

PHENOTYPIC CHARACTERISTICS AND BIOMETRICAL STUDY ON DIFFERENT BREEDS OF PIGEON IN NORTHERN BANGLADESH

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ABSTRACT

The experiment was conducted to characterize different breeds of pigeon phenotypically and to study their body biometry, which are available in the northern Bangladesh. During this study 30 farms were selected which have >20 pair of pigeons in the three study area namely Rajshahi, Natore and Pabna districts of Bangladesh. There about 15 breeds have been selected for the observation of phenotypic characteristics such as color of bill, eye, eyelid, skin, shank, toe, egg, head feather, neck feather, body feather, down feather, wing feather, tail feather and shape of bill, body and egg. The biometrical data were collected from the measurement of length of bill, head, body, shank, middle toe, wingspan and mature body weight. In this study the highest mean bill length was found 2.83 ± 0.05 cm in Strasser and lowest mean head length 5.00 ± 0.00 cm in Kormona, Nun and Jacobin. The highest mean body length was found 41.60 ± 0.38 cm in Strasser and lowest mean body length 30.00 ± 0.43 cm in Owl. The highest mean wingspan was found 81.00 ± 0.51 cm in Jacobin and lowest mean wingspan 60.45 ± 0.76 cm in kormona. The heighest mean shank length was found 3.40 ± 0.13 cm in Homer and lowest mean shank length 2.50 ± 0.00 cm in Giribug, Kormona, Nun, Satinette and Suachandan. The heighest mean middle toe length was found 4.40 ± 0.05 cm in pouter and lowest mean middle toe length 3.00 ± 0.00 cm in kormona. The heighest mean mature body weight was found 748.20 ± 8.96 gm in Strasser and lowest mean mature body weight 265.10 ± 7.03 gm in Giribug. Phenotypic correlation among bill length, head length, body length, wing span, shank length, middle toe length and mature body weight of these breeds of pigeon ranged from 0.233 to 0.789. The experiment's result may contribute to breed up gradation, helps to formulate the conservation and improvement strategies for the breed as genetic resource.

Key words: Pigeon, breed, phenotypic characters, biometry

INTRODUCTION

Pigeon, common name for members of the large family Columbidae, land birds, cosmopolitan in temperate and tropical regions, characterized by stout bodies, short necks, small heads, and thick, heavy plumage (Gifford, 1941). Pigeons are incredibly complex and intelligent animals. Pigeons (Order Columbiformes) are ubiquitous birds and can be found in virtually every town and city around the globe (Marques *et al.* 2007). They are highly dependent on humans to provide them with food and sites for roosting, loafing, and nesting. They live side by side with human as a source of food, hobby and experimental purposes (Sari *et al.* 2008). Although pigeons are one of the most intelligent of all the bird species man has found limited uses for the birds other than for the purposes of sport, food and as a message carrier. Bangladesh has a long historical record of raising poultry under backyard system (Bhowmik, 2014). The weather and vast areas of crop field along with housing premises of Bangladesh are suitable for pigeon farming (Asaduzzaman *et al.*, 2009). Mbap (1985) suggested that before attempting any genetic improvement, animals must first be characterized. The future utilization of genetic resource depends on breed characterization (FAO, 2010). Present status of a livestock breed in terms of breed characteristics is essential to formulate the conservation and improvement strategies for the breed. Pigeons are mainly monogamous birds (Essam, 1997). Courtship display of pigeon is usually performed by the male, and shown by the fluffing of the breast feathers, dragging of the tail, cooing, and treading of the feet on the floor. If the female is receptive she will nod her head, after which billing follows. The male presents an open beak into which the female inserts hers. There is evidence that the male regurgitates into the beak of the female. Subsequently the female will crouch, elevate her wings and receive the male, and the pair-bond is formed (Whitman, 1919; Craig, 1918; Gifford, 1941).

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MATERIALS AND METHODS

The experiment was conducted at the Department of Veterinary and Animal Sciences, Faculty of Agriculture, Rajshahi University, Rajshahi from June 2015 to June 2016. 30 selected pigeon farms of three districts (Rajshahi, Natore & Pabna) of Rajshahi division have been visited and the different breeds of pigeons were recorded. The pigeons were reared in scavenging condition and nests were used as a night shelter for protection against predator. Each pair of pigeon was kept in nest separately. The size of each nest was 32 cm × 60 cm × 22 cm. Nest was made strong with iron and was placed at a reasonable height using strong support. The pigeons were offered high quality diets and water *ad libitum* with high and low protein level. One pair of pigeon requires about 60 gm feed per day. The nests were cleaned periodically for maintaining good body condition of bird. The pigeons were treated with vaccine and deworming. The lengths of bill, head, body, shank, wing span and eggs were measured with slide calipers and measuring tape. Body weights were measured with an electronic balance in the morning before the birds were fed. Birds were individually observed for phenotype expression. For each pair of pigeon, different record sheets with full details of each parameter were maintained. The data generated from this experiment were entered in Microsoft Excel work sheet, 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 AND DISCUSSION

The color of body, bill, skin, shank, toe, eye, eyelid, eggs, and head, neck, body, wing, tail and down feather, and shape of body, bill and eggs of different breeds of pigeon were presented in Table 1. The mean body length, wing span, shank length, bill length and head length of different breeds of pigeon were presented in Table 2. The phenotypic correlation among body length, bill length, head length wing span, shank length, middle toe length and weight of mature pigeon were provided in Table 3.

Bhowmik *et al.* (2014) reported that the body length was 33.28cm in Jalali pigeon, which was comparable to those results reported by David *et al.* (2001), Axelson and Messonnier (2005) but nearly similar to nun and mookie pigeons in this research findings. The body weight of pigeon varies according to the breed, nutrition and management. Darwati *et al.* (2010) reported that mean body weight of local pigeon on 4th week was 290.40gm. Bhowmik *et al.* (2014) found the mean body weight of Jalali pigeon was 275.59gm which also in partial agreement with Islam (2010) and Azad (2009). Islam (2010) found that live weight of Jalali and Giribaz pigeon were 237.20 gm and 244.70 gm respectively. Azad (2009) observed that live weight of Gola male and female pigeon were 304.10 and 257.50 gm, respectively. Bhowmik *et al.* (2014) found the mean wing span 64.37cm of Jalali pigeon that is nearly 64.60cm of Giribug in the present research work. Mayntz (2012) pointed out that the wing span of rock pigeon was 25 inch which is very lower from the present findings. Bhowmik *et al.* (2014) reported that the positive and significant correlation between body weight with body length, wing span, shank length and head length and also suggests that selection for any of these body parameters will cause direct improvement in body weight. Similar results have been reported by Mbap and Zakar (2000) and Okpeku *et al.* (2003). Many of the phenotypic correlations between body measurements were positive and high which also reported by Mancha (2004). Zickefoose (2012) found that adult pigeons have orange or reddish orange eyes which support these results in the present findings with the Giribug. Similar results were also found by Johnston (1992) in adult Rock pigeon. The body color of Jalali pigeon is in agreement with those of Axelson and Messonnier (2005) and Johnston (1992). Axelson and Messonnier (2005) documented that a mature pigeon has a basic color of dull grey with white rump and two large wing bars. Johnston (1992) found that body color of Rock pigeon (*Columba livia*) were green, gray, purple or violet, sheen or iridescence. Bhowmik *et al.* (2014) reported that the color of shank and toe of Jalali pigeon were red, are similar with those of Zickefoose (2012) and also similar with the present research findings. Gambo *et al.* (2014) reported that among the linear body parameters shank length is the best single predictor of body weight than the other body measurements in Japanese quail. Anebi (2010) had earlier reported a similar finding, although in the domestic pigeon, that shank length was the best predictor of body weight as compared with other body measurements. Bokhari (2002) reported that shank length serves as a reliable index of body weight during most of the pigeons' growing period. Gambo *et al.* (2014) also reported that age had very highly significant effects on all linear body parameters as similarly reported by Daikwo (2011).

Table 1. Phenotypic characteristics of different breeds of pigeon

Parameters	Observations in the breeds														
	Giribug	Kormona	Nun	Owl	Satinette	Mookee	Suachandan	Lakkha	Jacobin	Bokhara	Shirajee	Homer	Pouter	King	Strasser
Bill color	Black	White	White	White	White	White	White	White	White	White	White	White	White	White	Black
Eye color (Cornea color)	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Cornea encircling ring color	Orange	Yellow	White	White	White	White	White	White	White	White	White	White	Yellow	Yellow	Yellow
Eyelid color	White	White	White	White	White	White	White	White	White	White	White	White	White	White	White
Skin color	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink
Head feather color	Black and white	White	Yellow	Yellow	White	White	Brown	White	White	Yellow	Black	Red	Yellow	White	Blue
Neck feather color	Greenish black	Red	Yellow white	Yellow	White	Black	Brown	White	Yellow	Yellow	Black white	Red	White	White	White
Body feather color	White	Red	White	Yellow	White	Black	Ash	White	Yellow	Yellow	White	Red	White	White	White
Wing feather color	Black and white	Red white	Yellow white	Yellow	Ash brown	Black	Ash	White	Yellow white	Yellow	White	Red	Yellow	White	Ash blue
Tail feather color	Black	Red	Yellow	Yellow	Black	Black	Ash	White	White	Yellow	White	Reddish gray	Yellow	White	Ash black
Down feather color	White	Red	White	Yellow	White	Black	Ash brown	White	Yellow	Yellow	White	Red	White	White	White
Shank color	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Toe color	Red with black claw	Red with white claw	Red with white claw	Red with white claw	Red with white claw	Red with black claw	Red with black claw	Red with white claw	Red with white claw	Red with white claw	Red with white claw	Red with white claw	Red with white claw	Red with black claw	Red with black claw
Egg color	White	White	White	White	White	White	White	White	White	White	White	White	White	White	White
Bill shape	Elongated narrow and curve	Short and curve	Short and curve	Short and straight	Short and curve	Elongated and curve	Short and curve	Short and curve	Short and straight	Elongated and curve	Elongated and curve	Elongated and straight	Elongated and straight	Elongated	Elongated and straight
Body shape	Elongated and round	Round	Round	Round	Round	Round	Round	Round	Elongated round	Elongated and round	Elongated and round	Elongated round	Elongated and round	Round	Elongated and round
Egg shape	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval	Oval

Table 2. Effect of breed on body biometry of different breeds of pigeon (n=20)

Name of the breeds	Parameters						
	Bill length(cm)	Head length (cm)	Body length (cm)	Wing span (cm)	Shank length (cm)	Middle toe length(cm)	Mature body weight(gm)
Giribug	1.90±0.05 ^f	5.70±0.11 ^{de}	32.40±0.49 ^{ef}	64.60±0.63 ^e	2.50±0.00 ^b	3.10±0.05 ^{de}	265.10±7.03 ^g
Kormona	1.50±0.00 ^g	5.00±0.00 ^f	30.95±0.20 ^{fg}	60.45±0.76 ^f	2.50±0.00 ^e	3.00±0.00 ^e	269.10±6.05 ^g
Nun	1.50±0.00 ^g	5.00±0.00 ^f	33.10±0.38 ^{de}	63.30±0.47 ^e	2.50±0.00 ^e	3.05±0.03 ^e	289.35±5.78 ^{fg}
Owl	1.50±0.00 ^g	6.00±0.18 ^{cd}	30.00±0.43 ^g	63.20±0.80 ^e	2.80±0.06 ^d	3.30±0.06 ^d	301.80±9.55 ^f
Satinette	1.50±0.00 ^g	6.00±0.00 ^{cd}	32.50±0.36 ^{ef}	60.80±0.67 ^f	2.50±0.00 ^e	3.00±0.00 ^e	332.85±5.30 ^e
Mookee	2.00±0.00 ^e	5.60±0.11 ^e	33.00±0.53 ^{de}	64.80±0.80 ^e	2.60±0.05 ^e	3.30±0.06 ^d	333.75±6.36 ^e
Suachandan	1.85±0.05 ^{ef}	5.70±0.11 ^{de}	34.60±0.61 ^d	64.70±0.38 ^e	2.50±0.00 ^e	3.15±0.05 ^{de}	336.50±12.04 ^e
Lakkha	1.95±0.03 ^{ef}	6.00±0.00 ^{cd}	36.40±0.41 ^c	69.78±0.52 ^d	2.80±0.08 ^d	3.63±0.09 ^c	414.80±9.19 ^d
Jacobin	1.85±0.05 ^f	5.00±0.00 ^f	37.50±0.39 ^c	81.00±0.51 ^a	2.80±0.06 ^d	3.30±0.06 ^d	436.00±6.75 ^d
Bokhara	2.20±0.06 ^c	6.00±0.18 ^{cd}	39.40±0.99 ^b	76.85±1.04 ^b	3.20±0.09 ^b	4.28±0.13 ^{ab}	469.80±12.76 ^c
Shirajee	2.50±0.00 ^b	5.90±0.12 ^{de}	37.55±0.48 ^c	73.70±1.38 ^c	3.00±0.00 ^c	4.15±0.00 ^b	481.75±19.13 ^c
Homer	2.83±0.05 ^a	6.25±0.16 ^c	37.75±0.76 ^c	67.60±0.96 ^d	3.40±0.13 ^a	4.25±0.10 ^{ab}	496.40±13.34 ^{bc}
Pouter	2.50±0.00 ^b	6.00±0.00 ^{cd}	41.15±0.61 ^a	77.40±0.67 ^b	3.00±0.00 ^c	4.40±0.05 ^a	521.20±8.12 ^b
King	2.10±0.05 ^d	6.65±0.17 ^b	37.30±0.80 ^c	69.25±0.89 ^d	3.08±0.04 ^b	4.25±0.09 ^{ab}	727.20±10.38 ^a
Strasser	2.50±0.00 ^b	8.00±0.00 ^a	41.60±0.38 ^a	75.80±1.07 ^b	3.00±0.09 ^c	4.35±0.12 ^{ab}	748.20±8.96 ^a

Values are mean ± SE, a, b, c, d, e, f, g data in the column with different superscripts are significant from each other (p<0.05), n=no. of observation.

Table 3. Correlation among different body parameters

	Mature body weight	Body Length	Bill length	Head Length	Wing Span	Shank Length	Middle Toe Length
Mature body weight							
Body Length	0.723**						
Bill length	0.631**	0.691**					
Head Length	0.683**	0.536**	0.517**				
Wing Span	0.595**	0.754**	0.500**	0.233**			
Shank Length	0.509**	0.401**	0.621**	0.399**	0.317**		
Middle Toe Length	0.725**	0.610**	0.743**	0.506**	0.512**	0.789**	

**Correlation is significant at the 0.01 level

CONCLUSION

Although breed characteristics is essential to formulate the conservation and improvement strategies for the breed, so it is possible to improve these pigeons through selection and other relevant breeding strategies, therefore phenotypic characterization is important to measure and describe genetic diversity in these resources as a basis for utilizing them sustainably. External measurements are most useful in determining the sex that is important to maintain an ideal farm. Therefore, as a genetics resource, it is inevitably necessary for these pigeons to be conserved. More information needs to be collected and assessed to prevent their possible extinction and to promote their utilization. Further country wide studies should emphasize the genetic characterization of these pigeons.

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