



Phenotypic and morphometric characterization of desi duck of Odisha

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India ranks second in the world in terms of duck population with around 23.54 million ducks, out of which the eastern region had 15.5 million ducks in 2012 (BAHS 2016). Though at national level India has 3.7% improved strains of ducks, eastern India has about 8% improved strains. Of the total number of duck eggs, indigenous ducks contribute 91% while 9% are produced from 'improved' varieties (Gaur *et al.* 2010). Most of the farmers in the rural and coastal region rear indigenous ducks for meat and egg production (109/year). Eastern UP, followed by Odisha and Jharkhand had exhibited low egg production (53–86/year) through indigenous ducks.

More than 94% of 0.366 million ducks of Odisha were of indigenous breeds (BAHS 2016). In spite of the significant contribution of the indigenous ducks to the rural economy, research on indigenous ducks is by and large at its infancy. Characterization and inventory of poultry genetic resources are needed to identify defined poultry breeds (Tixier-Boichard *et al.* 2008). Due to non emphasis on duck characterization and improvement, its population in Odisha represented Indian trend showing a 38.4% decline between 2007–12. In this present study, we tried to characterize the ducks of Odisha along with different husbandry services that are in practice in Odisha.

The study was conducted in five districts of Odisha namely Khurdha, Cuttack, Balasore, Puri and Maurbhanj. Villages and families were selected purposively keeping in mind the fact that no ducklings of exotic types were distributed in the selected villages by the local authorities in the near past. The households selected for interviews within the villages too were selected purposively keeping in mind that the owner reared only the native ducks, the houses having exotic or even seem to be crossbred ducks were not included in the survey and the adjacent houses

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from where the flocks can intermingle were also not taken into consideration.

In order to collect the relevant information, personal interview and on spot recording were done on prevalent duck husbandry practices and phenotypic characteristics. The rearers were interviewed using a pretested questionnaire.

A total of 49 drakes and 111 ducks of desi/non-descript breed were selected randomly for phenotypic study. Different external morphological variants of both drake and duck such as plumage colour, shank colour, skin colour, eye colour, bean colour, bill colour, web colour, egg colour, shape of bill (uniform or saddle) and body carriage (horizontal, slight upright or upright) were observed, identified and documented properly through visual observation. The descriptions of external morphological variants considered in this study were assessed according to the guidelines suggested by Cuesta (2008).

Data collected from the farmers on several attributes were subjected to one-way analysis of variance using SPSS software (version 16.0) package. Statistical significance was established at $P < 0.05$ and data were expressed as mean \pm standard error.

The result of the study comprises both qualitative and quantitative traits of 49 drakes and 111 ducks of desi/non-descript type which were reared in the studied villages. The flock size were usually small and varied from 9 to 30. The average flock size was almost equal in Cuttack and Balasore (9–10 birds/flock), whereas in Maurbhanj and Puri it varied from 20 to 30 birds/flock.

About 99% of the farmers provided some kind of housing for their birds, usually constructed mainly from simple and locally available materials in their backyard. Farmers did not possess any permanent shelter and kept the ducks in the pen made of bamboo-rice straw covered by tin-shed and soil). Similar housing conditions were observed in Odisha (Halder *et al.* 2007, Banerjee 2013) and West Bengal (Padhi 2014).

The ducks were mostly fed with leftover feed of household or kitchen waste with foraging facilities. The leftover feed include rice and sometimes rice mixed with rice gruel. Banerjee (2013) also reported similar feeding

practices. The drake to duck ratio was usually 1:7. The annual average egg production per duck was very poor and most of the duck owners earned a good amount of subsidiary income from duck rearing by selling duck egg and meat. The eggs of the native duck breeds are preferred by the villagers for their taste and pigmentation.

Most of the duck rearers belong to economically challenged section of the society and are unable to provide much needed balanced nutrition, proper management and health services. Very few farmers use the available veterinary facilities and disease was reported as the main cause of mortality. They prefer to buy ducklings rather than adults, and they do not have any particular selection criteria. Women and children were mainly involved in duck rearing. They have very less or no scientific ideas of duck rearing and importance of breed. Indigenous ducks of Odisha have multicoloured plumage and their gait is similar to that of the Indian Runner. Predation by wild cats and other wild animals is a problem in most of the villages situated either near or within the forest area. Similar observations were found by earlier reports from West Bengal (Halder *et al.* 2007) and Tamil nadu (Gajendran and Karthickeyan 2009).

Body carriage in both drake and duck was slightly upright and bill was horizontal. The desi ducks have multiple colour plumage. Head colour was mixture of fawn and white in 75% of ducks, whereas in some ducks black (8.1%), white (8.1%) and black-white spotted head (8.1%) colour pattern were also noticed. Drake had plumage with different colour pattern ranging from greenish black (55.56%) to brown (22.22%). Neck colour in both male (44.44%) and female (88.29%) was white. In some drakes brown neck colour with white ring (33.33%) and greenish colour (22.22%) were also identified, whereas in some duck chocolate colour was also noticed. In drakes and ducks, the breast colour was predominantly white, while wing colour was brown/grey and white. In drake prominent bill colour was yellow (44.44%) followed by yellowish green (33.33%) and greenish black with yellowish tint (22.22%). In case of duck prominent bill colour was yellow (52.25%) followed by black (29.73%) and green (18.02%). Shank colour in both drake and duck was yellow (44.44% and 55.56%) and orange (55.56% and 59.46%). Skin colour in both drake and duck was white. Eye colour of ducks varied in colour. The multiple colour plumage of desi duck might be due to admixture of this breed with other available genotypes in

their habitats. All of these phenotypic observations about plumage colour were similar with the findings of earlier reports (Panda *et al.* 2008; Mishra *et al.* 2009). Similarly, reports of no definite feather pattern and the varied bill colour from duck to duck were also reported by Banerjee (2013). Egg colour of duck was distinguished as well and it was cream in colour. The bill was yellow and the shank was orange to red in colour in most of the varieties.

Morphometrical characteristics of desi ducks of Odisha are presented in Table 1 and Fig. 1. The average body weights of adult male and female desi ducks were 1.80±0.02 and 1.41±0.02 kg, respectively. It is in agreement with the earlier report of Padhi and Sahoo (2011) on ducks of Odisha, who recorded adult body weight of 1.32–1.53 kg. However, Vij *et al.* (2010) reported values of adult weight for drakes and ducks at 1.30 and 1.50 kg, respectively in desi ducks of West Bengal.

Table 1. Morphometrical characteristics of desi ducks of Odisha

Traits	Drake (n=49) Mean±S.E	Duck (n=111) Mean±S.E
Body weight (kg)	1.80±0.02	1.41±0.02
Body length (cm)	42.69±0.55	41.30±0.29
Bill length (cm)	6.11±0.02	5.60±0.04
Bill width (cm)	3.70±0.04	3.46±0.03
Shank length (cm)	6.21±0.03	5.89±0.03
Wing length (cm)	42.73±0.34	39.99±0.22
Head length (cm)	9.47±0.15	7.99±0.10
Neck length (cm)	12.42±0.21	10.32±0.05
Head width (cm)	3.41±0.05	2.98±0.03

Means values for all the morphometrical characteristics between drake and duck differ significantly (P<0.05).

The average body lengths were more than 40 cm for both males and females. Body length of Sanyasi and Keeri (Murugan *et al.* 2009) and Nageshwari (Zaman *et al.* 2007) varieties of ducks in India were 32.73, 31.26 and 23.79 cm, respectively which are lower than the present study. This might be due to the difference in breed.

Bill length (cm) was more in drakes (6.11) than the ducks (5.60). 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



Fig. 1. Different external morphological variants in desi duck of Odisha

Desi duck of West Bengal (Vij *et al.* 2010). In the present experiment, bill and head width were larger in drake than duck. The findings followed the similar trend as observed on Desi duck of West Bengal (Vij *et al.* 2010) and that of Nageswari ducks (Morduzzaman *et al.* 2015).

In the present experiment, the average shank length (cm) was 6.21 in drakes and 5.89 in ducks of Odisha. However, the respective values for Nageswari duck were 6.49 and 6.16 cm at 20 weeks of age (Sharma *et al.* 2003) and 5.67 cm for the Desi ducks of West Bengal (Vij *et al.* 2010). The differences in observations might be attributed to the breed differences.

Average neck length and wing length were measured and were found to be greater in males than that of females. Similar trend, but lower values were noted in Nageswari duck (Morduzzaman *et al.* 2015) and Sanyasi and Keeri variety of ducks (Murugan *et al.* 2009).

All the morphometric characters examined in this study exhibited a significant difference between drake and duck. On the contrary, Padhi (2014) reported no significant effect of gender for shank length, keel length and bill length for desi ducks of Odisha at eight weeks of age, which might be due to the effect of age.

Ducks in Odisha are traditionally reared as family poultry following free range scavenging system. Indigenous ducks of Odisha are popular among farmers. However, their productivity is low compared to crossbreds and 'exotic' breeds. Farmers prefer indigenous ducks in scavenging rearing system due to high adaptability to their farming conditions, unique foraging and disease resistance characteristics. Further genetic characterization needs to be conducted on indigenous ducks for devising proper strategy for their improvement.

SUMMARY

The present study was conducted in five districts of Odisha to study the different duck rearing practices by using a questionnaire and to differentiate the characters of ducks. Ducks were raised under semi-intensive management system and mostly depend on scavenging for their nutritional needs. The ducks are raised both for meat and eggs. The annual average egg production per duck was very poor. The flock size is usually small and varies from 9 to 30. In both drake and duck body carriage was slightly upright and bill shape was horizontal. Prominent head colour in drake was greenish black (55.6%) and in duck was fawn-white mix (75.68%). In both drake and duck dominant neck and breast colour was white. Wing colour was brown/grey and white in drake and duck, respectively. Prominent bill colour was yellow and bean colour was black in both drake and duck. Dominant shank and eye colour in drake and duck was orange and grey respectively. Mean values for all the morphometrical measurement, i.e. body length, bill length, bill width, shank length, wing length, head length, neck length and head width was significantly higher in drake. The average body weight of drake and duck were 1.80 ± 0.02 and 1.41 ± 0.02 kg, respectively.

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