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MORPHOMETRIC MEASUREMENTS AND PRODUCTIVE PERFORMANCE OF GUINEA FOWL (*Numidameleagris*) IN BANGLADESH

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ABSTRACT

The study was conducted to observe morphometric measurements and productive performance of guinea fowl**.** A total of 60 guinea fowl were observed randomly to gain the morphometric data, different body structure and color of guinea fowl at Baghmara, Tilagoreco-park, Alurtol, Sylhet, Bangladesh. The mean body weight, body length, beak length, neck length, head length, wing length, wing-span, keel length, tail length and shank length of male and female were 1.27±.02 g and 1.17±.02 g, 50.79±0.46 cm and 49.17±.046 cm, 2.86±.04 cm and 3.01±.05 cm, 15.01±0.19 cm and 14.29±0.15 cm, *5.±0.10* cm and 5.55±0.06 cm, 26.26±0.17 cm and 26.90±0.21 cm, 73.17±0.77 cm and 71.93±0.48 cm, 10.82±0.12 cm and 11.23±0.16 cm, 16.96±0.17 cm and 17.70±0.25 cm, 7.11±0.05 cm and 6.90±0.05 cm respectively. Statistically significant results were observed in case of beak length ($p<0.01$), neck length ($p<0.01$) and keel length ($p<0.05$) in relation to 6, 9, 12, 15 and 18 months of age. Phenotypic correlation between body weight, body length, beak length, neck length, head length, wing length, wing-span, shank length, tail length, and keel length ranged from 0.227 to 0.707. The mean egg weight, egg height, and egg width were 43.82±0.31 g., 4.99±0.02 cm and 3.94±0.01 cm.

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INTRODUCTION

Guinea fowl (*Numidameleagris*) is believed to be originated from the Guinea coast of Africa (Yildirim, 2012) and were brought to India during the medieval period by African slaves. In Bangladesh, mainly four varieties of guinea fowl are available. Namely, white guinea fowl, whose overall body is white except wattle, helmet, beak, shank and toe; lavender guinea fowl, whose whole body is light-purple with pearling over entire body except head, beak, wattle, helmet, shank and toe; pearl guinea fowl, whose plumage color is dark gray to blackish with white pearling on entire body. Any color can be pied, mainly pied guinea fowl contain white chest feather with reddish beak and wattle and grayish shank and toes like lavender and pearl guinea fowl.

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In a developing country, it has the potentiality for meat production and also produces a substantial number of egg (Microlivestock, 1991). Moreover, there are rarely any cultural hindrances against the consumption of guinea fowl (Saina *et al*., 2005). Guinea fowl as an alternative poultry enterprise is gaining ground throughout the world, especially in developing countries which have shown increasing demand for this particular meat (Nahashon *et al*., 2006;Yildirim, 2012). Minimum cost for production, excellent meat quality, harder egg-shell, higher scavenging capability for insects and grains, greater capacity to protect itself from predators and outstanding resistance to common poultry diseases, for example, Newcastle disease, and fowl pox make it unique over village chicken (Dieng *et al*., 1998). Guinea fowl meat has fewer health risks. The meat is a good source of protein, vitamins, niacin, iron and less amount of fat; hence, it has been argued that it deserves a better price than chicken (CAB, 1987; Mareko *et al*., 2006; Ajala *et al*., 2007).

Table 1. Mean±SE of morphometric characteristics of Guinea Fowl according to sex

Sex	Body Weight (kg)	Body Length (cm)	Beak Length (cm)	Neck Length (cm)	Head Length (cm)	Wing Length (cm)	Wing Span (cm)	Keel Length (cm)	Tail Length (cm)	Shank Length (cm)
Male (17)	1.27±.02	50.79±0.46	3.01±.05	15.01±0.19	5.87±0.10	26.90±0.21	73.17±0.77	11.23±0.16	17.70±0.25	7.11±0.05
Female (43)	1.17±.02	49.17±.046	2.86±.04	14.29±0.15	5.55±0.06	26.26±0.17	71.93±0.48	10.82±0.12	16.96±0.17	6.90±0.05
LS*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*LS, level of significance

Table 2. Mean±SE of morphometric characteristics of Guinea Fowl according to age

Age (Month)	Body Weight (kg)	Body Length (cm)	Beak Length (cm)	Neck Length (cm)	Head Length (cm)	Wing Length (cm)	Wing Span (cm)	Keel Length (cm)	Tail Length (cm)	Shank Length (cm)
6 (25)Ψ	1.10±0.04	47.53±0.52	2.72±0.04	13.76±0.09	5.32±0.05	25.79±0.17	70.81±0.78	10.50±0.17	16.43±0.14	6.84±0.08
9 (12) Ψ	1.18±0.02	48.99±0.47	2.84±0.04	14.24±0.28	5.50±0.13	26.02±0.22	72.21±0.80	10.83±0.11	16.78±0.35	6.94±0.05
12 (5) Ψ	1.23±0.02	50.52±0.61	2.88±0.03	14.86±0.06	5.98±0.05	26.54±0.38	73.50±0.20	11.12±0.13	17.96±0.04	7.04±0.05
15 (10) Ψ	1.33±0.01	51.71±0.78	3.19±0.04	15.28±0.17	6.05±0.09	27.54±0.32	73.89±0.39	11.41±0.19	18.21±0.27	7.09±0.10
18 (8) Ψ	1.35±0.01	54.01±0.53	3.21±0.02	15.98±0.13	6.12±0.08	27.68±0.06	74.23±0.56	11.73±0.15	18.28±0.15	7.17±0.05
LS	NS	NS	**	**	NS	NS	NS	*	NS	NS

**, p<0.01; *, p=0.05; NS=Not significance; Ψ parenthesis indicate number of observed birds

Table 3. Phenotypic correlation among morphometric characteristic

Parameter	Body weight (kg)	Body length (cm)	Beak length (cm)	Neck length (cm)	Head length (cm)	Wing length (cm)	Wing span (cm)	Keel length (cm)	Tail length(cm)	Shank length (cm)
Body weight (kg)										
Body length(cm)	0.469**									
Beak length(cm)	0.505**	0.521**								
Neck length(cm)	0.463**	0.675**	0.589**							
Head length(cm)	0.370**	0.530**	0.624**	0.536**						
Wing length(cm)	0.533**	0.536**	0.575**	0.561**	0.584**					
Wing span(cm)	0.373**	0.343**	0.450**	0.332**	0.388**	0.481**				
Keel length(cm)	0.707**	0.502**	0.410**	0.532**	0.453**	0.594**	0.382**			
Tail length(cm)	0.457**	0.611**	0.598**	0.607**	0.531**	0.686**	0.468**	0.606**		
Shank length(cm)	0.559**	0.334**	0.227	0.399**	0.227	0.494**	0.384**	0.650**	0.551**	

** Correlation is significant at the 0.01 level

Mbap (1985) stated that the characterization of animal is pivotal for any genetic improvement. To utilize genetic resource a breed must be characterized first (FAO, 2010). As interest in consumption and domestication of this bird are climbing up steadily, well-planned and voluntary efforts are required to accelerate the development of this species. This can be acquired by the launching of breeding programs, thereby amplifying the pragmatic knowledge on the performance of the different traits that will uplift the performance and other economic traits in the bird. On the basis of above-mentioned facts and circumstances, the current experiment was performed to scrutinize the phenotypic characteristics of guinea fowl and to conserve guinea fowl in Bangladesh.

MATERIALS AND METHODS

This study was conducted in a guinea fowl farm at Baghmara, Tilagoreco-park, Alurtol, Sylhet, Bangladesh. A total of 65 adult helmeted guinea fowl were observed randomly to gain the morphometric data, different body structure, and color of guinea fowl. There were four varieties of helmeted guinea fowl. Those were white guinea fowl, lavender guinea fowl, pied guinea fowl, and pearl guinea fowl. The birds were managed under the semi-intensive system, housing was provided, water was supplied *ad-libitum*, and fed on dried grain and whole corn seed and kitchen waste. They were also allowed to scavenge around at noon. Body weight and the lengths of body, beak, neck, head, wing, keel, tail, shank and wing-span were measured. Egg weight, egg height, and width were measured also.

Birds were individually observed for phenotypic expression. The body weight was measured in kg by an electronic balance. The body length of a bird was measured from the helmet to the tip of the tail. The length of the beak was measured from the anterior edge of the nostril to the tip of the beak. Head length was measured from the posterior edge of the nostril to the back of bird head. The wing was measured from the bend of the wing to the tip of the longest primary feathers. The distance between the anterior and posterior ends of keel was measured for estimating keel length. The measurement of the tail was taken from the base of the tail to the tip of the longest feathers. Shank length was measured from the hock joint to the footpad. Wing-span is measured between wing tips when the wings are held outstretched. All those measurements were taken in centimeter using a flexible measuring tape. Egg weight was measured in g. by using electronic balance. Egg length and egg width were measured in cm by using slide calipers. The data generated from this experiment were entered in Microsoft Excel 2013 worksheet, organized and processed for further analysis. Mean, standard errors (SE) and correlations were estimated with the help of Statistical Package for Social Science (SPSS, 2008).

RESULTS

The mean body weight, body length, beak length, neck length, head length, wing length, wing-span, keel length, tail length, and shank length were depicted in Table 1. The study revealed that male was a higher value in all measurement than female but it is not statistically significant.

Table 4. Mean±SE of reproductive characteristic of Guinea fowl

	Egg weight (g.)	Egg height (cm)	Egg width (cm)
Mean±SE	43.82±0.31	4.99±0.02	3.94±0.01
Number of observation	60	60	60

Table 5. Phenotypic features of Guinea Fowl

Body Parts	White guinea fowl	Lavender guinea fowl	Pied guinea fowl	Pearl guinea fowl
	Colors	Colors	Colors	Colors
Head	White	White	Black + White	Black + white
Neck	White	Light purple	Dark gray + white	Light bluish
Wattle	Reddish flat (female) Reddish round (male)	Reddish flat (female) Reddish round (male)	Reddish flat (female) Reddish round (male)	Reddish flat (female) Reddish round (male)
Helmet	Grayish + Elongated (male) Grayish+ Less elongated (Female)	Grayish + Elongated (male) Grayish+ less elongated (female)	Grayish + Elongated (male) Grayish+ less elongated (female)	Grayish + Elongated (male) Grayish + less elongated (female)
Beak	Reddish	Reddish	Reddish	Reddish
Eye	Dark	Dark	Dark	Dark
Breast	White	Light purple	White	Blackish + white dot
Back	White	Light purple	Dark gray + white dot	Blackish + white Dot
Wing	White	Light purple	Dark gray+ white dot Gray & white + Dot	Blackish + white dot
Skin	White	White	White	White
Tail	White	Light purple	Dark gray + white dot	Blackish + white dot
Shank	Yellowish	Grayish	Grayish	Grayish
Toes	Yellowish	Grayish	Grayish	Grayish

The mean value of body weight, body length, beak length, neck length, head length, wing length, wing-span, keel length, tail length and shank length of Guinea Fowl according to age were shown in Table 2. Statistically significant results were observed in case of beak length ($p<0.01$), neck length ($p<0.01$) and keel length ($p<0.05$) in relation to age of 6, 9, 12, 15 and 18 months of age. The phenotypic correlation among body weight, body length, beak length, neck length, head length, wing length, wing-span, keel length, tail length, and shank length were presented in Table 3. All of the aforementioned parameters were highly correlated with each other. The highest correlation was observed between body weight and keel length ($p<0.01$), and lowest were observed both of beak length and shank length, and shank length and head length (not significant). The mean value (Table 4) of egg weight, egg height and egg width were 43.82 g., 4.99 cm and 3.94 cm respectively. There were four types of guinea fowl namely white guinea fowl, lavender guinea fowl, pied guinea fowl, and pearl guinea fowl found with their distinctive characteristics. The color of their different body parts was presented in Table 5.

DISCUSSION

In this study, male and female body weight at a mature age (around 10 months of age) was 1.27 and 1.17 kg respectively nearly similar to the results of (Ogah, 2011). According to the (Gwaza and Elkana 2017), the male and female body weight of broad helmeted guinea fowl were 2.77 and 2.45 kg respectively at a mature age (around 10 months). Fajemilehin (2010) reported that body weight of pearl guinea fowl was 980.15g at around 7 months of age nearly supports the findings of the present study. At 12 month of age, the body weight was 1.23 kg nearly supports the results of Oke *et al*. (2004) who reported body weight 1.28 kg at 52 weeks of age. The body weight varies according to breed, variety, nutrition, management, and other disease condition. Malnutrition may cause for poor body growth (Popy *et al*., 2018). Observed that the body length of male and female were 50.74 and 49.17 cm respectively and dissimilar with the result of (Gwaza and Elkana 2017). This may be due to the method of measurement of body length. However, beak length and neck length of this study support the results of (Gwaza and Elkana 2017). Body length was found 41.68 cm (around 7 months) which nearly similar with the report of Fajemilehin (2010). According to the conducted study, the highest correlation was observed between body weight and keel length ($p<0.01$), and lowest were observed both of beak length and shank length, and head length and shank length (not statistically significant). The positive and significant correlation between body weight with body length, wing-span, shank length, and head length suggests that selection for any of these body parameters will cause direct improvement in body weight. Similar results have been reported by Daikwo *et al*. (2011). Eleroğlu *et al*. (2016) reported that the egg weight, egg height and egg width of guinea fowl ranges from 29.44 to 48.48 g., 4.74 to 5.87 cm and 3.79 to 4.49 cm respectively. The conducted study also reported the egg weight, egg height, and egg width were 43.82 g., 4.99 cm and 3.94 cm respectively belonging the findings of the author (Eleroğlu *et al*., 2016). However, Khairunnesa *et al*. (2016) reported the egg weight as 38.0g. Environmental variation, management factors, and nutritional handicap might have the influences of this dissimilarity.

White guinea fowl plumage was white in color. Its overall body is white except wattle, helmet, beak, shank, and toe. Lavender guinea fowl was another variety of helmeted guinea fowl. It was the lavender color with pearling over the entire body. Its whole body is light purple except head, beak, wattle, helmet, shank, and toe. Pied guinea was another variety of helmeted guinea fowl. Any color could be pied, mainly pied guinea fowl contains white breast feather. Pied guinea fowl had dark gray with a white dot on their plumage. Its head contains both white and back color. Pearl guinea fowl was another variety of helmeted guinea fowl. Its plumage color was dark gray to blackish in color with white pearling on the entire body. It was the original color of guinea fowl. Those findings are more or less similar to the other authors (Somes,

1996;Jacob, n.d.; Abdul-Rahman *et al*., 2015). Several diseases, poor management and weather fluctuation causes significance waves to lose the weight gain according to age advance. Methods of measurement, sampling procedures may be one of the mentionable causes for the variation of some morphometric characteristics.

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Conclusion

In Bangladesh, guinea fowl farming becomes familiar with the farmers and contributes to potential meat and substantial egg production. Consequently, it may provide a remarkable tool for meeting protein demand for rural people. Thus, morphometric measurements and productive traits belong to the study may provide baseline information for their characterization. However, poor management, several disease condition, weather fluctuation may cause the deviation of their recommended growth that was experienced in the study. Hence, the study may provide potential information to improve the performance of guinea fowl.

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