weight in Nigerian Local Chickens. Asset Series A. pg 206-212

Njoku, L.J. (2006). Climate change and soil condition in the tropic rain forest of the south eastern Nigeria. *International Journal of Agricultural research.*Pg 62-68

Nwajiuba, C and Nwoke, E. (2000). Inflation and the Poultry Industry in Nigeria Implications for Profitability. In: Orji, U.I. Mgbere, O.O. (eds) Proceedings of the 5th Annual Conference of Animal Science Society of Nigeria. Port Harcourt, Nigeria, pg 206-208

Olawunmi,O.O. (2 0 0 8) . Morphometric Differentiation and Assessment of functions of Fulani and Yoruba Ecotype Indigenous Chickens of Nigeria .*International. Journal of Morphology* 26 (4) 975980

Semacula, J. (2011). Estimation of Live Body Weight using Zoometrical Measurements for Improved Marketing of Indigenous Chicken in the lake. Victoria Basin of Uganda. Available in http/www.lrrd.org/lrrd23/8/sema23170.htm. accessed Oct. 2013.