

Original Research Article

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Socio-economic Condition of Khadia Poultry Farmers and Phenotypic Characteristics of Khadia Chicken of Northern Odisha, India

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ABSTRACT

The present study was undertaken to study the socio-economic status of Khadia Chicken rearers along with phenotypic characteristics of Khadia Chicken in two tribal districts of Northern Odisha. The sample size constituted two hundred households rearing 1435 Khadia chicken. The study revealed that 72.5 % of the poultry rearers earned Rs.20,000 per year which is a substantial amount to support their livelihood. The qualitative characteristics like plumage colour, shank colour, skin colour, wattle type, comb type and fighting characteristics are quite distinct than the other native chicken of Odisha. The quantitative characteristics such as annual egg production, egg weight, fertility, body weight, mortality, shank length and keel length are different from the registered native breed of Odisha-Hansli. The results showed that annual egg production of Khadia native chicken averaged to 70.7 ± 1.26 and fertility was found 80.41 ± 1.38 %. The male adult body weight was 1839.5 ± 22.274 g and adult female weight 1388.75 ± 10.96 g. The shank length in male is 1.12 ± 0.22 cm whereas the females shank length 9.78 ± 0.24 cm. These research-outcomes may serve as baseline information for the academicians, researchers and breeders for chalking out future breeding strategy for improvement of native chicken.

Keywords

Khadia, Socio-economic, Phenotypic, Tribal, Native chicken

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Introduction

India has 72.22 per cent of its population living in rural areas and 89 per cent rural livestock householder's rear native poultry as an important supplementary source of cash income (Khandait *et al.*, 2011). Poultry production in India evolved from back yard

venture to full-fledged poultry industry in last three decades (Reddy *et al.*, 2015). Poultry plays an important role in human nutrition, national income, employment, and income generation in India. Meat and egg from native chicken is preferred by people because of its taste, leanness and pigmentation (Nigussie *et al.*, 2015). Native chicken are best known for

their hardiness, adaptability to local agro-climatic condition, ability to utilize locally available feed, minimum requirement of care and management and less technology (Sharma, 2007; Moussa *et al.*, 2018) that made farmers to rear native chicken in backyard and intensive on their own traditional methods. Native chicken are good scavengers and foragers, well adapted to harsh environmental conditions and their minimal space requirements make chicken rearing a suitable activity and an alternative income source for the rural Indian farmers. The indigenous fowl population also is considered as gene reservoirs particularly those genes that have adaptive values in tropical conditions (Horst, 1988). In addition, the local chicken sector constitutes a significant contribution to nutritional, food and livelihood security of India (ICAR-DPR, 2018-19).

Native chicken in India are found abundantly and distributed across different agro-ecologies under traditional scavenging management system indicating that they are important avian resources reared as a source of animal protein and income to many of the rural households (Fisseha *et al.* 2010). Thus, their widespread distribution indicates their adaptive potential to the prevailing environment, disease and other stresses.

Mayurbhanj and Keonjhar districts in Northern Odisha are the major sources of biodiversity in poultry. Apart from crop production, native poultry rearing by tribal people in such tribal districts has become a chief source of their livelihood (Singh, *et al.* 2016). Literature is not available on the socio-economic conditions of Khadia chicken rearers and also its phenotypic characteristics. Therefore, investigation was carried out to generate base line information on Khadia chicken production systems, utilization, opportunities and challenges. The present

paper is aimed at discussing the socio – economic status of the farmers rearing native chicken and phenotypic characteristics of Khadia chicken.

Materials and Methods

Sample size

The present study was conducted in the purposively selected two districts of Northern Odisha viz. Mayurbhanj and Keonjhar as these districts are thickly populated with Khadia native chicken. Five blocks of Mayurbhanj district namely Baripada Sadar, Badasahi, Suliapada, Kuliana & Samakhunta, and five blocks of Keonjhar district namely Keonjhar Sadar, Ghatagaon, Bansapala, Patna & Harichandrapur were selected in consultation with local veterinarians. Thereafter, from each block, two villages were selected randomly & from each village ten poultry farmers were also sampled randomly for the study. Thus, two hundred households constituted the size of sample for socio-economic study. Besides, 1435 native Khadia chicken were also studied to capture the phenotypic characteristics. Structured schedule was used for recording phenotypic characters of poultry maintained by the poultry farmers in the selected study areas.

Study Area and Period

The study was conducted in Northern Odisha in thickly populated poultry villages situated at the range of 12°15'N to 13°00'N and 76°10'E to 76°50'E. It has an altitude ranging from 930 to 3925 m.a.s.l. The mean annual temperature varies from 9 °C to 28 °C. The coldest months are November, December and January with mean annual rainfall ranges from 400 to 912 mm (SZT, 2012). The study was conducted to collect data from poultry farmers during the period from April 2018 to March 2019.

Study design

Questionnaire method and focal group discussions in native chicken production system were conducted in the two districts of Northern Odisha to capture qualitative as well as quantitative data. Group discussions were made at block level with group comprising 5 to 7 members (Bhuiyan *et al.*, 2005).

Members of the focal groups include people having knowledge about past and present social and economic status of the area, community elders, women poultry keepers, veterinarians and extension personnel. Accordingly, data on chicken husbandry, health managements, opportunities and major constraints and/or challenges of village poultry production were also collected.

Statistical analysis

Descriptive statistics such as mean, range, frequency and percentage were used to analyze the data using SPSS (2019). The Garrett ranking method was employed to rank the constraints faced by the poultry farmers in backyard poultry rearing system.

Results and Discussion

Socio-Economic Benefits

Native poultry meat is a cheap source of protein and household income particularly to the poor rural and peri-urban families in developing countries (FAO, 2003 and 2010).

The survey indicated that chicken farming is commonly practiced as a sideline activity, and none of the respondents specialized in this activity. However, benefits of chicken farming in the context of smallholder farmers were multi-faceted (Shahjahan and Bhuiyan, 2016)

Household characteristics and respondents profile

The analysis of data presented in table 1 reveals that majority (66 %) of the poultry farmers are of middle age group (35-45 years). This indicates that the native chicken rearing in the study area is probable supporting the household income. Very few respondents (9.5 %) were illiterate, whereas most of the farmers (85.5%) were under the category of 7th pass (Bhuiyan *et al.*, 2005). Mostly, tribal farmers of the study area are opting job elsewhere who are 10th pass or above qualification. Poultry rearing was done by 52.5 % of the respondents who are landless farmers. This indicates that the poultry rearing is providing economic support to the landless farmers. Majority (57.5 %) of the poultry farmers was found having poultry birds of 20 to 50 numbers. This flock size may be suitable for the farmers to have a regular source of income (Fig.2). Income from poultry rearing is evident from the data that 72.5 % of the poultry rearers get around Rs.20,000/- per year which is a substantial amount in the context of tribal economy (Saleque and Mustafa, 1996).

Village Poultry Housing

The survey indicated that all the farmers provided night shelter for their chickens in either part of in perch in veranda (67.5 %) or in separate housing (32.5 %) purposely made for chickens (). The poultry farmers of the study area used to make shelter arrangement in order to protect their birds from different types of predators. These findings are in line with Selam (2010), Sultana *et al.*, (2012) and Eskinder (2013) who kept their poultry inside dwelling to protect them from jungle cats, foxes and thieves, but contradict with the reports of Halima, *et. al.* (2007) and Bogale (2008).

Incubation of egg

The broody hens are used by tribal poultry rearers for incubation of eggs to hatch out the chicks (Fig.2). The number eggs set for incubation ranged from 10-16, and normally the Khadia female birds undergo brooding 2-3 times in a year. On the contrary, Tadelle (1996); Dereje (2001);Tadelle (2003) reported that traditionally households attempted to break broodiness to resume egg laying with the final goal of increasing egg productivity.

Diseases and Health management

Diseases were one of the major bottlenecks for village chicken productions in the study areas. Marek's disease, Ranikhet disease, fowl pox, coccidiosis, parasitic infestation and other respiratory diseases were the most common among the village chicken of Northern Odisha. During the interview and farmer group discussions (FGD), the major disease easily recognized by the villagers was Ranikhet disease, fowl pox and parasitic infestation (Chaka, *et al.*, 2012; Billah *et al.*, 2013; Mulisa *et al.*, 2014). Most of the time of the year, desirable characters namely, hardiness, adaptability to the wide agro-climatic variability ranging from tropical to subtropical climate, disease tolerance, and flavour of meat and eggs of native chicken germplasm protects them from several infection (Higenyi, *et al.*, 2014; Terefe *et al.*, 2015; Singh *et al.*, 2017).

Phenotypic Characteristics of Khadia Chicken

Mayurbhanj and Keonjhar districts of Odisha are reservoir of poultry germ plasm. For last several generations, a tribal population named *Khadia* is inhabiting these areas with their own local birds which has undergone several generations of rearing, and the birds have a quite distinct features from other populations

of that area. These birds with similar phenotypic characteristics are called as *Balia* birds in Keonjhar district.

Qualitative Parameters

Seven qualitative parameters of male and female birds considered for this study were: plumage colour, shank colour, skin colour, wattle type, comb type and fighting characteristics. Other visible specific traits such as well-developed spur in adult males having fairly long neck with plenty of hackle feathers. The beak is fairly long, pointed at tip and light yellow in colour while wings are large in size well folded (Hailemichael *et al.*, 2015; Hareesh and Guru Vishnu, 2015). The plumage colour of this bird is black breasted red and birchen while the registered breed Hansli is mostly black and solid (Eskindir *et al.*, 2013). The shank color of Khadia chicken is blackish yellow whereas it is yellow in case of Hansli. The skin colour is pink in hansli and on the other hand, it is white in Khadia. Wattles are well developed in Khadia but, rudimentary in Hansli. Again comb type is mostly single, but pea in Hansli. Khadia birds are reared by tribals for livelihood as well as for fighting purpose whereas Hansli is mostly used for fighting purpose (Nandi *et al.*, 2017, Mohanta *et al.*, 2018).

Quantitative parameters

Seven quantitative parameters were recorded for both male and female birds such as annual egg production, egg weight, fertility, body weight, mortality, shank length and keel length which are analyzed and presented in Table 2. The annual egg production of Khadia native chicken averaged to 70.7 ± 1.26 whereas the fertility is found to be very high (80.41 ± 1.38) which is in agreement with Haunshi *et al.*, (2009) and Saleem *et al.*, (2014). The male adult body weight (1839.5 ± 22.274) was higher than adult female weight

(1388.75±10.96). The mortality of birds between 1 - 8 weeks of age was 6-9 % whereas the mortality in 8-20 weeks age

group was 5.47 % which corroborates the findings of Nandi *et al.*, (2017) and Mohanta, *et al.*, (2018).

Fig.1a Mayurbhanj District

Fig.1b Keonjhar District



Table.1 Distribution of the Backyard Poultry Farmers as per their Socio-economic characteristics (n=200)

Parameter	Classification	Percentage
Age	Young (< 30 years)	12.5
	Middle (30-45 years)	66.0
	Old (>45 years)	21.5
Education	Illiterate	9.5
	7 th pass	85.5
	10 th and above	5.0
Land holding	landless	52.5
	Marginal	40.5
	Small	7.0
No of birds	1-20	26.0
	21-50	57.5
	51 and above	16.5
No of livestock	Large animals	22.0
	Small animals	78.0
Annual Income from poultry	(< Rs.20,000)	77.5
	(Rs.20,000-50,000)	18.5
	(> Rs. 50,000)	4.0
Type of House	Katccha	2.5
	Pucca	97.5
Type of main occupation	Agriculture	85.5
	Livestock Rearing	12.5
	Others	2.5
Poultry Housing	Perch in veranda	67.5
	Separate hosing	32.5

Table.2 Phenotypic Characteristics of Native Khadia Chicken

Parameters	Average	Range	N
Annual egg production	70.7± 1.264	55 to 95	40
Egg weight (g)	40.38± 0.58	35 - 50	40
Fertility (%)	80.41±1.38	66 - 100	40
Adult body weight (g) Male	1839.5 ± 22.274	1650 - 2150	217
Adult body weight (g) Female	1388.75± 10.961	1250 - 1500	256
Mortality (1-8 weeks) in %	6.92 ± 1.43	5 - 13	962
Mortality (8-20 weeks) in %	5.47 ± 1.22	2 - 8	652
Shank Length (cm) Male	12.12±0.22	7 - 17	451
Shank Length (cm) Female	9.78±0.24	7 - 12	451
Keel Length (cm) Male	11.62±0.31	8.5 - 15.5	266
Keel Length (cm) Female	09.82±0.42	7.5 - 13.2	365

Table.3 Constraints faced by the farmers for rearing of local birds

Name of the Constraints	Rank
Disease outbreak and management	I
Timely vaccination of the bird	II
Inadequate grazing space	III
Lack of regular deworming	IV
Unavailability of veterinary services at village	V
Infestation of external parasites	VI
Availability of poultry feed (both in quality and quantity)	VII
Problem of predators	VIII
Theft of the bird	IX
Poor production performance of local chickens	X
Lack of housing	XI
Lack of proper extension services	XII

Fig.2 Native Khadia Chicken Flock



Fig.3 Brooding photo



The shank length is very high in males (1.12 ± 0.22 cm) whereas the females have the normal shank (9.78 ± 0.24 cm) which is in line with Daikwo *et al.*, (2011); Padhi *et al.*, (2015); Reddy *et al.*, (2015) and Das *et al.*, (2016) who reported comparable shank length in females. The egg weight, adult body weight and shank length are better than the registered Hansli bird of Odisha (ICAR-NBAGR, 2018).

Constraints of village chicken production system

Diseases and inadequate supplies of vaccines and medicine were identified as the most prominent problems in both the districts. When farmers were asked about problems they experienced in rearing poultry, disease outbreak and management was ranked first followed by timely vaccination of bird as second most important constraints faced by the poultry farmers (Table 3). These types of problems are also reported by Rajendran and Balusamy (2018) and Alemayehu *et al.*, (2018). The poultry rearers ranked inadequate grazing space, lack of regular deworming and unavailability of veterinary services at village as 3rd, 4th and 5th respectively. The findings are almost in accordance with Alaol *et al.*, (2015).

Village chickens play central role in supplying of high quality protein to the rural family foodbasket and providing cash income in addition to meeting the socio-religious obligation. The majority of the farmers included in this study expressed their willingness to increase their poultry activities, although the highest proportions of the farmers were low producers and most of them did not use vaccines to prevent diseases. The major problems in family poultry production included diseases, inadequate supply of vaccines and medicine, shortage of feed and lack of appropriate housing facilities. In order to increase the poultry production at the farmers' level, a systemic capacity building program on improved and scientific poultry farming should be organized specifically for rural women. Furthermore, preventive veterinary services may be made available to the native chicken farmers at their doorstep.

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