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## Morphology, morphometry and certain egg quality traits of indigenous ducks of North Eastern region of India

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**Abstract**

Different morphological and morphometric traits were studied in the indigenous ducks of Northeastern India under field condition namely Pati and Nageswari ducks of Assam, Tripura local ducks of Tripura and Manipur local ducks of Manipur. The recorded body weights (kilogram) at 20 weeks age were 1.040 and 0.990; 1.233 and 1.210; 1.020 and 0.980 and 1.757 and 1.689 in male and female Pati, Nageswari, Tripura Local and Manipur local ducks respectively. The mean length (centimeter) for shank, girth, keel and bill were recorded as 5.675, 31.022, 11.03 and 5.444 in Pati, 6.401, 31.124, 16.132 and 5.89 in Nageswari, 5.640, 30.971, 10.97 and 5.230 in Tripura local and 6.141, 34.000, 12.312 and 6.000 in Manipur local respectively. The average of different egg quality traits namely egg weight, shape index, air cell height, shell thickness, albumen index, yolk index, haugh unit score, yolk colour and yolk weight were observed. The average of egg weight (gram) were 58.03, 61.04, 57.84 and 66.33 for Pati, Nageswari, Tripura local and Manipur local ducks respectively.

**Keywords:** Morphology, morphometry, egg quality traits, indigenous ducks, Northeastern region

**Introduction**

Poultry plays a substantial role in ensuring food security for the family besides assisting in poverty reduction. Ducks are considered as the second most preferred poultry species in India after chicken. India has a total population of 16.6 million ducks (Livestock Census, 2011) [9]. In northeastern (NE) region the indigenous duck population is mostly concentrated in Assam, Manipur and Tripura. North-East India is a rich repository of duck genetic resources and is also endowed with abundant watershed areas and ducks which are aquatic in nature thrive well in such environment. The so called "Pati" duck is most common in the Brahmaputra valley of Assam. Another native unique egg-type duck known as 'Nageswari' duck is presently confined to a few areas of the Cachar and Karimganj districts of Barak Valley of Assam. The indigenous ducks of NE region have innate potential to produce eggs and meats with less input and are good sources of protein. More than 95 per cent of the population in this region is non-vegetarian and prefer duck eggs over chicken. Duck also plays an important role in socio-economic and ecological values in this region. Large numbers 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. Further, unplanned breeding over years had led to sufficient genetic erosion and degeneration of these native duck breeds. Keeping in such points in mind, this study was carried out to generate information on the native ducks which would help in exploiting the potentiality of ducks through formulation and adoption of scientific breeding strategy and managerial practices.

**Materials and Methods**

The source of study were Pati and Nageswari ducks of Assam, Tripura local ducks of Tripura and Manipur local ducks of Manipur. Data belonged to adult ducks (20 weeks) of both sexes which were randomly selected from the presurveyed areas of three different states. Study comprised 253 pati ducks (102 males and 151 females), 128 Nageswari ducks (55 males and 73 females), 251 Tripura local ducks (118 males and 133 females) and 154 Manipur local ducks (69 males and 85 females). The period of study was from May 2016 to May 2017.

Different morphological characters such as plumage pattern (head, neck and body), colour of bill, leg, feet, gill and shank were studied. Similarly at 20 weeks of age different morphometric traits studied *viz.* body weight, shank length, girth, keel length and bill length were also recorded. Body weight was measured by a standard electronic weighing balance and the various body measurements were taken with a standard measuring tape calibrated in centimeters (cm). The shank length was measured from hock joint to base of toe. Girth was recorded as the chest circumference just behind the attachment of the wings with help of measuring tape. Keel length was measured from tip to end of keel and the bill length was measured from tip to end of bill.

Thirty eggs from each variety of ducks, thus a total of 120 eggs were collected from different states to study the egg quality traits. Egg quality traits were Egg weight (g), Shape Index, Air cell height (mm), Shell thickness (mm), Albumen index, Yolk index, Haugh Unit Score, Yolk colour, Yolk weight. Egg weight was taken with a standard balance, Shape index was calculated as (Breadth/length) X100 and Shell thickness was measured by screw gauge. Albumin Index and Yolk Index were measured as per standard method given by Heiman and Carver (1936) <sup>[5]</sup> and Funk (1948) <sup>[2]</sup> respectively. The Haugh unit was calculated as per the standard method given by Raymond Haugh 1937 and Yolk colour was done by Roche's Colour Fan. Stratified random sample test have been carried for sampling of data. Statistical analysis and the laboratory work for egg quality traits have been carried out at Department of Animal Genetics and Breeding, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-22, Assam.

## Results and Discussions

**Pati ducks:** Pati ducks possessed mixed coloured plumage predominated by black and white. The general body colour were white, grey, brown, black, white with black patches, brown and black mixture, light brown and blue mixture, light brown and white. The neck was white, black and brown in colour. Head was greenish, grayish, black and white mixture and brown and white mixture. Shank was orange with black tip. Bill was black, orange, orange and black, black grey, light yellow, orange with black tip. Leg and feet were found to be orange for both the sex.

**Nageswari:** The general plumage colour can be described as blackish brown in back, tail and wings, wherein black was predominant over brown. The head were mainly brownish black and occasionally blackish brown and black also observed. The neck was usually blackish brown with a half white band, white plumage with a shade of brownish black plumage tapering at the top of the neck. The bill was blackish yellow with black spots, greenish yellow. The feet were orange in colour. All of these phenotypic observations about plumage color were similar with the findings of Sharma *et al.* (2002) <sup>[10]</sup>, Zaman *et al.* (2005) <sup>[13]</sup> and Valavan *et al.* (2009) <sup>[11]</sup> with few exceptions in head, neck, breast and bill color. This might be due to admixture of this breed with other available genotypes in their habitats. Morduzzaman *et al.* (2015) <sup>[8]</sup> carried out a study on Nageswari ducks of Bangladesh and observed few variations in morphological characters with exception for breast and bill color. They reported that neck, back, wing, tail and bean color in both male and female ducks were completely black. Head color in female ducks was black but white spotted head was found in some males.

**Tripura local:** Body colour was mostly mixed colored feathers. Plumage may be dark brown, colour of head varied from green, black, white, brown, grey, grayish black and yellowish brown. The neck colour was black, white, brown, grey and yellowish brownish. A white ring was seen at neck. Bill and shank were predominantly yellow. The feet were orange or yellow in colour.

**Manipur local:** Body colour was completely white, grey, grayish black, brown, white and grey. Neck was white and brown. Head was green, black, white, black and white, blackish green. The tail was black and white. Bills were yellow, greenish yellow, blackish brown. Leg and feet were orange, blackish brown.

## Morphometric measurement

The mean adult body weights of male and female ducks were recorded as 1.040 and 0.990, 1.233 and 1.210, 1.020 and 0.980 and 1.757 and 1.689 kg in Pati, Nageswari, Tripura Local and Manipur local respectively. In contrast to the present findings Morduzzaman *et al.* (2015) <sup>[8]</sup> reported lower adult body weight as  $1.66 \pm 0.07$  and  $1.51 \pm 0.05$  kg for male and female Nageswari duck of Bangladesh respectively. Zaman *et al.* (2007) <sup>[12]</sup> also reported a higher adult body weight of Nageswari duck which varied from 1.60 to 1.66 kg in males and 1.45 to 1.50 kg in females. Relatively lower body weight was found by Sharma *et al.* (2003) <sup>[10]</sup> in Nageswari duck. These differences in adult body weight might be due to difference in feeding and management practices.

The mean length (cm) for shank, girth, keel and bill were recorded as 5.675, 31.022, 11.03 and 5.444 in Pati, 6.401, 31.124, 16.132 and 5.89 in Nageswari, 5.640, 30.971, 10.97 and 5.230 in Tripura local and 6.141, 34.000, 12.312 and 6.000 in Manipur local respectively. A comparable shank length was reported by Sharma *et al.* (2003) <sup>[10]</sup> for male and female Nageswari duck at 20 weeks of age to be 6.49 and 6.16 cm respectively. The present findings were corroborated the findings of Zaman *et al.* (2007) <sup>[12]</sup>. However, Morduzzaman *et al.* (2015) <sup>[8]</sup> reported lower values of shank length in Nageswari ducks of Bangladesh. Morduzzaman *et al.* (2015) <sup>[8]</sup> reported bill length of Nageswari ducks of Bangladesh were  $5.87 \pm 0.09$  and  $5.54 \pm 0.07$  in male and female respectively.

**Egg quality traits :** The average of different egg quality traits *viz.* Egg weight (g), Shape Index, Air cell height (mm), Shell thickness (mm), Albumen index, Yolk index, Haugh Unit Score, Yolk colour, Yolk weight are presented in Table no.1

**Table 1:** Average egg quality traits

Parameters	Duck eggs			
	Pati	Nageswari	Tripura local	Manipur local
Egg weight (g)	58.03	61.04	57.84	66.33
Shape Index	70.21	73.82	69.52	74.14
Air cell height (mm)	2.05	2.38	2.02	2.42
Shell thickness (mm)	0.33	0.36	0.32	0.38
Albumen index	0.07	0.11	0.07	0.09
Yolk index	0.42	0.47	0.42	0.48
Haugh Unit Score	79.48	85.04	79.13	88.04
Yolk colour	8.94	9.84	8.87	9.29
Yolk weight	24.73	25.87	24.50	28.24
No. of Samples	30	30	30	30

The present study depicted the average of egg weight (g) as 58.03, 61.04, 57.84 and 66.33 for Pati, Nageswari, Tripura local and Manipur local ducks respectively. The egg weight of the present study was comparable with the findings of Sarma *et al.* (2017) <sup>[9]</sup> in Pati ducks of Assam as 57.83±0.87g. However as compared to the present finding, a slightly higher egg weight (60.55g) was observed by in *desi* ducks of Assam. The mean egg weight of Nageswari ducks of Assam (60.24±0.93) as given by Sharma *et al.* (2017) <sup>[10]</sup> was in good agreement of the present finding. 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) <sup>[6]</sup>. The average shape indices as 70.21, 73.82, 69.52 and 74.14 were recorded in Pati, Nageswari, Tripura local and Manipur local ducks respectively (Table 1). The shape index observed by Sarma *et al.* (2017) <sup>[10]</sup> in Pati ducks of Assam (70.29±1.12) was corroborated the present findings. But lower values as compared to present report were observed by Das *et al.* (2000) <sup>[1]</sup> and Kavitha *et al.* (2017) <sup>[6]</sup> in the *desi* ducks of Assam (73.01) and Tamil Nadu (74.23±0.59) respectively. The average air cell height (mm) observed in the present study were 2.05, 2.38, 2.02 and 2.42 in Pati, Nageswari, Tripura local and Manipur local ducks respectively. Sharma *et al.* (2017) <sup>[10]</sup> also reported comparable results with the present report in Pati and Nageswari ducks of Assam. However, Kavitha *et al.* (2017) <sup>[6]</sup> observed slightly higher mean air cell depth of 2.95±0.09 mm in indigenous ducks of Tamil Nadu.

The average shell thickness (mm) were estimated to be 0.33, 0.36, 0.32 and 0.38 in Pati, Nageswari, Tripura and Manipur ducks respectively. The results were comparable with the findings of Mahanta *et al.* (1993) <sup>[7]</sup> in *desi* ducks Assam (0.34± 0.004 mm) and Sarma *et al.* (2017) for Pati and Nageswari ducks of Assam (0.37±0.003 and 0.38±0.004). However, Kavitha *et al.* (2017) <sup>[6]</sup> recorded a slightly higher value (0.40 ± 0.02) in indigenous ducks of Tamil Nadu.

The average albumin index in eggs of Pati, Nageswari, Tripura and Manipur ducks were 0.07, 0.11, 0.07 and 0.09 respectively. Mahanta *et al.* (1993) <sup>[7]</sup> reported albumen index of 0.114± 0.00 in Pati ducks of Assam which is slightly higher than the present report.

The measured yolk index in the present study for Pati, Nageswari, Tripura and Manipur ducks averaged to be 0.42, 0.47, 0.42 and 0.48 respectively. The values were similar to the values of Pati and Nageswari ducks of Assam as reported by Mahanta *et al.* (1993) <sup>[7]</sup>, Das *et al.* (2000) and Sarma *et al.* (2017).

Present results indicated the average haugh unit as 79.48, 85.04, 79.13 and 88.04 respectively in Pati, Nageswari, Tripura and Manipur ducks. The values were comparable with the result of Sarma *et al.* (2017) <sup>[10]</sup> in Pati (80.28±0.97) and Nageswari ducks of Assam (84.74±1.23). However, lower values were reported by Mahanta *et al.* (1993) <sup>[7]</sup> and Kavitha *et al.* (2017) <sup>[6]</sup> in indigenous ducks of Assam and Tamil Nadu respectively.

The Yolk colour recorded in the present study as 8.94, 9.84, 8.87 and 9.29 in Pati, Nageswari, Tripura local and Manipur local respectively. The present findings were comparable with the findings Sarma *et al.* (2017) <sup>[10]</sup> in Pati and Nageswari ducks of Assam.

The colour of egg shell of Nageswari ducks under was found to be greenish blue in the present study. The findings were in agreement with the findings reported by Sarma *et al.* (2017) <sup>[10]</sup> in Nageswari ducks of Assam.

The average yolk weight observed in the present study was 24.73, 25.87, 24.50 and 28.24 in Pati, Nageswari, Tripura and Manipur duck. It was found that Manipur local duck had the heaviest (28.24g) and Pati duck had the lightest (24.73g) yolk under present study.

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