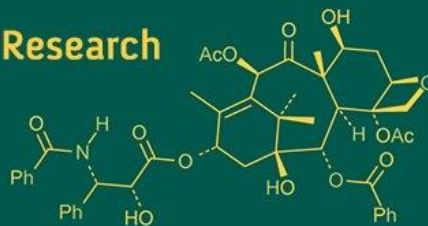
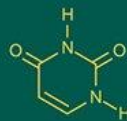
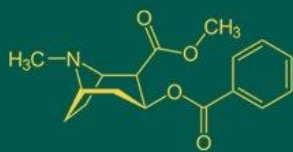


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Egg production performance and external egg quality of Desi chickens in Bidar district of Karnataka

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Abstract

Present study aimed to evaluate the production performance and external egg quality traits of Desi chickens in Bidar district of Karnataka. A total of 100 grower-stage birds were sourced from nearby villages within the district. These desi chickens were reared under intensive system in cage with all standard managerial practices followed. In the present study the recorded age at sexual maturity of desi chicken in Bidar district in cage rearing system was 156.57 ± 2.09 days and total egg production up to 52 week was represented as HHEP (Hen house egg production) of desi chicken was 59.31 ± 11.49 eggs. The external egg quality traits of desi chicken for egg weight (g), shape index (%), shell weight (g), shell thickness (mm) and shell ratio (%) of desi chicken at 22nd week was 32.50 ± 0.28 , 76.49 ± 0.71 , 4.70 ± 0.10 , 0.417 ± 0.013 and 14.45 ± 0.25 , at 34th week was 38.87 ± 0.36 , 74.17 ± 0.46 , 5.40 ± 0.09 , 0.396 ± 0.007 and 13.90 ± 0.20 , at 42nd week was 41.23 ± 0.24 , 73.72 ± 0.46 , 5.63 ± 0.11 , 0.369 ± 0.004 and 13.66 ± 0.27 and at 52nd week was 44.73 ± 0.35 g, 72.93 ± 0.55 (%), 5.97 ± 0.08 g, 0.365 ± 0.008 mm and 13.35 ± 0.17 %, respectively.

Keywords: Desi chickens, external quality, egg parameters, egg production

Introduction

Desi chickens, valued for their resilience, adaptability, and unique flavor of eggs and meat, form an integral part of traditional poultry farming in India. They not only contribute to the livelihoods of rural households but also play a key role in meeting the growing demand for naturally produced, nutrient-rich eggs. Their ability to thrive under low-input systems makes them especially important in regions where modern poultry farming is less feasible. In recent years, consumer preference has increasingly shifted towards desi eggs due to their perceived superior taste, health benefits, and cultural significance. Karnataka has a total poultry population of 59.5 million, reflecting an 11.33% increase over previous censuses (DADF, 2019) [2]. Backyard poultry accounts for 10.98 million birds, including 9.58 million desi and 1.39 million improved backyard birds. In Bidar district, the poultry population is 7,34,275, with Bidar taluka contributing about 35,118 birds (DDAH & VS, Bidar). Given the rising consumer preference for high-quality desi eggs, the present study was undertaken to evaluate the egg production performance and external egg quality parameters of desi chickens in Bidar district under farm conditions, aiming to enhance breed performance under field conditions.

Materials and Methods

The present study was conducted on desi chickens in Bidar district, Karnataka. A flock of 100 grower-stage birds was procured from nearby villages and reared under a cage system, following standard feeding and management practices. Age at sexual maturity, daily egg production, and external egg quality parameters were recorded at 22, 34, 42, and 52 weeks of age.

The experiment was carried out at the Department of Livestock Production and Management, Veterinary College, Bidar, under standard management conditions. Eggs were evaluated individually for quality traits. Egg weight was measured using a precision electronic balance, while egg length and width were determined with a Vernier caliper (mm). Data obtained were analyzed using one-way ANOVA followed by Tukey's multiple comparison post-test

to compare means, employing GraphPad Prism software (version 5.0).

External egg quality traits: Egg weight (g): With the use of an electronic balance, the egg's weight was calculated in grams (g) with 0.1g accuracy. Based on the individual egg weight of thirty randomly selected eggs from each specified week, the average egg weight was calculated.

Egg Shape Index: Using digital Vernier calipers with 0.1 mm accuracy, the largest length and widest breadth of each egg were measured in millimeters (mm). By dividing the maximum width by maximum length of the egg and multiplying the result by 100.

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

Shell weight (g): By using the electronic weighing balance with 0.1g accuracy, the weight of each egg shell was determined in grams (g).

Shell thickness (mm): By using the screw gauge shell thickness was measured in millimeters (mm). The average value of three measurements (wide end, narrow end and middle) was calculated to represent the thickness of the shell.

Shell ratio (%): Shell ratio is calculated by shell weight divided by egg weight multiplying the result by 100, the shell weight and egg weight are given in grams.

$$\text{Shell ratio} = \frac{\text{Shell weight (g)}}{\text{Egg weight (g)}} \times 100$$

Results and Discussion

Egg Production

The egg production performance of desi chicken in Bidar district was evaluated up to 52 weeks of age, considering hen housed egg production (HHEP). The average HHEP recorded was 59.31 ± 11.49 eggs per bird. This level of productivity is consistent with earlier findings reported by Gopinath (2013) [4] in indigenous chickens of Mysore Division (52.53 ± 5.13 eggs), Sankhyan and Thakur (2016) [8] in indigenous chicken (57.58 eggs at 52 weeks), and Veeranna Gowda *et al.*, (2020) [10] in indigenous chickens of Belgaum Division (57.86 ± 1.92 eggs).

The slightly higher productivity observed in the present study may be associated with improved nutrition, intensive cage rearing, and better health management. The desi chickens in this study also exhibited a lower age at sexual maturity, which likely contributed to higher overall egg output within the observation period.

Age at Sexual Maturity (ASM)

The average age at sexual maturity was 156.57 ± 2.09 days (22.36 weeks). This is in close agreement with reports by Faruque *et al.*, (2010) [3] in native chickens of Bangladesh—Hilly (22.17 weeks), Naked Neck (21.73 weeks), and Non-descript desi (22.44 weeks); Rajat Thakur (2019) [6] in Kadaknath; Vinothraj *et al.*, (2019) [12] in Tanuvas Aseel (155 days); Chitra (2021) [1] in Tanuvas Aseel (159 ± 0.24 days); and Vidyasagar *et al.*, (2022) [11] in desi chickens.

The slightly earlier maturity in the present flock compared to other Indian native chickens may be due to:

- **Balanced diet:** Adequate protein, minerals, and vitamins accelerate growth and reproductive development.
- **Restricted movement:** Cage rearing reduces energy loss, diverting nutrients toward egg production.
- **Environmental control:** Optimal temperature, lighting, and reduced stress stimulate hormonal activity.
- **Genetic predisposition:** Some indigenous populations mature faster when reared under improved management.

External Egg Quality Traits

1. Egg Weight

There were significant ($p \leq 0.05$) differences in egg weights among each week under study. There was an increasing trend in egg weights with the increment in age, similar trend was reported by Gopinath (2013) [4] in indigenous chicken of Mysore division, Rajakumar (2013) [5] in indigenous chicken of Bangalore division and Sudhir Naik (2021) [9] in indigenous chickens of Gulbarga district. As age progressed, egg weights increased, demonstrating a positive relationship between age and egg weight. Diet composition, feeding schedule and local environmental conditions could all contribute to the variance in egg weight.

2. Egg Length and Width

Egg length increased from 44.55 ± 0.38 mm (22 weeks) to 53.73 ± 0.42 mm (52 weeks), while egg width increased from 34.04 ± 0.30 mm to 39.12 ± 0.11 mm over the same period. Both parameters followed a similar growth trend to egg weight, indicating proportional enlargement of the egg's longitudinal and transverse dimensions with age.

3. Shape Index

The shape index at 22nd week of age was significantly ($p \leq 0.05$) highest when compared to the shape index at 34th, 42nd, 52nd weeks of age. There was a decreasing trend observed in shape index with the increasing in age, similar trend was reported by Rajakumar (2013) [5] in indigenous chickens of Bangalore division and Sudhir Naik (2021) [9] in indigenous chickens of Gulbarga division. In contrast, shape index of present findings observed by Veeranna Gowda (2020) [10] in indigenous chickens of Belgaum division. Since egg length and the egg width increase with age, the shape index decreases because egg size increases with age. The high shape index value observed suggests improved egg uniformity, which is critical for optimal hatchability and healthy chick production.

4. Shell Weight

Shell weight increased from 4.70 ± 0.10 g at 22 weeks to 5.97 ± 0.08 g at 52 weeks, showing a positive correlation with egg weight. Similar trends were reported by Rajkumar *et al.*, (2009) [7], Gopinath (2013) [4], and Sudhir Naik (2021) [9]. The increase in shell weight is likely due to larger egg size in older hens and efficient calcium metabolism under supplemented feeding.

5. Shell Thickness

Shell thickness decreased slightly with age, from 0.417 ± 0.013 mm at 22 weeks to 0.365 ± 0.008 mm at 52 weeks. A similar age-related decline is well documented, as the same amount of calcium carbonate is distributed over a larger eggshell surface area in bigger eggs. The consistent

calcium supplementation in the diet likely maintained adequate shell strength despite this reduction.

6. Shell Thickness without Membrane

Values ranged from 0.339 ± 0.007 mm at 22 weeks to 0.323 ± 0.005 mm at 52 weeks, showing minimal variation. This suggests that the major decline in total shell thickness is due to the membrane component rather than the calcified portion alone.

7. Shell Ratio

Shell ratio (percentage of shell weight to total egg weight) decreased from $14.45 \pm 0.25\%$ at 22 weeks to $13.35 \pm 0.17\%$ at 52 weeks, with significant differences ($p \leq 0.05$) between the youngest and oldest age groups. The decline is primarily due to the faster increase in egg weight compared to shell weight with advancing age. Similar trends were observed by Gopinath (2013) [4] and Sudhir Naik (2021) [9]. A gradual reduction in shell ratio with age is typical in poultry and does not necessarily indicate reduced shell quality if thickness and mineral content remain within optimal limits.

Overall study demonstrates that desi chickens of Bidar district, when reared intensively under a cage system with balanced nutrition, achieve earlier sexual maturity and maintain good external egg quality traits across the laying cycle. While egg production levels remain modest compared to commercial layers, the quality of eggs—especially shell strength and traditional market preference—makes these birds a valuable asset for sustainable rural poultry production.

Conclusion

The present study on desi chickens of Bidar district under intensive cage-rearing conditions revealed significant ($p \leq 0.05$) differences in key production and external egg quality traits across different age groups. Egg weight, shell weight, and overall egg size showed a consistent increasing trend with advancing age, whereas shape index and shell thickness exhibited a gradual decline, which is a normal physiological pattern in laying hens.

The relatively early age at sexual maturity (156.57 ± 2.09 days) and moderate hen housed egg production (59.31 ± 11.49 eggs up to 52 weeks) highlight the productive potential of this native germplasm when reared under improved feeding and management conditions.

Since no prior documented information exists for this specific Bidar district population, the findings provide a valuable baseline for its characterization. These data can serve as a foundation for genetic evaluation, selection, and future breed improvement programs aimed at developing improved varieties while preserving the adaptive traits and market-preferred egg qualities of these indigenous chickens.

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