CORRELATION BETWEEN BODYWEIGHT AND MORPHOMETRIC TRAITS IN TWO QUAIL COLOUR LINES

Jubril, A.E[1]., Ekahma, F.A[2]., Chimezie V.O[2]., Daudu, A.O[3]., Nwakpa, F.I[3]., Agbo, F.O[3].

Department of Animal Science, University of Abuja
Department of Animal Production, University of Ilorin
Agricultural and Rural management Training Institute, Ilorin

Corresponding Author: superiorknight4rill@gmail.com

ABSTRACT

*A total of 200 one week old Japanese quail chicks constituting of 100 brown and 100 white plumage color were used to evaluate the correlation between bodyweight and morphometric measurements. The two quail color lines where kept in battery cages. Feed and water where provided adlibitum throughout the experimental period. All birds were allotted to 5 replicates and 2 treatments with a total of 20 birds per replicate. The measure of associations between traits was determined by the Pearson correlation coefficients. Significant positive correlations between shank length and body girth,(0.323**) shank length and wing length,(0.201*) shank length and body length,(0.503**) shank length and body weight,(0.508**) body girth and wing length,(.594**) body girth and body length,(0.261**) body girth and body weight, (.568**) wing length and body length,(0.594**) wing length and body weight (0.699**) at P < 0.01 alpha level among the Brown quails. Among the White quails correlations between shank length and body girth,(0.857**) shank length and wing length, (0.531**) shank length and body length,(0.831**) shank length and body weight, (0.786**) body girth and body length, (0.748**) body girth and body weight, (0.810**) wing length and body length, (0.503**) wing length and body weight (0.683**) were significantly positive at P < 0.01 alpha level. Pooled phenotypic correlations between body parameters of the two quails varieties show significantly (P < 0.01) positive association between shank length and body girth, shank length and wing length, shank length and body length, shank length and body weight, body girth and wing length, body girth and body length, body girth and body weight, wing length and body length, wing length and body weight. Among the White color variety SL, BG, BL and WL were the best values correlated with bodyweight while WL, BG, SL and BL were best among the browns when correlating with bodyweight as well. Combination of all linear body morphometric traits had more precision than the use of single traits in all the quails strains investigated. The study reveals high association between body weight and body linear measurements in the two colour lines studied.*

Keywords: *Bodyweight, Colour lines, Correlation, Morphometric traits, Quail birds.*

INTRODUCTION

Quails birds are relatively small domestic birds which are known for the production of both meat and eggs (Baumgartner, 1993). These birds have better advantages over other poultry species based on their fast growth, early sexual maturity, high rate of egg production and short generation interval (Owen and Amakiri, 2010). These attributes make quail production a viable option in ameliorating shortage of protein in developing countries.

Morphometric traits are the quantitative measurements of the structure, shape, and size of an organism and its a derivation relative to body weight from body measurements (i.e. morphometric traits) has been reported to be a practical and easy technique, especially among rural poultry breeders whom are exposed to limited resources (Semacula *et al.,* 2011). Maciejowski and Zeiba (1982) reported that morphometric traits such as shank length and diameter were indicators of leg development while body girth was an indicator of breast development. Aside its use as indicator of body weight, morphometric traits can further be used to develop breeding strategies via optimum combination of body measurements (Chineke *et al.* 2002) to achieve maximum body weight and economic returns. The phenotypic correlation estimates between body weight and morphometric traits could guide the breeder in the choice of body size traits to incorporate into his selection index.

Estimates of the relationship between body weight and these linear measurements is not only important in developing predictive equations, it could also be employed in genetic improvement strategies to achieve an optimum combination of body weight and good conformation (Adeniji and Ayorinde, 1990). Hence, the study was designed to evaluate the correlation between body weight and morphometric traits in two colour lines of Japanese quail.

MATERIALS AND METHODS

Location and Duration of the Study

This experiment was conducted at the Poultry unit of University of Abuja Teaching and Research Farm which is located along Airport Road, Gwagwalada, FCT-Abuja. Gwagwalada falls within latitude 90° 4'N, longitude 7° 28'E,1500mm (59.1in) rainfall annually, average temperature 18.45°c and relative humidity of 67% at 0900GMT (present). The location has a particular rainy and dry season with a unimodal rainfall pattern which for the most part sets up between mid-May to early June, and tops in the long periods of the months of July/August. The total yearly rainfall in the location is between 1284mm-1383mm. However, dry season starts from mid of October to end of April. The area has a daily mean temperature of 30^0c in the raining season and 34^0c in the dry season (Meteorological Station of Nnamdi Azikiwe International Airport (MET), 2018). The experiment lasted for six weeks.

Experimental Animal and Management

A total of Two hundred brown and white (200) Japanese quail birds *(Cortunix japonica)* of one week of age was used for the study including hundred brown quails (n=100) and hundred white quail (n=100). The brown and white quail colour line was purchased at one week from a reputable Hatchery in Jos, Plateau state. They were housed in battery cage system under the same living conditions. On arrival they were given water with vitalyte anti stress. They were weighed individually at the beginning of the experiment and tagged for identification purpose. This experiment was carried out using completely randomized design. Supplementary heat was given during the first two weeks. Anti-stress was added into their drinking water. They

were kept under the same management conditions throughout the study period. The quails were housed in battery cages raised under the same living conditions. A standard commercial diet (super starter) containing 22% crude protein/kg and 3000kcal of ME (Metabolized Energy)/kg as well as water was provided *ad-libitum* during the rearing period. Standard management and medication was provided throughout the experimental period. Strict Farm biosecurity and standard hygienic precautions were maintained to prevent the outbreak of any potential infections.

Parameter measured

The following morphometric parameters were measured during the period of the experiment:
Body weight (g): Body weight was recorded to two decimal places using a sensitive weighing scale.

Body length (cm): Body length was taken with a measuring tape stretched from bird's nasal opening, along its gently stretched neck and back, to the tip of its hypostyle.

Breast girth(cm): Breast girth was taken when a measuring tape is looped round the region of the breast under the wing.

***Wing length(cm*)**: Wing length was as the distance from the humerus coracoid unction to the distal tip of the phalange digits, using a measuring tape.

Shank length(cm): The shank length was taken as the distance between the foot pad and the hock joint, measured by a set of Vernier calipers.

Statistical analysis

Data was collected and recorded in Microsoft Excel. SPSS package (version 17.0) was used to carry out correlation analysis.

RESULTS AND DISCUSSION

RESULTS

Phenotypic correlations between body weight and body linear parameters in white quail

Table 1 reveals significant positive correlations between shank length and body girth, shank length and wing length, shank length and body length, shank length and body weight, body girth and wing length, body girth and body length, body girth and body weight, wing length and body length, wing length and body weight at $p<0.05$ level.

Table 1: Phenotypic correlations between body weight and body linear parameters of White Quail

	SL	BG	WL	BL	BW
SL					
BG	.857**				
WL	.531**	.587**			
BL	.831**	.748**	.503**		
BW	.786**	.810**	.562**	.6830**	

*= Correlation was significant at P<0.05, **= Correlation was significant at P<0.01.

Phenotypic correlations between body weight and body linear parameters in brown quail

Table two shows that the correlations between shank length and body girth, shank length and wing length, shank length and body length, shank length and body weight, body girth and body length, body girth and body weight, wing length and body length, wing length and body weight were significantly positive at $P < 0.01$ alpha level. On the other hand, body girth was positively associated with wing length at $P < 0.05$ significant level.

Table 2: Phenotypic correlations between body weight and body linear parame ters of brown quail

	SL	BG	WL	BL	BW
SL					
BG	.323**				
WL	.259**	.201*			
BL	.263**	.261**	.594**		
BW	.508**	.568**	.699**	.503**	

*= Correlation was significant at P<0.05, **= Correlation was significant at P<0.01.

Pooled correlation matrix between body weight and body linear parameters of the both White and the Brown Quail

In Table 3 the pooled phenotypic correlation between body parameters of the two strains of quails investigated shows that significantly (P < 0.01) positive association between shank length and body girth, shank length and wing length, shank length and body length, shank length and body weight, body girth and wing length, body girth and body length, body girth and body weight, wing length and body length, wing length and body weight.

Table 3: Pooled phenotypic correlation between body weight and body linear parameters in the white and the brown quail lines

	SL_B	BG_B	WL_B	BL_B	BW_B
SL_W	.454**	.481**	.361**	.481**	.435**
BG_W	.601**	.625**	.176**	.601**	.525**
WL_W	.557**	.600**	.649**	.562**	.524**
BL_W	.841**	.884**	.671**	.802**	.711**
BW_W	.508**	.595**	.479**	.541**	.523**

*= Correlation was significant at P<0.05, **= Correlation was significant at P<0.01, B; Black, W; White

DISCUSSION

From the result in table1 it showed when there is an increase in one parameter will lead increase in the second parameter under investigation. The positive correlation of body linear parameters in this study gives insight on the rate of progress when selection is applied. This finding is in agreement with Ojo *et al*.(2014) who also established that body parameters of quails were correlated in the positive plane. The results in this study also corroborate with findings of Raji *et al.* (2009) for quails in Maiduguri. These positive correlations of traits could be due to the fact growth as a physiological process begins at the cellular level, spreading through tissues and organs (parameters investigated).

The positive correlation between body weight and the parameters studied have agreed with Gwaza *et al*.(2017) who reported that body weight and body trait co-varied in the positive direction among the French broiler guinea fowl in Katsina. The findings on the pooled data in this study agreed with the findings of Oke *et al*. (2015) who observed positive relationship between body traits in guinea fowl. The overall findings indicated that body morphometric

traits which maintained a positive correlation with one another among the two quail colors.

The implication of the positive relationship between parameter investigated may suggest that these traits are governed by similar genetic and physiological control. Thus selection of one trait will result in a proportionate correlated increase in the second trait thereby enhancing selection progress during breed improvement.

Conclusion

The study shows that body weight is highly associated with other linear body measurements, and this gives an insight on the high chance of arriving at correlated response when selection is applied on a single trait or multiple traits in these two strains of quails.

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