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## Phenotypic characterization of native chicken 'Zoar' of Mizoram, India in its home tract

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### Abstract

A study was conducted on native chicken 'Zoar' of Mizoram, India in its breeding tract (Aizawl and Mamit districts) to evaluate the phenotypic characteristics. All the Zoar birds had normal feather morphology and normal feather distribution. The most predominant plumage colour of males was Black golden yellowish brown (36.54%), followed by Orange yellowish white (23.08%) and Reddish orange (21.15%), with low frequencies of White orange brownish mix and whitish yellow. In females, the most prominent plumage colour was either brownish or red and black brownish. The majority of males showed plain plumage pattern while mottled plumage pattern was most frequent in females. The Skin was mostly creamish with pinkish colour with less proportion of whitish skin. The birds had a featherless shank with mostly yellow colour. The other colours were green, white and black. Beak colour was mainly blackish yellow followed by yellow and black. The most common eye colour was orange. The other colours were red, brown and with a low frequency of pearl. The most frequent ear lobe colour was red followed by the admixture of red and white. The red colour comb was most frequently observed than the blackish red colour comb. The most common comb type was single comb type, followed by pea, rose and buttercup. The findings suggested that the Zoar chicken of Mizoram is a chicken type of normal feathered morphology with multi-coloured plumage and featherless shank.

**Keywords:** native chicken, Zoar, Mizoram, plumage colour, characterization

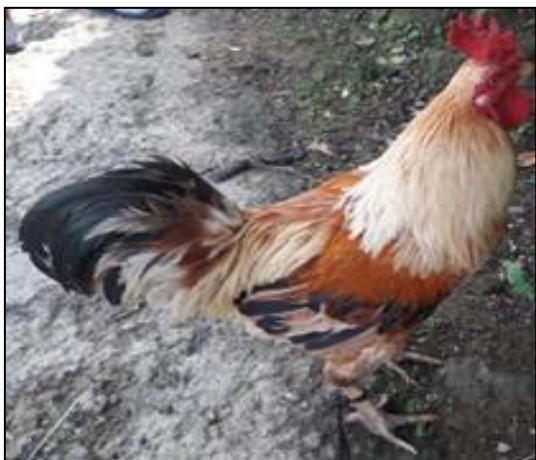
### Introduction

The North-eastern region of India is considered as one of the first territories in Asia for the advancement of present-day poultry from the red wilderness fowl, which is as yet found in the woodland of North-east India. Native chicken reared in the backyard system of management in the villages still plays an important role in rural livelihood, income generation and provides important animal protein for the large human populations. The native chicken 'Zoar' (Zo means hill; ar means chicken in Mizo language) of Mizoram is a non-descript type that had been reared or raised since days of yore. Practically all Mizo individuals of Mizoram are meat eaters and poultry raising were exceptionally well known. Raising chicks in the backyard is a deep-rooted practice and it is a custom of the Mizo individuals to raise 1-2 pigs alongside 5 to 7 desi birds are commonly reared in small flock under free range system, the fowls are not appropriately overseen and henceforth their profitability is low. Despite low yield and being the indigenous winged creatures, they can flourish and deliver with a sporadic stock of feed and water in the hilly terrain of the Mizoram state. The other characteristic features of indigenous chicken are the peculiar taste and flavour of their meat as compared to broiler chicken. Moreover, their multi colour plumage and plumage pattern enable them to protect themselves from predators. However, no literature is available about the phenotypic characteristics of this native chicken of Mizoram. Hence, the present study was undertaken to characterize the plumage colours and patterns along with the skin characteristics of native chicken 'Zoar' of Mizoram, India in its home tract.

### 2. Materials and Methods

The present study was conducted in the Aizawl and Mamit districts of Mizoram. These two districts were purposively selected on account of more concentration of the native chicken. From each district, 10 villages were purposively selected based on availability of local chicken. Ten numbers of the households who are rearing this native chicken were considered from a village in the study.

A total of 102 hens and 52 cocks of 'Zoar' were observed and recorded for plumage colours and patterns, and skin characteristics as per the standard descriptor [5]. The frequencies of various morphological characteristics were analyzed using Chi square test to find out the significant difference between the two districts for any of the traits.



Zoar cock



Zoar hen

### 3. Results and Discussion

#### 3.1 Feather characteristics

The present findings revealed that all the birds of the population showed normal feather morphology with normal feather distribution. However, native chicken of Kerala had normal feather morphology in 99.43% of birds while the rest were frizzled pattern. Normal feather distribution was in 93.14% of birds while 6.86% was of necked neck type [7].

#### 3.2 Plumage colours and patterns

In the present study, five categories of plumage colours were recorded in males (Table 1). The most predominant one was Black golden yellowish brown (36.54%), followed by Orange yellowish white (23.08%) and Reddish orange (21.15%). The other two colours White orange brownish mix and whitish yellow were in low frequencies. In females, the most prominent plumage colour was either brownish or red and black brownish.

Both sexes showed different plumage colours, indicating of sexual dimorphism as sex has an influence on the plumage colours of poultry [7]. Similar findings of various plumage colours predominantly of mixed / multi colours with varying

percentages had been observed in native chickens of Sikkim and West Bengal [1] and Manipur [10]. Various types of plumage colours in the dwarf chicken of Bangladesh was also reported [6].

Out of the two categories of plumage patterns observed in males, 82.69% of birds had plain plumage pattern while the rest barred plumage. However, the mottled plumage pattern was most frequent (35.71%) in females. Males are having a long-arched tail with a strong tail root and female are having short erect which is upright in position. The feathers are shimmer with a purplish hue, greenish or sometimes bluish on the tail feathers, breast and wings in males and sometimes in females. Males are having a golden/yellow colour on hackle feathers and saddle feathers which marked a differentiable feature from females.

The various plumage colourations observed in this local chicken might be attributed to the lack of any selection pressure directed towards the choice of plumage colour [9]. It was also observed that the farmers of the local chicken of Mizoram, India used to breed their own birds irrespective of the plumage colours resulting in the intermingling of various plumage colours and patterns.

**Table 1:** Phenotypic frequency of plumage colours and patterns of Native chicken 'Zo ar' of Mizoram, India

Sl. No.	Parameters	Districts		Overall (154)
		Aizawl (77)	Mamit (77)	
<b>a.</b>	<b>Plumage colours</b>			
	<b>Male</b>	<b>(26)</b>	<b>(26)</b>	<b>(52)</b>
i.	Black golden yellowish brown <sup>NS</sup>	34.61	38.46	36.54
ii.	Orange yellowish white <sup>NS</sup>	26.92	19.23	23.08
iii.	Reddish orange <sup>NS</sup>	19.23	23.07	21.15
iv.	White orange brownish mix <sup>NS</sup>	7.69	11.53	9.61
v.	Whitish yellow <sup>NS</sup>	11.53	7.69	9.61
	<b>Female</b>	<b>(51)</b>	<b>(51)</b>	<b>(102)</b>
i.	Brownish <sup>NS</sup>	11.76	21.56	16.67
ii.	Red brownish <sup>NS</sup>	17.64	7.84	12.74
iii.	Black brownish <sup>NS</sup>	13.72	9.80	11.76
iv.	Solid black <sup>NS</sup>	17.64	11.76	14.70
v.	Light brown <sup>NS</sup>	5.88	3.92	4.90
vi.	Solid white <sup>NS</sup>	13.72	9.80	11.76
vii.	Black with white spot <sup>NS</sup>	9.80	11.76	10.78
viii.	Black & white mix <sup>NS</sup>	5.88	11.76	8.82
ix.	Blue <sup>NS</sup>	3.92	7.84	5.88
x.	Greyish white <sup>NS</sup>	0	3.92	1.96
<b>b.</b>	<b>Plumage patterns</b>			
	<b>Male</b>	<b>(26)</b>	<b>(26)</b>	<b>(52)</b>
i.	Plain <sup>NS</sup>	80.77	84.61	82.69
ii.	Barred <sup>NS</sup>	19.23	15.38	17.31
	<b>Female</b>	<b>(51)</b>	<b>(51)</b>	<b>(102)</b>
i.	Mottle <sup>NS</sup>	38.96	32.47	35.71
ii.	Laced <sup>NS</sup>	7.79	9.09	8.44
iii.	Double laced <sup>NS</sup>	5.19	7.79	6.49
iv.	Barred <sup>NS</sup>	13.72	15.68	14.70
v.	Plain <sup>NS</sup>	7.84	9.80	8.82

<sup>NS</sup> Non-significant difference between the districts; Figures within the parentheses are the number of birds.

#### 3.3 Skin characteristics

The present findings indicated that native chicken of Mizoram has predominantly creamish with a pinkish appearance in their skin colour. The whitish skin colour (17.53%) was rarely observed. Similar two types of skin colour with more frequency of creamish with pinkish appearance were also reported in the indigenous chicken of Manipur [10]. The

findings are also comparable with that in Daothigir breed of Assam [12] and Bursa birds [14], who reported creamish skin colour slightly towards pinkish appearance and pinkish, respectively. In the indigenous chicken of Sikkim and West Bengal, whitish skin colour was the predominant one followed by yellow and slate skin colour [1]. As the white skin birds carry the dominant allele and yellow skin birds are homozygous for a recessive allele [4], the present finding of the low proportion of white skin colour in this local chicken indicated the presence of least frequency for the dominant allele. Moreover, skin colouration is a genetic trait associated with carotenoid pigments in the skin of birds and also related with the types of nutrition, adaptive fitness and health conditions [4, 11]. The absence of yellow skin birds in the present study might be attributed to the modification of yellow colour with the availability of diversified feed resources in the free range rearing system and differences in the blood supply to several structures within the skin.

The majority of the birds in the population had yellow shank colour (68.83%), followed by green (20.13%), white (6.94%) and black (4.54%). Similar findings of predominant yellow shank colour, followed by green, white and black colour shank was also observed in the local chicken of Manipur [10]. Most of the indigenous chicken breeds such as Daothigir [12], Bursa [14], Harringhata Black [15] also had mostly yellow shank colour. In the present study, all the birds in the population had featherless shank, which was similar with that of indigenous chicken of Manipur [10] and Tellicherry chicken [13]. However, the feathered shank was observed in local hill fowl of the Himalayan region [8].

Beak colour was mainly blackish yellow (59.09%), followed by yellow (32.47%) and black (8.44%). In local chicken of Manipur also, blackish yellow colour was the common beak colour followed by yellow, black and blackish white [10]. However, blackish beak colour constituted maximum portion in Tellicherry fowls [13]. Variations in the beak colour might be attributed to the degree of pigmentations as in shank colours.

The most common eye colour was orange (53.95%), followed by red (25.66%), brown (15.13%) and pearl (5.26%). The present findings were fairly similar to the results of local chicken of Manipur [10], where maximum proportion was constituted by orange eye colour followed by red, brown and pearl eye colour. On the contrary, black eye colour was the most predominant one in the indigenous dwarf chicken of Bangladesh [6]. The present finding of varied eye colours might be due differences in the degree of pigmentation of carotenoid pigments and blood supply within the eye [3]. The most frequent ear lobe colour observed in the local chicken of Mizoram was red (73.38%), followed by admixture of red and white (22.37%). Earlier studies [10, 12] also reported that majority of indigenous chickens had red ear lobe. However, white or brown colour ear lobe was the predominant colour in Busra birds [14].

In the present study, only two comb colours with four comb types were observed in the studied chicken population (Table 2). The red colour comb was most frequently observed than the blackish red colour comb. Single comb type was observed in the majority of the birds followed by pea, rose and buttercup, which is comparable to that in indigenous chicken of Manipur [10], who also observed mainly single red comb followed by pea and rose comb. In native chicken of Kerala [7] and Andaman [2], the predominant comb type was a single comb with a very little proportion of pea comb. However, the

other native chicken breeds like Tellicherry and Harringhata Black had only a single comb [13, 15].

Non-significant differences observed in the plumage colour and pattern, and skin characteristics between the Zoar chickens of the two districts studied indicated the genetic similarities of birds of these two districts.

**Table 2:** Phenotypic frequency (%) of skin characteristics of Native chicken 'Zoar' of Mizoram, India

Sl. No.	Parameters	Districts		Overall (154)
		Aizawl (77)	Mamit (77)	
<b>a.</b>	<b>Skin colour</b>			
i.	Creamish with pinkish appearance <sup>NS</sup>	84.42	80.52	82.47
ii.	Whitish <sup>NS</sup>	15.58	19.48	17.53
<b>b.</b>	<b>Shank colour</b>			
i.	Yellow <sup>NS</sup>	64.94	72.73	68.83
ii.	Green <sup>NS</sup>	23.38	16.88	20.13
iii.	Black <sup>NS</sup>	2.60	6.49	4.54
iv.	White <sup>NS</sup>	9.09	3.90	6.49
<b>c.</b>	<b>Shank feather</b>			
i.	Present <sup>NS</sup>	0.00	0.00	0.00
ii.	Absent <sup>NS</sup>	100	100	100
<b>d.</b>	<b>Beak colour</b>			
i.	Blackish yellow <sup>NS</sup>	62.34	55.84	59.09
ii.	Yellow <sup>NS</sup>	29.87	35.06	32.47
iii.	Black <sup>NS</sup>	7.79	9.09	8.44
<b>e.</b>	<b>Eye colour</b>			
i.	Orange <sup>NS</sup>	64.93	72.73	68.83
ii.	Brown <sup>NS</sup>	15.58	11.69	13.64
iii.	Pearl <sup>NS</sup>	7.79	9.09	8.44
iv.	Yellow <sup>NS</sup>	11.69	6.49	9.09
<b>f.</b>	<b>Earlobe colour</b>			
i.	Red <sup>NS</sup>	71.43	75.32	73.38
ii.	Admixture of red and white <sup>NS</sup>	28.57	24.67	26.62
<b>g.</b>	<b>Comb colour</b>			
i.	Red <sup>NS</sup>	85.72	89.61	87.66
ii.	Blackish red <sup>NS</sup>	14.28	10.39	12.34
<b>h.</b>	<b>Comb type</b>			
i.	Single <sup>NS</sup>	75.32	74.02	74.67
ii.	Pea <sup>NS</sup>	18.18	14.28	16.23
iii.	Buttercup <sup>NS</sup>	0	2.60	1.30
iv.	Rose <sup>NS</sup>	6.49	9.09	7.79

<sup>NS</sup> Non significant difference between the districts; Figures within the parentheses are the number of birds.

#### 4. Conclusion

The present findings revealed that the local chicken 'Zoar' of Mizoram were predominantly mixed plumage colors with mottled and plain plumage pattern, creamish with pinkish skin appearance, blackish yellowish beak, yellow shank, orange eye colour, red ear lobe and single red comb type birds.

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