

Review Article

INDIAN CHICKEN BREEDS AND CONSERVATION STRATEGIES

ABSTRACT

Poultry development has been a household activity in India for a long time. In most developing and underdeveloped countries, indigenous chicken breeds significantly improve rural economies. Indigenous breeds can resist disease and utilize low-quality feeds. Backyard poultry eggs and their meat fetches higher prices than commercial poultry. Although they are associated with poor productivity in terms of the number of eggs laid, most consumers prefer them because of their delicious meat. Low risks and low inputs are significant advantages of indigenous chicken production. Considering the rapid loss of indigenous breeds and strains due to commercial strain and breed replacement, preserving these valuable genetic breed resources is crucial. In the presence of a selective breeding program, backyard or free-range birds could be more productive. In order to prevent their extinction, governments should encourage the conservation and further study of these breeds.

Keywords: Chicken, Conservation, Delicious meat, Indigenous breeds, Selective breeding

Introduction

Chicken is the most popular poultry worldwide, irrespective of culture and religion. Indigenous breeds of chicken spread worldwide, and over twenty breeds spread across the country. Nineteen breeds register with the National Bureau of Animal Genetic Resources (N.B.A.G.R.). The conservation of indigenous chicken breeds is vital for maintaining the local genetic resources, biodiversity, and sustainability of animal production. As a consequence of natural selection, under scavenging conditions, indigenous breeds are more disease-resistant (Minga *et al.*, 2004). They can utilize low-quality feed (Farrell, 2000) and have a greater tendency to survive than commercial hybrid strains (Horst, 1988; Sonaiya *et al.*, 1999). Free range and backyard systems of rearing with little or no proper housing are necessary for indigenous chicken production across the country. The rearing of Indigenous chickens has been gaining attention recently due to the high demand for their eggs and meat. It also provides subsidiary income to the farmers and provides household nutritional security to the rural/tribal people.

NATIVE CHICKEN BREEDS

The documented breeds in India are Aseel, Ankleshwar, Danki, Ghagus, Kadaknath, Kalasthi, Miri, Tellicherry, Naked neck, Nicobari, Hansli, Uttara, Harringhata Black, Punjab Brown, and Busra. Besides all these, non-descriptive desi chickens are also present.

Table 1 : Representation of the chicken breeds and their home tract

Sr. No.	Name of the breed	Home tract	Sr. No.	Name of the breed	Home tract
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1.	Ankleshwar	Gujarat	11.	Kashmir Favorolla	Jammu and Kashmir
2.	Aseel	Chhattisgarh, Odisha and Andhra Pradesh	12.	Miri	Assam
3.	Busra	Gujarat and Maharashtra	13.	Nicobari	Andaman & Nicobar
4.	Chittagong	Meghalaya and Tripura	14.	Punjab Brown	Punjab and Haryana
5.	Danki	Andhra Pradesh	15.	Tellichery	Kerala
6.	Daothigir	Assam	16.	Mewari	Rajasthan
7.	Ghagus	Andhra Pradesh and Karnataka	17.	Kaunayen	Manipur
8.	Harringhata Black	West Bengal	18.	Hansli	Odisha
9.	Kadakhnath	Madhya Pradesh	19.	Uttara	Uttarakhand
10.	Kalasthi	Andhra Pradesh			

(Source: N.B.A.G.R. <https://nbagr.icar.gov.in/en/new-breeds>)

- Tellicherry:** The Tellicherry breed of chicken is indigenous to the Malabar region of Kerala (Acharya and Bhatt, 1984). This breed gets its name from Tellicherry in the Kannur district of Kerala, found mainly in Calicut. Tellicherry is also known as Thalassery. In general, these birds are raised for their meat. There is a wide variation in plumage color, from black to grey. The eggs are tinted and small to medium (Mohapatra and Panda 1981, Acharya and Bhatt 1984, Singh and Johari 2000). It is believed that these birds have medicinal properties. They are used to prepare ayurvedic medicines for problems such as anemia, asthma, and worm infestation. The sexual maturity age is between 5-8 months; the hatchability rate is approximately 70-80 percent. A hen will lay an average of 60 to 80 eggs per year.
- Ankleshwar:** The Ankleshwar breed of chicken is native to the Ankleshwar area of the Bharuch and Narmada districts in Gujarat. A free-range backyard is used to rear the chickens for their meat and eggs. The plumage pattern is generally striped or spotted with black tips on golden-yellow feathers. Ankleshwar breed chickens have three alleles not found in any other indigenous chicken breed. An allelic gene variant was detected at loci LEI 155, LEI 174, and HUI 003 (Vijhet *et al.*, 2006). They can survive on 25-30 grams of grain and have a reasonable feed efficiency (Pandey *et al.*, 2005). There is excellent fertility in this breed. Sexual maturity occurs around 154 days, and fertility and hatchability are 86 percent and 77 percent, respectively (Patel *et al.*, 2020). Each year, approximately 80 eggs are produced (Yadav *et al.*, 2017). These birds are primarily raised by South Gujarat tribal communities for backyard poultry farming.
- Aseel:** The Aseel breed of chicken originates from the districts of East Godavari, Vishakhapatnam, and Vizianagaram in Andhra Pradesh. However, these birds are also found in other states, such as Orissa, Madhya Pradesh, and Rajasthan. They are known for their aggressiveness, intelligence, high stamina, majestic gait, and dogged fighting qualities, the Aseel is one of India's most important indigenous chicken breeds (Singh, 2001). The most popular varieties are peela (golden red), yarkin (black and red), nurie (white), kagar (black), chitta (silver black and white), teekar (brown), and reeza (light red). They are mainly known for the quality of their meat, and they are not as productive (Rajkumar *et al.*, 2016). Its meat

is known for its pungent flavor, firm texture, low fat, and rich nutritional content (Zhao *et al.*, 2007; Chen *et al.*, 2008). Fertility and hatchability of fertile eggs are 66 percent and 63 percent, respectively, at 196 days of age. Approximately 64 eggs are produced by the Aseel breed annually (Rajkumar *et al.*, 2017).

4. **Ghagus:** The Ghagus chicken breed is an essential native chicken breed in India (Singh and Singh, 2000). It is native to the Kolar district in Karnataka, on the border between Andhra Pradesh and Karnataka (Vij *et al.*, 2006). It is a medium-sized bird with strong maternal instincts and brooding behavior. Males of this breed have golden yellow feathers on their necks; their wings and tail feathers are bluish-black. The majority of feathers in female birds are brown (Haunshiet *al.*, 2019a). In backyard farming systems, these birds are kept for eggs. It is estimated that sexual maturity occurs between 150 and 180 days (Thiruvankadan, 2012). There is a 91.5 percent fertility rate and a 90.8 percent hatchability rate for fertile eggs. The average number of eggs produced per year is 45-60 (Yadav *et al.*, 2017).
5. **Kadaknath:** The meat of this breed is black, that's why Kadaknath is also called kalamashi. Jhabua and Dhar districts in Madhya Pradesh are the home tract of this breed. Black is the dominant color of all body components in this breed, including blood and flesh. The black color is due to hyperpigmentation caused by the fibro melanosis gene (Fm) (Arora *et al.*, 2011). Intellectual Property India Registry, Chennai, has granted Geographical Indication (G.I.) status to this native chicken breed for its black chicken meat. Despite its unattractive appearance, Kadaknath chicken meat is famous for its flavor and taste. In addition to having aphrodisiac properties, the meat possesses high levels of protein (25.7 percent) and 18 kinds of essential amino acids, along with vitamins B1, B2, B6, B12, and C. A significant number of genes have been recognized in the Kadaknath chicken breeds, which improve high-yielding exotic germplasm, tropical adaptability, and disease resistance. Sexual maturity occurs between 162 and 200 days, with an average of 185.4 days (Mohan *et al.*, 2008; Haunshiet *al.*, 2011; Jha *et al.*, 2013; Yadav *et al.*, 2018). At 25 to 30 weeks of age, fertility and hatchability are 83.1 percent and 80.2 percent, respectively (Biswas *et al.*, 2009). The egg production of Kadaknath chicken varies between 93.6 and 105 per year (Singh and Prasad, 2005).
6. **Nicobari:** A Nicobari breed of chicken originates from the Nicobar Islands. The Nicobari fowl comes in three varieties: brown, black, and white. With short legs and a stout neck, they have a brownish matte color. When Nicobari fowls reach ten weeks, they have short shanks measuring 3.7 cm (Chatterjee and Yadav, 2008). Among all Indian chicken breeds, the Nicobari breed produces the most significant number of eggs (Ahlawat and Chatterjee, 2002). Annual egg production of 169.1 eggs was reported (Haunshiet *al.*, 2019b).
7. **Kalasthi:** A breed of chicken called Kalasthi comes from the Chittoor district of Andhra Pradesh (Mohapatra and Panda 1981) and its adjoining areas. The legs of these birds are proportionately longer than their bodies. There are no wattles. Sexual maturity was observed around 6 to 8 months (Yadav *et al.*, 2017). The hatchability of total egg production was 72.14 percent (Vij *et al.*, 2006). A hen will lay around 34 eggs annually (Kalita *et al.*, 2012).
8. **Miri:** The Miri tribes of Assam typically raise Miri-type chickens. According to the local name in Assam, it is also called "Porog." These are mainly found in Dhimaji, Lakhimpur, Dibrugarh, and Sibsagar in Assam. The age at sexual maturity is around 147 days (Haunshiet *al.*, 2009). Among the total eggs produced, 87 to 91 percent are fertile and the hatchability percentage is around 41.36 ± 3.56 (Kalita *et al.*, 2012). It lays 60-70 eggs per year (Yadav *et al.*, 2017).

9. **Uttara:** The Uttara breed was registered in 2018, belonging to the Kumaon region of Uttarakhand that borders Nepal and Tibet (Singh *et al.*, 2017). The breed is disease-resistant and can survive well under poor housing, poor management, and poor feeding (Singh *et al.*, 2017). The plumage of these birds is black, the shanks are feathered, the skin is white, and the comb is single. Kumar *et al.* (2018) report an annual egg production of about 137 eggs.
10. **Danki:** The home tract of this breed is in the Vizianagaram, Vishakhapatnam, and Srikakulam districts of Andhra Pradesh. The plumage color of these birds determines what name the locals call them. There are black-colored birds (khaki or sanwla), red-colored birds (dega), brick-colored birds (parla), white-colored birds (satua), and spotted birds (pingle). The fight between these birds is called Danki and hence used for fighting purposes. The fights can last between one and one and a half hours. It is also possible to keep eggs for hatching instead of consuming them. Most birds have brown plumage on their bodies, with a few black feathers on the ventral surface. The appearance of Danki birds is similar to that of Aseel birds. Danki fighting does not involve slashers, but each Aseel bird has its slasher. Sexual maturity occurs between 6 to 8 months of age (Yadav *et al.*, 2017). Most eggs produced will hatch, with 71.93 percent hatchability (Vij *et al.*, 2006). The average annual egg production is around 32 eggs (Kalita *et al.*, 2012).
11. **Naked neck:** Despite its unknown origin, the Naked neck chicken is widely believed to have been brought back from Asia by Hungarian conquerors towards the end of the ninth century. In addition to Turken, Kaalnek, Transylvanian. Although it looks like a turkey, it is a pure chicken. A Native naked neck chicken lacks neck feathers or hackles, giving it an unusual appearance. As a dual-purpose breed, the breed lays eggs and produces meat. This type of chicken is capable of adapting, surviving, performing, and reproducing under harsh, hot, and humid environmental conditions better than regular feathered birds (Yakubu *et al.*, 2008). The Naked neck gene is crucial for tropical broiler production primarily because it is associated with heat tolerance, the most significant factor inhibiting chicken production in hot tropical climates (Lin *et al.*, 2006). The hatchability percentage is 57.66 (Faruque *et al.*, 2010). The percentage of mortality of Naked neck is 3.29 percent (Grobbelaar *et al.*, 2010).
12. **Hansli:** Keonjhar and Mayurbhanj in Odisha are home to the Hansli chicken breed. Its plumage color is predominantly black, while its body and breast are dark greys. Despite high ambient temperatures and humidity, these birds can perform well under low input conditions. It is important to note that birds weigh less and can fly to protect themselves from predators. According to Behera *et al.* (2017), female birds weighed 1318g, and male birds weighed 1629g at 20 weeks. It takes 6 months for a hen to reach sexual maturity (Mohapatra *et al.*, 2006). Most of the eggs produced are hatched and rarely consumed. The average number of eggs produced each year is 50-67.
13. **Busra:** A breed of chicken known as the Busra is reared by tribal people in Maharashtra and Gujarat. Only this breed of backyard poultry contributes significantly to the economy of tribal people in Maharashtra. Its body color varies widely, and it is small in size. They have white plumage with black feathers on the neck and tail and reddish-brown feathers on their shoulders and wings. There is a specific frizzle character to these birds. In general, sexual maturity occurs between the ages of 5-7 months (Yadav *et al.*, 2017), with an average of around six months. Hatchability varies between 60 and 85 percent for total egg production (Yadav *et al.*, 2017). The average number of eggs produced per year is between 40 and 55 (Vij *et al.*, 2009).

14. **Punjab Brown:** Punjab and Haryana are the main breeding regions for this breed. The plumage of this bird is brown. Usually, males have black stripes on their tails, wings, and necks. The birds are reared for egg production as well as meat production. Sexual maturity occurs between 5-6 months of age (Vijhet *et al.*, 2005). On average, 60-80 per cent of the eggs produced will hatch. The average number of eggs produced each year is 60 to 80. Average clutch size in Punjab Brown egg is about 4-5 eggs (Yadav *et al.*, 2017).
15. **Harringhata Black:** One of the registered chicken breeds is found in Nadia district, West Bengal, in the Harringhata black (Mohapatra and Panda 1981). Their bodies are small, and they have a black color to them. In both males and females, the plumage color is black. Sexual maturity occurs around 5-6 months of age. A study conducted by (Vij *et al.*, 2015) projects that yearly flock will lay 98 eggs without brooding and 45 eggs with brooding.
16. **Daothigir:** The home tract of this breed is the Miri, Kokrajhar, Chirang, Udalguri, and Baska districts of Assam. Mostly, it is reared in backyards or free ranges by the Bodo tribes. The breed's name comes from the plant 'Thigir' (*Dillenia indica*). The shape of the flower is similar to the comb of these birds. As 'Dao' is a word meaning 'Bird' in the Bodo language, this bird has the name Daothigir (Kalita *et al.*, 2021). It has a striped and spotted pattern, black feathers mixed with white feathers, and is tiny in stature but heavy in weight (Vij *et al.*, 2006). Approximately 5-8 months is required to attain sexual maturity. There is an 80-85 percent hatchability rate on total egg production. The average annual egg production is 60-70 eggs (Yadav *et al.*, 2017).
17. **Chittagong:** It is also known as Malay Chicken. In India, it is native to the northeastern states bordering Bangladesh and is the tallest breed. Body size is larger, shoulders are broad, and loins are slightly narrower. Compared to the rest of the breeds, they have taller neck and feet. It has a featherless shank and an upright stance. The annual egg production is between 70 and 120 eggs (Kumar and Rahim 2015).
18. **Kashmir Favorolla:** Usually found in Srinagar, Baramulla, Anantnag, Budgam, Kupwara, and Pulwama districts of Jammu and Kashmir. Cold climates are most suitable for this breed. It has a characteristic feather cap (tuft of feathers) and is highly disease resistant and the bird's average egg weight is $46.06 \pm 0.48\text{g}$ (Rather *et al.*, 2020). These birds are raised for both eggs and meat. It takes around 210 days to reach sexual maturity (Vijhet *et al.*, 2005). On average, 64 percent of eggs hatch. Egg production varies from 60 to 65 eggs a year.
19. **Kaunayen:** It originates from the eastern and western districts of Imphal and Bishnupur in Manipur. As the name implies, Kaunayen combines the words 'Kauna' and 'yen.' 'Kauna' means to 'kick or fight' in the Manipuri language, while 'Yen' means 'hen' or 'poultry'. Due to their fighting characteristics, these birds are called Kaunayen. These birds contribute significantly to the income of poultry owners due to their fighting abilities. At the age of eight months, cocks are trained to fight. These breeds can fight for a more extended period. To reach sexual maturity, a bird will need 5-7 months, Average hatchability is 80 percent and a hen can produce around 35 eggs annually (Vij *et al.*, 2016). The egg production of Kaunayen birds is similar to that of Aseel (Terminal Report 1996-1999) and Danki (Vij *et al.*, 2006).

ADVANTAGES OF INDIGENOUS CHICKEN BREEDS

In conventional backyard farming, these breeds are suitable. In addition to being more resistant to diseases, they consume low-quality feeds. They can adapt to adverse conditions

and survive well by scavenging and using the leftover feed. In all cases, indigenous birds with red or white plumage colors with pea-shaped combs command higher prices. There is a marked difference in taste between the meat of these birds and that of broilers. Breeds of indigenous chickens have broodiness character. Additionally, they provide supplemental income for the rural poor and contribute to family nutrition.

MAJOR DRAWBACKS OF INDIGENOUS CHICKEN BREEDS

There is usually poor production performance, a small body size, delayed sexual maturity, and high mortality among indigenous breeds. Genetic dispositions and inadequate management practices are responsible for the poor performance of indigenous breeds.

CONSERVATION STRATEGIES

There is concern about the genetic resources of chicken breeds being endangered and under-conserved (Hoffman, 2009). Around 33% of the world's chicken breeds are threatened, and another 40% are at unknown risk (FAO, 2007). In sustainable animal breeding segments, indigenous chickens receive much-needed attention due to their unique genetic resources (Al-Qamashouiet *al.*, 2014). Creating an inventory of indigenous chicken varieties is necessary for conserving and evaluating their traits for the development of future breeding strategies (Solis *et al.*, 2005). It is possible to characterize indigenous chicken breeds using biotechnological approaches such as D.N.A. markers (Mtileniet *al.*, 2011). In a study by Mtileniet *al.* (2016), local chicken populations in South Africa and Zimbabwe have a high degree of heterozygosity and many alleles.

Most poultry genetic resources are preserved in situ in the living population. However, this method has difficulties, including pathogen epidemics, genetic problems, and natural disasters. Chicken semen mainly goes into ex-situ preservation on industrial chicken farms. Nevertheless, indigenous breeds are preserved as in-situ populations.

All breeds and strains with minor variations are candidates for conservation for academic and scientific reasons. It will be necessary to distinguish between breeds based on the cost of infrastructure facilities involved in conservation. The National Bureau of Animal Genetic Resources is responsible for this in India. The conservation process is expensive and requires planning, funding, and follow-up. An Avian Resource Genetic Task Force (A.G.R.T.F.), composed of members from national institutions, state governments, state agriculture universities, commercial breeders, and fancy breeders, should be established to plan conservation strategies. Depending on the genetic diversity and existence of any particular genes, a breed/ecotype may be recommended for conservation by AGTRG/SAC. The National Center for Conservation and the evaluation center will maintain the breed/ecotype in living form. Embryos, D.N.A., and tissue samples will be cryopreserved for ex-situ conservation. In traditional poultry production systems, improving a few important indigenous breeds is crucial to ensure their sustainable production. The native germplasm of backyard poultry is excellently suited for poultry production. It is intended that the improved germplasm will be distributed to the respective state governments for replication and distribution in their home territories for backyard poultry production. Conservation will take place in their natural habitats. These breeds will provide a source of variation for future improvements in poultry. The establishment of a National Center for Avian Genetic Resources would be a desirable idea. The Food and Agriculture Organization of the United Nations has initiated a program to characterize and conserve indigenous breeds to preserve

their genetic material (Rischkowsky and Pilling, 2007). Breeds such as Naked Neck, Ovambo, Potchefstroom, and Venda are part of the South African Agricultural Research Council's genetic improvement and conservation program (Mtileniet *et al.*, 2016).

PRESENT STATUS OF EVALUATION AND CONSERVATION

We are evaluating and conserving Aseel (Peela and Kagar), Kadaknath, Ankleshwar, Naked Neck, and Frizzled ecotypes at C.A.R.I., Izatnagar. Nicobari breeds are assessed and conserved at ICAR-Central Agricultural Research Institute, Port Blair. Several breeds are being assessed at the N.B.A.G.R., Karnal, through field surveys and network projects, but flocks are not being kept. Madhya Pradesh's Animal Husbandry department also maintains a random-bred population of Kadaknath and Aseel at Jhabua and Jagdalpur hatcheries.

CONCLUSIONS

Native chicken breeds provide a significant source of income for rural poor and marginalized populations. Furthermore, it provides them with nutritious chicken eggs and meat. Despite challenging environmental conditions and poor husbandry practices, these breeds can produce well without much loss in production. Selective breeding can improve the productivity of indigenous chickens raised in free-range or backyards. The production of indigenous chickens can be increased through various breeding techniques to conserve their natural habitats. Governments need to support the conservation of these breeds to prevent their extinction and conduct further studies to prevent their extinction. The development and implementation of conservation techniques and genetic enhancement can be coordinated in a coordinated approach.

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