

# Morphometric and egg characteristics of indigenous ducks

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## ABSTRACT

Observations were recorded from 89 flocks of indigenous ducks reared by farmers in 13 districts of 4 states viz. Nadia, North 24 Parganas and Hooghly of West Bengal; Puri, Cuttack, Kendrapara and Khurda of Orissa, Alappuzha, Pathanamthitta, Kottayam and Kollam of Kerala; and Krishna and West Godawari of Andhra Pradesh to study management practices, morphological characters, body biometry and egg quality parameters. It was observed that indigenous ducks are reared by local poor people following backyard system. These are maintained in community ponds in West Bengal and Orissa and along with paddy cultivation in an integrated farming system in Kerala and Andhra Pradesh. The local ducks are medium in size and have wide variation in plumage colour, mainly brown mixed with other colours. The ducks of Kerala and Andhra Pradesh are morphologically similar. In Kerala, native ducks are known as Chara and Chemballi on the basis of plumage colour. Head width, bill length, bill width, body girth, wing span and shank length averaged  $3.02 \pm 0.03$ ,  $5.25 \pm 0.04$ ,  $3.21 \pm 0.02$ ,  $30.07 \pm 0.31$ ,  $81.58 \pm 0.52$  and  $5.67 \pm 0.05$  cm respectively. Drakes had significantly higher ( $p \leq 0.01$ ) body measurements than ducks. Effect of location/state was significant on head width, bill length, bill width, body girth and shank length. Average adult body weight was  $1.40 \pm 0.02$  kg and it was significantly affected by sex and location/state. Egg weight averaged  $62.75 \pm 0.54$  g. Average values for albumen index, yolk index and haugh units were  $0.109 \pm 0.002$ ,  $0.388 \pm 0.004$  and  $87.422 \pm 0.713$  respectively

**Key Words:** Indigenous ducks, phenotypic characteristics, measurements, egg characteristics

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## INTRODUCTION

Ducks occupy an important position next only to chicken as far as avian farming in India is concerned. These are reared mainly for eggs and meat. There are about 27.64 million ducks in India (Livestock Census 2007) which constitute about 4.3% of the total poultry population and contribute about 3% of total eggs produced in the country. During last five years (2003-07), duck population of India decreased @3.32% per annum. Majority of the ducks (95%) are of indigenous (desi) type contributing about 92% of the total duck eggs. Ducks are by and large concentrated in the Eastern and Southern States of the country found mainly in coastal regions. Indigenous ducks differ in their attributes like colour, size, body measurements, performance, etc. Very few reports are available on characteristics of indigenous ducks and even the reported literature is restricted to ducks reared on organized farms (Eswaran et al. 1985, Mahanta et al. 1993, 1998, Das et al. 2000, Sharma et al. 2002, Jalaludeen et al. 2004 and Padhi et al. 2009a, b, c). Therefore, an attempt has been made to study morphometric characteristics and egg quality parameters of indigenous ducks reared by farmers under field conditions.

## MATERIAL AND METHODS

Study was carried out in 13 districts of 4 states viz. Nadia, North 24 Parganas and Hooghly of West Bengal; Puri, Cuttack, Kendrapara and Khurda of Orissa, Alappuzha, Pathanamthitta,

Kottayam and Kollam of Kerala; and Krishna and West Godawari of Andhra Pradesh. A total of 89 flocks having about 21000 ducks were surveyed. Data on management practices, morphological characteristics, body weights and body measurements were recorded. Eggs were weighed and then broken out onto a level surface. Height of the thick albumen and yolk were measured with a spherometer. Egg yolk was weighed after separation from albumen. Shell thickness was measured with micrometer. Albumen, yolk and shell weights were measured. Albumen index, yolk index and haugh units were estimated as:

Albumen index = Height of albumen / Average width of albumen

Yolk index = Height of yolk / Average width of yolk

Haugh unit =  $100 \log (H + 7.57 - 1.7W^{0.37})$

Where H = Height of albumen and W = Weight of egg

Least-squares analysis of variance technique (Harvey, 1975) was used for analysis of data and to study effects of location/state and sex. Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957) was used to make comparison among ducks from different locations.

## RESULTS AND DISCUSSION

*Duck Characteristics:* West Bengal: Ducks are reared by local poor people in the backyard system and maintained in community ponds. These local ducks are medium in size and

have wide variation in plumage colour, mainly brown mixed with black, white or blue. Few ducks were even completely black or white. The bill was mostly yellow with shades of black or brown. The skin was whitish or pinkish. The head was dark in colour than the plumage. Age at first egg was 6-7 months. These ducks lay about 120-130 eggs per year.

*Orissa:* Duck production system in Orissa largely resembled to that of West Bengal. Ducks are reared in the backyard system in community ponds. Similar to those of West Bengal, these local ducks are also medium in size and have wide variation in plumage colour, mainly brown mixed with dark brown. Few ducks were black with dark brown feathers. The bill is mostly greenish with shades of yellow. The head was mostly darker in colour than the plumage with greenish tinge and was shining in males. Age at first egg was about 6 months. These ducks lay about 80-140 eggs per year.

*Kerala:* Duck production in Kerala gets along well with paddy cultivation in an integrated farming system. During paddy harvesting season farmers move with their flocks of 500 to 1000 ducks every year for foraging. The flocks migrate by vehicles during night as ducks are sensitive to heat. Ducks are reared by small and marginal farmers and socially backward communities. Age at first egg was about 5-6 months. These ducks lay about 180 eggs per year. Native ducks are named as Chara and Chemballi on the basis of plumage colour.

*Chara:* Drakes have dull orange bill with black spots. Head is lustrous greenish black. Neck has brownish black plumage with full or half white band in front of the neck. Ducks are blackish brown in the back, tail and wings. Bill is yellowish with black spots and shorter than drakes. Head is brownish black.

*Chemballi:* Bill is yellow with black spots. Drakes head is dull brownish black. Neck has brown plumage with white band. The plumage is brownish black or back, blackish brown tail and brownish grey wings. Ducks are generally brownish black with brownish grey in the back, tail and wings. Neck is brown with or without white band.

*Andhra Pradesh:* Ducks in Andhra Pradesh are also reared along

with paddy cultivation in an integrated farming system similar to that in Kerala. Flock size varied from 500 to 2000 in traditional system (Paddy Fields). The farmers generally purchase the ducklings and do not incubate eggs for hatching. The Hatcheries in Kerala and Tamilnadu purchase eggs from this area. The ducks migrate from Kerala to Andhra Pradesh via Tamilnadu and vice versa as per paddy cultivation season. The ducks of these states are morphologically similar. Ducks generally have brownish black plumage with brownish grey in the back, tail and wings. Neck is brown with or without white band. Bill is yellow. Head is darker in drakes - lustrous greenish black or brownish black Age at first egg was about 5-6 months. These ducks lay about 150-200 eggs per year.

*Body Measurements:* Overall least-square means (Table 1) for head width, bill length bill width, body girth, wing span and shank length were 3.02±0.03, 5.25±0.04, 3.21±0.02, 30.07±0.31, 81.58±0.52 and 5.67±0.05cm respectively. Analysis of variance revealed significant ( $p \leq 0.01$ ) effect of location/state on head width, bill length, bill width, body girth and shank length. Ducks of Orissa had significantly higher values for head width, bill length and bill width as compared to ducks of other states. Head width was shortest for Kerala ducks, bill length and shank length for West Bengal ducks, and bill width and body girth for Andhra Pradesh ducks. Wing span was almost similar in ducks of all the four states. Drakes had higher body measurements as compared to those of ducks. Differences were significant ( $p \leq 0.01$ ) for all the measurements except for head width and bill width. Mahanta et al. (1998) also reported longer shank in males than that of females in Ducks of Kerala. Mean values for bill length and shank length of ducks reared under field conditions obtained in this study were lower than that reported for desi ducks kept at organized farms (Mahanta et al., 1998; Jalaludeen et al., 2004 and Padhi et al., 2009a). This might be due to different feeding and management practices under field and farm conditions in addition to other factors like genetic stock, age at measurement, etc.

Table 1. Least-square means for body measurements and body weights

State	Sex	Measurements (cm)							Weight (kg)	
		N	Head Width	Bill Length	Bill Width	Body Girth	Wing Span	Shank Length	N	Body weight
West Bengal	Drakes	15	2.90±0.09	5.20±0.10	2.93±0.05	32.47±0.81	84.40±1.37	5.57±0.14	15	1.41±0.07
	Ducks	58	2.74±0.05	5.02±0.05	2.95±0.03	30.16±0.41	79.66±0.70	5.28±0.07	72	1.20±0.03
	Overall	73	2.82±0.05 <sup>a</sup>	5.11±0.06 <sup>a</sup>	2.94±0.03 <sup>bc</sup>	31.31±0.45 <sup>a</sup>	82.03±0.77	5.42±0.08 <sup>a</sup>	87	1.30±0.04 <sup>a</sup>
Orissa	Drakes	13	3.72±0.10	5.47±0.11	4.05±0.06	32.08±0.87	83.54±1.47	5.72±0.15	14	1.76±0.07
	Ducks	43	3.67±0.05	5.40±0.06	3.97±0.03	28.84±0.48	78.98±0.81	5.70±0.08	43	1.44±0.04
	Overall	56	3.69±0.06 <sup>b</sup>	5.43±0.06 <sup>b</sup>	4.01±0.03 <sup>b</sup>	30.46±0.49 <sup>ab</sup>	81.26±0.84	5.71±0.09 <sup>b</sup>	57	1.60±0.04 <sup>b</sup>
Kerala	Drakes	14	2.63±0.13	5.44±0.14	3.00±0.08	30.25±1.11	79.75±1.88	5.88±0.20	44	1.53±0.04
	Ducks	8	2.68±0.10	4.96±0.11	3.00±0.06	29.57±0.84	81.00±1.42	5.57±0.15	68	1.36±0.03
	Overall	22	2.65±0.08 <sup>c</sup>	5.20±0.09 <sup>a</sup>	3.00±0.05 <sup>a</sup>	29.91±0.69 <sup>b</sup>	80.38±1.18	5.72±0.12 <sup>b</sup>	112	1.45±0.02 <sup>c</sup>

Andhra Pradesh	Drakes	11	2.98±0.11	5.34±0.12	3.00±0.06	29.64±0.94	83.64±1.60	6.02±0.17	11	1.28±0.08
	Ducks	7	2.81±0.13	5.14±0.15	2.79±0.08	27.57±1.18	81.71±2.01	5.64±0.21	7	1.20±0.10
	Overall	18	2.90±0.09 <sup>a</sup>	5.24±0.10 <sup>a</sup>	2.89±0.05 <sup>c</sup>	28.60±0.76 <sup>c</sup>	82.68±1.28	5.83±0.13 <sup>b</sup>	18	1.24±0.06 <sup>d</sup>
Overall	Drakes	47	3.06±0.05	5.36±0.06	3.25±0.03	31.11±0.47	82.83±0.80	5.80±0.08	84	1.50±0.03
	Ducks	122	2.98±0.05	5.13±0.05	3.18±0.03	29.03±0.39	80.34±0.67	5.55±0.07	190	1.30±0.03
	Overall	169	3.02±0.03	5.25±0.04	3.21±0.02	30.07±0.31	81.58±0.52	5.67±0.05	274	1.40±0.02

Means in a column with the same superscript do not differ significantly

**Body weight:** Least-square means for body weight of drakes were 1.50±0.03kg and that of ducks was 1.30±0.03kg with an overall average of 1.40±0.02kg (Table 1). Differences between the two sexes were significant ( $p \leq 0.01$ ). Ducks of the four states also differed significantly ( $p \leq 0.01$ ) in body weights – ducks of Orissa being the heaviest (1.60±0.04kg) and that Andhra Pradesh being the lightest of all (1.24±0.06kg). Average body weight of ducks of Orissa recorded in the present study was higher than that reported by Padhi et al. (2009b) for desi ducks of the same state.

**Egg quality parameters:** Least-square means for egg weight and quality parameters for ducks of the four states are presented in

Table-2. Overall egg weight averaged 62.75±0.54g which was similar to that reported by Sharma et al. (2002) in Nageswari ducks reared by farmers of Assam. However, Padhi et al. (2009b) reported higher egg weight in desi ducks of Orissa reared at farm than that obtained in the present study for ducks reared by farmers. Eggs of ducks of Andhra Pradesh were the heaviest, followed by that of Kerala, Orissa and West Bengal. Differences were statistically significant ( $p \leq 0.01$ ). Albumen, yolk and shell constituted 46.4, 39.4 and 14.2 percent of the total egg weight.

Table 2. Least-square means for egg quality characters

State	N	Egg Weight (g)	Albumen Weight (g)	Yolk Weight (g)	Shell Weight (g)	Shell Thickness ( $\mu$ )	Albumen Index	Yolk Index	Haugh Units
West Bengal	23	58.20±0.99 <sup>a</sup>	26.00±0.75 <sup>a</sup>	24.19±0.79	8.01±0.23 <sup>a</sup>	43.74±1.09	0.102±0.004 <sup>a</sup>	0.350±0.008 <sup>a</sup>	85.143±1.303 <sup>a</sup>
Orissa	25	59.23±0.95 <sup>a</sup>	27.24±0.72 <sup>a</sup>	23.62±0.76	8.37±0.22 <sup>a</sup>	41.32±1.05	0.118±0.004 <sup>b</sup>	0.347±0.007 <sup>a</sup>	91.601±1.250 <sup>b</sup>
Kerala	24	65.56±0.97 <sup>b</sup>	31.12±0.73 <sup>b</sup>	25.09±0.77	9.35±0.23 <sup>b</sup>	43.54±1.07	0.114±0.004 <sup>b</sup>	0.419±0.008 <sup>b</sup>	87.680±1.275 <sup>a</sup>
Andhra Pradesh	12	68.02±1.37 <sup>c</sup>	31.12±1.04 <sup>b</sup>	25.98±1.09	9.95±0.32 <sup>c</sup>	44.92±1.51	0.104±0.005 <sup>a</sup>	0.437±0.011 <sup>c</sup>	85.264±1.804 <sup>a</sup>
Overall	84	62.75±0.54	29.11±0.41	24.72±0.43	8.92±0.13	43.38±0.60	0.109±0.002	0.388±0.004	87.422±0.713

Means in a column with the same superscript do not differ significantly

The average value of egg shell thickness (43.38±0.60 $\mu$ ) obtained in the present study was higher than that reported at farms by Eswaran et al. (1985) in desi ducks of Kerala, and Mahanta et al. (1993) and Sharma et al. (2002) in desi and Nageswari ducks of Assam respectively. The average values for albumen index, yolk index and haugh units were 0.109±0.002, 0.388±0.004 and 87.422±0.713, respectively. These were comparable to those reported by Mahanta et al. (1993), Das et al. (2000) and Padhi et al. (2009c). Sharma et al. (2002), however, reported lower values for albumen index and yolk index in Nageswari ducks of Assam as compared to that of present study.

The eggs of local ducks of all the four states were creamish white in colour, large sized, thick shelled and of good quality with yellow to deep yellow yolk.

The study thus presents the comparative morphological characteristics and egg characteristics of indigenous ducks reared in four coastal states of India.

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