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Phenotypic and Reproductive Parameters of Indigenous Ducks of Boalkhali Upazila, Chattogram

Keya Ghosh[1], Ashutosh Das[1], Goutam Buddah Das[2], Md. Emran Hossain[2], Mohammad Mejbah Uddin[3], Joyita Basu[4], Md. Amdadul Haque[5] , Mohammad Majibur Rahman[6] and Omar Faruk Miazi[1*]

[1]Department of Genetics and Animal Breeding, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, Bangladesh.
[2]Department of Animal Sciences and Nutrition, Chattogram Veterinary and Animal Sciences University,Khulshi, Chattogram, Bangladesh.
[3]Department of Anatomy and Histology, Breeding, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, Bangladesh.
[4]Department of Livestock Services, Bangladesh.
[5]Department of Zoology, Jahangirnagar University, Dhaka, Bangladesh.
[6]Department of Environmental Sciences, Jahangirnagar University, Dhaka, Bangladesh.

*Corresponding author: Omar Faruk Miazi, Email: *f_cvasu@yahoo.co.in*

Abstract

The present study was aimed to characterize the morphology and reproduction potentialities of indigenous duck genetic resource of Bangladesh. This study was performed in Boalkhali Upazila under Chattogram district over a period of two months. Information was collected by using a structured questionnaire through personal interaction, on spot recording and direct phenotypic measurements in this region. Data on 40 representative adult indigenous ducks were included for morphological study, productive and reproductive performances from 10 duck owners. Phenotypic characteristics were varied among the indigenous ducks. Head color was noticed mottled brown (70%) and black (30%) in female ducks whereas, black (65%) and dark green color (35%) in male ducks. Bill color in male and female ducks was prominently observed yellowish tipped with black but bright yellow with black tip (35%) was also found in male ducks. Bright orange color shank was noticed in both male and female ducks (100%). Quantitative measurements on adult live weight, body length, bill length, neck length, shank length, wing length and wing span in male and female were found to be 1.87±0.44kg and1.52± 0.02kg, 28.32±0.57cm and 25.54±0.27 cm, 6.1±0.37cm and 5.7±0.04cm, 22.47±0.53cm and 20.36±0.05cm, 6.15±0.12cm and 5.6±0.03 cm, 26.52±0.24cm and 24.7±0.23cm, 86.24±0.23cm and 82.39±0.28cm respectively. Total number of eggs laid per month averaged 18.33±0.17 and clutch size was found 12.32±0.23.The average egg weight, egg length and egg width were estimated to be58.56±0.67gm, 55.44±0.42mm and 39.67±0.19mm.Characteristic creamy white and bluish tinge of egg color were observed. The present study provided some baseline information on indigenous duck of Bangladesh which could be useful for genetic characterization and future improvement programs in Bangladesh.

Keywords: Phenotype, duck, indigenous, production, reproduction

Introduction

Poultry sector is an inevitable part of agriculture that plays a substantial role in ensuring food security as well as facilitating poverty reduction. Bangladesh has a large and rapidly growing poultry sector in which ducks are considered as the most preferred poultry species after chicken for egg and meat purposes. The climate, environment and the countless water bodies of Bangladesh are favourable for duck habitation and production. Therefore, duck in Bangladesh reared by rural families and landless people particularly who cannot afford to rear cattle or goat. Ducks have a great role in village poultry production (Farrell and Stapleton, 1986). Consumption of duck meat and eggs in the country is estimated about 30 percent of total poultry meat and egg consumption that plays important role to narrow the gap of animal protein requirement in human diet (Islam *el al*., 2003). However, large-scale duck farming is found particularly in the north-eastern and coastal regions of the country where the ecology of land, agro-climatic condition and natural feed resources largely influence on duck population demography (Khanum *et al*., 2005). Small-scale duck rearing has potential contribution to upliftment of socio-economic condition and improving the nutritional status of the rural people in Bangladesh. Total duck population in the country has been reported to be 57.75 million (DLS, 2019), of which 95 percent are of indigenous or non-descriptive type scattered throughout the country (Hoque and Sultana, 2003).In Bangladesh most of the duck are indigenous (Ahmed, 1986; Arboleda, 1990) but other most important ducks available in the country are Khaki Campbell, Indian Runner, Jinding, Pekin and their crosses. Local ducks are ubiquitous in the country and peoples are traditionally rearing them under subsistence level of management. In Boalkhali Upazila, every household keep just a few ducks in association with chicken in which most of the ducks are indigenous non-descriptive, crosses and deshipati. It occupies an important place in Chattogram in respect of back yard poultry practice because of having available natural feeds during harvesting season. Despite the large number of households having backyard duck in a traditional practice, few studies have been done on the subject in Boalkhali Upazila and backyard duck has not been identified as a focus area in the human development programmers. As more than 95 per cent of the population in this region is non-vegetarian, they prefer duck eggs over chicken. Large number of indigenous ducks are found in their home tracts which are need to be documented. There have been very few systematic studies of these ducks, hence information on their physical, productive and reproductive characteristics are very scanty. Keeping in such points in mind, this study was carried out to generate information on the native ducks for the establishment of database on production and fitness traits which would help in exploring the potentiality of ducks and adoption of scientific breeding strategy and management practices. Furthermore, there is also lack of scientific documentation on their phenotypic features, production, reproduction, egg quality attributes under proper feeding and management condition and disease aspects of this genetic resource in Bangladesh. Therefore, the study was designed to investigate the phenotypic characteristics, productive and reproductive performances of indigenous duck of Boalkhali Upazila, Chattogram, Bangladesh.

Materials and Methods

Study area and duration

The investigation was carried out at Boalkhali Upazila in Chattogram district over a period of two months (October, 2019 to December 2019) and the area was selected on the basis of availability of ducks.

Selection of sample

A Total 10 households were selected for this study. Households having at least 3 ducks reared under semi-scavenging condition were considered in the study. Therefore, 40 ducks comprising 20 females and 20 males were selected to conduct the study. Simple random sampling technique would be followed to collect data.

Data collection

A structured questionnaire was prepared, pre-tested and used for data collection. In order to collect the relevant information, face to face interviewing and on spot recording were performed on production potential, reproductive performance, phenotypic characteristics such as plumage color, shank color, skin color, eye color, bill color, egg color. Quantitative data like egg weight, clutch size, live weight at different ages and different morphometric measurements like shank length, bill length, neck length, wing span, wing length and body length were measured on spot by using digital electric balance, measuring tape and slide calipers. The phenotypic features were identified and documented properly.

Data analysis

All collected information was carefully checked, reviewed and summarized in the MS Excel 2013.Latterly,the data were exported to STATA--13 (Statacorp, 4905, Lakeway Drive, College station, Texas 77845, USA) for conducting descriptive analysis. Simple statistical measures like arithmetic mean, frequency, percentage etc. were used in this study. The results of categorical and continuous variables were expressed with percentage and standard deviation respectively.

Results and Discussion

Phenotypic characteristics (qualitative)

The features of different phenotypic traits and their distributions are presented in Table 1 and Figure 1. The indigenous ducks have multiple color plumage. Head color was noticed black in 65% of drake and 30% duck, whereas mottled brown head (70%) in female ducks and dark green head (35%) in male ducks were also observed. Breast color in male ducks was 65% white and 35% reddish brown while it was 30% white and 70% mottled brown in female ducks.

Table 1: Phenotypic features and their frequencies in indigenous duck of Boalkhali

Phenotype		Sex	n	Characteristic features	Frequency
Plumage	Head color	Male	20	Black	65%
				Dark green	35%
		Female	20	mottled brown	70%
				black	30%
	Neck color	Male	20	dark Green with white ring	35%
				Black	65%
		Female	20	mottled brown	70%
				white	10%
				black	20%
	Breast	Male	20	reddish-brown	35%
				white	65%
		Female	20	mottled brown	70%
				white	30%
	Back color	Male		Black	65%
				dark grey	35%
		Female		brown to buff	60%
				black	40%
	Wing color	Male	20	Grey-brown with blue speculum	35%
				black	25%
				White and black	40%
		Female	20	Golden brown with black line	50%
				mottled brown	20%
				Black and white	30%

Phenotype		Sex	n	Characteristic features	Frequency
	Tail color	Male	20	black	65%
				dark green	35%
		Female	20	brown	60%
				black	40%
Bill color		Male	20	Bright yellow with black nail at tip	35%
				yellowish orange tipped with black	65%
		Female	20	Yellowish orange with black tip	100%
Shank color		Male	20	bright orange	100%
		Female	20	Bright orange	100%
Skin color		Male	20	white	100%
		Female	20	white	100%
Eye color		male	20	black	100%
		female	20	black	100%
Egg color		Female	20	Creamy-white	55%
				Bluish	45%

Black color (65%), dark green with white ring collar (35%) neck were noticed in male ducks and mottled brown(70%), white(10%), black(20%) color neck observed in female ducks. Wing color was found to be black and white (40%), black (25%) and grey-brown with blue speculum (35%) in male ducks. In female, wing color found was observed golden brown with black line (50%), black with white (30%) and mottled brown (20%). Back color was found black (65%), dark grey (35%) in male ducks and brown to buff (60%), black (40%) in female ducks. In male, tail color was noticed black (65%) and dark green (35%) whereas, brown (60%) and black (40%) in female ducks. Bill color in female ducks was yellowish tipped with black but bright yellow with black tip was also found in some male ducks (35%). Bright orange color shank was noticed in both male and female ducks (100%). Therefore, white color skin and black color eyes were found in both drakes and ducks. Egg color in female ducks was observed creamy white (55%) and bluish white (45%). All of these phenotypic observations about plumage color were similar with the findings of (Panda *et al*., 2008; Kamal *et al.*,2019)but there were some dissimilarities with the findings with Morduzzaman *et al.* (2015). Similarly, reports of no definite feather pattern and the varied bill color from duck to duck were also reported by (Banerjee, 2013). This might be due to admixture of this breed with other available genotypes in their habitats. There was no exotic breed was found. All of the farmers reported to have reared indigenous ducks including deshi black and non-descriptive ducks (Hoque and Rahman, 2004).Egg color of duck was distinguished as well and supported by previous findings of Kamal *et al.* (2019).

Phenotypic measurement (quantitative)

Phenotypic characteristics (quantitative) of indigenous ducks are presented in Table 2. The average body weight of adult male and female indigenous ducks were 1.87±0.44 and 1.52±0.02kg, respectively. It is in agreement with the earlier report of (Padhi and Sahoo, 2011; Kamal *et al.*, 2019). However, relatively lower body weight was found by (Sharma *et al.* (2003) and Morduzzaman *et al.*,(2015) in Nageswari duck and Vij *et al*., (2010) that reported values of adult weight for drakes and ducks at 1.30 and 1.50 kg, respectively .This might be due to difference in feeding and management practices. Body length was 28.32±0.57 and 25.54±0.27cm respectively in adult males and females.

This finding is supported by the study of Morduzzaman *et al.*, (2015). On the contrary, body length of male and female ducks according to Kamal *et al*., (2019) and Vij *et al*., (2010) were 42.69±0.55, 41.30±0.29cm and 32.73±0.14, 31.26±0.29 cm, respectively which are higher than the present study. This might be due to the difference in breeds. Bill length averaged at 6.1±0.37 and 5.7±0.04 cm respectively in adult males and females. This result is anticipated to a study Kamal *et al.*, (2019). Our observation values on bill length were lesser than the values reported by Murugan *et al*., (2009) for Sanyasi and Keeri varieties of ducks, but higher than values for Nageswari ducks (Morduzzaman *et al*., 2015) and for Deshi duck of West Bengal (Vij *et al*., 2010). In the present experiment, bill and head length were larger in drake than duck. The findings followed the similar trend as observed on Deshi duck of West Bengal (Vij *et al*., 2010) and that of Nageswari ducks (Morduzzaman *et al*., 2015).

Table 2: Phenotypic characteristics (quantitative) of indigenous ducks of Boalkhali

Trait	Male				Female			
	n	Min	Max	Mean±SE	n	Min	Max	Mean±SE
Body weight(kg)	20	1.3	2.5	1.87±0.44	20	1.1	2	1.52± 0.02
Body length(cm)	20	22.67	34.56	28.32±0.57	20	21.73	30.32	25.54±0.27
Bill length(cm)	20	5.6	6.5	6.1±0.37	20	5.2	6.1	5.7±0.04
Neck length(cm)	20	18.3	24.4	22.47±0.53	20	15.4	23.5	20.36±0.05
Shank length(cm)	20	5.5	7.1	6.15±0.12	20	5.2	6.8	5.6±0.03
Wing span(cm)	20	68.8	90.6	86.24±0.23	20	60.6	86.5	82.39±0.28
Wing length(cm)	20	22.32	30.6	26.52±0.24	20	21.5	27.67	24.7±0.23

Average neck and wing length were recorded to be 22.47±0.53cm and 26.52±0.24cm in males and 20.36±0.05cm and 24.7±0.23cm in females respectively and found to be greater in males than that of females. These findings are anticipated by the values that noted in Nageswari duck *(*Morduzzaman *et al*., 2015).Similar trend, lower values of neck length and higher values of wing length reported in (Kamal *et al.*,2019*)*.Average shank length was measured as6.15±0.12cm in males and 5.6±0.03 cm in female ducks. Sharma *et al.* (2003) found shank length of male and female Nageswari duck at 20 weeks of age to be 6.49 and 6.16 cm respectively. In addition, Zaman *et al*., (2007) and Morduzzaman *et al.*, (2015) reported the shank length at 20 weeks of age in male and female Nageswari duck to be 6.67±0.71, 6.12±0.68 cm and 5.76 ± 0.12, 5.16 ± 0.11cm respectively. However, the respective values for deshi duck were 6.21±0.03 and 5.89±0.03 cm (Kamal *et al*., 2019) and 5.67 cm for Deshi ducks of West Bengal (Vij *et al*., 2010). The differences in all of these observations might be due to response to selection for this trait and difference in measurement method and breed. Average wing span was estimated 86.24±0.23cm in males and 82.39±0.28 cm in female ducks in the present study.

(A) **(B)**

(C) **(D)**

(E) **(F)**

Fig 1: Different phenotypic features of indigenous ducks
(A) Plumage color (B) Bill color (C) Eye color (D) Egg color (E) Shank color (F) Wing color.

Fig 2: Measuring of wing span of two indigenous ducks

Fig 3: Measuring of A) wing length B) bill length of indigenous ducks

Productive and reproductive performance

The productive and reproductive performance of indigenous ducks of the study represents in table 3.60 eggs were weighted in which 18% eggs were 52-54 gm, 36% eggs were 55-57gm and 46% eggs were 58-60 gm. So the average egg weight was estimated as being 58.56±0.67g in the present study .This result is in accordance with the findings of Bhuiyan *et al*., (2017) who reported average egg weight to be 58.20 ± 1.50g in Nageswari ducks. In addition, the present findings are also corroborated with the results of Phookan *et al*., (2018) who estimated the egg weight as being 58.03g in Patiducks of Assam and 57.84g in local ducks of Tripura.

Almost similar egg weight (56-60g) was reported both in Bangladeshi indigenous and Indian Nageswari duck (Das and Hoq, 2000; Islam *et al*., 2002; Rahman *et al*., 2009; Khatun *et al*., 2012). However as compared to the present finding, higher egg weight also reported by Sharma *et al*., (2002) in Nageswari duck (62.45g); Phookan *et al*., (2018) in Nageswari duck (61.04g) and Manipur local duck (66.33g) of Manipur; Mahanta *et al*.,(2009) in Chara-chamballi duck (71.6g) of Assam and Morduzzaman *et al*., (2015) in Nageswari duck (69.67 ± 1.05g). The mean egg weight of Nageswari ducks of Assam (60.24±0.93) was also in good agreement of the present finding (Sharma *et al*., 2003). A lower mean egg weight of indigenous ducks of Tamil Nadu (54.78 ±0.90) as compared to present finding was reported by (Kavitha *et al*., 2017).

Table 3: Productive and reproductive performance of indigenous ducks of Boalkhali

Traits	Mean±SE
Egg weight(g) (n=60)	58.56±0.67
Egg width(mm) (n=60)	39.67±0.19
Egg length(mm) (n=60)	55.44±0.42
Clutch size	12.32±0.23
Total no of egg per month	18.33±0.17

Egg weight increased linearly with age despite the difference was insignificant from 26 to 72 weeks of age (Bhuiyan *et al*., 2017). Relatively smaller eggs might be breed characteristic features of Nageswari ducks as revealed by the findings of previous studies. Unlike to chicken, we found only 40% ducks lay eggs in the laying box even though sufficient laying nests were provided in the shed. The differences of all observation could be due to breed difference and management practices.

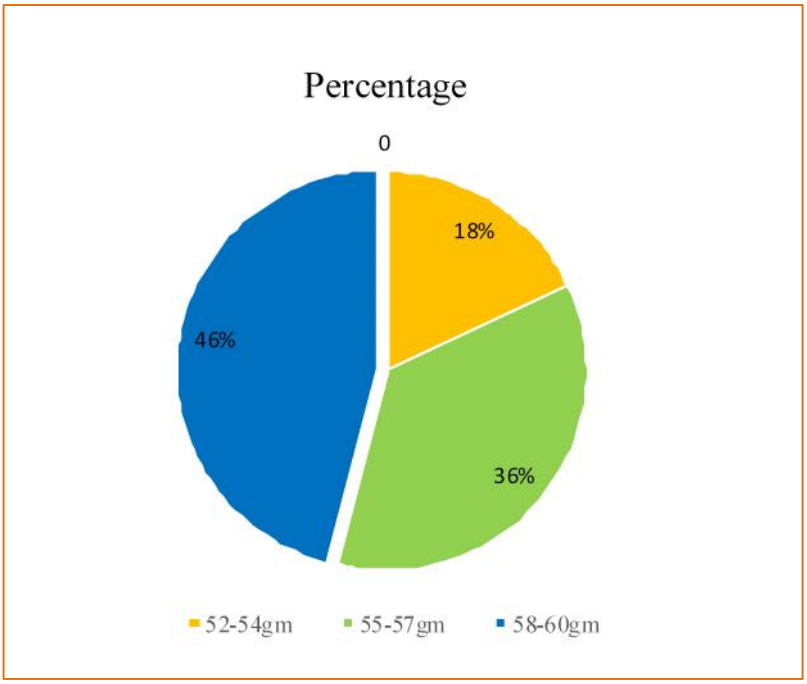

Fig 4: Percentage of Productive and reproductive performance

The egg length and egg width of ducks recorded to be 55.44±0.42mm and 39.67±0.19mm respectively. These characteristics are very much close to the previous findings of Khatun *et al*., (2012) and Harikrishnan *et al*. (2011) and Sharma *et al*., (2002). On the other hand, present results are also in agreement with the findings as reported by Bhuiyan *et al*., (2017) where egg length and egg width studied 56.04 ± 0.52mm and 41.74 ± 0.19mm respectively. The clutch size of ducks was found 12.32±0.23 and total number of eggs per month was estimated 18.33±0.17.This result is very close to the findings of Morduzzaman *et al*., (2015).

Conclusion

The study represented the phenotypic, productive and reproductive characteristics of indigenous ducks where multiple color plumage noticed in indigenous ducks in which head and neck prominently observed mottled brown color in female ducks and black color in male ducks. Therefore, bright orange color shank found in all indigenous ducks in this study. The average live weight of duck was drake 1.87 kg and duck 1.52 kg and average egg weight was 58.56gm.In general terms the study indicates that there are great potentials for improvement of duck production in rural Bangladesh. In some cases particular production was reported higher than expected. However, the findings of this study could be useful to differentiate the characters of ducks along with a better knowledge about production potentials of local ducks and prevent from genetic erosion.

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