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Phenotypic characterization and body conformation traits of native Vezaguda, Phulbani and Hansli chickens of Odisha

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Abstract

The present study was aimed at survey, identification and characterization of three domestic chicken populations *viz.* Vezaguda in southern, Phulbani in western and Hansli in northern Odisha. All the populations studied in this investigation are raised in small-holder production system. The qualitative phenotypic traits like plumage color, plumage pattern, skin color, shank color, ear lobe color, comb and wattle color, eye color, type of comb and wattle, head shape, etc. and quantitative body measurement traits such as body length, body girth, keel length, shank length, shank width, breast angle, beak length, head width and height of the bird were studied. Attempt was also made to evaluate its performance traits like body weight and egg production.

Keywords: Native chicken, phenotypic characterization, performance traits

Introduction

Poultry genetic resources are the most important component in agricultural production system, particularly in India. Indigenous breeds of poultry have shown exceptional attributes like high survivability, high fertility, good maternal ability, disease resistance and the ability to survive, reproduce and perform under low plane of nutrition and sub-optimal management. Over the years, indigenous breeds of poultry have been selected by different stakeholders for traits like disease resistance, poor roughage base feed efficiency, ability to withstand starvation and drought as well as for diverse other reasons, such as fighting and racing ability and physical characteristics. Negative impact of climate change and preference of products from indigenous livestock and birds have made such resources even more important. Locally adopted breeds may produce less compared to highly specialized breeds but they are definitely more efficient in use of natural resources unfit for human consumption and more suitable for exploitation of low input production systems. Highly productive breeds developed under high input intensive production system fail to produce to the desired extent under stressful environment encountered with rural poor and tribal people. Conservation of domestic birds diversity therefore, must encompass survey, identification, characterization and monitoring of genetic resources for their sustained use as well as ensuring their long-term availability.

Although in progress, 19 chicken breeds have so far been identified in our country and breed characteristic are described, some lesser-known breeds of chicken are identified and discussed at times (Mohapatra and Panda 1981, Mohapatra and Mishra 2008) [3, 2]. The State, Odisha ranks 10th in poultry population and the total poultry population in the State stood at 274 lakhs (Odisha Economic Survey, 2021-22). Koraput and Phulbani districts are among backward districts of Odisha. There are 14.25% scheduled caste (SC) and 50.56% scheduled tribe (ST) of total population in Koraput district (Census India 2011) [1] and in Phulabani/Kandhamal district, scheduled caste (SC) constitutes 24.5% while scheduled tribe (ST) were 11.7% of total population (Census India 2011) [1]. These two districts have a major percentage of scheduled caste and scheduled tribe population for whom poultry has been a major source of livelihood besides crops. No scheduled studies have been undertaken in these districts as well as in the state so far to identify the poultry genetic resources and to evaluate their potential.

Materials and Methods

The primary objective of this investigation was to identify the domestic poultry genetic resources available in the region, to characterize them for their phenotypic and performance

traits with a comparison with a registered chicken breed in the state – Hansli [INDIA_CHICKEN_1500_HANSLI_12018]. The data were collected for various traits from three populations of chicken, viz.- Vezaguda, Phulbani and Hansli. The information collected from each population includes the following heads:

1. **Phenotypic traits:** Qualitative traits such as plumage color, plumage pattern, skin color, shank color, ear lobe color, comb and wattle color, eye color, type of comb and wattle, head shape and other visible traits were recorded.
2. **Body measurement traits:** Quantitative traits such as body length, body girth, keel length, shank length, shank width, breast angle, beak length, head width and height of the bird were studied.
3. **Performance traits:** Performance traits such as body weight, age at sexual maturity and annual egg production were recorded.

All information were collected from the poultry owners of Koraput, Phulbani/Kandhamal and Mayurbhanj districts by taking actual measurements on the birds at farmers' doorstep on biometric traits and by personal observation along with interaction with bird owners on management and production traits.

Results and Discussion

a) Vezaguda: This lesser-known breed of chicken is widely distributed throughout Koraput and Malkangiri districts. They account for 20% - 25% of the total domestic fowl found in these two districts. These birds are being raised since long and the attitude of rearing the poultry is inherited from parental generation. In spite of several livelihood development programmed undertaken in these two districts particularly for ethnic tribals, no mixing of exotic and indigenous poultry population has taken place, since exotic stocks could not survive in the rural and tribal areas where the indigenous variety maintain the production potentials. The average adult body weight and measurement traits of the breed are presented in the Table 1.

Some of the important phenotypic characteristics of this breed are described below:

It is a small to medium sized bird used for production of eggs and meat and also for fighting purpose. The birds of both the sexes are very active, alert with well-balanced body. Head is small to medium in size, deep, flat on the top. Average body weight at adulthood was found to be 2661.21±30.42 kg for males. The female counterparts were significantly lighter with 1751.62±25.9 kg at similar stage of growth. The width of head was estimated as 3.95±0.10 cm in males and 3.56±0.13cm in females. Beak is medium in size, wider at the base and pointed at the tip. Average beak length was 3.04±0.13cm in males and 2.81±0.12 cm in females. No significant difference was observed between male and female with regard to either head width or beak length.

Comb is large in size and firmly set on the head. Pea comb is mostly observed. Wattles are proportionate to the comb, small to medium in size, well rounded at the bottoms and correspond to the texture of the comb. Both combs and wattles are larger in males compared to females and reddish in color. Eyes are round, large, prominent and dark or brown in color. Earlobes are small, elongated and white in color. Neck is longer and slender in males whereas small and thicker in females. Neck is covered with hackle feathers which extend little beyond base of the neck. The body is small, compact and round in appearance both in males and in females. The

average height, body girth and length of the bird in cocks were significantly more than those of hens. Back is small in length, relatively broad across shoulders and saddles and slopes down from base of the neck to base of the tail. Saddle feathers are medium in length and abundant. Breast is round and extends well forward. The keel bone was 14.02±0.29cm in length in males and 12.52±0.29cm in females. Breast angle was 40.95±0.67° in males and 38.62±0.87° in females. Males had significantly longer keels and wider breasts compared to females. Wings are small in size, compact and placed very close to the body. Primary and secondary feathers are relatively narrow and overlap in natural order in the wing. Tail is fairly large compared to body size and full. Legs are medium in length, longer in males than females, placed well apart from each other and look straight when seen from anterior side. Shanks are medium in size, clean, light black / saltish in color and free from feathers. Shanks are longer in males than in females. The shank length was about 11.85±0.15cm in males and 10.65±0.17cm in females. Width of shank was 2.04±0.03cm in males and 1.49±0.03cm in females. The color of plumage in both the sexes were black/brown/white. In some of the males few hackle feathers were of light golden in color. Age of sexual maturity is 158.67 days and annual egg production is 52.14.

b) Phulbani: This lesser-known breed of chicken is widely distributed throughout Phulbani/Kandhamal district and also found in Boudh, Kalahandi, Bolangir and Nuapada districts. These birds are being raised since long and the attitude of rearing the poultry is inherited from parental generation. The average adult body weight and measurement traits of the breed are presented in the Table 1.

Some of the important phenotypic characteristics of this breed are described below:

It is a small to medium sized bird used both for production of egg and meat. The birds of both the sexes are very active, alert with well-balanced body. Head is small to medium in size. Average adult body weight was found to be 1473.42±16.47kg for males. The female counterparts were significantly lighter with 942.82±10.79 kg at similar stage of growth. The width of head was estimated as 2.71±0.08 cm in males and 2.54±0.05cm in females. Beak is medium in size. Average beak length was 2.91±0.07 cm in males and 2.68±0.06cm in females.

Single comb is common. Comb is fairly large in size and firmly set. V-shaped comb is also seen. Wattle is poorly developed. Both combs and wattles are larger in males compared to females and reddish in color. Eyes are small and brown in color. Earlobes are white in color. Neck is longer and slender in males whereas small and thicker in females. Neck is covered with hackle feathers which extend little beyond base of the neck. The body is small, compact and round in appearance both in males and in females. The average height, body girth and length of the bird in cocks were significantly more than those of hens. Back is small in length, relatively broad across shoulders and saddles and slopes down from base of the neck to base of the tail. Saddle feathers are medium in length and abundant. Breast is round and extends well forward. The keel bone was 13.72±0.49 cm in length in males and 11.86±0.54cm in females. Breast angle was 53.60±2.04° in males and 49.83±1.62° in females. Males had significantly longer keels and wider breasts compared to females. Wings are small in size, compact and placed very close to the body. Legs are medium in length, longer in males than females, placed well apart from each other. Shanks are

medium in size and yellow in males and yellow, greenish (slate) and black color in females. Shanks are longer in males than in females. The shank length was about 7.31 ± 0.12 cm in males and 6.87 ± 0.18 cm in females. Width of shank was 1.22 ± 0.07 cm in males and 1.02 ± 0.04 cm in females. Brown, golden white, white with some black and green plumage are observed in males. Mostly brown color plumage is seen in females. In broody hens, black color plumage is noticed. Mixed color or barred plumage is also seen. The tail feathers of female birds are predominantly black. Tail feathers of male birds are black color with greenish shades. Age of sexual maturity is 233.1 days and annual egg production is 53.01.

c) Hansli: This registered breed of chicken is widely distributed throughout Mayurbhanj and Keonjhar districts. The average adult body weight and measurement traits of the breed are presented in the Table 1. Some of the important phenotypic characteristics of this breed are described below:

The birds are tall and slim with majestic look. The birds are aggressive in nature and males are well suited for fighting purpose. It is used for production of meat. The birds of both the sexes are very active, alert with well-balanced body. Average adult body weight was found to be 3005.24 ± 32.29 kg for males. The female counterparts were significantly lighter with 2068.67 ± 16.19 kg at similar stage of growth. The width of head was estimated as 4.78 ± 0.12 cm in males and 4.22 ± 0.08 cm in females. Beak is small, strong and stout at the base, narrow and blunt at the tip and light yellow in color. Average beak length was 4.00 ± 0.03 cm in males and 3.80 ± 0.04 cm in females.

Pea comb is common. Comb is medium to large in size. Wattles are small and rudimentary in males and almost absent in females. Eyes are small and brown in color. Earlobes are red in color. Neck is fairly long with plenty of hackle feathers flowing over the shoulder in males. Neck feather in both the sexes are moderately close. Hackle feathers are less in females compared to males. The average height, body girth and length of the bird in cocks were significantly more than those of hens. The keel bone was 14.56 ± 0.12 cm in length in males and 13.67 ± 0.08 cm in females. Breast angle was $59.92\pm 0.08^\circ$ in males and $59.87\pm 0.12^\circ$ in females. Wings are medium to large in size, situated close to the body well folded and carried horizontally. Shanks are yellow in color and are longer in males than in females. The shank length was about 12.89 ± 0.17 cm in males and 11.32 ± 0.16 cm in females. Width of shank was 2.97 ± 0.06 cm in males and 2.46 ± 0.04 cm in females. Hackle and saddle feathers are rich golden yellow in

males and light golden yellow in females. Primary feathers are light yellow, secondary feathers are dark gray, coverts of the primaries are black. In some of the females primary and secondary feathers are red and black in color. Tail feathers are silky and bronze. Spur is present in males and well developed in adults. Age of sexual maturity is 273.1 days and annual egg production is 33.25.

Management and Disease Condition

All the three populations of the chickens are raised in the backyard under small holder production system and there is not much difference among those with regard to the breed management. They meet their feed requirement from scavenging and rarely fed at home mostly with kitchen waste. The flock size varies from 5-50 birds per family. This includes one or two cocks, adult hens, growing birds and chicks. Water is provided at home at a permanent space and is available all the time during the day. There is almost no other source from which birds can drink while scavenging. Birds are not usually provided any supplemental feed at home. Only the sick birds, chicks and broody hens are fed to some extent. The supplemental feed includes local grown cereals, pulses and they're by products including kitchen waste. The birds roam around the village for scavenging and are provided shelter only during night. Only resourceful families have separate arrangement for housing the birds during night. Locally prepared bamboo basket serves as shelter material in most of the houses. In few cases no separate provision is there, and the birds share the same space along with the owners.

Male to female ratio was found to be highly variable. None of the families maintain more than 1-2 males for reproduction purpose. Extra males are usually sold for table purpose. Predation is a problem. The predators include dogs and cats both wild and domestic, mongoose, snakes, eagles, other large birds, jackals and wild animals in the forest or nearby forest areas.

Mortality and morbidity vary considerably among the flocks and during epidemics some of the flocks are completely wiped out. Ranikhet disease and fowl pox are the most important diseases of the indigenous chicken encountered in the area. They also suffer from echo- and endo-parasites. Vaccination against New castle disease and fowl pox is undertaken in the villages where the people are conscious and request for such help. Deworming is also practiced but very occasionally. As reported, these birds are highly adopted to this environment and relatively resistant to worm infection.

Table 1: Average body weight and body measurement traits of adult Vezaguda, Phulbani and Hansli chickens of Odisha

Sl. No.	Attributes	Vezaguda		Phulbani		Hansli	
		Male (N= 16)	Female (N= 45)	Male (N=26)	Female (N=35)	Male (N= 29)	Female (N=41)
1	Body weight (kg)	2661.21±30.42	1751.62±25.91	1473.42±16.47	942.82±10.79	3005.24±32.29	2068.67±16.19
2	Head width (cm)	3.95±0.10	3.56±0.13	2.71±0.08	2.54±0.05	4.78±0.12	4.22±0.08
3	Beak length (cm)	3.04±0.03	2.81±0.00	2.91±0.07	2.68±0.06	4.00±0.03	3.80±0.04
4	Height of bird (cm)	73.34±1.15	63.67±0.88	31.35±0.41	28.35±0.32	64.19±0.74	59.16±0.31
5	Body girth (cm)	34.48±0.37	32.58±0.34	30.30±0.21	24.84±0.35	37.12±0.37	34.27±0.11
6	Body length (cm)	56.02±0.86	49.87±0.15	36.32±0.56	30.82±0.48	50.67±0.90	44.56±0.47
7	Keel length (cm)	14.02±0.29	12.52±0.29	13.72±0.49	11.86±0.54	14.56±0.12	13.67±0.08
8	Breast angle (degree)	40.95±0.67	38.62±0.87	53.60±2.04	49.83±1.62	59.92±0.08	59.87±0.12
9	Shank length (cm)	11.85±0.15	10.65±0.17	7.31±0.12	6.87±0.18	12.89±0.17	11.32±0.16
10	Shank width (cm)	2.04±0.03	1.49±0.03	1.22±0.07	1.02±0.04	2.97±0.06	2.46±0.04
11	No. eggs /hen		52.14		53.01		33.25
12	Age of maturity (days)		158.67		233.1		273.1

Conclusion

This research provides a baseline data on phenotypic and performance traits of Vezaguda and Phulbani chicken germplasms of Odisha with a comparison with a registered chicken breed in the state - Hansli. Realizing the uniqueness in disease resistance and low-input system of rearing, both Vezaguda and Phulbani chicken germplasms may be registered as breeds by National Bureau of Animal Genetic Resources (NBAGR), Karnal and efforts may be made towards their conservation and improvement.

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