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Research Article

Phenotypic Characterization of Native Chicken of Kerala Reared Under Intensive System of Management

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ABSTRACT

A study was conducted at All India Co-ordinated Research Project (AICRP) on Poultry for Eggs, Mannuthy centre, to evaluate the phenotypic characteristics of native chicken of Kerala. The presence of beautiful, distinct and multi colour plumage and patterns protect native chicken from the predators and thereby increase their livability in backyard rearing. Almost all native birds (99.43 %) birds had normal feather morphology while 0.57 per cent birds had frizzle feather. Normal feather distribution and fast feathering were prominent in the native chicken population under study. The multi colour plumage was prominent in the population followed by red, black, brown, white, gold and blue colour plumage. Out of the primary plumage pattern, the solid pattern was predominant. Other plumage patterns include patchy, barred, dull, spotted, columbian and striped. No specific secondary plumage patterns were exhibited by majority of birds while self-white, self-black, self-blue, self-red, barred, mottled, lace and spangled patterns were also observed in the population. Majority of birds had white coloured skin. The prominent shank colour observed for native chicken was yellow followed by black, white, green, blue and yellow & black. Majority of birds had single comb and the prominent ear lobe colour was white followed by white & red, red and black.

Keywords: *Plumage, Backyard, Native chicken, Phenotypic, Characterization*

INTRODUCTION

Backyard poultry production is mainly oriented in using region specific local chicken or its crossbreds by relying more on traditional practices with minimum dependence on external inputs. India is bestowed with diverse indigenous chicken germplasm and National Bureau of Animal Genetic Resources (NBAGR) has already recognized 19 region specific poultry breeds in India. Due to natural selection, indigenous breeds show increased disease resistance (Minga et al., 2004).

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The other features of indigenous chicken include foraging on low quality feed resources (Farrell, 2000) and the peculiar taste and flavor for their meat than commercial broilers. Broodiness (maternal instinct) exhibited is yet another striking feature of native birds for self propagation. The presence of beautiful, distinct and multi colour plumage protects themselves from the predators. Since livability is an essential trait in backyard rearing, the plumage of native chicken has its own importance. Hence a study was conceived to characterize the plumage colours and patterns of native chicken of Kerala.

MATERIALS AND METHODS

The study was conducted at All India Co-ordinated Research Project on Poultry for Eggs (AICRP), Mannuthy centre. Phenotypic characters of 500 female and 200 male birds housed in the individual cages were recorded as per the standard descriptor (FAO, 1986). Phenotypic characters like feather characteristics, feather colour and skin characteristics of the individual birds were recorded at the end of 40 weeks of age.

1. Feather characteristics

Feather characteristics *viz*., feather morphology, feather distribution and feather growth rate were documented (phenotypic frequency %).

2. **Feather colours**

Feather colours *viz*., colours in plumage, plumage pattern and pattern within feather were documented (phenotypic frequency %).

The plumage colour was recorded based on the base plumage colour of the bird, which included white, black, blue, red, brown or gold. The birds having more than one colour were grouped under multi colour. The colour distribution in the plumage among the different body parts was examined to group them under the following primary feather pattern: solid, dull, striped, patchy, spotted, barred and columbian. The feathers on the anterior part of the back region of each bird were carefully examined to record the secondary plumage patterns, *i.e.,* the colour distribution within each feather. Various secondary plumage patterns include self-white, self-black, self-blue, self-red, barred, mottled, lace, spangled and non-specific.

3. **Skin characteristics**

Skin characteristics like skin colour, shank clour, comb type and ear lobe colour were documented (phenotypic frequency %).

The non-feathered parts of skin underneath the wings were examined to record the skin colour. The skin colour was categorized into white, yellow and black. Shank colour was categorized into six categories, *viz*., white, yellow, black, blue, green and yellow & black. The birds were examined individually to record the type of the comb, *viz.*, single and pea. The ear lobe colour was classified as white, red, white & red and black.

RESULTS AND DISCUSSION

1. Feather characteristics

In the present study, 99.43 per cent birds of the population had normal feather morphology while 0.57 per cent birds had frizzled pattern. Frizzling pattern was completely absent in males. The feather distribution was normal for 93.14 per cent birds while 6.86 per cent was Naked neck. No much variation in feather distribution was observed between sexes. Fast feathering was noticed in majority of birds (90.29 %) while slow feathering was observed in 9.71 per cent birds (Table 1). Gopinath (2013) reported similar results for feather morphology and feather distribution for indigenous chicken population of Mysore while no other similar studies were available in case of feather growth rate and hence no corroboration can be made.

Table 1: Phenotypic frequency of feather characteristics of native chicken of Kerala, per cent

	Feather morphology		**Feather distribution**		**Feather growth rate**	
Generation & Sex	**Normal**	**Frizzled**	**Normal**	**Naked neck**	**Fast feathering**	**Slow feathering**
Males (200)	100	0	94.00	6.00	76.00	24.00
Females (500)	99.20	0.80	92.80	7.20	96.00	4.00
Pooled sex (700)	**99.43**	**0.57**	**93.14**	**6.86**	**90.29**	**9.71**

2. Feather colours

The plumage colours and patterns of native chicken of Kerala were documented (Table 2) separately for each sex, as sex has an influence on plumage colour of poultry (sexual dimorphism). Pooled values of both sex was calculated by obtaining weighted arithmetic mean for comparison, as plumage colour and patterns were described in the whole population in various literature.

In the present study, six categories of plumage colour was observed in males, the most prominent being red (36 %) followed by multi colour (26.50 %) and black (19 %). The other colours were brown, gold and white. However in females, majority of birds had mutli colour plumage (41 %). Peculiar blue colour feather was observed for 3.80 per cent females while the same colour was absent in males. In the overall population, majority of the birds (36.86 %) had multi colour plumage followed by red (26.00 %) and black (15.14 %). Similar observation of plumage colour variable from multi colour to red and black and sometimes with varying percentages was reported by Gopinath (2013) and Mohankumar (2015) for indigenous breeds of Mysore and Banglore, respectively. Many earlier works also report that plumage colours are non specific to indigenous chicken population, but consisted of different colours with predominant black and multi colours (Vij et al. 2006; Vij et al. 2008; Girishkumar, 2009; Vij et al. 2015; Vij et al. 2016 and Rajkumar et al. 2017)

According to primary plumage pattern, the male birds were grouped in to seven categories namely solid, patchy, barred, dull, columbian, spotted and striped. But in females striped pattern was absent. In the whole population, predominant patterns were solid, patchy and barred while striped and columbian were less. The literature describing primary plumage pattern was scanty. However, the results are in accordance with the studies of Gopinath (2013) and Mohankumar (2015), which concludes that solid, patchy and dull are the predominant plumage patterns in native chicken while higher number of spotted and barred pattern were observed in native chicken of Kerala compared to indigenous birds of Mysore and Banglore. The secondary plumage was documented as per the colour distribution in individual feather.

Table 2: Phenotypic frequency of plumage colour and patterns of native chicken of Kerala, per cent

Sl. No.	Parameters	Categories	Native chicken of Kerala		
			Males (200)	Females (500)	Pooled sex (700)
1	Plumage colour	White	4.00	6.40	5.71
		Black	19.00	13.60	15.14
		Blue	0	3.80	2.71
		Red	36.00	22.00	26.00
		Brown	9.00	11.60	10.86
		Gold	5.50	1.60	2.71
		Multi colour	26.50	41.00	36.86
		Total	**100.00**	**100.00**	**100.00**
2	Primary plumage pattern	Solid	29.00	56.00	48.29
		Dull	10.50	8.40	9.00
		Striped	7.00	0.00	2.00
		Patchy	20.50	12.40	14.71
		Spotted	9.00	8.00	8.29
		Barred	14.00	12.20	12.71
		Columbian	10.00	3.00	5.00
		Total	**100.00**	**100.00**	**100.00**
3	Secondary plumage pattern	Self-white	4.00	6.40	5.71
		Self-black	11.50	12.6	12.29
		Self-blue	0	3.80	2.71
		Self-red	26.50	20.00	21.86
		Barred	14.00	12.20	12.71
		Mottled	5.50	10.6	9.14
		Lace	0	12.4	8.86
		Spangled	0	6.2	4.43
		Non specific	38.50	15.80	22.29
		Total	**100.00**	**100.00**	**100.00**

Majority of males had no specific colour patterns within feather while females had self-red pattern. The secondary feather patterns like self-blue, lace and spangled observed in females was completely absent in males. Majority of secondary plumage colour in the population was non-specific followed by self-red, barred, self-black, mottled and lace. Spangled, self-blue, self-white patterns were also observed in the population but per cent wise it was not that significant. The studies of Gopinath (2013) and Mohankumar (2015) revealed that self-red and self-black was the major pattern within the feather observed for indigenous birds of Mysore and Banglore. Majority of birds in the present study showed non-specific patterns for the secondary plumage which is in agreement with the findings of Girishkumar (2009) who reported that majority of native chicken of northern Kerala had no specific patterns within the feather.

3. Skin characteristics

The various skin characteristics *viz*., skin colour, shank colour, comb type and ear lobe colour (Table 3) did not show much variation among sex.

The overall population had 80.00 per cent birds with white skin, 19.29 per cent with yellow skin and 0.71 per cent black. The results are in agreement with the findings of Girishkumar (2009), Mohankumar (2015) and Rajkumar et al. (2017) who observed that major skin colour was white for native chicken of northern Kerala (61.50 %), indigenous chicken of Banglore (97.40 %) and for Aseel birds (98.00 %). Contrary to these findings, majority of indigenous birds in Mysore had yellow skin colour (83.11 %) as reported by Gopinath (2013). However, other skin colours like grey and off-white were reported for Tellicherry and Harringhatta black, respectively (Vij et al., 2008; 2015).

Table 3: Phenotypic frequency of skin characteristics of native chicken of Kerala, per cent

Sl. No.	Parameters	Categories	Native chicken		
			Males (200)	Females (500)	Pooled sex (700)
1	Skin Colour	White	76.50	81.40	80.00
		Yellow	23.50	17.60	19.29
		Black	0	1.00	0.71
		Total	**100.00**	**100.00**	**100.00**
2	Shank colour	White	18.50	22.60	21.43
		Yellow	49.00	28.20	34.14
		Black	11.00	26.00	21.71
		Blue	4.50	2.60	3.14
		Green	14.50	18.60	17.43
		Yellow& Black	2.50	2.00	2.14
		Total	**100.00**	**100.00**	**100.00**
3	Comb Type	Single	98.5	99.00	98.86
		Pea	1.50	1.00	1.14
		Total	**100.00**	**100.00**	**100.00**
4	Ear lobe colour	White	30.00	47.00	42.14
		Red	35.00	20.60	24.71
		White & Red	33.50	29.80	30.86
		Black	1.50	2.60	2.29
		Total	**100.00**	**100.00**	**100.00**

The predominant shank colour was yellow (34.14 %), followed by black (21.71 %), white (21.43 %) and green (17.43 %). However rare shank colours, blue (3.14 %) and yellow & black (2.14 %) were also seen in the population. Similar shank colour pattern was seen for indigenous birds of Mysore (Gopinath 2013). Most of the indigenous breeds had yellow shank (Vij et al., 2006; Girishkumar 2009; Mohankumar 2015, Rajkumar et al., 2017) while Harringhata, Kaunayen, Danki, Ghagus and Kalasthi birds had yellow as well as grey colour shank (Vij et al., 2006; 2015; 2016).

Majority of birds in the population had single comb (98.86 %) while a few had pea comb (1.14 %) and the results are in accordance with the findings of Girishkumar (2009), Goipnath (2013) and Mohankumar (2015) for the native chicken of northern Kerala, indigenous breeds of Mysore and Banglore, respectively. However the presence of rare combs like rose (indigenous birds of Mysore and Banglore) and strawberry (Ghagus) was also reported. Tellicherry breeds and Harringhta breeds had only single comb (Vij et al., 2008; 2015) while Ghagus, Danki, Kalasthi, Kaunayen and Aseel

breeds had pea comb (Vij et al., 2006; 2016 and Rajkumar et al., 2017).

The ear lobe colour of majority of birds in the population was white (42.14 %) followed by admixture of white & red (30.86 %), red (24.71 %) while 2.29 per cent birds had black ear lobes. But reports confirm that majority of indigenous birds had red colour ear lobes (Gopinath 2013; Mohankumar 2015; Vij et al., 2016). However, Girishkumar (2009) observed majority of native chicken of northern Kerala had a combination of white and red ear lobes (64 %).

CONCLUSION

Phenotypic characterization of birds is important in identification of the breed character. Although plumage is an important character for the survivability of birds in the backyard, it is also important for selective breeding and for the development of new varieties and strains within the breed. Phenotypic characterization shall invariably followed by molecular characterization to identify genetic pool of the birds. The selected native birds can be field tested and can be released for the benefit of farming community as native birds has its own innate properties.

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