Indian Journal of Animal Sciences **94** (1): 39–43, January 2024/Article
https://doi.org/10.56093/ijans.v94.i1.142235

Phenotypic characterization of the native chicken variety maintained at Hosur

P THIRUNAVUKKARASU[1]✉, T VASANTHAKUMAR[1] and V KANNAN[1]

Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu 600 055 India.

Received: 10 September 2023; Accepted: 1 November 2023

ABSTRACT

The study on phenotypic characterization of the native chicken variety maintained at the College of Poultry Production and Management (CPPM), Hosur was studied as per directives by National Bureau of Animal Genetic Resources (NBAGR), Karnal, India. A sum of 540 male and 540 female day-old chicks (a total of 1080 chicks) were distributed randomly into three replicates of each sex having 180 chicks and reared up to 20 weeks of age. The morphological traits like feather morphology and distribution were normal. The plumage colour was predominantly brown followed by greyish black and brownish black with solid plumage pattern with yellow colour of skin and shank. The earlobe and comb colour was red. The male birds showed higher morphometric values in shank and keel length except for breast angle of the native chicken variety. Based on this study, it was concluded that the native chicken variety maintained at CPPM, Hosur is most suitable for backyard rearing by the farming community as its demand is showing increasing trend towards future.

Keywords: Morphological character, Morphometric character, Native chicken variety, Phenotypic characterization

The poultry industry is one of the best allied agricultural sectors in India with an annual growth rate of 8-10%. Native chicken plays an important role in small backyard enterprise. The commercially developed high-yielding layer strain produces about 310-340 eggs at 72 weeks of age and broiler strains can attain about 2.4-2.6 kg in about 6 weeks of age under standard managemental conditions. The per capita consumption of egg and meat is around 95 and 6.52 kg, respectively. Indigenous chicken secures a key role in the welfare of rural and tribal families in India because of their adaptability to various climatic conditions and also provides nutritional security through supplementation of valuable animal protein in the form of egg and meat (Edmew *et al.* 2018). These chickens contribute about 10.29% to the total egg production and 51.44% (inclusive of improved poultry) to the total meat production during 2021-22 (BAHS 2022). The Indigenous chicken excels in their characteristics like broodiness, self-protection from predators, compliance to an adverse environment, immunity to disease, better survivability, distinct taste and flavour of the meat, brown shelled eggs, rich in threonine and valine and a remunerative price for the indigenous poultry products. Indigenous chicken are sacrificed during festival season and easily reared by all the poorest of the poor people including women and children (Assefa and Melesse 2018).

Native chicken meat is more preferred by consumers than commercial broiler meat because of its high collagen content which perceives a growing market demand for native chicken meat in retail outlets with premium prices (Bhimraj *et al.* 2018). Indigenous chicken breeds are forced to extinction because of a well-organized commercial poultry production system and a lack of breeding plans to improve the production potential of the indigenous birds. The study of phenotypic characterization of the native chicken variety would fulfill the demand and preference concerning native chicken consumption. However, consumer preferences at marketing places are dictated by phenotypic characteristics such as shank colour, comb pattern, plumage colour, etc.

MATERIALS AND METHODS

The study was conducted in the native chicken variety of CPPM, Hosur from day-old to 20 weeks of age at Poultry Farm Complex, Department of Poultry Science, Veterinary College and Research Institute, Namakkal, Tamil Nadu, and the whole research work was divided into two phases, viz. chick (0-8 weeks), grower (9-20 weeks). A sum of 540 male and 540 female day-old chicks (a total of 1080 chicks) were individually weighed, wing banded, and distributed randomly into three replicates for each sex having 180 chicks. The characterization of morphological and morphometric traits was studied under a deep litter system of management. All the chicks were fed as per the feeding standard BIS (2007), and health coverage was also provided with regular vaccination and biosecurity measures.

Phenotypic characterization: Phenotypic characteristics,

Present address: [1]Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu. ✉Corresponding author email: karasudr@gmail.com

both qualitative and quantitative traits were documented in both male and female adult chickens as per directives defined by the National Bureau of Animal Genetic Resources (NBAGR), Karnal, India.

Morphological traits: A sum of 144 male and 155 female birds were selected randomly to record their morphological characteristics such as feather morphology and distribution, plumage colour and pattern, comb type, skin colour, ear lobe colour, eye colour, and shank colour.

Morphometric traits: Morphometric characters such as shank length, keel length, and breast angle were measured at the 5th, 6th, 12th, and 20th week of age in both sexes. The other morphometric characteristics such as bird height, body length, neck length, back length, wing span, chest circumference, and shank circumference were measured (Negassa *et al.* 2014). The measurements were taken using a measuring tape and digital vernier caliper.

Shank length (mm): The distance between the hock joint and tarso metatarsus.

Keel length (mm): The distance between the tip of the keel bone and the joint of the sternum.

Breast angle (degree): Measured at the middle of the breast region by using the Goniometer or protractor with an accuracy of one degree.

Bird height (cm): The vertical distance between the base of the footpad and the tip of the beak.

Body length (cm): The distance between the last cervical vertebrae before the thoracic vertebrae and caudal vertebrae.

Neck length (cm): The distance between the first and last cervical vertebrae before the thoracic vertebrae.

Back length (cm): The distance between the beginning of the neck and tail.

Wing span (cm): The distance between the tip of one wing and the tip of the other wing when spread out.

Chest circumference (cm): The circumference of the chest taken at the top of the pectus (hind breast).

Shank circumference (cm): Measured as the diameter of the shank.

Statistical analysis: The data collected were subjected to statistical analysis and presented as mean±S.E for both morphological and morphometric traits.

RESULTS AND DISCUSSION

Phenotypic characterization

The results obtained from this study concerning the phenotypic characterization of the native chicken variety maintained at CPPM, Hosur are as follows.

Morphological traits: The morphological traits (%) of the native chicken variety maintained at CPPM, Hosur are presented in Table 1. The pictorial representation of the Native chicken (male and female) variety, plumage pattern, and shank colour is depicted in Fig. 1 and Fig. 2.

Feather morphology and distribution: The feather morphology and its distribution in the Native chicken variety were observed to be normal (100%) irrespective of sex. These findings accorded with the outcomes of Gopinath (2013), Tadelle *et al.* (2018), and Sudhir *et al.* (2021) in native chicken of Karnataka.

Table1. Morphological traits (%) of the native chicken

Trait	Male (n=162)	Female (n=158)	Pooled (n=320)
Plumage pattern			
Solid	43.83	71.52	57.50
Spotted	24.07	3.16	13.75
Stripped	24.07	16.46	20.31
Patchy	7.41	7.59	7.50
Speckled	0.62	1.27	0.94
Plumage colour			
Brown	35.19	61.38	48.13
Grey	4.94	12.66	8.74
Greyish brown	0.0	10.13	5.0
Greyish black	40.12	12.03	26.25
Black	0.00	1.90	0.94
Brownish black	19.75	1.90	10.94
Comb type			
Pea	87.04	86.08	86.56
Rose	5.56	5.70	5.63
Walnut	7.40	8.22	7.81
Eye colour			
Brown	96.91	94.94	95.94
Black	3.09	5.06	4.06
Shank colour			
Yellow	88.88	89.88	89.38
Black	5.56	5.06	5.31
White	5.56	5.06	5.31

*n, number of observations.

Plumage pattern: The plumage pattern was predominantly solid (43.83%) followed by spotted (24.07%) and stripped (24.07%) in males, and in females it was solid (71.52%), followed by stripped (16.46%). The above observation is in agreement with the discovery of Gopinath 2013, Vij *et al.* (2015), Gowda *et al.* (2020) and Sudhir *et al.* (2021).

Plumage colour: The predominant plumage colour in males was greyish black (40.12%) followed by brown (35.19%) and brownish black (19.75%) and in females it was brown (61.38%) followed by grey, greyish black, greyish brown (10.0 to 12.66%). Other colours like grey, black, and brownish-black were also observed at small proportions. The outcomes correspond with the findings of Daikwo *et al.* (2011), Gopinath (2013), Gowda *et al.*

Male Female

Fig. 1. Chicken variety maintained at CPPM, Hosur.

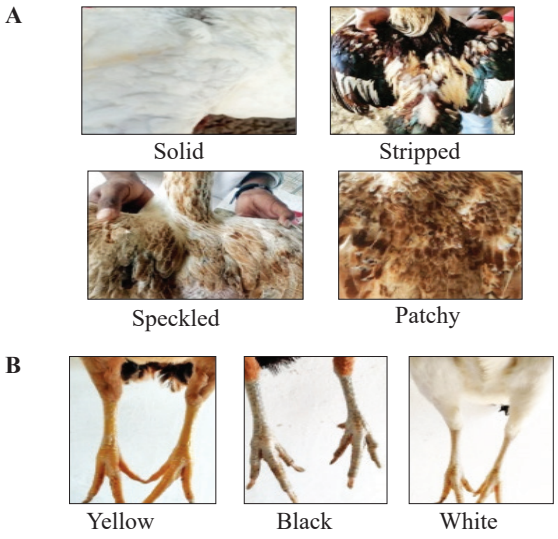

Fig. 2. A. Plumage pattern and B. shank colour in native chicken variety maintained at CPPM, Hosur.

(2020), and Sudhir *et al.* (2021) in native chicken.

Comb type: The Pea comb was the major comb type in both sexes (86%). Rose and Walnut comb types were also observed in small proportions. the Fig. The observation was similar to the findings of Rajkumar *et al.* (2017) with 98% pea comb in Aseel chicken and Qureshi *et al.* (2018) in Aseel chicken of Hyderabad. Gopinath (2013) and Agarwal (2020) observed other comb types as predominant ones in their native chicken.

Skin colour: The yellow skin colour was found in both males and females and is to the findings of Gopinath (2013) (83.11% yellow), Assefa and Melesse (2018) (44.8% yellow), Gowda *et al.* (2020) (93.86% yellow) and Sudhir *et al.* 2021 (76.99% yellow) in male and (83.54% yellow) in female. However, Vij *et al.* (2016) observed 100% white, Rajkumar *et al.* (2017) 98% white and Agarwal *et al.* (2020) 100% white skin colour as the predominant colour in their native chicken.

Earlobe colour: The red earlobe colour was observed in both sexes. The findings of Vij *et al*. (2016), Rajkumar *et al.* (2017), Qureshi *et al. (*2018), Agarwal *et al.* (2020), Gowda *et al.* (2020), and Sudhir *et al.* (2021) dare adhered to the present findings.

Eye colour: Brown was the major eye colour in both sexes with more than 95% and black colour in small proportion. The brown eye colour was also observed by Gopinath 2013 (91.31%), Gowda *et al.* 2020 (57.55%) and Sudhir *et al.* (2021). The occurrence of other eye colour was described by Rajkumar *et al.* (2017).

Shank colour: The yellow shank was the major predominant shank colour in both sexes with more than 89–90% with the least proportion of black and white shank colour. The pictorial representation of the shank colour of the native chicken is depicted in Fig. 2.

The yellow shank colour was reported by Gopinath (2013), Vij *et al.* (2016), Rajkumar *et al.* (2017), Qureshi *et al.* (2018), Agarwal *et al.* (2020), Gowda *et al.* (2020) and Sudhir *et al.* (2021).

Morphometric traits: The mean (±S.E.) morphometric traits of the Native chicken variety maintained at CPPM, Hosur are presented in Table 2.

Shank length: The shank length (mm) of the native chicken variety at the 20th week of age is similar to the observation by Valavan *et al.* (2016) about 10.6 cm in the TANUVAS Aseel chicken, by Singh *et al*. (2018) about 9.91 cm in Uttara fowl, by Rajkumar *et al.* (2017) about 120.3 mm in Aseel, by Thangadurai and Shanmugam (2019) about 10.35 cm in TANUVAS Aseel chicken. Vinothraj *et al.* (2020) had similar findings at respective ages. The shank length of the native chicken variety is longer in indigenous chickens of Assam (Kalita *et al.* 2012), and indigenous chickens of Karnataka (Gopinath 2013 and Rajkumar *et al.* 2013).

Keel length: The keel length (mm) of the native chicken variety at the 20th week of age was longer than Aseel chicken (Chatterjee *et al.* 2007), the native chicken of Assam (Kalita *et al.* 2012), and the indigenous chicken of Bangalore (Gopinath 2013). Since the keel length, an important trait for meat development was longer than the above breeds and comparable with Aseel chicken and highly correlated with shank length in Uttara chicken (Singh *et al*. 2019).

Breast angle: The breast angle of this native chicken variety at the 20th week of age is narrower than Aseel chicken (Chatterjee *et al.* 2007), a native chicken of

Table 2. Morphometric traits of the native chicken

Trait	Male (n=144)	Female (n=155)	Pooled (n=299)
Shank length (mm)			
5th week	51.1±0.37	51.5±0.36	51.3±0.26
6th week	56.3±0.40	56.4±0.33	56.4±0.26
12th week	86.7±0.55	78.3±0.50	82.3±0.45
20th week	108.2±1.13	89.5±0.43	98.6±0.81
Keel length (mm)			
5th week	54.5±0.70	56.0±0.54	55.3±0.44
6th week	60.1±0.56	60.9±0.48	60.5±0.37
12th week	89.0±0.65	84.0±0.60	86.4±0.46
20th week	112.3±0.99	97.8±1.00	104.8±0.82
Breast angle (degree)			
5th week	62.8±0.37	64.5±0.40	63.7±0.28
6th week	67.3±0.33	67.8±0.38	67.5±0.25
12th week	71.4±0.42	71.4±0.44	71.4±0.30
20th week	73.4±0.44	76.2±0.54	74.8±0.36
Other morphometric traits at 20 weeks of age			
Bird height (cm)	67.1±0.03	59.2±0.23	63.0±0.30
Body length (cm)	49.8±0.24	45.7±0.17	47.7±0.19
Neck length (cm)	15.1±0.11	14.5±0.05	14.8±0.06
Back length (cm)	24.1±0.18	21.7±0.13	22.8±0.13
Wing span (cm)	37.9±0.18	33.8±0.12	35.8±0.16
Chest circumference (cm)	29.2±0.19	28.0±0.17	28.6±0.13
Shank circumference (cm)	4.5±0.04	3.9±0.02	4.2±0.03

*n, number of observations.

Karnataka (Gopinath 2013). It is wider than the native chicken of Assam (Kalita *et al.* 2012).

Bird height: The bird height observed in this native chicken variety is higher (44.70±1.41 cm) than the male chicken of Aseel (Richard Churchil *et al.* 2019).

Body length: The observed body length of the bird was similar to the findings of Qureshi *et al.* (2018) in Aseel chicken at Hyderabad (475.52 mm) and a greater value was recorded by Valavan *et al.* (2016) in TANUVAS Aseel chicken.

Neck length: The larger neck length was observed in TANUVAS Aseel chicken by Omprakash *et al.* (2018) when compared to the present study.

Back length, wing span, chest circumference, and shank circumference: The recorded back length, wing span, chest circumference, and shank circumference were higher in this study when compared to other varieties of the native chicken.

The study of morphometric traits of the native chicken variety of CPPM, Hosur revealed shorter shank length, neck length, and keel length. The bird's height and body length were comparable to that of Aseel chicken of India. Hence, this Native chicken variety simulates and fulfillsfulfils the farmer's enthusiasm to rear this native chicken variety under backyard conditions to meet their socioeconomic status.

The morphological traits in the native chicken variety maintained at CPPM, Hosur at the age of 20th week had normal plumage, red earlobe with yellow skin. Solid plumage pattern was predominant in female and male sex along with varying proportion of other plumage pattern of spotted and stripped. The feather colour of greyish black and brown in males and brown in females were the predominant. The Pea comb, brown eye colour, and yellow shank were the major morphological characteristics of the native chicken.

The morphometric traits at the 20th week of age revealed that shank length, keel length, and breast angle were 98.6±0.81 mm, 104.8±0.82 mm, and 74.8±0.36^{o} in pooled sex with higher values in male birds except for breast angle. Similarly, the other morphometric traits also had higher values in male birds than female birds. The tenderness and juiciness of the meat will create high demand of native chicken reared in backyard system. The consumer preferences over native chicken meat and egg consumption are consistent with phenotypic characteristics including all morphometric and morphological traits.

ACKNOWLEDGEMENT

The author is very much grateful to Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) for smooth conduct of the trial at Poultry Farm Complex, Veterinary College and Research Institute.

REFERENCES

Agarwal S, Prasad S, Kumar R, Naskar S, Kumari N, Chandra S, and Agarwal B K. 2020. Phenotypic characterization and economic traits of native chicken of Chotanagpur plateau of Jharkhand. *Journal of Entomology and Zoology Studies* **8**(5): 2328–333.

Assefa H and Melesse A. 2018. Morphological and morphometric characterization of indigenous chicken populations in Sheka Zone, South Western Ethiopia. *Poultry Fishery Wildlife Science* **6**(2): 1–9.

Basic Animal Husbandry Statistics. 2022. Government of India, Ministry of Fisheries, Animal Husbandry and Dairying, Department of Animal Husbandry and Dairying, Krishi Bhawan, New Delhi.

BIS, 2007. Nutritional requirement of poultry by Bureau of Indian Standards. Government of India.

Chatterjee R N, Sharma R P, Reddy M R, Niranjan M and Reddy B L N. 2007. Growth, body conformation and immune responsiveness in two Indian native chicken breeds. *Livestock Research Rural Development* **19**(10): 1–7.

Daikwo I S, Okpe A A and Ocheja J O. 2011. Phenotypic characterization of local chickens in Dekina. *International Journal of Poultry Science* **10**(6): 444–47.

Gopinath, 2013. 'Characterization and performance evaluation of indigenous chicken in the Mysore division of Karnataka State.' Ph.D. thesis, Karnataka Veterinary Animal and Fisheries Sciences University, Bidar.

Gowda B G, Jayanaik C S, Nagaraja, Veeregowda M, Krishnamurthy T N, Jayashree R, Kotresh A M, Gouri M D and Basavarajaiah D M. 2020. Phenotypic characterization of indigenous chicken of Belagaum division of Karnataka State, India. *International Journal of Current Microbiological and Applied Sciences* **9**(4): 1304–312.

Kalita N, Pathak N and Islam R. 2012. Performance of indigenous chicken in intensive system of management. *Indian Veterinary Journal* **89**(12): 43–44.

Omprakash A V, Pandian C and Ezhil V S. 2018. *TANUVAS Technical Reporter* **1**(2): 1–4.

Qureshi M, Qadri A H and Gachal G S. 2018. Morphological study of various varieties of Aseel chicken breed inhabiting district Hyderabad. *Journal of Entomology and Zoology Studies* **6**(2): 2043–045.

Rajkumar N. 2013. 'Characterization and performance evaluation of indigenous chicken in the Bangalore division of Karnataka State.' Ph.D. thesis Karnataka Veterinary Animal and Fisheries Sciences University, Bidar.

Rajkumar U, Haunshi S, Paswan C, Raju M V L N, Rama Rao S V and Chatterjee R N. 2017. Characterization of indigenous Aseel chicken breed for morphological, growth, production and meat composition traits from India. *Poultry Science* **96**(7): 2120–126.

Singh M K, Kumar S, Sharma R K, Singh S K, Singh B and Singh D V. 2019. Genetic and phenotypic parameters evaluation for body weight, conformation and production traits of indigenous Uttara using MMLSML. *Indian Journal of Animal Sciences* **89**(7): 807–10.

Singh M K, Kumar S, Sharma R K, Singh S K, Singh B and Singh D V. 2018. Genetic analysis of body conformation traits of indigenous Uttara Chicken. *Journal of Livestock Biodiversity* **8**(1): 11–15.

Sudhir N, Jayanaik, Basavraj Inamdar, Malathi V and Gopinath C R. 2021. Managemental practices and phenotypic characterization of native chicken of Gulbarga division of Karnataka under field conditions. *The Pharma Innovation Journal* **10**(7): 280–85.

Thangadurai R and Shanmugam P S. 2019. Comparative

performance of TANUVAS Aseel, Gramapriya and indigenous desi bird under backyard condition in Dharmapuri district. *Indian Veterinary Journal* **96**(12): 33–35.

Valavan S E, Omprakash A V, Bharatidhasan A and Ramesh Saravana kumar V. 2016. Production performance of Aseel under Indian tropical condition, *International Journal of Applied and Pure Science and Agriculture* **2**(11): 107–10.

Vij P K, Tantia M S and Pan S. 2015. Performance of Harringhata black chicken under field conditions. *Indian Journal of Animal Sciences* **85**(8): 930–32.

Vij P K, Tantia M S and Singh T R. 2016. Kaunayen chicken - A new indigenous germplasm from Manipur. *Indian Journal of Animal Sciences* **86**(9): 1085–087.

Vinothraj S, Alagesan P, Pachiappan P, Saravanakumar S, Siva and Srinivasan R D. 2020. Production performance of TANUVAS Aseel poultry breed in Western Zone of Tamil Nadu. *International Journal of Current Microbiology and Applied Science* **9**(9): 2447–450.