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DISCOVERY

Growth performance traits of meat-type chicken progenies from a broiler line sire and Nigerian indigenous chickens' dams reared in southern guinea savanna condition of Nigeria

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ABSTRACT
The genetic improvement in animal breeding could either through selection or breeding methods and the inherit potential of Nigerian indigenous chickens could further improved through these tools. This study was designed to determine the effect of chickens' genotype on the growth performance characteristics of the chicken progenies resulting from Arbor acre broiler sire line and Nigerian indigenous chicken dams (Arbor acre x Naked neck- AANN), (Arbor acre x Fulani ecotype-AAFE) (Arbor acre x Frizzled feather- AAFF) and (Arbor acre x normal feather-AANF) crosses. Data obtained on body weight, body length, breast girth, keel

length, thigh length, shank length, wing length, feed intake, weight gain and feed conversion ratio in a Completely Randomized Design were analysed using one-way analysis of variance for the fixed effect of chicken genotype. Growth performance characteristics were significantly affected (P < 0.05) by chickens' genotype. Progenies resulting from mating of Arbor acre x Naked neck- AANN chickens had the highest body weight (1390 g), body length (17.35 cm), keel length (8.29 cm), shank length (5.55), breast girth (20.75 cm), thigh length (15.32 cm), wing length (17.89 cm), consumed lesser feed (0.48 g), gain more of weights (0.90) and better feed conversion ratio than other chickens' genotype. However, the relationships between the body weight and other linear body measurements including the feed intake, weight gain and FCR of these crossbred chickens revealed positive and very highly significant (P<0.001) correlations. In conclusion therefore, the genetic superiority exhibited by the crosses of Arbor acre x naked neck when compared with other crossbreds could be exploited to speed up the growth performance of indigenous chicken towards having Nigerian indigenous broiler line and the correlations among these traits prove to be an indication of pleiotropism action and good indicator for selection for improvements in one trait in an animal.

Keywords: Meat type chicken line, Nigerian Indigenous birds, growth performance, sire, dam

1. INTRODUCTION

The Nigerian indigenous chickens has been reported to exhibited higher fertility and hatchability under natural incubation, and better adaptation to the prevailing diseases, physical conditions and local management practices than exotic chickens (Amao*et al*., 2019). In addition, its meat is perceived to have superior gustatory qualities. It is however less productive (meat and eggs) than its exotic counterparts (Amao 2017a, b, c). Researchers have shown that the indigenous fowl possesses great potentials for genetic improvement through breeding programme such as selection and or cross breeding (Adedeji *et al.,* 2006 and Amao, 2017a). Two methods that are commonly used to improve growth performance of indigenous chickens are selection within breed and crossbreeding. Selection within breed is done on purpose of fast growing individuals and subsequent breeding of those selected individuals among themselves. The major drawback with this method is that i it is very slow and selection limit is reached faster. Crossbreeding is another way of making better growth performance in poultry aimed at producing superior crosses for growth traits under the influence of various genetic and non-genetic factors (Mahmoud and El-Full, 2014). In crossbreeding two different but complimentary breeds are mated together in order to benefit from heterosis and breed complementary and improvements in economic traits are realized within a relatively short period of time (Adedeji *et al*., 2015).The problems of better productivity are in terms of breeds unsuitable for the environment and to diseases, bad management, lack of supplementary feeding and predators (Bagust, 1994). Crossbreeding of local breeds of poultry with their exotic counterpart stocks will take merits of systematic scientific selection for productivity in the exotic birds and natural selection for hardiness in the indigenous birds.

Meanwhile, chickens with improve production performance can result from the combined ability of best performing exotic lines and the indigenous chickens by exploring the potentials of the Nigerian indigenous light chicken ecotype through crossbreeding that will not only lead to improvement of the local chicken but also provide solution to agitation of banning importation of day-old chicks and breeder stock which are expensive to handle, especially in Nigeria. This work was designed to evaluate growth performance traits of progenies derived crosses between of the broiler Abor acre strain sire and the Nigerian indigenous chickens' dams in the southern guinea savanna environment of Nigeria.

2. MATERIALS AND METHODS

Experimental site

The study was conducted at the Animal Breeding and Genetics Unit of Teaching and Research Farm, Emmanuel Alayande College of Education, Oyo, Oyo state, Nigeria and Oyo lies on the longitude 3°5′ east of the Greenwich meridian and latitudes 7°5′ North eastwards from Ibadan, the capital of Oyo State. The altitude is between 300 and 600 meter above sea level. The mean annual temperature and rainfall are 27°C and 1,165mm respectively. The vegetation of the area is Southern guinea savanna zone of Nigeria (Amao, 2019).

Experimental Birds and Management

A total number of 60 mature birds were used for the experiment which comprises of 24 Arbor acre sires and 24 each of naked neck, normal feather, frizzled feather and Fulani ecotype chickens' dams. This distribution was 6 cocks, 24 hens for each of the genotype. The Arbor acre broiler chicken sires were procured from a reputable breeder farm in Ibadan, Nigeria while Nigerian indigenous birds were sourced from the pre-existing chickens at the Breeding and Genetics unit of Poultry unit of Teaching and Research Farm. The experimental birds were managed strictly under intensive system of management. The age of the birds was between 18 weeks to 24 weeks for the hens and 18 weeks for the cocks. The birds were wing tagged individually for identification purpose. Cocks and hens were tagged individually in an open sided poultry house providing a two-tier galvanized batter cage space of 1800 square inches. Each bird was confined in a cell space of 15 by 7.5 inches. Medication and vaccination such as Lasota, Gumboro and Fowl pox was done as required.

Feed and feeding of parent stock

The cocks were fed *ad libitum* with commercial breeders grower mash containing 16% crude protein and 2600 kcal/kg metabolizable energy. Hens were also fed commercial layers mash containing 16% crude protein and 2800 kcal/kg metabolizable energy. Clean and cool water were also supplied *ad libitum*.

Experimental mating

Artificial Insemination (AI) method was used in mating the hens. The massage technique was used to collect semen from the cocks; the cocks were trained for two weeks for semen collection by applying pressure at the back towards the tail forty times before sperm production. Feathers around the cock's vent were trimmed at two weeks interval and semen collection from the cock started at 22 weeks of age after the collection of the semen it was immediately inseminated into a doughnut shape in the left vent of the hen. This was done twice in a week in the evening. For each hen, 0.1ml of undiluted fresh semen was used for insemination each time with an inseminator.

Mating design

The mating design is as shown below:
Arbor acre (Male) x Frizzled Feather (Female): AA_m x FF_f
Arbor acre (Male) x Fulani ecotype (Female): AA_m xFE_f
Arbor acre (Male) x Naked Neck (Female): AA_m x NN_f
Arbor acre (Male) x Normal feather (Female): AA_m x NF_f

Egg Collection and Incubation

Eggs from artificial inseminated hens were collected along genotypes' lines and allow accruing in a cool room having 25^0C for five days before transferred to the hatchery for incubation. Eggs were set in a cabinet-type incubator at a commercial hatchery in Ibadan, Oyo State Nigeria and set along genotypes' lines at a temperature between 27-39^0C and a relative humidity of 55 to 56% for 18 days, then the temperature and relative humidity increased to 29-40^0C and 70-75% respectively from 19^{th} day to hatching time. The eggs were turned automatically through 90^0 in the incubator. Candling was carried out on the 5^{th} and 18^{th} day of the incubation for the identification of fertile eggs and clear eggs using a candler fixed with a neon florescent tube carried out in a dark room.

Management of the chicks

All chicks resulting from each genotypes' lines were properly identified at day old by wing tagged with industrial aluminum galvanized tag at two weeks for proper identification. All chicks were raised under the same intensive management system. Vaccination and medication programs were duly observed from day old. The day old chicks were transferred to a separate and previously disinfected brooders pen. Every batch was brooded for six weeks period.

Feed and feeding of the chicks

The chicks were fed *ad libitum* on a commercial chick mash from day old to six weeks of age containing 22 % crude protein and 2900 kcal/kg metabolizable energy. Thereafter, they were fed on a finisher broiler feed till 12 weeks.

Data Collection

The wing tagged chicks were weighed with an electronic kitchen scale (model EK5350) having maximum calibration of 5kg/11lb. Growth traits and feed intake of each bird were obtained on the first week and subsequently at each week interval till 12 weeks. The growth performance traits measured were the feed intake which was measured by the subtraction of feed left unconsumed from feed initially supplied (gram) and this was later used to calculate the feed conversion ratio for each genotype. The weight gain was estimated by subtracting the previous and recent weights of each genotype of the birds in gram while feed conversion ratio was calculated for each week thus: feed intake/Rate of gain. The growth traits under study were measured thus; Body weight (BW):- This was measured with the use of an electronic kitchen scale with maximum with maximum capacity of 5kg/11lb. Breast girth (BG):- This was measured as the circumference of the breast around the deepest region of the breast. A tape rule calibrated in centimeters was used to take the measurement (cm), Keel length (KL):- This was taken as the length of the sternum. Body length (BL):- It was measured as the distance between the base of the neck and the cloaca. Shank length (SL): (length in cm of the shank from the hock joint to the spur of either leg), Wing length (WL): (length in cm between tips of right and left wings after both are stretched out in full). A tape rule was used to take the measurement (cm) (FAO, 2012).

Statistical analysis

All data were completely randomized and subjected to one way analysis of variance for fixed effect of genotype, age sex and season using the procedure of SAS (2009) and significant means separated with Duncan multiple range test. The following model was adopted:

Model for growth performance characteristics:

$$Y_{ij} = \mu + G_i + e_{ij}$$

Where,

Y_{ij} = j^{th} Individual observation within the i^{th} genotype

μ = Overall mean

G_i = Fixed effect of the i^{th} genotype (i = 1, 2, 3, 4,)

e_{ij} = Experimental errors which is evenly distributed.

Phenotypic correlations among the egg production performance traits for each of the genotypes were determined with Pearson's correlation coefficients (r) using SAS (2009) software. The model for the Pearson's correlation is as follows:

$$r = \frac{\Sigma X_i Y_i}{(\Sigma X^2_i Y^2_i)^{0.5}}$$

Where,

r = Pearson product moment correlation coefficient

X_i = first random variable of the i^{th} growth performance traits

Y_i = second random variable of i^{th} growth performance traits

3. RESULTS

The least square mean values of growth performance traits of crossbred chickens as affected by different genotypes. Chickens of genotype AANN had highest values for body weight (1389. 95 g), body length (17.35 cm), keel length (8.29 cm), shank length (5.55 cm), breast girth (20.75 cm), thigh length (15.32 cm) and wing length (17.89 cm) followed by AAFE chickens while the lowest values for all the growth traits evaluated was recorded for AANF chickens. The crossbred of AANN chickens consumed lesser feed (0.48 g), gain more weight (0.90 g) and had highest feed to gain ratio of 0.75 than other genotypic groups of crossbred chickens.

Table 1 Least square mean values of growth performance traits of crossbred chickens as affected by different genotype of chickens

Parameter	**AANN**	**AAFE**	**AAFF**	**AANF**
Body weight (g)	1390.95±3.47^a	1280.45±9.35^b	1169.50±2.55^b	1005.05±9.35^c
Body length (cm)	17.35±0.49^a	15.45±0.45^b	14.05±1.35^b	12.64±0.45^c
Keel length (cm)	8.29±0.36^a	7.31±0.05^b	6.41±0.35^c	4.68±0.35^d
Shank length (cm)	5.55±0.12^a	4.35±0.11^b	3.60±0.17^c	2.35±0.14^d
Chest girth (cm)	20.75±0.55^a	18.34±0.15^b	15.22±0.18^c	9.17±0.19^d
Thigh length (cm)	15.32±0.13^a	12.96±0.19^b	11.89±0.13^c	6.10±0.05^d
Wing length (cm)	17.89±1.35^a	14.51±0.25^b	12.93±0.15^c	5.80±0.35^d
Feed Intake (g)	0.48±0.02^c	0.57±0.03^a	0.58±0.01^a	0.52±0.01^b
Weight gain (g)	0.90±0.01^a	0.75±0.02^b	0.55±0.01^c	0.62±0.03^b
FCR	0.75±0.03^a	0.60±0.01^b	0.50±0.03^c	0.40±0.01^d

^{abcd}Means along the same row in with different superscripts are significant($P<0.05$) different.

AANN = Arbor Acre x Naked Neck crossbred, AAFE =Arbor Acre x Fulani Ecotype crossbred, AAFF = Arbor Acre x Frizzled Feather crossbred, AANF =Arbor Acre x Normal Feather crossbred, FCR = Feed conversion ratio

Table 2 Phenotypic correlation coefficient of growth performance traits of Arbor acre Naked neck crossbred chicken

Trait	BW	BL	BG	KL	SL	TH	WL	FI	WG	FCR
BW	1									
BL	0.86***	1								
BG	0.94***	0.91***	1							
KL	0.86***	0.95***	0.93***	1						
SL	0.73***	0.84***	0.78***	0.77***	1					
TH	0.86***	0.95***	0.94***	0.96***	0.83***	1				
WL	0.81***	0.96***	0.90***	0.95***	0.83***	0.96***	1			
FI	0.89***	0.89***	0.57***	0.38***	0.67***	0.45***	0.67***	1		
WG	0.80***	0.57***	0.67***	0.65***	0.73***	0.56***	0.23***	0.46***	1	
FCR	0.45***	0.56***	0.45***	0.66***	0.70***	0.68***	0.43***	0.45***	0.76***	1

***P< 0.001 = Very highly significant

BW = body weight, BL = body length, KL = keel length, SL = Shank length, BG = chest girth, TH = thigh length, WL = wing length

Table 2 indicated the phenotypic correlation coefficient of growth performance traits of Arbor acre Naked neck crossbred chicken. There are positive and very highly significant (P<0.001) correlations between BW and BL (0.86), BG (0.94), KL (0.86), SL (0.73), TH (0.86), WL (0.81), FI (0.89), WG (0.80) and FCR (0.45). The relationship between BL against BG (0.91), KL (0.95), SL (0.84), TH (0.95), WL (0.96)FI (0.89), WG (0.57) and FCR (0.56) were found to be positive and very highly significant correlated (P<0.001). Positive and very highly significant (P<0.001) correlations was observed between BG and KL (0.93), SL (0.78), TH (0.94), WL (0.90), FI (0.57), WG (0.67) and FCR (0.45). The relationship between KL and SK (0.77), TH (0.96), WL (0/95),FI (0.38), WG (0.65) and FCR (0.66).was found to be positive and very highly significant correlated (P<0.001). The positive and very highly significant (P<0.001) correlations was recorded between SL and TH (0.83), WL (0.83), FI (0.67), WG (0.73) and FCR (0.70). The relationship between TH, WL (0.96), FI (0.45), WG (0.56) and FCR (0.68) were positive and very significant correlated (P<0.001). Positive and very highly significant (P<0.001) were observed between FI and WG (0.46), FCR (0.45) and WG and FCR (0.76).

The phenotypic correlation coefficient of growth performance traits of Arbor acre Fulani ecotype crossbred chicken is presented in Table 3. There are positive and very highly significant (P<0.001) correlations between BW and BL (0.92), BG (0.93), KL (0.88), SL (0.74), TH (0.85), WL (0.90), FI (0.67), WG (0.77) and FCR (0.23). The relationship between BL against BG (0.95), KL (0.94), SL (0.76), TH (0.92), WL (0.94), FI (0.45), WG (0.56) and FCR (0.78) were found to be positive and very highly significant correlated (P<0.001). Positive and very highly significant (P<0.001) correlations was observed between BG and KL (0.94), SL (0.77), TH (0.93), WL (0.94), FI (0.67), WG (0.48) and FCR (0.59). The relationship between KL and SL (0.78), TH (0.92), WL (0.92), FI (0.69), WG (0.45) and FCR (0.64) were found to be positive and very highly significant correlated (P<0.001). The positive and very highly significant (P<0.001) correlations were recorded between SL and TH (0.72), WL (0.86), FI (0.89), WG (0.62) and FCR (0.61). The relationship between TH and WL (0.89), FI (0.55), WG (0.77) and FCR (0.69) were positive and very significant correlated (P<0.001). The correlation magnitudes ranged from 0.72 to 0.94.

Table 3 Phenotypic correlation coefficient of growth performance traits of Arbor acre Fulani ecotype crossbred chicken

Trait	BW	BL	BG	KL	SL	TH	WL	FI	WG	FCR
BW	1									
BL	0.92***	1								
BG	0.93***	0.95***	1							
KL	0.88***	0.94***	0.94***	1						
SL	0.74***	0.76***	0.77***	0.78***	1					
TH	0.85***	0.92***	0.93***	0.92***	0.72***	1				
WL	0.90***	0.94***	0.94***	0.92***	0.86***	0.89***	1			
FI	0.67***	0.45***	0.67***	0.69***	0.89***	0.55***	0.88***	1		
WG	0.77***	0.56***	0.48***	0.45***	0.62***	0.77***	0.56***	0.71***		
FCR	0.23***	0.78**	0.59**	0.64***	0.61***	0.69***	0.78***	0.91***	0.56***	1

***P< 0.001 = Very highly significant

BW = body weight, BL = body length, KL = keel length, SL = shank length, BG = Breast girth, TH = thigh length, WL = wing length

Table 4 Phenotypic correlation coefficient of growth performance traits of Arbor acre Frizzled feather crossbred chicken

Trait	BW	BL	BG	KL	SL	TH	WL	FI	WG	FCR
BW	1									
BL	0.94***	1								
BG	0.84***	0.91***	1							
KL	0.87***	0.92***	0.84***	1						
SL	0.89***	0.91***	0.96***	0.94***	1					
TH	0.98***	0.96***	0.89***	0.89***	0.91***	1				
WL	0.83***	0.80***	0.92***	0.92***	0.78***	0.80***	1			
FI	0.56***	0.67***	0.67***	0.89***	0.89***	0.91***	0.78***	1		
WG	0.77***	0.58***	0.59***	0.78***	0.67***	0.89***	0.67***	0.67***	1	
FCR	0.89***	0.76***	0.89***	0.99***	0.74***	0.78***	0.55***	0.88***	0.78***	1

***P< 0.001 = Very highly significant

BW = body weight, BL = body length, KL = keel length, SL = Shank length, BG = Breast girth, TH = thigh length, WL = wing length

Table 5 Phenotypic correlation coefficient of growth performance traits of Arbor acre normal feather crossbred chicken

Trait	BW	BL	BG	KL	SL	TH	WL	FI	WG	FCR
BW	1									
BL	0.91***	1								
BG	0.95***	0.92***	1							
KL	0.82***	0.89***	0.89***	1						
SL	0.60***	0.43***	0.64***	0.57***	1					
TH	0.78***	0.90***	0.85***	0.91***	0.33***	1				
WL	0.87***	0.83***	0.92***	0.89***	0.80***	0.76***	1			
FI	0.78***	0.67***	0.67***	0.91***	0.88***	0.67***	0.81***	1		
WG	0.56***	0.77***	0.88***	0.89***	0.89***	0.66***	0.72***	0.77***	1	
FCR	0.71***	0.76***	0.59***	0.78***	0.67***	0.77***	0.83***	0.67***	0.66***	1

***P< 0.001 = Very highly significant

BW = body weight, BL = body length, KL = keel length, SL = Shank length, BG = Breast girth, TH = thigh length, WL = wing length

Table 4 indicated the phenotypic correlation coefficient of growth performance traits of Arbor acre frizzled feather crossbred chicken. There are positive and very highly significant (P<0.001) correlations between BW and BL (0.94), BG (0.84), KL (0.87), SL (0.89), TH (0.98), WL (0.83),FI (0.56), WG (0.77) and FCR (0.89). The relationship between BL against BG (0.91), KL (0.92), SL (0.91), TH (0.96), WL (0.80), FI (0.67), WG (0.58) and FCR (0.76) were found to be positive and very highly significant correlated (P<0.001). Positive and very highly significant (P<0.001) correlations was observed between BG and KL (0.84), SL (0.96), TH (0.89), WL (0.92), FI (0.67), WG (0.59) and FCR (0.89).. The relationship between KL and SL (0.94), TH (0.89), WL (0.92), FI (0.89), WG (0.67) and FCR (0.74) were found to be positive and very highly significant correlated (P<0.001). The positive and very highly significant (P<0.001) correlations was recorded between SL and TH (0.91) and WL (0.78), FI (0.89), WG (0.67) and FCR (0.74). The relationship between TH and WL (0.80), FI (0.91), WG (0.89) and FCR (0.78)were positive and very significant correlated (P<0.001). The correlation magnitudes ranged from 0.78 to 0.98.

The phenotypic correlation coefficient of growth performance traits of Arbor acre frizzled feather crossbred chicken is as shown in Table 5. There are positive and very highly significant (P<0.001) correlations between BW and BL (0.91), BG (0.95), KL (0.82), SL (0.60), TH (0.78), WL (0.87), FI (0.78), WG (0.56) and FCR (0.71). The relationship between BL against BG (0.92), KL (0.89), SL (0.43), TH (0.90), WL (0.83), FI (0.67), WG (0.77) and FCR (0.76) were found to be positive and very highly significant correlated (P<0.001). Positive and very highly significant (P<0.001) correlations was observed between BG and KL (0.89), SL (0.64), TH (0.85), WL (0.92), FI (0.67), WG (0.88) and FCR (0.59). The relationship between KL and SL (0.57), TH (0.91), WL (0.89), FI (0.91), WG (0.89) and FCR (0.78) were found to be positive and very highly significant correlated (P<0.001). The positive and very highly significant (P<0.001) correlations was recorded between SL and TH (0.33), WL (0.80),FI (0.88), WG (0.89) and FCR (0.67).The relationship between TH and WL (0.76), FI (0.67), WG (0.66) and FCR (0.77) were positive and very significant correlated (P<0.001). The correlation magnitudes ranged from 0.33 to 0.95.

4. DISCUSSION

Crossbreeding programs with specialized meat-type or egg type chickens has been shown by several workers to improve their productivity significantly and growth traits ccomponents, such as bodyweight and morphometric measurements, are key factors to both poultry breeders and meat processors (Adedeji *et al*., 2015a). Morphometric traits are the quantitative analyses of the structure, shape and size of an organism (FAO, 2012). The results of the present study revealed significant genotype effect of body weight and other linear body measurements of birds. This is expected because of variations in the genetic constitutions of the birds and this is a major determinant of growth and physiological development and this is consistent with the reports of Adedeji *et al*. (2015b). The current study on the growth performance traits of crossbred chickens produced from Arbor acre sires and Nigerian indigenous chicken dams that affirmed that chickens' genotype of ANN had highest body weight and other body conformations than its counterpart crossbred chickens and this observation was in line with the earlier documentation of Assefa and Mellese (2018); Amao (2018a); Amao (2018b) and Ojedapo*et al*. (2018). These authors from their various studies claimed that growth traits of chickens varied based on genetic components of the chickens. Assefa and Mellese (2018) found variations in morphological and morphometric characteristics in chicken population in Ethiopia. Dorji*et al*. (2017) reported growth traits variations in native chicken types in Bhutan. Amao (2018b) affirmed variations in early growth traits of chicken progenies produced from chicken sires crossed with Fulani ecotype dams that are in accordance with this current findings. Ojedapo *et al*. (2016) reported differences in growth traits of two commercial broiler chickens. Ojedapo *et al*. (2018) found variations in the growth traits of pure and crossbred of chicken progenies under derived savannah area of Nigeria. The ability of naked neck gene to combine well while comparing with other Nigerian indigenous chicken for body conformation was also established in this current study which was in agreement with the study of Amao (2017c) that naked neck genotype had better growth traits when combined with an exotic chickens than normal feather, frizzled feather and Fulani ecotype chickens. The lesser feed intake, more weight and conversion ratio displayed by AANN crossbred over other genetic stocks of crossbred involved was in line with the findings of Mahmoud and El-Full (2014) on crossbreeding components for daily gain and growth rate traits in crossing Rhode Island red with Gimmizah chickens in Egypt who claimed that the progenies produced between crosses of Rhode Island red with Gimmizah chickens had more of growth performance characteristics than pures of Rhode Island red and Gimmizah chickens.

The correlation procedure describes the interrelationships that exist among traits of interest and the estimates of correlation coefficients are therefore very useful in animal breeding as a tool of predicting potential response to or progress made from selection (Obike *et al*. 2016). Correlations permit prediction of direction and magnitude of change in the dependent trait as a correlated response to direct selection of the principal trait (Laxni*et al*. 2002). Thus, correlations are of great interest to the breeder. The extent and direction of correlated selection response are determined by the genetic correlation or covariance between the concerned traits. The pattern of phenotypic correlation among the growth traits of each genetic group of crossbred chickens suggested that traits are under the same gene action (pleiotropism) and good indicator for selection for improvements in one trait in an animal will eventually result in improvement of the other traits correlated in direct selection. The present results on the phenotypic correlations for egg production performance traits among the crossbred chickens was in line with the findings of Egahi *et al*. (2013)in Nigeria who reported similar ranges of magnitude of positive and very highly significant correlations for three genetic group of native chickens of Nigeria. Adeleke *et al*. (2011) found positive and very highly significant relationship for body weight and body measurements in crossbred progenies of Nigerian chickens and the magnitudes were in line with this current study.

5. CONCLUSION

This study indicated that chicken progenies produced from crosses of Arbor acre and naked neck birds had improved body weight, body length, keel length, shank length, chest girth, thigh length and wing length than Arbor acre Fulani ecotype crossbred, Arbor acre normal feather crossbred and Arbor acre frizzled feather. However, the relationships between the body weight and other linear body measurements of these crossbred chickens revealed a pleiotropism action and this is a good indicator for selection for improvements in one trait in an animal.

Recommendation

It can be recommended that progenies of chickens produced through crossing of Arbor acre and naked neck (AANN) chickens can be selected for among Arbor acre Fulani ecotype (AAFE) crossbred, Arbor acre normal feather (AANF) crossbred and Arbor acre frizzled feather (AAFF) progenies produced for its better growth performances characteristics. However, the relationship between these traits can be exploited in the planning scheme for improvement of indigenous chickens.

Conflicts of Interest - None

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