

Research

Charka Chicken: An Adapted Indigenous Poultry Resource for Sustainable Livelihoods in Jharkhand

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ABSTRACT

Indigenous chickens constitute an important component of small holder and backyard production systems in India, particularly among resource-constrained rural and tribal households. Their importance extends beyond egg and meat production, as they provide household food, supplementary income and a readily available livestock asset while requiring relatively low external inputs. The present study was undertaken to document the production system, population status, selected phenotypic characteristics, egg production, ranging behaviour and survivability of Charka chicken, an indigenous chicken population of Jharkhand, India. Charka chicken was distributed mainly across the Santhal Pargana, North Chotanagpur and Kolhan regions, covering an estimated geographical area of approximately 45,000 km². The estimated population during 2022-25 was approximately 1.70 lakh birds. The population was predominantly characterized by solid white plumage, accounting for >75.0% of the observed birds, although a black plumage variant was also recorded. The average household flock size was 4.25 birds, with chicks constituting the major component. Birds were predominantly maintained under backyard and free-ranging conditions and relied substantially on scavenging and locally available feed resources. Annual egg production ranged from 35 to 70 eggs per hen, indicating a modest but useful contribution to household egg availability under traditional management. Charka chickens exhibited good ranging ability, with mean flight distance and flight height of 37.26 and 7.77 ft, respectively, while adult cocks maintained an average territory radius of 115.54 ft. Mortality were highest during 0–1 week (23.62%) and progressively declined with age, reaching 10.49% during 6–12 months. The ability of Charka chickens to maintain flocks, produce eggs and survive under low-input conditions indicates substantial local adaptation. The population therefore represents a valuable indigenous poultry resource for rural food security, supplementary livelihood generation and conservation of locally adapted genetic diversity in Jharkhand.

Keywords: Backyard poultry, Charka chicken, Indigenous chicken, Adaptability, Survivability, Egg production, Rural livelihood, Jharkhand

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INTRODUCTION

Indigenous chickens form an integral component of traditional livestock production systems in many developing countries. Unlike commercial poultry, these birds are generally maintained in small flocks under free-range or semi-extensive conditions, with limited expenditure on housing, feed and health inputs. Their importance is therefore determined not only by individual bird productivity but also by their ability to survive, reproduce and utilize locally available resources under challenging production environments (Rath *et al.*, 2015; Rajkumar *et al.*, 2021, Kamal *et al.*, 2024)). Backyard poultry provides multiple benefits to rural households. Eggs and meat contribute to household nutrition, while birds and eggs can be sold

to generate supplementary income. Because individual birds can be sold according to immediate household requirements, poultry also functions as a readily accessible financial asset. Rajkumar *et al.* (2021) reported that backyard poultry has considerable potential for improving nutritional security, reducing poverty, generating supplementary income and empowering rural women in India.

Indigenous chickens are particularly valuable because of their ability to utilize locally available feed resources. Scavenging allows birds to obtain insects, seeds, grains, household residues and other naturally available materials, thereby reducing dependence on purchased feed. Such production systems are especially relevant to small and marginal farmers who may have limited

capacity to purchase commercial poultry feed. Singh *et al.* (2023) comprehensively documented indigenous chicken production systems in different agro-ecologies of the Indian Himalayan Region and demonstrated their contribution to household food, nutritional and economic security. The authors reported that indigenous chickens were predominantly maintained under semi-extensive systems using homegrown feed and temporary night shelters. Adaptability, survivability and scavenging ability were among the important attributes valued by farmers. Indigenous poultry also represents an important component of agricultural biodiversity. Local populations are shaped by natural and farmer-mediated selection over generations and may possess adaptive characteristics that are poorly represented in commercial genetic resources. Conservation and sustainable utilization of such populations are therefore important for maintaining genetic diversity and developing production systems suited to changing environmental and socio-economic conditions.

Jharkhand possesses considerable diversity of indigenous livestock and poultry genetic resources. Traditional poultry production in the state is closely associated with tribal and other rural communities, where small poultry flocks are commonly integrated with crop and livestock farming. Charka chicken is one such indigenous chicken population traditionally maintained in Jharkhand. It is distributed mainly in the Santhal Pargana, North Chotanagpur and Kolhan regions. The population is predominantly maintained under low-input backyard conditions, where birds are allowed to scavenge freely and receive variable amounts of supplementary feed according to household resources. The present study was undertaken to document selected characteristics of the Charka production system, including population and geographical distribution, predominant plumage pattern, flock size, egg production, ranging behaviour and age-specific survivability. Unlike a conventional breed-characterization study, emphasis was placed on the production-system and adaptive significance of Charka chicken and its potential contribution to rural food and livelihood security.

MATERIALS AND METHODS

The study was conducted in the native tract of Charka chicken in Jharkhand, covering mainly the Santhal Pargana, North Chotanagpur and Kolhan regions (21.96°–24.30° N and 85.00°–87.30° E). Distribution and population information were documented through field surveys, farmer interactions and direct observations. Information on flock size, flock composition, management practices, feeding,

scavenging behaviour and utilization of birds and eggs was collected from farmers maintaining Charka chickens under traditional backyard conditions. Selected production and adaptive traits were considered for the present study. Plumage pattern was recorded through direct observation, with emphasis on the predominant solid-white phenotype and other colour variants. Annual egg production was recorded through field observations and farmer records and expressed as eggs produced per hen per year. Ranging ability was assessed by recording flight distance and flight height, while territorial behaviour of adult cocks was estimated based on the radius of the area regularly occupied or defended. Age-specific mortality was recorded for 0–1 week, 1–8 weeks, 8–20 weeks and 6–12 months to assess survivability under traditional management conditions. Descriptive statistics, including mean, standard error, range and sample size, were used to summarize the recorded observations.

RESULTS AND DISCUSSION

Geographical distribution and population status

Charka chicken was distributed mainly across the Santhal Pargana, North Chotanagpur and Kolhan regions of Jharkhand. Based on the observed geographical limits of approximately 21.96°–24.30° N latitude and 85.00°–87.30° E longitude, the estimated area of occurrence was approximately 45,000 km². The estimated population of Charka chicken was approximately 1.70 lakh birds during 2022–2025. The presence of a sizeable population across several regions indicates that Charka chicken remains an important component of the indigenous poultry resource base of Jharkhand. The persistence of a locally adapted population over a relatively broad geographical area is important from a genetic-resource perspective. Indigenous poultry populations maintained by rural communities are often subjected to natural selection under local environmental conditions as well as farmer selection for desirable traits such as survival, brooding ability, appearance and taste (Ahuja and Sen, 2007; Rajkumar *et al.*, 2021; Kamal *et al.* 2024).

Traditional production system

Traditional housing and management system

Charka chickens were predominantly maintained under backyard and free-ranging conditions. During the daytime, birds were generally allowed to move freely around the household premises, adjoining areas and agricultural fields. At night, birds were kept in simple shelters located close to the household. The night shelters were generally constructed using locally available materials, and their primary functions were

protection against predators, theft, rain and adverse weather rather than intensive environmental control. The relatively simple housing system reduced the investment required for poultry keeping and allowed households with limited resources to maintain poultry. Such a production system is characteristic of indigenous backyard poultry. Rajkumar *et al.* (2021) described traditional backyard poultry in India as a system in which small numbers of native birds are maintained with limited external inputs under free-range scavenging conditions. Similarly, Singh *et al.* (2023) reported that indigenous chickens in the Indian Himalayan Region were predominantly maintained under semi-extensive systems using simple or temporary night shelters.

The Charka production system therefore demonstrates a high degree of integration between poultry and household activities. The low investment requirement is an important advantage for small and marginal farmers.

Feeding habits and scavenging behaviour

Charka chickens obtained a considerable proportion of their daily feed requirements through scavenging. Birds foraged around homesteads, crop fields and adjoining areas and consumed insects, worms, seeds, grains, household residues and other naturally available feed materials. Farmers provided supplementary feed according to household availability, commonly in the form of locally available grains, broken cereals, kitchen residues and other feed resources. The dependence on scavenging reduces the requirement for purchased commercial feed and is therefore an important economic feature of indigenous poultry production. Similar dependence on homegrown and locally available feed resources has been documented in indigenous chicken production systems of the Indian Himalayan Region (Singh *et al.*, 2023). Rajkumar *et al.* (2021) also emphasized that free-range scavenging is a characteristic feature of traditional backyard poultry farming in India and contributes to the economic viability of the system by reducing external

input costs. The ability of Charka chickens to exploit scattered and seasonally available feed resources is therefore an important component of their adaptability. However, dependence on scavenging alone may result in variable nutrient intake, particularly during periods of feed scarcity. Strategic supplementation with locally available nutrient-rich feed resources could therefore improve production without substantially increasing production costs.

Flock size and household-level poultry production

The average flock size of Charka chicken was 4.25 birds, with a range of 2–8 birds. Chicks constituted the largest component of the flock, followed by hens and cocks. The small flock size indicates that Charka chicken is primarily maintained as a household poultry resource rather than as a specialized commercial enterprise. Such small flocks require limited housing space and financial investment and can easily be integrated with crop and livestock farming. The flock size observed in Charka was smaller than the average flock size reported for Harringhata Black-associated backyard flocks. Vij *et al.* (2015) reported an average flock size of 7.9 birds in the study area, including approximately 3.25 Harringhata Black birds. They also reported that a substantial proportion of poultry keepers were landless or marginal farmers, highlighting the importance of indigenous poultry for resource-poor households. Differences in flock size among indigenous populations may reflect household resources, landholding, local preferences, availability of feed, predation pressure and the relative importance of poultry within the farming system.

Predominant plumage pattern and population identity

Solid white plumage was the predominant plumage pattern in Charka chicken, accounting for >75.0% of the observed population. A distinct black plumage variant was also observed within the population. The predominance of white plumage (Fig. 1) provides a useful population-level descriptor of Charka chicken and may contribute to its recognition by local farmers. At the same time, the presence of a black variant



Fig. 1: Representative birds of Charkha having White plumage- hen and cock.



Fig. 2: Representative birds of Charkha having Black plumage- hen and cock.

indicates within-population phenotypic variation (Fig. 2). This feature distinguishes Charka from several better-characterized indigenous chicken populations of eastern and central India. Harringhata Black is predominantly characterized by black plumage, while Kadaknath is recognized for extensive black pigmentation and distinctive genetic and phenotypic characteristics (Vij *et al.*, 2015; Haunshi and Prince, 2021).

Hansli represents another indigenous poultry population from eastern India. Behera *et al.* (2017) documented its production characteristics under controlled conditions, demonstrating the diversity of indigenous chicken genetic resources in eastern India.

Natural reproduction, flock regeneration and household egg supply

Natural reproduction is an important component of the Charka chicken production system. The occurrence of natural broodiness enables hens to incubate their eggs and produce replacement chicks without dependence on artificial incubation or the continuous purchase of chicks. Indigenous or desi chickens maintained under traditional systems are generally valued for their brooding ability and maternal behaviour. Vij *et al.* (2015) reported that backyard desi chickens were good brooders and efficient mothers, highlighting the importance of these traits in traditional poultry production systems. Natural flock regeneration therefore reduces external input requirements and contributes to the self-sustaining nature of the Charka production system, particularly in remote rural areas where access to commercial chicks may be limited.

Along with flock regeneration, Charka hens contribute to household food availability through egg production. Under the traditional backyard production system, annual egg production ranged from approximately 35 to 70 eggs per hen, indicating considerable variation among individual birds. This variation may be associated with differences in age, nutritional availability, brooding behaviour, flock management and seasonal conditions. Nevertheless, the ability of Charka hens to produce eggs under scavenging and low-input conditions represents an important contribution to household food supply. The annual egg production of Charka is lower than that of improved backyard strains and commercial layers; however, direct comparison with intensively managed birds may not be appropriate because Charka chickens are maintained primarily under free-ranging conditions with limited supplementary feeding. In traditional production systems, indigenous chickens are valued for a combination of egg production, natural brooding, chick production, survivability and low input requirements, rather than for maximum egg output

alone. Singh *et al.* (2023) reported that indigenous chicken production systems across different agro-ecological regions of the Indian Himalayan Region contributed to household food and nutritional security through the production and consumption of eggs and poultry meat. The authors also emphasized the importance of scavenging ability and adaptation to low-input production environments. Similarly, Rajkumar *et al.* (2021) highlighted the role of backyard poultry in household nutrition, supplementary income and livelihood security, particularly among resource-poor rural households.

Thus, the natural brooding ability of Charka hens, together with an annual production of 35–70 eggs per hen, makes the population particularly suitable for self-sustaining backyard production. Natural incubation facilitates continuous flock replacement, while eggs provide an accessible source of animal protein for household consumption. Surplus eggs, chicks or birds may also be sold or exchanged, providing additional economic benefits. Improvement in nutrition, early chick management and health care could further enhance egg production and flock survival while retaining the adaptive characteristics that make Charka chicken suitable for low-input rural production systems.

Ranging ability and utilization of the backyard environment

Charka chickens showed considerable ranging ability under free-ranging conditions. The mean flight distance was 37.26 ft, while mean flight height was 7.77 ft. Adult cocks maintained an average territory radius of 115.54 ft. The ability to move over the backyard environment is likely to facilitate the exploitation of scattered feed resources. Active ranging may also assist birds in avoiding immediate threats and responding to predators. Scavenging and ranging behaviour are important characteristics of indigenous chickens because the production system depends partly on the bird's ability to obtain nutrients independently from the environment. Singh *et al.* (2023) reported scavenging ability as one of the important attributes valued by farmers maintaining indigenous chickens in the Indian Himalayan Region.

Territorial behaviour of adult males may also support natural mating and flock organization. Under traditional production systems where artificial mating is not practiced, behavioural fitness can contribute to the maintenance of flock reproduction (Kamal *et al.* 2024). Charka chickens, particularly adult cocks, also exhibited fighting or aggressive behaviour, which may represent an additional behavioural attribute under free-ranging conditions. Fighting and agonistic

interactions in domestic chickens are associated with the establishment of social hierarchy, territorial defence and competition among males (McBride and Foenander, 1962; Hughes and Wood-Gush, 1977). Indigenous chickens in India are also recognized for behavioural traits such as alertness, aggression and fighting ability, which may contribute to their ability to defend themselves and respond to challenges under extensive production environments (Kanakachari *et al.*, 2022).

Survivability

Mortality in Charka chicken was highest during the early chick period. Mortality was 23.62% during 0–1 week, followed by 16.00% during 1–8 weeks, 12.60% during 8–20 weeks and 10.49% during 6–12 months. The progressive reduction in mortality with increasing age indicates that the first few weeks represent the most vulnerable period, after which survivability improves. Early chick mortality may be associated with inadequate brooding, climatic stress, predation, nutritional limitations and infectious diseases. This pattern is consistent with the constraints commonly reported in indigenous poultry systems. Singh *et al.* (2023) identified disease, predators and limited availability of chicks among the major constraints affecting indigenous chicken production in different agro-ecological zones. The importance of early chick survival is therefore considerable in Charka because a high proportion of the household flock consists of chicks. Improvements in brooding and protection could increase flock size and subsequently enhance the availability of eggs and birds for household consumption and sale.

Adaptability and implications for household food and economic security

The combination of free-ranging behaviour, scavenging ability, natural reproduction and survival under limited-input management indicates good adaptation of Charka chicken to its local environment. Similar to other indigenous chickens, its adaptability and low dependence on external inputs make it suitable for traditional backyard production systems (Singh *et al.*, 2023; Vij *et al.*, 2015). These adaptive traits directly contribute to household food and economic security. Charka hens produce approximately 35–70 eggs per hen per year, while natural brooding supports flock replacement without regular purchase of chicks. Eggs and birds provide animal-source food and may also be sold or exchanged, generating supplementary income. Backyard poultry has been recognized as an important contributor to nutritional security, livelihood improvement and income generation among rural and resource-poor households (Dhaka *et al.*, 2017; Rajkumar *et al.*, 2021). The average flock size of 4.25

birds indicates that Charka is mainly maintained as a household-level enterprise. Therefore, improving early chick survival, health care and strategic supplementary feeding could increase flock size and household benefits while retaining the low-input and adaptive nature of the Charka production system.

Role of women in the production system

Backyard poultry is commonly integrated into household activities and can be managed close to the homestead. Consequently, women often participate substantially in feeding, watering, chick care, egg collection and routine flock management. Singh *et al.* (2023) reported that women were largely responsible for routine poultry-rearing activities in indigenous chicken production systems of the Indian Himalayan Region, highlighting the potential of backyard poultry for women's empowerment. Rajkumar *et al.* (2021) also emphasized the role of backyard poultry in improving women's livelihoods and household nutritional security. The household-based nature of Charka production therefore provides an opportunity for women-oriented interventions, particularly through self-help groups, farmer groups and community-based poultry conservation programmes.

Opportunities for sustainable improvement

The findings suggest that improvement of Charka production should focus primarily on reducing avoidable losses while retaining adaptive characteristics. The first priority should be improvement of chick survival. Simple interventions such as improved brooding, predator protection, clean drinking water, vaccination, basic biosecurity and strategic supplementary feeding could potentially reduce early mortality (Singh *et al.*, 2023). The second priority should be conservation of breeding birds within the farmer population. Selection should consider survival, natural brooding, ranging ability and reproductive fitness in addition to egg and growth performance. The third priority should be development of community-based conservation and improvement units. Such units could provide selected breeding males and females to farmer households while maintaining the genetic identity of the population.

CONCLUSION

Charka chicken represents a valuable indigenous poultry resource adapted to the traditional, low-input production systems of Jharkhand. Its ability to utilize locally available resources, range freely, reproduce naturally and survive under variable management conditions makes it particularly suitable for resource-constrained rural households. Beyond production, the population contributes to household food availability, supplementary income and livelihood diversification.

Farmer-participatory in-situ conservation, supported by improved chick management, health care, nutrition and predator protection, can enhance productivity while retaining its important adaptive characteristics. The distinct geographical distribution, characteristic predominantly white plumage, adaptive attributes and established population base provide a strong foundation for considering Charka chicken for recognition and registration as a distinct indigenous chicken breed. Further genetic characterization and sustainable breeding strategies are recommended to ensure long-term conservation and utilization of Charka chicken.

Ethical statement: No animal experimentation or invasive procedures were involved.

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