

Phenotypic Character and Reproductive Parameters of Indigenous Ducks of Sandwip Upazila, Chattogram



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Phenotypic Character and Reproductive Parameters of Indigenous Ducks of Sandwip Upazila, Chattogram



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List of Abbreviations

Abbreviation	Elaboration
CVASU	Chittagong veterinary and animal sciences university
DVM	Doctor of Veterinary Medicine
e.g.	Exempli gratia
<i>et al.</i>	et alia(and others)
n	Number
%	Percentage
CDBF	Central Duck Breeding Farm

Abstract

The goal of the current study was to learn more about the genetic resources of native ducks in Bangladesh, including their morphology, production capacity, and reproductive abilities. The study was performed in Sandwip upazila under the district of Chattogram over a period of 1 month. Information was collected from 40 ducks (20 male and 20 female) for this purpose. Using a structured questionnaire, data were gathered from ducks through in-person interactions, direct observation of ducks (like the observation of plumage color), and on-spot recording. Phenotypic characteristics varied among the same gender and between the opposite genders of indigenous ducks. Head color was noticed dark green (55 %) and black (45%) in males whereas mottled brown (55 %), black (35 %), and white with a black tint (10%) in females. Neck colors were found to be black(45 %), dark brown (40 %), and black with white ring(15%) in males whereas mottled brown(55 %), white(25 %), black(10 %), and white with black tint(10%) in female. Breast color was noticed as white (65%), brownish (25 %), and black (10 %) in males, whereas mottled brown (55 %), white (35 %), and black (10 %) in females. Bill's color was noticed as yellowish with a black tint (70 %), brownish with a black tint (20 %), and black (10 %) in males whereas yellowish with a black tint (75 %), brownish with a black tint (15 %), black (20 %) in female. The shank color was noticed orange with a black tint (45 %), yellowish (40 %), and blackish (15 %) in males whereas, deep yellow (80 %), and black (20%) in females. Eye color was noticed 100% black in both sexes. According to morphometric measurement, the adult live weight was found to be 1.9 ± 0.08 kg in male and 1.57 ± 0.056 kg in female, body length(including neck) 55.01 ± 0.561 cm in male and 53.55 ± 0.369 cm in female, bill length 5.63 ± 0.119 cm in male and 5.54 ± 0.123 cm in female, wing span 86.07 ± 1.498 cm in male and 80.58 ± 1.654 cm in female, shank length 6.14 ± 0.995 cm in male and 5.95 ± 0.155 cm in female. According to the study, total egg production/year was 188 ± 6.2 . The clutch size was 13.67 ± 0.519 . The average egg weight, length, and width were estimated to be 62.2 ± 1.03 gm, 69.52 ± 0.734 mm, and 45.93 ± 1.135 mm. The current study offered some baseline data on indigenous ducks that may be helpful for genetic characterization, conservation, and upcoming improvement projects in Bangladesh.

Key words: Phenotype, morphometric, indigenous, production, reproduction, color.

Chapter 1: Introduction

Poultry plays a vital role in ensuring food security as well as facilitating poverty reduction by providing eggs and meat. Duck is the second most popular poultry species in Bangladesh after chicken. Duck meat and eggs make up around 30% of the entire amount of poultry consumed in the nation, which helps close the gap in the amount of animal protein needed in the average person's diet (Islam et al., 2003). Now, the total duck population in Bangladesh has been reported to be 66.02 million (DLS,2022-23), most of which is indigenous type. Examples of some indigenous ducks are the Deshi pati duck, Nageshwari duck, Sylheti mati duck, Deshi white, Deshi black, etc. A native duck breeding program was originally launched in 1991 at the CDBF (Central Duck Breeding Farm) in Narayngonj. Some native ducks from the Mymensingh district were brought to CDBF. The history of these local ducks is not particularly interesting. Since then, numerous studies have been conducted to improve native duck production under intensive management in terms of fertility, hatchability, adaptation, survival, susceptibility, etc. In the first instance, numerous mothers and the same father (Black) from F1 through F6 generations produced a new breed of 100% black offspring known as "Deshi Black." It was found that a different breed, the "Deshi white," had maintained its white parent from the F1 to the F6 generation (Momu, J. M., and Hossain, M. A. 2022). These two breeds produced between 200 and 230 eggs per year, according to CDBF record book 2016. Whereas yearly egg production of Nageshwari duck was around 173 (Morduzzaman et al., 2015). These statistics indicate the immense potentialities of indigenous ducks.

Due to their high level of adaptability to their farming environment, distinctive foraging habits, and disease resistance, farmers choose indigenous ducks in extensive rearing systems. They have various advantages over chicken, including being more prolific and laying 15 to 20 more eggs per clutch (Morduzzaman et al., 2015). Duck can easily collect their feed around 60-70% from aquatic sources from snails, slugs, water plants, crop residues, water small fishes, and flies. For this reason, marshy, swamp riverside, wetland, and barren lands are more suitable regions for duck rearing. Sandwip is an island located along the southeastern coast of Bangladesh. Its marshy and swampy nature makes it more suitable for duck farming. Almost every family of this upazila rears 5-10 ducks. Despite such scope, there is no scientific documentation on duck's phenotypic and reproductive

Performances of Sandwip upazila. Therefore the present study was done with the below objectives:

1. To know the phenotypic characteristics of indigenous ducks of Sandwip
- 2 .To know the reproductive parameters of indigenous ducks of Sandwip.

Chapter 2: Materials and Methods

Study area and duration:

The study was carried out at Sandwip upazila under the district of Chattogram, Bangladesh over a period of almost one month (July 2023 to August 2023). The area was selected on the basis of the availability of ducks.

Selection of sample:

8 households were included in this study that had at least 5 ducks and reared their duck under a semi-intensive system. Data was collected through a simple random technique and a total of 40 ducks (20 male and 20 female) and 50 eggs were included under the study.

Data collection:

Data was collected through a structured questionnaire. For this purpose, face-to-face interviews, direct observation of the duck, and spot recording were done on phenotypic characteristics such as plumage color, bill color, shank color, and eye color; morphometric parameters such as bill length, body length, shank length, wing span; productive performances like egg production/year, clutch size, egg weight, color, length, width, etc. were measured by using digital balance and measuring tape.

Data analysis

All data was carefully checked, reviewed, and transferred in MS Excel 2010. All statistical analysis like arithmetic mean, frequencies, standard deviation, and standard error was done in MS Excel 2010.



(A)



(B)



(C)



(D)

Figure 1: Different phenotypic features in indigenous ducks (A) Plumage color (B) Breast and shank color (C) Bill color (D) Egg color.



(E)



(F)



(G)



(H)

Fig.2: Measuring of live weight (E), Bill length (F), Wing span (G), Body length including neck (H).

Chapter 3: Results and discussion

Phenotypic characteristics (qualitative):

Phenotypic characteristics and their frequencies are presented in Table 1. According to information, Head color was noticed dark green (55%) and black (45 %) in males whereas mottled brown (55%), black (35 %), and white with a black tint (10%) in females. Neck color was noticed as black (45 %), dark brown (40 %), and black with white ring (15 %) in males whereas mottled brown (55%), white (25%), black (10 %), white with black tint (10 %) in females. Breast color was noticed as white (65%), brownish (25 %), and black (10 %) in males, whereas mottled brown (55%), white (35%), and black (10 %) in females. Bill's color was noticed as yellowish with black tint (70 %), brownish with a black tint (20 %), and black (10 %) in males whereas yellowish with a black tint (75 %), brownish with a black tint (15 %), black (20 %) in female. The shank color was noticed as orange with a black tint (45 %), yellowish (4%), and blackish (15 %) in males whereas, deep yellow (80%), and black (20 %) in females. Eye color was noticed 100 (%)black in both sexes.

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

Phenotype		Sex	n	Characteristic feature	Frequency(%)
Plumage	Head color	male	20	Dark green	55
				Black	45
		Female	20	Mottled brown	55
				Black	35
				White with black tint	10
		Neck color	male	20	Black
				Dark green	40
				Black with white tint	15
	Female		20	Mottled brown	55
				White	25
				Black	10
	Breast color	Male	20	White	65
				Brownish	25
				Black	10
		Female	20	Mottled brown	55
			White	35	
			black	10	

Phenotype	Sex	n	Characteristic feature	Frequency (%)
Bill color	Male	20	Yellowish with black tint	70
			Brownish with black tint	20
			Black	10
	Female	20	Yellowish with black tint	75
			Brownish with black tint	15
			black	20
Shank color	Male	20	Orange with black tint	45
			Yellowish	40
			Blackish	15
	Female	20	Deep yellow	80
			Blackish	20
Eye color	Male	20	Black	100
	Female	20	Black	100
Egg color	Female	50	Creamy white	67
			Bluish	33

Egg color was observed in females as creamy white (67 %) and bluish (33%). Most of the phenotypic observations about plumage color were nearly to similar the findings of (Morduzzam et al., 2015). But there were dissimilarities with Gosh et al., 2020. Dissimilarity in feather pattern and bill color from duck to duck has been also reported by (Banerjee, 2013). This could be a result of this breed mixing with other genotypes that are present in their surroundings (Gosh et al., 2020). Egg color was also supported by the previous findings of (Gosh et al., 2020) which were also creamy white and bluish.

Phenotypic measurement (quantitative):

The phenotypic features (quantitative) of indigenous ducks are presented in Table 2. The adult live weight was found to be 1.9 ± 0.08 kg in males and 1.57 ± 0.056 kg in females, body length(including neck) 55.01 ± 0.561 cm in males and 53.55 ± 0.369 cm in females, bill length 5.63 ± 0.119 cm in male and 5.54 ± 0.123 cm in female, wing span 86.07 ± 1.498 cm in male and 80.58 ± 1.654 cm in female, shank length 6.14 ± 0.995 cm in male and 5.95 ± 0.155 cm in female. All of these traits were nearly similar to the findings of (Gosh et al., 2020) except for body length. According to Gosh et al., 2020, the adult live weight were estimated as 1.87 ± 0.44 in male and 1.52 ± 0.02 in female, shank length of 6.15 ± 0.12 in male and 5.6 ± 0.03 in female. (Dissimilarity in body length in the current study was due to consideration of neck length along with body). The shank length is also supported by Zaman et al., 2007(6.67 ± 0.71 cm in males and 6.12 ± 0.68 cm in females) and Kamal et al., 2019(6.21 ± 0.03 cm in males and 5.89 ± 0.03 cm in female). Again some criteria show dissimilarities with Morduzzaman et al., 2020 and Vij et al., (2010). The shank length was estimated as 5.87 ± 0.09 cm in the male by Morduzzaman et al., (2015) and 5.67 cm in Vij et al., (2010). This may be due to response to selection for this trait, difference in breed and difference in geographic area, availability of feed and rearing system, etc.

Table 2: Phenotypic characteristics (quantitative) of indigenous duck of Sandwip.

Trait	Male				Female			
	n	Max	Min.	Mean ±SE	n	Max.	Min.	Mean ±SE
Body weight(kg)	20	2.4	1.3	1.9±0.08	20	1.9	1.2	1.57±0.056
Body length with neck (cm)	20	58	53	55.01±0.0561	20	55	50.8	53.55±0.369
Wing span(cm)	20	92	70.1	86.07±1.498	20	87	60	80.58±1.654
Shank length (cm)	20	7.1	5	6.14±0.995	20	7	5.1	5.95±0.155
Bill length(cm)	20	6.2	4.7	5.63±0.119	20	6.2	4.9	5.54±0.123

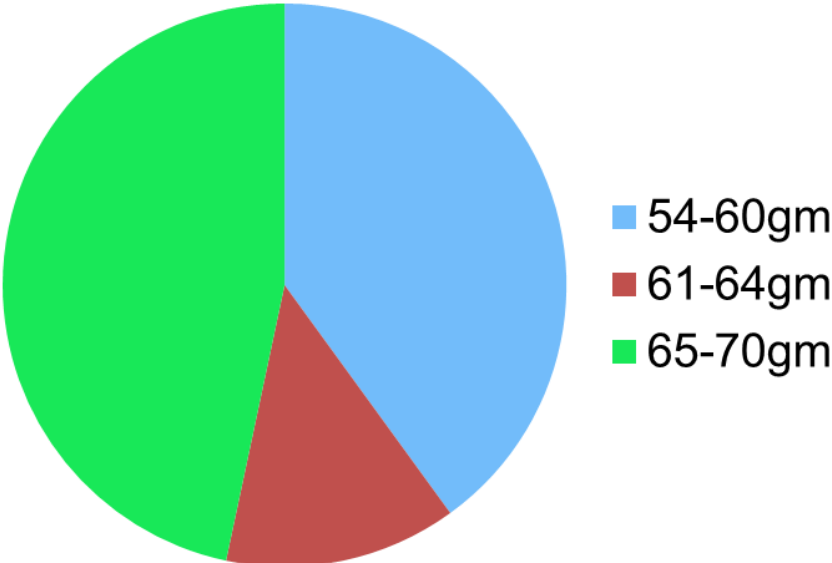
Productive and reproductive performances:

The productive and reproductive performances of indigenous ducks of sandwip upazila are shown in Table 3. According to the study, total egg production/year was 188 ± 6.2 . This result shows nearly similarity to Morduzzaman et al., 2020 in the case of pooled-level duck rearing (173.63 ± 3.39). The clutch size was estimated to be 13.67 ± 0.519 . This finding is very close to Gosh et al., 2020 (12.32 ± 0.23). The estimated egg weight was 62.2 ± 1.03 gm. which is supported by the findings of Khatun et al., (2012) which was 62.20 ± 2.06 gm. in the case of native duck and 61.04 gm. in Nageswari duck in Phookan et al., (2018). But the estimated egg weight shows dissimilarity with Kavitha et al., 2017 (54.78 ± 0.90 gm.) in the case of indigenous duck, Gosh et al., (2020) where the value was 58.62 ± 0.06 gm. and in Bhuiyan et al., 2017(58.20 ± 1.50 gm).

Table 3: Productive and reproductive performances of indigenous ducks:

Trait	N	Mean \pm SE
Egg weight(gm.)	50	62.2 ± 1.03
Egg length(mm)	50	69.52 ± 0.734
Egg width(mm)	50	45.93 ± 1.135
Clutch size	50	13.67 ± 0.159
Egg production/year	50	188 ± 6.2

The egg length and width were estimated to be, $69.52 \pm 0.734 \text{mm}$ and $45.93 \pm 1.135 \text{mm}$. These results showed a higher value than Gosh et al., 2020 ($55.44 \pm 0.42 \text{ mm}$ and 39.67 ± 0.19). This might be due to breed differences, differences in laying stage, and availability in feed and rearing systems.



Graph 1: Differences in eggs laid by indigenous ducks.

Chapter 4: Conclusion

This report upholds the phenotypic, morphometric measurement, and reproductive parameters of the indigenous duck of Sandwip Upazila, Chattogram, Bangladesh. The study's findings revealed the varieties of the breed, higher egg weight, increased clutch size, and production rate than other regions of Bangladesh like Boalkhali. It indicates the higher potentialities of indigenous ducks in this region. The results of this study may be helpful in defining the characteristics of the duck breed and preventing genetic dilution by implementing national conservation programs.

Chapter 5: Limitation

There were some limitations in this study. The data was collected within a very short period (one month). Due to the lack of slide calipers, some measurement was measured by measuring tape. The farmer reared ducks not for business purposes, so they didn't keep the exact value of values like clutch length, egg production /year, etc. So they gave assumptive data in some cases.

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Biography

I am Minara Begum Munni, daughter of Mijanur Rahman and Jesmin Begum. I passed my Secondary School Certificate examination from Dwip Bandhu Mustafizur Rahman High School, Sandwip, Chattogram in 2015 (G.P.A-5.00) followed by the Higher Secondary Certificate examination from Ctg.Govt.Girls College, Chattogram in 2017 (G.P.A-5.00). Now I am an intern veterinarian under the Faculty of Veterinary Medicine at Chattogram Veterinary and Animal Sciences University, Bangladesh.