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ANALYSIS OF GROWTH PERFORMANCE OF INDIGENOUS CHICKEN OF BREED BY CORRELATION COEFFICIENT

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ABSTRACT

This study was conducted to determine the genetic relationship between body weight and growth trait of indigenous chicken at different ages. All the experimental chicks have statistically the same body weight ($P > 0.05$) and carry out some analyses to test the existence of differences in the growth pattern between these breeds. There was similar body weight gain and significant difference ($P< 0.05$) in disease traits between phenotypes of chicks. The body weight at all ages except at 2 weeks of age was significantly ($P<0.05$) higher in indigenous. The body weight gain was also significantly ($P<0.05$) higher in at all periods except between 2 – 4 weeks of age. Parameter values, the Durbin-Watson Statistic (DW) test for autocorrelation, computing difficulty based on the number of iterations needed for convergence and size of residual variances. Highest correlation coefficient estimate was obtained between body weight and chest circumference in both populations. The correlation between the first canonical variable and the two chicken ecotypes is moderate (0.55), canonical variables being highly significant based on the Wilks lambda test.

Key Words: Indigenous Chicken, Body Weight, Correlations, Body measurement

INTRODUCTION

Indigenous breed is a general terminology to describe those birds kept in the extensive system, scavenging in the free-range, have no identified description, multi-purpose and unimproved 13, Horst P (1989) and Pedersen C.V. (2002). Indigenous chickens are reported to have variable morphological identity carrying genes that have adaptive values to their environment and diseases. According to Horst, indigenous chickens can be considered as gene reservoir, particularly, for those genes that have adaptive values in the tropical conditions. Relationships exists between body weight and linear body measurements. This is to organize the breeding programme so as to achieve an optimum combination of body weight and good conformation for efficient production and maximum economic returns. Body weight and body dimensions have been used as parameters for selection by local sellers and for research. Nowadays, commercial poultry production, allows rapid propagation of diseases among the birds. High density of birds increases the risk of disease transmission, genetic homogeneity of the flock, preventing the barrier role of most resistant bird genotypes or the sanitary quality of the selected flock which disables every resistant genotype natural selection (Calenge et al., 2011). Indigenous chicken productivity, expressed in terms of egg production, egg size, growth and survival of chicks, is low compared to the rest of the world. The morphological features, growth and egg potentials of the local chicken have been reported (Nwosu, 1992, Nwosu and Asuquo, 1985, Oluyemi, 1990, Adedokun and Sonaiya 2001). The correlation of the linear body measurement with body weight depends on species and breeds. Wiener (1994) reported that linear body dimension can be used as a way of estimating body

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weight. Thus, correlation and regression are of great interest to breeder. The extent and direction of correlated selection response are determined by the genetic correlation or covariance between the concerned traits. Therefore for improving the total economic value of an animal, it is important to know both the effect of the trait actually being selected and its effect on the other traits.

In a number of studies, growth trend parameters have been found to be highly heritable and have been successfully used in selection studies (Merrit, 1974; Mignon-Grasteau *et al.*, 2000; Sengul & Kiraz, 2005).

A number of growth models exist that can be used to determine the age-live weight relationship of animals. Phenotypic correlations among body weight and body measurement in some pure breeds of chicken and their crosses were estimated by Ezzeldin *et al.* (1994). Ige (2011) reported that high, positive and significant correlation coefficient between body weight and linear body measurement indicates that easily measured body parts can be used as criteria for selection of body weight in crossbred Fulani ecotype. The correlations between live body weight and body linear measurement were studied by Adeniyi and Ayorinde (1990) using Cobb broilers strain.

Live body weight was best predicted using chest circumference. The objective of this study is to estimate genetic parameters through correlation in indigenous chicken ecotypes. Guèye (2002) posited that there are usually humanized relationships between humans and poultry. Thus small poultry flocks are kept by producers; and humans and poultry often live in the same house. Aini (2000) showed that bio security practices are very important to indigenous chicken producers. Reports have shown that indigenous fowls possess great potentials for genetic improvement through breeding programmes (Omeje and Nwosu, 1983; Nwosu, *et al.,* 1985; Ikeobi, *et al.*, 1996; Adebambo, *et al.,* 1999; Peters, 2000; Adedeji, *et al.,* 2008; Adebambo, *et al.*, 2009).

MATERIALS AND METHODS

The data utilized in this study were obtained from Desi Breeds for present investigations were collected from the records of the indigenous chicken. The chickens were reared together on a litter floor in an open house. They were medicated similarly and were subjected to the same managerial, hygienic and climatic conditions. Standard commercial starter and grower diets were provided *ad libitum* and the birds had free access to water. Chickens were wing-banded at 1 day of age and body weights were recorded at the end of each one-week period. The birds were wing-tagged individually for identification purposes and were exposed to natural day light. Each dam was at the same time inseminated with 0.1ml of fresh undiluted semen twice a week from same sire throughout the period of insemination. Fertile eggs from inseminated birds were collected on a daily basis and were pedigreed along sire and dams lines. Only eggs with good shape and unbroken shells were separated and stored at room temperature and relative humidity of 70-80% before they were set in a kerosene fuelled table type incubator. The eggs were set along sire line at temperature of 38 – 39oC and at humidity of 55 – 56% for the first eighteen days. The temperature was increased from 39oC to 40oC and humidity of 70 – 75% from nineteenth day to hatching time.

STATISTICAL ANALYSIS AND MODEL

The data collected were analyzed with Pearson□s coefficients of correlation (r) and it was achieved using SAS software. The operational model for Pearson correlation is as follows;

$$r = \frac{\Sigma X_i Y_i}{\sqrt{\Sigma X^2 i \ \Sigma Y^2 i}}$$

Where r = Pearson□s product moment correlation coefficient

Xi = the first random variable of the ith LBM or Body weight

Yi = the second random variable of the ith LBM or Body weight

RESULT AND DISCUSSION

Phenotypic correlation coefficients that described the degree of association between Body Weight and body measurements studied in indigenous Chicken are presented in Table .The result indicated that Body weight was positively and significantly ($P < 0.05$) correlated with most body parameters in both sexes within the population. The Phenotypic correlation between body weights at various ages. Day old body weight was positively correlated with body weight at later ages. The genotypic correlation mostly varied from low to medium. The magnitude of genetic correlation gradually increase up to 16 week of age and then decrease .the phenotypic correlation between these traits were small and positive and follow similar trend.

Table-1-Correlation coefficients between body weights (BW) of ecotype Indigenous chickens.

		BW4	BW6	BW8	BW10	BW12
BW4	Pearson Correlation	1.000	.843	.738	.729	.563
	Sig. (2-tailed)	.	.000	.000	.000	.000
	N	114	114	114	114	114
BW6	Pearson Correlation	.843	1.000	.713	.714	.558
	Sig. (2-tailed)	.000	.	.000	.000	.000
	N	114	114	114	114	114
BW8	Pearson Correlation	.738	.713	1.000	.765	.651
	Sig. (2-tailed)	.000	.000	.	.000	.000
	N	114	114	114	114	114
BW10	Pearson Correlation	.729	.714	.765	1.000	.796
	Sig. (2-tailed)	.000	.000	.000	.	.000
	N	114	114	114	114	114
BW12	Pearson Correlation	.563	.558	.651	.796	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.
	N	114	114	114	114	114

Body weight at 4 week of age was positively correlated with body weight at 8, 10, and 12 week of age. The phenotypic correlation of Body weight 4, 6, 8, 10, and 12 was 1.000, 0.843, 0.738, 0.729 and 0.563 respectively. The magnitude of such phenotypic correlation gradually decrease with increase in age. These results are higher than those reported by Desai (1962), Wilson (1979) and Elfaki (2000) for Sudanese chicken, and were also higher than those suggested by Aganga (2003) and Haitook (2003) for Taswana chicken.

Village poultry production is mostly based on the scavenging indigenous domestic fowl. These genetically unimproved local chickens remain predominant in Sudanese villages despite the introduction of exotics and cross strains; this is due to the fact that farmers are not able to afford the high input requirements of these introduced breeds. Body weights at various ages showed significant differences between the Betwil and the Bare Neck ecotypes, and between the two sexes within each ecotype; the results agree with those reported by Yousif et al (2006), Elsheikh(2001) and Mekki et al (2005), but were higher than that reported by Elfaki (2000) for indigenous chicken of Sudan. Weight gain showed significant differences between males and females at various ages, and was also significantly different between the Betwil and Bare Neck.

In general, chicken growth is well described as a sigmoid curve with an initial exponential development phase, an intermediate or transitory phase, and a final phase of inhibited growth that consists of a gradual reduction in the growth rate following an asymptotic increase in the body weight (Aguilar *et al.*, 1983). A comparable pattern of heritability changes in monthly egg numbers has also been reported by Anang et al. (2002) and Wolc and Szwaczkowski (2009).

Correlation coefficients indicate the strength of a linear relationship between two traits and thus provide useful information about the traits involved for the purpose of breeding and improvement plan. The coefficients of correlation from this study varied from strong to low, positive and significant at most of the ages considered. Values obtained for coefficients of correlation at week 2 agreed with literature values reported by Okon *et al.* (1996) where moderate to high and positive ranges of genetic correlations between body weight and body measurements were observed at this age in their study. This shows that favourable relationships exist among traits that had higher correlation coefficients; It further explains that such traits could be collectively included in the selection index to achieve positive genetic progress. Ojo, (2010) Lilja (1983) reported a high value of 0.93 between the two traits. This shows that body girth is a reliable criteria to evaluate body weight of chicken and other livestock. Okoro and Ogunde (2006) equally recorded high and positive coefficients of correlation between body weight and other growth traits and it was concluded that these traits are good indicators of bodyweight. Okpeku (2003) reported that body weight was positively correlated with body length and chest circumference among local chicken in Edo state.

CONCLUSIONS

In conclusion, the high, positive and significant correlations between body weight and linear body measurements indicate that these easily measured parts can be used as criteria for selection of body weight in poultry. Selection for any of, or a combination of traits of economic importance can be done at 2, 4, 6, 8 and 10 weeks, at which time high, positive and consistent significant correlations between the desired traits.

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