

RESEARCH ARTICLE

Phenotypic Characterization of Syiar Markasa: An indigenous chicken of Meghalaya

Sourabh Deori^{1*}, Ethman A. Marak¹, Rahul Katiyar¹, Mihir Sarma², Rafiqul Islam², Samir Das¹, Himsikha Chakravarty¹, D. R. Paul¹, Sandeep Ghatak¹, A. K. Mishra³, U. Rajkumar⁴ and Sunil Doley⁵

Abstract

The present study documented the flock structure, management practices and morphological and performance traits of Syiar Markasa chickens, maintained by 105 households across Eastern West Khasi Hills, West Khasi Hills, and Ri-Bhoi districts of Meghalaya. Syiar Markasa is an indigenous chicken poultry, more densely found in Eastern West Khasi Hills, reared under backyard systems mainly for meat and also as a cash reserve during hardship. These birds are small, compact, with long legs. Morphological traits such as plumage colour and pattern, skin, earlobe, and eye colour were recorded. The predominant plumage colour in Syiar Markasa chickens was Golden Reddish Brown (40.323%), followed by Golden Blackish Brown (37.096%). In females, Golden Reddish Brown (53.225%) and Black (19.354%) were the most common. Males mostly exhibited solid plumage patterns (83.871%), while females showed solid (54.838%) and striped/penciled (19.354%) patterns. Yellow was the dominant skin colour (75.00%), with white accounting for 25.00%. Shank colour was mainly yellow (69.355%), followed by white (11.290%), grey (8.065%), and black (0.806%). Earlobes were predominantly red (95.161%), with a few showing white (3.226%) or red-white admixture (1.613%). Adult cocks averaged 1.960 ± 0.052 kg in body weight, and hens 1.656 ± 0.028 kg. Hens laid around 35–40 eggs per year and were broody. Eggs were medium-sized, weighing 41.848 ± 1.084 g, with creamy to brown shells. Egg quality indices: Albumin Index, Yolk Index and Haugh Units were 17.376 ± 0.334 , 20.397 ± 0.435 , and 93.527 ± 0.895 , respectively. Over generations, Syiar Markasa chickens have adapted well to local conditions, marking them as a distinct, meat-type indigenous poultry population of Meghalaya.

Keywords: Indigenous chicken, Meghalaya, Management practices, Morphological, Performance traits.

Introduction

The Indian poultry industry is believed to be 5,000 years old. There have been remarkable changes in structure and operation, which have been its transformation from a mere backyard activity into a major commercial Agri-based industry over a period of four decades. India ranks 2nd in the world in terms of total egg production and ranks 5th in the world in terms of total meat production (BAHS, 2024). The total egg production in the country is estimated as 142.77 billion during 2023-24 and registered a growth of 6.8% growth over the past 10 years, as compared to the estimates of 78.48 billion during 2014-15. Further, the production has increased annually by 3.18% during 2023-24 over 2022-23 (BAHS, 2024). The meat production from poultry is 4.995 million tonnes, contributing about 51.14% of total meat production (BAHS, 2023). The growth of poultry meat production has increased by 4.52% over the previous year (BAHS, 2023). The North East Region of India is the original home tract of the Red Jungle Fowl, which is still found in the forests of the region. The region comprises eight states with a total area of 2.55 lakh Sq Km, which is 8% of the total area of the country. The region had a total of 24.3 million livestock and 69.2 million poultry in 2019, contributing 4.5

% to the all-India livestock population and 8.1 % to the country's poultry population, respectively (Sharma *et al.*, 2024). The physiography of the region is divided into three divisions, namely Meghalaya plateau, the north-eastern hills and the Brahmaputra valley. The majority of the farmers

¹ICAR Research Complex for NEH Region, Umiam, Meghalaya, India.

²College of Veterinary Science, Assam Agricultural University, Khanapara Guwahati, Assam, India.

³ICAR-National Bureau of Animal Genetics Resources, Karnal, Haryana, India.

⁴ICAR- ICAR-Directorate of Poultry Research, Hyderabad, Telangana, India.

⁵ICAR-Research Complex for NEH Region, Mizoram Centre, Kolasib, Mizoram, India.

***Corresponding Author:** Sourabh Deori, ICAR Research Complex for NEH Region, Umiam, Meghalaya, E-Mail: sourabhd1@rediffmail.com

How to cite this article: Deori, S., Marak, E.A., Katiyar, R., Sarma, M., Islam, R., Das, S., Chakravarty, H., Paul, D.R., Ghatak, S., Mishra, A.K., Rajkumar, U., Doley, S. 2025. Phenotypic Characterization of Syiar Markasa: An indigenous chicken of Meghalaya. *Indian J. Hill Farm.*, **38**(1):1-6.

Source of support: Nil

Conflict of interest: None.

Received: 03/06/2025 **Revised:** 03/07/2025 **Accepted:** 22/09/2025

of this region raise chickens in their backyards in addition to pigs, goats and cattle. Rural poultry production has the advantage of being easy to raise, low input, higher growth and reproduction, quick return and therefore is suitable for the majority of the small and marginal farmers of the region (Malik *et al.*, 2014). Backyard poultry flocks of the region consist largely of colourful indigenous birds that have adapted to the local climatic conditions over the periods and have been catering to the needs of consumers who have specific taste for the meat of these birds and eggs (Yadav *et al.*, 2017). Although backyard poultry uses relatively little input, it guarantees a steady supply of wholesome animal proteins and provides modest income for household needs, especially for the poorer sections of society in rural areas (Singh *et al.*, 2022). In addition to free scavenging for insects and leftover grains, these birds can be easily provided supplemental feeding with domestic waste, agricultural by-products and green plants. Thus, backyard poultry farming can improve the socio-economic standing of low-income rural and tribal families. However, the introduction of high-yielding chicken varieties to rural areas of the region has led to a decrease in the number of native chickens, putting several of them in danger of going extinct (Padhi, 2016). Therefore, native chickens must be accurately described, documented, and conserved for improvement due to their significance in the backyard system (Thirunavukkarasu *et al.*, 2024). In India, a large number of indigenous chickens are only recognized by their names in the native tract, but few of them are documented and studied for their importance and utilities (Gowda *et al.*, 2020). Syiar Markasa is one such native chicken population found in the Khasi hills of Meghalaya and has been contributing significantly to the nutritional requirements of large non-vegetarian populations of the state (Jamatia *et al.*, 2021). Therefore, the present investigation was carried out to study the population structures, management practices, phenotypic characteristics and performance of Syiar Markasa chicken in their existing native tract of Meghalaya.

Materials and Methods

In order to locate their geographical distribution and population status, a preliminary survey was conducted in different districts of Meghalaya (Fig. 1). The population of Syiar Markasa was identified in Eastern West Khasi Hills, West Khasi Hills and parts of Ri-Bhoi districts and a further detailed study was conducted. The geographical location of the study place lies in the central part of the State of Meghalaya and is situated between approximately 25 degrees 10' and 25 degrees 51' N latitude, and between 90 degrees 44' and 91 degrees 49' E longitude. A total of 885 birds of 105 farmers' families of 11 different villages belonging to four different blocks, namely Mawthadraishan block under Eastern West Khasi Hills and Rambrai Block and

Nongstoin Block under West Khasi Hills district and Jirang Block under Ri-bhoi district. Information on body biometric characteristics, viz. shank length, wing length, comb type, comb size, eye colour, wattle colour, egg colour, etc, was recorded. The information recorded included both cocks (Adult males 5 months and above) and Hens (Adult females 5 months and above). The information on housing, feeding, breeding, flock size and its structure, performances, disease prevalence and morphological traits were collected through formal interviews using a structured questionnaire. The information and data were recorded both from the farmers as well as the inspections and observations made by the interviewers and data collectors.

Morphological and Performance evaluation

The morphological traits, both qualitative and quantitative, were recorded in both male and female adult chickens as per directives defined by the National Bureau of Animal Genetic Resources (NBAGR), Karnal, Haryana, India. The quantitative traits recorded were body weight, wing span, body length, shank length and comb length and the qualitative traits were comb type, plumage colour and pattern, ear lobe colour, shank colour, skin colour and eye colour. A Spring Balance was used to measure the body weight, and other linear measurements were taken using textile measuring tape from males and females. The qualitative traits were recorded through observation. The information on existing traditional poultry production systems in the field, including housing, feeding, breeding management, reproductive performance, and disease prevalence, was recorded by interviewing the farmers. The data collected were compiled and presented as Mean $\pm$ S.E. and Percentage (%) for quantitative and qualitative traits, respectively.

Results and Discussion

Origin, distribution and flock size

There has not been a clear documentation of the origin and migration of the local indigenous poultry of Meghalaya, which the local people call "Syiar Markasa". These local indigenous poultry are distributed over different hilly regions of Meghalaya, North East India, where the population is most densely distributed in Markasa Village, the Eastern West Khasi Hill district of Meghalaya. These local indigenous poultry were being reared and managed by the Khasi Tribes since ancient times and have a deep cultural and social impact on the Khasi Tribal society of Meghalaya. Every household in the nearby villages and neighbouring districts mostly keeps this type of chicken. The word 'Syiar Markasa' is a combination of two words, "Syiar" and "Markasa". In the Khasi language, "Syiar" means "chicken" and since it is believed to originate from Markasa Village, and also these birds are densely populated in the Eastern West Khasi Hills and are mostly marketed during the weekly market in

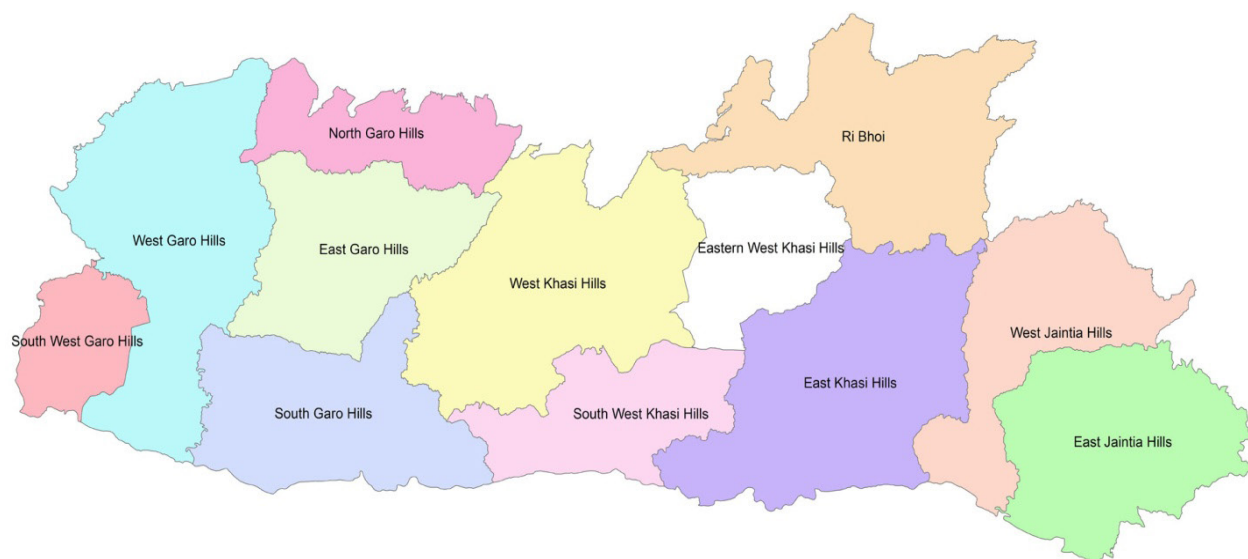


Fig 1: Distribution of Syiar Khasi Population

Markasa Village and so it is also popularly known as “Syiar Markasa” among the Khasi Tribe. Flock size varied from 4 to 60, with an average of 20. On average, a flock consisted of 40% chicks, 28% of cocks and 32% of hens.

Utility

These are reared mainly for domestic use of meat and eggs are mostly set for hatching. These also serve as cash reserves for the farmers. The meat is considered a delicacy and is also one of the major sources of animal protein and hence, there is a high demand for the meat of this chicken. Breeders rear these chickens for commercial purposes and sell adult chickens to earn money. The chickens are usually marketed at an age of 8 months to 1 year old. Adult male Cocks are usually priced at Rs 1000-1500, while adult hens are priced at Rs 600-800 per bird.

Housing management

Syiar Markasa birds are reared in the backyard system and managed mainly by women (86.17%). The majority of the farmers have Kutcha Houses made up of bamboo materials, tin sheets, or wooden planks. Some of the farmers are beneficiaries of the Mahatma Gandhi National Rural Employment Guarantee Act and get the construction of a pucca poultry shed. Usually, the floors of the poultry shed are a kutcha floor, while some in a deep litter system with sawdust. Usually, the sheds were only for the purpose of shelter at night, easier management during incubation and brooding of chicks, or Treatments and vaccinations. Some farmers do not have a separate shed/house for birds. This is because the mortality of the birds is high due to predators since the houses are located adjacent to the jungle without any fencing. At night, the birds shelter on the branches of the trees, or they are kept in a bamboo basket (Fig. 2).

Feeding management

The Syiar Markasa birds are managed by free ranging or scavenging in the nearby villages or resident areas from morning till evening. The majority of the farmers provide feed supplements along with the scavenging of birds. The feed supplements generally are broken rice, kitchen waste and Maize. Few farmers feed the commercial feed as supplements only.

Disease incidences and management

The majority of the farmers had limited knowledge about vaccination and deworming, and were not practiced by the local farmers. The reason for non-vaccination of poultry was a lack of awareness and less availability of vaccines and expertise in many places. However, in some villages, Lasota and R2B vaccination to local birds was done by some trained Farmers by the State Veterinary department or some staff from the State Veterinary dispensaries.

Morphological traits

The results of various Plumage colours, patterns and other morphological features observed in Syiar Markasa chicken from three districts of Meghalaya are presented in (Tables 1 and 2). Syiar Markasa birds are small-sized, compact-bodied birds with long legs. The predominant plumage colour is golden reddish brown with patches of black, brown, or golden feathers on the neck, back and wings, especially in males. The pattern is generally solid in both sexes. Cocks generally have shining bluish black feathers on wings, breast, tail and thighs. Hens are generally brown with solid or penciled plumage. Some are observed to be pure black shining colour, but sometimes black with red on the neck were also found. The comb is bright red in colour, mainly single comb and small or medium in hens

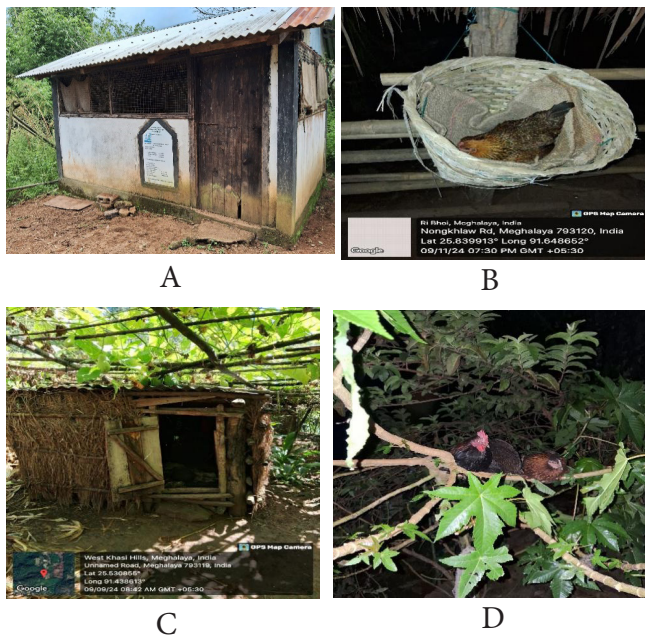


Fig 2: (a): Pucca Poultry Shed under MGNREA, (b): Night shelter and incubation of eggs by broody hen in a bamboo basket, (c): Kutcha poultry shed, (d): Night shelter of birds on tree branches.

and large in cocks. Skin is generally yellow or white. The earlobe is red mostly and a few carried white or red-white earlobes. Eye ring is Orange in colour. Wattles are bright red in colour. The beak is generally yellow, but greyish black is also observed. Shank is yellow, sometimes white, grayish, or black in colour. (Fig. 3.)

Means with different superscripts differ significantly ($P < 0.05$) in a column.

Feather characteristics

The present findings revealed that all the birds of the population showed normal feather morphology with normal feather distribution. The findings of the study were similar to the indigenous chicken of Mizoram (Lalhlimpuia *et al.*, 2021).

Plumage colour and pattern

In the present study, in males, the most predominant one was Golden Reddish brown (40.323%), followed by Golden blackish brown (37.096%) and multi-colour (19.354%) and the least was black (3.226%). In females, the most prominent plumage colour was Golden Reddish brown (53.225%), followed by black (19.354%) and Golden blackish brown (16.129%); the least observed was multi-colour (11.290%). The plumage pattern in males observed was Solid (83.871%), Patchy (11.290%) and Striped (4.838%). In females, solid (54.838%), pencilled (19.354%), Patchy (14.516%) and Laced (11.290%) were also observed. Males have a long-arched tail with a strong tail root and females have having short erect which is upright in position. Males have shining bluish black feathers on wings, breast, tail and thighs. Males have a golden/yellow colour on hackle feathers and saddle feathers, which marks a differentiable feature from females.



Fig 3: Syiar Markasa chicken (Adult Cock and Hen)

Duguma (2006) reported very diverse plumage colouration in indigenous chicken of Ethiopia, and he concluded that diversity in plumage colour is a feature for camouflaging, adaptability and survival. Both sexes showed different plumage colours, indicating sexual dimorphism as sex has an influence on the plumage colours of poultry (Harikrishnan *et al.*, 2019).

Eye colour

The most common eye colour observed was orange eye colour (92.742%), followed by brown eye colour (7.258%).

Table 1: Qualitative morphological traits of Syiar Markasa chicken of Meghalaya

Traits	Male (n= 287)	Female (n= 607)	Pooled (n= 885)
Plumage colour			
Golden Reddish Brown	40.323%	53.225%	46.774%
Golden Blackish Brown	37.096%	16.129%	26.613%
Black	3.226%	19.354%	11.290%
Multi-colour	19.354%	11.290%	15.323%
Plumage pattern			
Solid	83.871%	54.838%	69.355%
Stripped/Penciled	4.838%	19.354%	12.096%
Patchy	11.290%	14.516%	12.903%
Laced	-	11.290%	3.225%
Comb type			
Single	100.00%	96.774%	99.193%
pea	-	3.225%	0.806%
Eye colour			
Orange	96.774%	88.709%	92.742%
Brown	3.225%	11.290%	7.258%
Ear lobe colour			
Red	95.161%	88.709%	95.161%
White	4.483%	4.838%	3.226%
Red-white	-	6.451%	1.613%
Comb colour			
Red	100.00%	100.00%	100.00%
Shank colour			
Yellow	83.871%	46.774%	69.355%
White	14.516%	24.193%	11.290%
Grey	1.612%	20.967%	8.065%
Black	-	8.064%	0.806%
Skin colour			
Yellow	85.483%	64.516%	75.00%
White	14.516%	35.483%	25.00%

*n = number of observations.

Table 2: Quantitative morphological traits of Syiar Markasa chicken of Meghalaya

Traits	Male (n = 287)	Female (n = 607)	Pooled (n = 885)
Shank length (cm)	8.550 ± 0.146	7.124 ± 0.094	7.990 ± 0.130
Wing span (cm)	68.876 ± 0.307 ^a	62.306 ± 0.416 ^b	66.076 ± 0.465
Comb length (cm)	6.617 ± 0.165 ^a	3.156 ± 0.097 ^b	5.466 ± 0.205
Body length (cm)	39.875 ± 0.627 ^a	34.605 ± 0.398 ^b	37.246 ± 0.443
Body weight (kg)	1.960 ± 0.052	1.656 ± 0.028	1.856 ± 0.039

*n = number of observations

The present findings were similar to the local chicken of Mizoram (Lalhlimpaia *et al.*, 2021). The present findings of varied eye colours might be due to differences in the degree of pigmentation of carotenoid pigments and blood supply within the eye (Crawford, 1990).

Earlobe colour

The most frequent ear lobe colour observed in the Syiar Markasa chicken of Meghalaya was red (95.161%), followed by white (3.226%) and admixture of red and white (1.613%). Earlier studies (Lalhlimpaia *et al.*, 2021) also reported that the majority of indigenous chickens of Mizoram have red ear lobes.

Shank colour

Shank colours are so important in identifying dietary nutrients in Syiar Markasa. The predominance of yellow shank is an indication of dietary carotenoid or xanthophyll, which results from free-ranging scavenging in a variety of natural vegetation and dietary supplementation of Maize. These suggest that chickens raised in these regions are rich in vitamins and are better for human consumption. The findings from this study

are similar to those reported study from Tanzania (Lucas *et al.*, 2024) and Mizoram, India (Lalhlimpaia *et al.*, 2021).

Comb

The comb is red (100.00%), single (99.193%), or pea (0.806%). It is large in cocks and small or medium in hens. It is erect in cocks and drooping on the rear side in hens. The findings in this study are similar to the Tellicherry chicken breed of India (Viji *et al.*, 2008).

Skin colour

The present findings recorded that the skin colour in both sexes was Yellow (75.00%) in colour, followed by white (25.00%) skin colour. Similar findings were recorded from the indigenous chicken of the Belagaum division of Karnataka state (Gowda *et al.*, 2020).

Performance and egg quality traits

The body weight of an adult cock ranged from 1.5kg to 2.5 kg, with an average of 1.960 ± 0.053 kg and that of an adult hen ranged from 1.1 kg to 2.2 kg, with an average of 1.656 ± 0.028 . Syiar Markasa hens start laying eggs at the age of about 5-7 months. A hen produces about 12-16 eggs in a laying period of 12-18 days. After a laying period, the hens become broody and incubate the eggs for 20-21 days. Hatchability on a Total egg basis varies from 65-100% with an average of about 80%. After hatching, the hen broods the chicks for about 2.5-3 months. Then the next laying cycle starts. It takes about 4 months to complete one laying cycle and in a year, a hen undergoes at most three laying cycles, laying around 35-40 eggs per year. The egg characteristics are presented in (Table 3).

Conclusion

Syiar Markasa is an important indigenous poultry of Meghalaya reared by the farmers for generations. They are confined to the Eastern West Khasi Hills, West Khasi Hills, and Ri-Bhoi districts of Meghalaya and are mainly reared for meat. This is the first documentation of Syiar Markasa poultry of Meghalaya. These poultry have the potential to be described as one of the poultry breeds from the state of Meghalaya.

Acknowledgement

The authors are thankful to ICAR -Network Project on Animal Genetics Resources and AICRP on Poultry Breeding.

Table 3: Egg Characteristics of a Syiar Markasa Chicken (n=200)

Parameters	Average
Weight (g)	
Albumin	24.78 ± 0.719
Yolk	12.89 ± 0.334
Shell	4.173 ± 0.118
Egg	41.848 ± 1.084
Shell colour (% of eggs)	
Cream	38.89%
Brown	38.89%
White	22.22%
Shape index	74.498 ± 1.055
Albumin index	17.376 ± 0.334
Yolk index	20.397 ± 0.435
Haugh units	93.527 ± 0.895
Inclusion bodies (% of eggs)	
Absent	83.33%
Blood spot	11.11%
Meat spot	5.56%

*n= number of observations

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