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A systematic evaluation of indigenous chicken of Mysore division of Karnataka state for egg quality traits reared under backyard condition

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Abstract

An experimental study was carried out in the indigenous chicken of Mysore Division (Hassan, Kodagu, Chikmagalur, Udupi, and Dakshina Kannada Districts) of Karnataka state reared under backyard conditions to evaluate the egg parameters. Evaluation of the external and internal quality of eggs is important to study the characterization of indigenous chicken. The external egg quality traits studied were an eggshell color, egg weight and shape index. The internal quality traits studied were albumin index, yolk index, shell weight, shell thickness and Haugh Unit Score. The percentage of different shell colors of eggs recorded under field conditions was 12.66 creamy, 35.77 light brown and 51.55 brown colour. The average Egg weight, Albumin index, Yolk index, Shell thickness, Shape index and Haugh Unit score recorded was 46.46 ± 0.51 , 0.052 ± 0.00 , 0.14 ± 0.00 , 0.32 ± 0.00 , 76.12 ± 0.52 and 77.12 ± 0.74 , respectively. The average Fertility (%), Hatchability on TES and Hatchability on FES was 61.48, 46.90 and 76.29 respectively.

Keywords: Egg quality, albumin index, yolk index, shape index and haugh unit score

1. Introduction

Although indigenous chickens grow at a slower rate and produce fewer eggs than improved commercial breeds, eggs and meat from these birds are preferred because of their taste, leanness, pigmentation and suitability to special dishes (Lambio 1990) [6]. The backyard poultry production system is characterized by small flock sizes, low input and output due to the absence of proper husbandry practices (Aberra Melesse, 2014) [1]. The lack of recorded data on the productive performance of chicken reared under the traditional production system makes it difficult to assess their importance to improve poultry production for small-scale farmers (Fisseha Moges *et al.*, 2010) [2]. The chicken egg is not only a tool for reproduction but is also a valuable food source for humans. The demand for eggs and meat in rural areas can be met by backyard poultry rearing (Nandi *et al.*, 2007 and Panda *et al.*, 2008) [7, 8]. It is generally agreed that all the characteristics of egg quality have a genetic basis. The egg size and internal quality of eggs are important for both table and hatching eggs. The nutrient content of eggs and the weight of day-old chicks depend on the weight of the egg. A laying hen's egg weight is affected by many factors such as heredity, breed, strain, age of hen, body size, feed and water consumption, ambient temperature and diseases. Egg weight is an important trait that influences egg quality as well as grading. It is a parameter that can be determined without breaking the egg (Kirmizibayrak *et al.*, 2005) [5]. The present investigation was undertaken to assess the various egg quality characteristics in indigenous chickens of the Mysore division of Karnataka.

2. Material and Methods

Eggs were collected from each district of indigenous chicken reared under a scavenging system from different villages of the Mysore division of Karnataka state *viz.*, Hassan, Kodagu, Chikmagalur, Udupi and Dakshina Kannada district. The collected eggs were subjected to internal and external quality parameters.

2.1 External egg quality traits.

2.2 Shell colour

The total eggs, collected from the study area, from five Districts (an average of 150 eggs from

each District) were subjected to visual examination to record their shell colour and classified into three categories namely, cream, light brown, and brown.

2.3 Egg weight (gm)

Average egg weight was computed based on the individual egg weight on a sample of thirty eggs pertaining to each District of the survey area accounting for 150 eggs were subjected to egg quality studies.

2.4 Shape index

The longest length and broadest width of each of the eggs were measured (mm) using digital slide calipers to the accuracy of 0.1 mm. The shape index was computed using the following formula.

$$\text{Shape Index} = \frac{\text{Breadth (mm)}}{\text{Length (mm)}} \times 100$$

2.5 Shell thickness (mm)

The average of three measurements was taken as the shell thickness. The shell thickness was measured at the broad end, narrow ends, and middle piece using a screw gauge.

2.6 Internal egg quality traits

Thirty fresh eggs from each District collected from the survey area accounting for 150 eggs were subjected to egg quality studies. The internal egg quality traits viz., albumen index, yolk index, and Haugh unit score were recorded. These eggs were broken on a level surface to measure the height of thick albumin and yolk at three different points by using a spherometer.

2.7 Albumen Index

The greatest length and broadest width of the thick albumen were measured using digital slide calipers. The height of the albumen at 3 locations was using Ames tripod micrometer. Albumen index was computed using the following formula.

$$\text{Albumen Index} = \frac{\text{Av. height of the albumen (mm)}}{\text{Av. Width and length of the albumen (mm)}}$$

2.8 Yolk index

The height of the yolk was measured using Ames micrometer and the diameter of the yolk was measured using digital slide

calipers. Yolk index was computed using the following formula.

$$\text{Yolk index} = \frac{\text{Height of the yolk (mm)}}{\text{Diameter of the yolk (mm)}}$$

2.9 Haugh Unit Score

Haugh Unit Score (HU) was computed as per the following formula.

$$\text{HU} = 100 \text{ Log (H} + 7.57 - 1.7 \text{ W}^{0.37})$$

Where H is the albumen height in millimeters and W is the weight of the egg in grams.

3. Statistical analysis

All the data collected on various parameters were analyzed adopting ANOVA as per the methods described by Snedecor and Cochran (1994) using SPSS 20 statistical software. One-way ANOVA was used to compare between the Districts and Duncan multiple tests were applied to test the significance.

4. Results and Discussion

During the field survey eggs were collected from five Districts namely, Hassan, Kodagu, Chikmagalur, Udupi, and Dakshina Kannada Districts and ten eggs from each District were used for recording egg quality traits and rest of the eggs were set for hatching and the results are depicted in the Table.

4.1 External egg quality traits

4.2 Eggshell color

Eggs collected were studied for external egg quality traits for egg colour. Overall maximum per cent of egg colour recorded among all the Districts were brown colour egg (51.55) followed by Light brown (35.77) and creamy (12.66). Rajakumar, (2013) [9, 11] disclosed that in the indigenous chicken of Bangalore Division of Karnataka, the majority of the eggs showed light brown (44.46%) followed by brown (38.65%) and cream coloured eggs (16.90%). Gopinath, (2013) [3] acknowledge in the indigenous chicken of Mysore Division of Karnataka that majority of eggs showed cream colour (50.33%) followed by brown (26.32%) and light brown (23.33%). Veerannagowda, (2020) [12] revealed that the eggs collected from the field were graded for shell colour. The shell colour observed in the indigenous chicken of Belgaum Division was predominantly brown colour (55.92%) followed by light brown (35.18%) and cream-colored eggs (8.89%).

Table 1: Percentage of eggshell colour, and external egg quality traits of indigenous chicken of Mysore division.

| District | Eggshell colour | | | External egg quality traits | | |
|------------------|-----------------|-------------|-------|-----------------------------|-------------|-----------------|
| | Creamy | Light Brown | Brown | Egg Wt | Shape Index | Shell Thickness |
| Hassan | 10.00 | 30.00 | 60.00 | 45.50±0.58 | 76.05±0.37 | 0.31±0.00 |
| Kodagu | 7.78 | 41.11 | 51.11 | 47.00±0.98 | 75.35±1.69 | 0.32±0.00 |
| Chikmagaluru | 11.11 | 35.56 | 53.33 | 45.10±1.07 | 77.53±1.14 | 0.33±0.01 |
| Udupi | 15.56 | 36.67 | 47.78 | 47.10±1.27 | 76.57±0.63 | 0.32±0.01 |
| Dakshina Kannada | 18.89 | 35.56 | 45.56 | 47.60±1.59 | 75.08±1.53 | 0.32±0.00 |
| Overall mean | 12.66 | 35.77 | 51.55 | 46.46±0.51 | 76.12±0.52 | 0.32±0.00 |

4.3 Egg weight

The mean of egg weight recorded from all the five Districts of the Mysore Division was 46.46±0.51 g. The egg weight of Dakshina Kannada District recorded higher egg weight compared to Hassan, Chikmagalur, Udupi, and Dakshina Kannada Districts. The statistical analysis revealed a non-

significant ($P \geq 0.05$) difference in egg weight among all the five different Districts. Rajakumar (2013) [9, 11] disclose in the indigenous chicken of Bangalore Division of Karnataka that egg weight ranged from 39.83±0.43 gm in Ramanagar District to 43.79±0.70 gm in Bangalore rural District. Gopinath (2013) [3] related in the indigenous chicken of Mysore

Division of Karnataka that egg weight ranged from 38.90±1.84 in Chamarajanagar District to 40.10±0.54 gm in Mandya District. Gopinath *et al.* (2014) [4] published that no significant ($P \leq 0.05$) differences were noticed between the different Districts in field eggs external quality traits like egg weight in the Mysore Division of Karnataka. Veerannagowda, (2020) [12] admit that egg weight recorded ranged from 45.59±0.70 gm in Dharawad to 46.88±0.49 gm in Belgaum and 47.28 ±0.68 gm in Bijapur District with an overall mean of 46.58±0.70 gm.

4.4 Shape index

The average shape index recorded from all the five Districts of the Mysore Division was 76.12±0.52. The statistical analysis revealed a non-significant ($P \geq 0.05$) difference in shape index among all the five different Districts. The results of the present study are in agreement with Rajakumar (2013) [9, 11] detailed that in the indigenous chicken of the Bangalore Division of Karnataka that the shape index ranged from 73.69±1.53 in Chikkaballapur District to 76.45±0.82 in Ramanagar District and the values were non-significant among the Districts. Gopinath (2013) [3] also reported that in indigenous chickens of Mysore Division of Karnataka that the shape index ranged from 73.59±1.79 in Mysore District to 75.36±1.35 in Chamarajanagar District and there were no significant differences among the three Districts. Gopinath *et al.* (2014) [4] reported that no significant ($P \leq 0.05$) differences were noticed between the different Districts in field eggs external quality traits like shape index in Mysore Division of

Karnataka. Veerannagowda, (2020) [12] revealed that the shape index in the present study ranged from 74.58±1.45 in Belgaum to 75.35±0.28 in Bijapur and 76.28±0.83 in Dharawad District with an overall mean value of 75.40±0.55 in the indigenous chicken of Belgaum Division.

4.5 Shell thickness (mm)

The mean eggshell weight recorded from all the five Districts of the Mysore Division was 0.32±0.00. The eggshell thickness of Chikmagalur showed higher eggshell weight when compared with other Districts. The statistical analysis revealed a non-significant ($P \geq 0.05$) difference in eggshell thickness among all the five different Districts. Rajakumar (2013) [9, 11] accessed higher values in indigenous chicken of Bangalore Division of Karnataka that shell thickness ranged from 0.39±0.01 mm in Chikkaballapur District to 0.42±0.01 mm in Ramanagar District. Gopinath (2013) [3] described similar values to that of the present study in indigenous chicken of Mysore Division of Karnataka that the shell thickness ranged from 0.33±0.003 mm in Mandya District to 0.35±0.011 mm in Chamarajanagar District and no significant differences were observed among the Districts. Gopinath *et al.* (2014) [4] reported that no significant ($P \leq 0.05$) differences were noticed between the different Districts in field eggs with respect to external quality traits like shell thickness and shell weight in the Mysore Division of Karnataka. Veerannagowda, (2020) [12] notified that the shell thickness in all three Districts showed the value of 0.32±0.01 mm.

Table 2: Egg quality traits of birds of Mysore division under field conditions

| Groups | N | Internal egg quality traits | | |
|------------------|----|-----------------------------|------------|------------|
| | | Albumen Index | Yolk Index | HUS |
| Hassan | 10 | 0.05±0.00 | 0.15±0.00a | 78.90±0.60 |
| Kodagu | 10 | 0.04±0.00 | 0.15±0.00a | 75.10±1.82 |
| Chikmagalur | 10 | 0.06±0.00 | 0.13±0.01b | 75.90±1.97 |
| Udupi | 10 | 0.05±0.00 | 0.15±0.00a | 80.00±1.13 |
| Dakshina Kannada | 10 | 0.06±0.00 | 0.14±0.00a | 75.70±2.04 |
| Overall | 10 | 0.052±0.00 | 0.14±0.00 | 77.12±0.74 |

Means bearing at least one common superscript within a column do not differ significantly ($P \leq 0.05$)

4.6 Internal egg quality traits

4.7 Albumen index

The albumen index of Kodagu District recorded lower compared to Hassan, Chikmagalur, Udupi, and Dakshina Kannada Districts. The statistical analysis revealed a non-significant ($P \geq 0.05$) difference in albumen index among all the five different Districts. The results of the present study are in agreement with that of Rajakumar (2013) [9, 11] who detailed in indigenous chicken of Bangalore Division of Karnataka that the albumen index recorded was 0.077±0.003, 0.068±0.003 and 0.066±0.002 for Ramanagar, Chikkaballapur and Bangalore Rural District, respectively. Gopinath (2013) [3] notified lower values in indigenous chicken of Mysore Division of Karnataka that the albumen index ranged from 0.034±0.003 in Chamarajanagar District to 0.046±0.002 in Mandya District and there were significant differences among the Districts. Veerannagowda, (2020) [12] summarized that the albumen index recorded were 0.06±0.00, 0.07±0.00 and 0.07±0.00 in Bijapur, Belgaum and Dharawad District, respectively.

4.8 Yolk index

The mean of albumen index recorded from all the five

Districts of the Mysore Division was 0.14±0.00. The yolk index of Chikmagalur showed a lower value in the yolk index when compared with other Districts. The statistical analysis revealed a non-significant ($P \geq 0.05$) difference in yolk index among all the five different Districts. The results of the present study are in agreement with that of Rajakumar (2013) [9, 11] who disclose that in the indigenous chicken of Bangalore Division of Karnataka that the eggs showed yolk index values of 0.39±0.003, 0.38±0.015 and 0.35±0.005 in Bangalore Rural District, Chikkaballapur and Ramanagar District respectively. Gopinath (2013) [3] also wrote that in the indigenous chicken of Mysore Division of Karnataka that the yolk index ranged from 0.283±0.004 in Mandya District to 0.339±0.006 in Chamarajanagar District and there was a significant difference observed between Chamarajanagar District from that of Mysore and Madya District. Veerannagowda, (2020) [12] acknowledges that the yolk index recorded was 0.34±0.00, 0.36±0.01 and 0.38±0.00 in the eggs of Bijapur, Belgaum and Dharawad District, respectively.

4.9 Haugh unit score

The mean Haugh score unit recorded from all the five Districts of Mysore Division was 77.12±0.74. The statistical

analysis revealed a non-significant ($P \geq 0.05$) difference in Haugh unit score among all the five different Districts. The results of the present study are in agreement with that of Rajakumar (2013) ^[9, 11] reported that in indigenous chicken of the Bangalore Division of Karnataka the HUS value reported was 77.30 ± 1.52 , 76.70 ± 1.06 and 75.60 ± 0.60 in Ramanagar, Chikkaballapur and Bangalore Rural District, respectively. Gopinath (2013) ^[3] reported lower values in indigenous chickens of Mysore Division of Karnataka the HUS value ranged from 67.50 ± 1.40 to 70.40 ± 0.76 . Veerannagowda, (2020) ^[12] enumerated that the HUS value in the present study was 77.70 ± 0.88 ; 78.20 ± 0.92 and 79.30 ± 0.40 in Bijapur, Belgaum and Dharawad, respectively.

4.10 Incubation and hatchability results of indigenous chicken (field eggs)

4.11 Fertility

In the present study, the mean fertility recorded from all the five Districts of the Mysore Division was 61.48. These values are compared to the findings of Gopinath (2013) ^[3] also reported a lower fertility percentage in the eggs indigenous chicken of Mysore Division of Karnataka the values were 61.34 per cent. Rajakumar (2013) ^[9, 11] described higher fertility in indigenous chickens of Bangalore Division of Karnataka the value ranged from 73.33 to 78.79 per cent. Veerannagowda, (2020) ^[12] revealed that the per cent fertility recorded was higher than the present study showed the fertility in his study was 81.57, 80.31 and 78.35 in the eggs of Bijapur, Belgaum and Dharawad, respectively.

4.12 Hatchability on total egg set

The mean hatchability per cent on the total egg set basis recorded from all the five Districts of the Mysore Division was 46.90. Rajakumar (2013) ^[9, 11] reported that in the indigenous chicken of Bangalore Division of Karnataka that the percentage of hatchability on the total egg set ranged from 49.82 to 56.70. Rajakumar *et al.* (2012) ^[10] reported no significant ($P \leq 0.05$) differences between the Districts in the Bangalore Division of Karnataka. Gopinath (2013) ^[3] also disclose in indigenous chicken of Mysore Division that the value ranged from 50.75 to 52.00 per cent on total egg set. Veerannagowda, (2020) ^[12] described higher hatchability on total egg set ranging from 56.28 per cent in Bijapur to 58.23 per cent in Dharawad District and 64.3 per cent in Belgaum District eggs.

4.13 Hatchability on fertile egg set

The mean hatchability per cent on fertile egg set basis recorded from all the five Districts of Mysore Division was 76.29. Similar findings were reported by Rajakumar (2013) ^[9, 11] in the indigenous chicken of Bangalore Division of Karnataka which ranged from 63.23 to 73.77 per cent. Rajakumar *et al.* (2012) ^[10] enumerated non-significant ($P \leq 0.05$) differences between the Districts in the Bangalore Division of Karnataka. Gopinath (2013) ^[3] reported that in the indigenous chicken of Mysore Division of Karnataka, the value ranged from 71.50 to a higher value of 83.01%. Veerannagowda, (2020) ^[12] admit that the percentage of hatchability on fertile egg sets was 68.99 per cent in Bijapur followed by 74.32 per cent in Dharawad and 80.06 per cent in Belgaum District eggs.

Table 3: Percentage of Fertility and Hatchability (%) on total egg set and fertile egg set of indigenous chicken of Mysore division

| District | Fertility and Hatchability (%) | | |
|------------------|--------------------------------|---------------------|---------------------|
| | Fertility | Hatchability on TES | Hatchability on FES |
| Hassan | 60.30 | 42.72 | 70.85 |
| Kodagu | 69.72 | 44.78 | 64.22 |
| Chickmagalur | 57.58 | 42.78 | 74.29 |
| Udupi | 55.06 | 51.60 | 93.72 |
| Dakshina Kannada | 65.14 | 55.53 | 85.24 |
| Overall mean | 61.48 | 46.90 | 76.29 |

5. Conclusion

The external and internal egg quality traits of indigenous chicken of Mysore division reared under field conditions, the birds of Udupi district had better egg quality traits in terms of egg weight and shell weight, whereas the other parameters like albumen Index, yolk index, shape index and Haugh unit score showed no significant differences among the birds of Mysore division.

6. References

1. Aberra Melesse. Significance of scavenging chicken production in the rural community of Africa for enhanced food security. *World's Poultry Science Journal*. 2014;70:593-606.
2. Fisseha Moges, Aberra Melesse, Taddesse Dessie. Assessment of village chicken production system and evaluation of the productive and reproductive performances of local chicken ecotype in Bure district, North West Ethiopia. *African Journal of Agricultural Resource*. 2010;5(13):1739-1748.
3. Gopinath CR. Characterization and performance evaluation of indigenous chicken in the Mysore division of Karnataka state. Doctoral thesis submitted to the Karnataka Veterinary Animal and Fisheries Sciences University, Bidar, Karnataka, India, 2013.
4. Gopinath CR, Narasimha Murthy, HN. and Rajakumar Nagarahalli. Comparative study of egg quality traits in indigenous chicken. In the Proceedings of National conference on Native chicken production: challenges and opportunities on 4th -5th September, held at TANUVAS. 2014; Chennai, 2014, 216.
5. Kirmizibayrak T, Aksoy AR, Tilki M. Egg weight, shape index and hatching weight and interrelationships among these traits in native Turkish geese with different colored feathers. *Turk J Vet Anim Sci*. 2005;29:353-357.
6. Lambio AL. Artificial insemination in poultry breeding in the Philippines. *Animal Production Technology Journal*. 1990;5:18-23.
7. Nandi S, Sharma K, Pawan Kumar, Nandi D. Poultry farming: A rapidly growing profitable business. *Poultry Line*. 2007;7(12):19-20.
8. Panda AK, Raju MVLN, Rama Rao SV. Poultry Production in India: Opportunities and Challenges Ahead. *Poultry Line*. 2008;8(1):11-14.
9. Rajakumar Nagarahalli. Characterization and performance evaluation of indigenous chicken in the Bangalore division of Karnataka State, Ph.D. thesis submitted to Karnataka Veterinary Animal and Fisheries

- Sciences University, Bidar, 2013.
10. Rajakumar Nagarahalli, Narasimha Murthy HN, Gopinath CR, Veeregowda BM. Egg quality traits, fertility and hatchability performance of indigenous chicken reared under the intensive system. In the proceedings of XXIX IPSACON. Hyderabad, 2012, 175-176.
 11. Rajakumar. Characterization and performance evaluation of indigenous chicken in the Bangalore division of Karnataka. Doctoral thesis submitted to the Karnataka Veterinary Animal and Fisheries Sciences University, Bidar, Karnataka, India, 2013.
 12. Veeranna Gowda, BG. Characterization and performance evaluation of indigenous chicken in the Belgaum division of Karnataka State Ph.D. thesis submitted to Karnataka Veterinary Animal and Fisheries Sciences University, Bidar, 2020.