ABG -02

Sexual Dimorphism and Phenotpic Correlations among Growth Traits of Exotic Turkey (*Meleagris gallopavo*)

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Abstract
This study was conducted to determine sexual dimorphism and phenotypic correlations among growth traits of six month old exotic turkeys raised at the Turkey Unit, Teaching and Research Farm of Ondo State University of Science and Technology, Okitipua. Data collected were subjected to analysis of variance and Pearson's correlation. Body weight, shank length, thigh length, body length, wing length, wing span and breast girth for females were 8.16 kg, 8.31 cm, 22.29 cm, 68.47 cm, 32.93 cm, 73.65 cm and 57.24 cm respectively, while the corresponding values for males were 8.84 kg, 9.97 cm, 23.40 cm, 76.27 cm, 35.87 cm, 80.27 cm and 60.20 cm. The effect of sex on the variables was significant ($p<0.05$) except on body weight and thigh length. Though the body weight and thigh length were numerically higher in males (8.84 and 23.40) and lower values observed in females (8.16 and 22.29). The correlation coefficients were all positive for both sexes except in females where the correlation between body weight and shank length was negative (-0.031). Among the males the correlation coefficients ranged between 0.447 and 0.859 while in the females it ranged between -0.031 and 0.539. Sexual dimorphism was displayed virtually in all the variables considered and in a similar trend body weight could be predicted virtually by all the linear body measurements considered.

Keywords: Sexual dimorphism, phenotypic correlation, body weight, shank length, thigh length

Introduction

The developmental processes of males and females are governed by partially different hormonal and physiological controls (Nestor *et al*., 2000). Such sex differences in physiological parameters may translate into sex-specific responses to selection among males and females of the same age and, ultimately, can lead to a rapid change in sexual size dimorphism even under constraints of shared gene pool (Rhen, 2000).Poultry is now by far the largest livestock species worldwide (FAO, 2000), accounting for more than 30% of all animal protein. Turkey is either of two species of birds in the family *Meleagrididae* (order *Galliformes*). The best known is the common turkey (*Meleagris gallopavo*), a native game bird of North America but widely domesticated. The biometric measurements are used to assess several characteristic of animals. These measurements provide important evidences for the growth of the breed and the properties that change with environmental effects and feeding factors. In addition, body measurements are important data sources in terms of reflecting the breed standards (Riva *et al*., 2002) and are also important in giving information about the morphological structure and development ability of the animals.

Body measurements differ according to the factors such as breed, gender, yield type and age. The most common parameters used for body measurements in turkey are; shank length, breast girt, keel length, body length and thigh length (Ilori *et al*., 2010). Assessment of body weight and linear body measurements have been found useful in quantifying body size and shape (Ibe and Ezekwe, 1994). Linear body measurements have also been used to predict live weight in poultry (Gueye, 1998). The multitudes of different body measurements available lead several researchers to use multivariate techniques to simultaneously examine the relationship among body measurements and production traits.

Therefore, the aim of this present study was to determine the effect of sex and phenotypic correlations among growth traits of an exotic turkey reared South- West Nigeria.

Materials and Methods

One hundred and two (102) day old turkeys (poults) bought from a reputable hatchery in Ibadan were reared at the Turkey Unit of Teaching and Research Farm of Ondo State University of Science and Technology, Okitipupa. Okitipupa is located between latitude 6°53' N and longitude 4°53' E (Worldatlas.com). The area lies within the rain forest zone of Nigeria. The management system was intensive whereby the turkeys were fed with commercial feed and water supplied *ad libitum* in deep litter housing till six months of age. At sixth month of age the weights of the birds were obtained using a 20 kg weighing scale, while a measuring tape was used for body measurements in centimeter. Wing Length (WL) was taken from the shoulder joint to the extremity of terminal phalanx while Shank Length (SL) was measured from the hock joint to the spur. Thigh Length (TL) was taken as the distance between the hock

joint and the pelvic joint. Body Length (BL) is the length between the tip of the *rostrum maxillare* (beak) and that of the *cauda* (tail, without feathers). Breast girth (BG) was taken under the wing at the edge of the sternum while wing span (WS) is length between tips of right and left wings after both are stretched out in full. To ensure accuracy, each measurement was taken twice and the mean was used in subsequent analysis. All the measurements were taken by the same person.

The data collected were subjected to analysis of variance to determine sex effect on the growth traits using SAS (2003). Pearson correlation was used to determine the relationship correlation among the traits on sex basis.

Results and Discussion

Table 1 shows the descriptive statistics of the body weight and linear body measurements of male and female exotic turkey. The body weight, shank length, thigh length, body length, wing length, wing span and breast girth for female were 8.16 kg, 8.31, 22.29, 68.47 32.93, 73.65 and 57.24 cm respectively, while the corresponding values for male were 8.84 kg, 9.97, 23.40, 76.27, 35.87, 80.27 and 60.20 cm respectively. The effect of sex on the variables was significant ($p<0.05$) except on body weight and thigh length. Though the body weight and thigh length were numerically higher in male (8.84 and 23.40) and lower values observed in female (8.16 and 22.29).

Table1: Descriptive statistics of growth traits of exotic turkey by sex

Variables	Sex	Mean ± standard error	Minimum	Maximum	CV
Body weight (kg)	Male	8.84 ± 0.63^{a}	4.50	13.00	27.60
	female	8.16 ± 0.22^{a}	5.40	11.00	15.62
Shank length (cm)	Male	9.97 ± 0.38^{a}	8.00	12.00	14.74
	female	8.31 ± 0.13^{b}	7.00	10.00	8.89
Thigh length (cm)	Male	23.40 ± 1.33^{a}	16.00	35.00	22.14
	female	22.29 ± 0.38^{a}	17.00	27.00	9.97
Body length (cm)	Male	76.27 ± 2.10^{a}	63.00	86.00	10.67
	female	68.47 ± 0.58^{b}	62.00	77.00	4.97
Wing length (cm)	Male	35.87 ± 0.94^{a}	30.00	43.00	10.16
	female	32.93 ± 0.42^{b}	27.00	37.00	7.46
Wing span (cm)	Male	80.27 ± 2.10^{a}	62.00	91.00	10.16
	female	73.65 ± 0.72^{b}	65.00	84.00	5.67
Breast girth (cm)	Male	60.20 ± 1.33^{a}	51.00	67.00	8.54
	female	57.24 ± 0.73^{b}	45.00	66.00	7.43

a,b means with different superscript in the same column are significantly different ($p<0.05$)

Table 2 shows the correlation coefficients among body weight and linear body measurements. The upper diagonal is for male while the lower diagonal is for female. The correlation coefficients were all positive for both sexes except in female where the correlation between body weight and shank length was negative (-0.031). Among the males the correlation coefficients ranged between 0.447 and 0.859 while in the females it ranged between -0.031 and 0.539.

Table 2: Correlation coefficient among body weight and linear body measurement in male and female exotic turkey

	BWT	SL	TL	BL	WL	WS	BG
BWT	1.000	0.471	0.662**	0.772**	0.447	0.479	0.859***
SL	-0.031	1.000	0.668*	0.786**	0.773**	0.868***	0.204
TL	0.158	0.386*	1.000	0.712**	0.589*	0.591*	0.509
BL	0.432*	0.489**	0.549**	1.000	0.719**	0.792**	0.630*
WL	0.048	0.280	0.489**	0.239	1.000	0.833***	0.108
WS	0.305	0.439**	0.530**	0.579**	0.514**	1.000	0.223
BG	0.539**	-0.072	-0.226	0.147	-0.053	0.177	1.000

Bwt - body weight, Sl-shank length, Tl - thigh length; Bl - body length; Wl – wing length; Ws - wingspan; Bg - breast girth

The non-significant effect of sex observed in the live body weight and thigh length of exotic turkey in this study is contrary to the report of Djebbi *et al.* (2014) who reported significant difference in the body weight and thigh length of male and female local turkey in

Tunisia. Similar report was also given by Ogah (2011) for Nigerian Indigenous turkey. The values, 8.84 Kg and 8.16 Kg observed in body weights for male and female respectively, are higher than 3.38 kg and 2.65 kg reported by Ogah (2011) and similarly, 23.40 cm and 22.29 cm observed for male and female thigh length are more than 22.40 cm and 18.44 cm reported by Djebbi *et al*., (2014). This could be attributed to the improved nature of the exotic turkey compare with the local turkey. The statistical effect observed in shank length, body length, wing length, wing span and breast girth with higher values in favour of male is similar to the findings of (Oblakova, 2007; Janjecic and Muzic, 2007; Djebbi *et al*., 2014; Ogah, 2011). However, higher values were reported in this study. In the male, the correlations between the body weight and other growth traits ranged between medium to high, positive and significant ($p<0.01$; $p<0.001$) except with shank length and wing span that were not significant.

The positive correlation between the body weight and other variables indicate plieotropy which means that body weight can be predicted by any of the variables. Similar trend was also observed in the female. The positive and high correlations observed among the growth traits in the male and female are in line with the reports of Djebbi *et al*. (2014) and Ogah (2011). Sexual dimorphism was displayed virtually in all the variables considered and in a similar trend body weight could be predicted virtually by all the linear body measurements considered.

Conclusion and Recommendation

It could be concluded that, there was a significant effect of sex on virtually all the linear body measurements considered and the correlation between body weight and these linear body measurements are positive and ranged between moderate and high in both sexes. The use of linear body measurements is hereby recommended for the prediction of live body weight of exotic turkey at six month of age.

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