

RESEARCH ARTICLE

Performance assessment of Khaki Campbell, Kuttanad, Pati, and Indian runner ducks in field conditions of Assam

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Abstract

The research work was conducted to evaluate the performance in respect to production and reproduction of different duck breeds reared under the traditional backyard production system in Assam. Data pertaining to 400 ducks covering four different breeds/genetic groups, viz. Khaki Campbell, Kuttanad, Pati, and Indian Runner, which were maintained at farmers' households under a demonstration programme of Krishi Vigyan Kendra (KVK), Baksa, Assam Agricultural University, were utilized. The study period was one year. Eight farmers were selected, and an individual farmer was provided with 25 day-old ducklings for rearing under backyard conditions. A highly significant ($p < 0.01$) effect of genetic group was observed on body weight at different ages (day-old, 5th, 10th, 15th, 20th and 25th weeks), age at first egg, annual egg production, and egg weight among the studied duck breeds. The body weight (g) pertaining to 25 weeks of age was averaged to be 1485.10 ± 14.41 , 1639.48 ± 10.98 , 1282.70 ± 10.01 , and 2026.96 ± 3.37 for Khaki Campbell, Kuttanad, Pati, and Indian Runner ducks, respectively. The age at first egg of Khaki Campbell, Kuttanad, Pati, and Indian Runner ducks averaged to be 170.99 ± 0.68 , 162.40 ± 0.55 , 209.99 ± 1.73 , and 154.27 ± 1.15 days. The average annual egg production (numbers) was 254.46 ± 2.40 in Khaki Campbell, followed by 195.02 ± 1.71 in Kuttanad, 193.03 ± 1.65 in Indian Runner, and 69.32 ± 0.27 in Pati ducks. The corresponding average egg weights were 62.26 ± 0.46 , 67.68 ± 0.31 , 59.28 ± 0.27 , and 69.46 ± 0.53 g, respectively. The results revealed considerable variability among the studied duck breeds, indicating the potential for selecting suitable breeds for the agro-climatic conditions of Assam to enhance egg production and overall productivity. The findings provide useful field-level evidence for farmers, extension agencies, and development programmes to promote appropriate breeds for sustainable backyard duck farming and improved livelihood and nutritional security of rural households in Assam.

Keywords: Ducks, Egg production, Body weight, Age at first egg, Egg weight

Introduction

Duck farming plays a vital role in the rural economy of Assam. It serves as a potential path to income and employment for the populace. Ducks are excellently adapted to the agro-climatic conditions of the region and are commonly reared under backyard systems due to their ability to thrive on locally available feed resources. Duck eggs and meat are widely consumed in the state, and the demand for duck eggs is further supported by their use in the bakery industry.

Evaluation of productive and reproductive traits is essential for assessing the performance and economic viability of different duck breeds. Such information is important for identifying suitable breeds for specific production systems and agro-climatic conditions. However, scientific data on the performance of different duck breeds reared under backyard conditions in Assam are limited.

Therefore, systematic evaluation of important economic traits of ducks under field conditions is necessary for identifying suitable genetic groups and for developing appropriate breeding and management strategies to enhance productivity. Considering the facts, the current

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study was carried out to evaluate the performance of Khaki Campbell, Kuttanad, Pati, and Indian Runner ducks reared under backyard conditions in the prevailing climatic conditions of Assam.

Materials and Methods

The research work was conducted using data from 400 ducks representing four genetic groups/breeds, namely Khaki Campbell, Kuttanad, Pati, and Indian Runner, reared under backyard conditions at farmers' households under the Demonstration Programme of Krishi Vigyan Kendra (KVK), Baksa, Assam Agricultural University. The study period comprised one year. Eight farmers from the Baksa district of Assam were selected for the study. 100 day-old ducklings of each breed (Khaki Campbell, Kuttanad, Pati, and Indian Runner) were distributed among the eight farmers. Each farmer received 25 ducklings consisting of all four genetic groups, thereby maintaining uniform representation of breeds across farmers. The sex ratio was maintained at 1:1 (male:female) at the time of distribution. Thus, each farmer received approximately 25 male and 25 female ducklings. Egg production traits such as age at first egg, annual egg production, and egg weight were recorded only from the female ducks that survived up to the laying stage. The birds were reared under a backyard production system, following the traditional management practices adopted by farmers in the region. Ducks were allowed to scavenge freely for natural feed resources such as insects, aquatic plants, and kitchen waste. In addition, farmers supplemented the birds with commercial concentrate feed. The feeding regime consisted of approximately 40–50 g starter feed per bird per day during 0–8 weeks of age, 50–70 g grower ration during 9–20 weeks, and 70–100 g finisher or layer ration

during the adult stage. Clean drinking water and basic night shelter were provided by the farmers. Data on growth and production traits were collected through regular personal visits to the farmers' households and by using standard recording sheets supplied to the farmers. Body weights of birds were recorded using a weighing balance at day-old (0 day) and subsequently at 5-week intervals extending till 25 weeks of age. Age at first egg was recorded in days for individual female birds. The total number of eggs laid by each duck over a period of one year is equivalent to the average annual egg production. Egg weight was recorded in grams using a digital weighing balance, and individual eggs were weighed separately. The overall mortality from day old to 25 weeks of age was 8.75% across all breeds under backyard conditions.

Analysis of Variance (ANOVA) following the standard statistical procedures described by Snedecor and Cochran (1989) was utilised to find out the effect of genetic group on growth and production traits. The following statistical model carried out the analysis

$$Y_{ij} = \mu + G_i + e_{ij}$$

where

Y_{ij} = observation on the j th individual of the i th genetic group,

μ = total mean,

G_i = effect of the i th genetic group ($i = 1, 2, 3, 4$),

e_{ij} = random error associated with each observation.

Table 1: Mean $\pm$ SE of body weight at different ages and economic traits of different duck breeds under field conditions, along with genetic group-wise comparison using Tukey's HSD test

Traits	Mean $\pm$ SE			
	Khaki Campbell	Kuttanad	Pati	Indian Runner
Average body weight at 1 day(g)	43.16 ^a $\pm$ 0.57 (100)	39.29 ^b $\pm$ 0.44 (100)	39.78 ^b $\pm$ 0.53 (100)	35.84 ^c $\pm$ 0.43 (100)
Average body weight at 5 week(g)	336.09 ^a $\pm$ 3.72 (98)	340.41 ^a $\pm$ 2.06 (96)	222.93 ^b $\pm$ 2.08 (96)	251.31 ^c $\pm$ 2.36 (98)
Average body weight at 10 week(g)	522.26 ^a $\pm$ 2.51 (97)	853.91 ^b $\pm$ 5.60 (95)	551.45 ^c $\pm$ 3.93 (95)	804.05 ^d $\pm$ 2.53 (96)
Average body weight at 15 week(g)	829.58 ^a $\pm$ 3.89 (96)	1139.33 ^b $\pm$ 8.71 (95)	689.66 ^c $\pm$ 4.15 (94)	949.94 ^d $\pm$ 4.69 (93)
Average body weight at 20 weeks (g)	1282.24 ^a $\pm$ 5.76 (95)	1429.96 ^b $\pm$ 9.27 (92)	1118.91 ^c $\pm$ 7.83 (93)	1399.33 ^d $\pm$ 6.92 (92)
Average body weight at 25 weeks (g)	1485.10 ^a $\pm$ 14.41 (93)	1639.48 ^b $\pm$ 10.98 (89)	1282.70 ^c $\pm$ 10.01 (93)	2026.96 ^d $\pm$ 3.37 (90)
Average age at first egg (days)	170.99 ^a $\pm$ 0.68 (47)	162.40 ^b $\pm$ 0.55 (46)	209.99 ^c $\pm$ 1.73 (47)	154.27 ^d $\pm$ 1.15 (45)
Average annual egg production(no)	254.46 ^a $\pm$ 2.40 (47)	195.02 ^b $\pm$ 1.71 (44)	69.32 ^c $\pm$ 0.27 (45)	193.03 ^b $\pm$ 1.65 (43)
Average Egg weight (g)	62.26 ^a $\pm$ 0.46 (50)	67.68 ^b $\pm$ 0.31 (50)	59.28 ^c $\pm$ 0.27 (50)	69.46 ^b $\pm$ 0.53 (50)

Sub-class means with different superscripts differed significantly ($p < 0.05$). Values within brackets are the number of observations.

Mean $\pm$ standard error (SE) was used to express the result. Tukey's Honestly Significant Difference (HSD) test was carried out whenever significant differences among means were observed ($p < 0.05$) and for multiple comparisons among means. Standard statistical software was utilised for statistical analyses.

Results and Discussion

Table 1 represents the means with standard errors (SE) of bodyweight at different ages of growth *viz.* day old, 5th week, 10th week, 15th week, 20th week, 25th week, average age at first egg, average annual egg production and average egg weight of Khaki Campbell, Kuttanad, Pati and Indian Runner ducks and analysis of variance for factor (genetic group) affecting body weight at different ages, average age at first egg, average annual egg production and average egg weight and results of Tukey's HSD (honestly significant difference) test are presented in Table 2, 3 and 4 respectively.

Body weight

The average bodyweight at day old, 5th week, 10th week, 15th week, 20th week, and 25th week of Khaki Campbell ducks were found to be 43.16 ± 0.57 , 336.09 ± 3.72 , 522.26 ± 2.51 , 829.58 ± 3.89 , 1282.24 ± 5.76 and 1485.10 ± 14.41 g, respectively. In the present study the average bodyweight at day old, 5th, 10th, 15th, 20th, and 25th week of Kuttanad ducks were found to be 39.29 ± 0.44 , 340.41 ± 2.06 , 853.91 ± 5.60 , 1139.33 ± 8.71 , 1429.96 ± 9.27 and 1639.48 ± 10.98 g, respectively. The corresponding values in Pati ducks of Assam were found to be 39.78 ± 0.53 , 222.93 ± 2.08 , 551.45 ± 3.93 , 689.66 ± 4.15 , 1118.91 ± 7.83 and 1282.70 ± 10.01 g, respectively. Under the field condition of Assam, the average bodyweight at day old, 5th, 10th, 15th, 20th, and 25th week of Indian Runner ducks were recorded as 35.84 ± 0.43 , 251.31 ± 2.36 , 804.05 ± 2.53 , 949.94 ± 4.69 , 1399.33 ± 6.92 and 2026.96 ± 3.37 g,

respectively. Sarmah *et al.* (2024) reported average body weight at 5th, 10th, 20th and 30th week of age of Khaki Campbell ducks as 0.42 ± 7.31 , 1.33 ± 6.73 , 1.56 ± 9.87 and 1.82 ± 8.40 Kg, respectively. Padhi *et al.* (2009) obtained average body weight at 10th and 20th weeks of age of Khaki Campbell ducks as 1370.80 ± 8.50 and 1540.74 ± 11.87 g respectively and corresponding body weight of Desi ducks of Orissa were 1184.90 ± 6.64 and 1515.27 ± 11.79 g, respectively. Khaki Campbell ducks of Odisha have the average body weight at birth and at the 20th week of age as 39.02 ± 0.02 and 1276.74 ± 25.44 g (Giri *et al.*, 2014). El-Deghadi *et al.* (2022) reported average body weight at 16th and 20th weeks of age of Khaki Campbell ducks in Egypt as 2148.00 ± 1.78 and 2218.00 ± 1.78 g. Kuttanad ducks of Kera had an average body weight at the 10th week of age of 1262.22 ± 18.53 g, as reported by Sahana *et al.* (2024). A highly significant ($p < 0.01$) effect of genetic group on body weight at all ages was recorded (Analysis of variance). Among the four breeds, Indian Runner ducks recorded the highest body weight at 25 weeks, whereas Pati ducks showed the lowest body weight under backyard rearing conditions in Assam. The comparatively higher body weight observed in Indian Runner ducks in the current study may be credited to genetic potential, better adaptability to scavenging conditions, and efficient utilization of available feed resources under backyard management. On the other hand, the lower body weight observed in Pati ducks could be due to their indigenous genetic makeup and adaptation to low-input production systems.

Average age at first egg (days)

A highly significant ($p < 0.01$) effect of genetic group was witnessed through ANOVA on average age at first egg of Khaki Campbell, Kuttanad, Pati and Indian Runner ducks under field conditions of Assam. Pati duck of Assam took more time in laying the first egg (209.99 ± 1.73 days) and

Table 2: Analysis of variance for body weight (g) at 0 day, 5 weeks and 10 weeks among different genetic groups of ducks

Source of variation	Body weight at								
	0 day			5 weeks			10 weeks		
	df	MSS	F	df	MSS	F	df	MSS	F
Genetic group	3	856.39	34.19**	3	332938.77	466.40**	3	2698642.74	1822.43**
Error	396	25.04		384	713.83		379	1480.79	

**P(<0.01); *P(<0.05)

Table 3: Analysis of variance for body weight (g) at 15, 20, and 25 weeks among different genetic groups of ducks

Source of variation	Body weight at								
	15 weeks			20 weeks			25 weeks		
	df	MSS	F	df	MSS	F	df	MSS	F
Genetic group	3	3278041.85	1007.51**	3	1722667.13	304.07**	3	9168228.88	602.55**
Error	374	3253.57		368	5665.22		361	15215.55	

**P(<0.01); *P(<0.05)

Table 4: Analysis of variance for Average age at first egg, Average annual egg production and average egg weight of different genetic groups of duck

Source of variation	Average age at first egg			Average annual egg production			Average egg weight		
	df	MSS	F	df	MSS	F	df	MSS	F
Genetic group	3	60916.41	459.53**	3	605768.26	2102.48**	3	1114.40	66.37**
Error	181	132.55		175	288.11		196	16.79	

** $p(<0.01)$; * $p(<0.05)$

comparatively less time was taken by Indian Runner ducks (154.27 ± 1.15 days (Tukey's HSD /honestly significant difference). 170.99 ± 0.68 and 162.40 ± 0.55 days were found to be the average age at first egg in Khaki Campbell and Kuttanad ducks. Earlier maturity in Indian Runner ducks may be attributed to their genetic predisposition for early laying and higher productivity, whereas indigenous Pati ducks generally exhibit slower growth and later maturity under backyard conditions. The average age at first egg was 152.95 ± 3.96 days in Khaki Campbell ducks in Odisha (Giri *et al.*, 2014). Sankaralingam (2017) observed a range of 126 to 140 days as the age at first egg of Kuttanad ducks of Kerala under field conditions. Dutta (2022) reported that the age at first egg for Pati and Khaki Campbell ducks of Marigaon district of Assam ranged from 210 to 240 and 150 to 180 days, respectively, suggesting a wider range in age at first egg, reflecting the variability commonly observed in indigenous populations. Sarmah *et al.* (2024) stated that the average age at first egg of Khaki Campbell ducks is 163.00 ± 4.30 days. Pati ducks of Assam revealed the age at first egg laying as 240 days (Dutta *et al.*, 2025).

Average annual egg production (no.s)

Khaki Campbell, Kuttanad, Pati and Indian Runner ducks under field conditions of Assam have average annual egg production (no.s) of 254.46 ± 2.40 , 195.02 ± 1.71 , 69.32 ± 0.27 and 193.03 ± 1.65 , respectively. A highly significant ($p < 0.01$) effect of genetic group on average annual egg production (ANOVA) was revealed in Khaki Campbell, Kuttanad, Pati and Indian runner ducks under field conditions of Assam. Among the breeds studied, Khaki Campbell ducks exhibited the highest annual egg production, followed by Kuttanad and Indian Runner ducks, whereas Pati ducks showed comparatively lower egg production. Khaki Campbell ducks excel in egg production and have a well-established reputation as a high egg-producing breed. The comparatively lower egg production in Pati ducks may be due to their indigenous nature and adaptation primarily for dual-purpose or scavenging systems rather than intensive egg production. The Kuttanad ducks were reported to lay an average of 200 eggs per annum with an average egg weight of 70 g (Anonymous 2022). El-Deghadi *et al.* (2022) reported average number of eggs of Khaki Campbell ducks in Egypt was 53.90 ± 1.13 ; the variation may be attributed to differences in management systems, feeding regimes, and

environmental conditions. Dutta (2022) reported that the annual egg production of Pati and Khaki Campbell ducks of Assam was found to be in the range of 90–100 and 240–250 per duck, respectively.

Average egg weight (g)

Analysis of variance supported a highly significant ($p < 0.01$) effect of genetic group on average egg weight of Khaki Campbell, Kuttanad, Pati and Indian runner ducks under field conditions of Assam. As per the results of Tukey's HSD (honestly significant difference) test, the Indian Runner ducks laid heavier eggs (69.46 ± 0.53 g) and the Pati duck of Assam laid lighter eggs (59.28 ± 0.27 g). The relatively higher egg weight in Indian Runner and Kuttanad ducks may be associated with their genetic characteristics and better nutrient utilization. The average egg weight of Khaki Campbell and Kuttanad ducks was 62.26 ± 0.46 and 67.68 ± 0.31 g respectively. A lower value of egg weight (64.03 ± 1.01 g) compared to the present finding was reported in Farm fresh Kuttanad eggs by Harikrishnan and Ponnuvel (2012). The average egg weight of Khaki Campbell ducks in Odisha was reported to be 57.09 ± 0.04 g by Giri *et al.* (2014). A study conducted on the morphology, morphometry and certain egg quality traits of indigenous ducks of the North Eastern region of India by Phookan *et al.* (2018) and depicted the average egg weight (g) as 58.03 for Pati ducks of Assam. Nath *et al.* (2021) recorded the average egg weight as 54.57 ± 0.81 g in Pati ducks reared in Assam. El-Deghadi *et al.* (2022) average observed the egg weight of Khaki Campbell ducks in Egypt was 64.30 ± 0.38 g. Dutta *et al.* (2025) reported that the average egg weight was 60.5 g in Pati ducks of Assam. Overall, the results indicate considerable variability in growth and production traits among the studied duck breeds, suggesting that appropriate breed selection can play an important role in improving productivity under backyard farming systems in Assam.

Conclusion

The study indicated that the genetic group had a highly significant effect on growth, age at which the first egg was laid, and egg production traits of ducks reared under farmers' household conditions. Indian Runner ducks exhibited superior growth performance and early sexual maturity, while Khaki Campbell ducks recorded the highest annual egg production. The results highlight the variability

among genetic groups and suggest that appropriate selection of duck breeds can enhance productivity under field conditions in Assam.

References

- Anonymous (2022). <http://www.keralabiodiversity.org/images/2019/brochures/poultry.pdf>
- Dutta, A. (2022). Analysis of duck farming systems in Morigaon district of Assam. M.V.Sc. thesis, Assam Agricultural University, Khanapara, Assam, India.
- Dutta, D., Dutta, I.B., Kaushik, P., Bora, M., Deka, R.J., Bhattacharyya, B.N. and Kalita, K.B. (2025). Morphological characteristics of Pati duck. *Indian Journal of Animal Research*. 59(5): 880–884. <https://doi.org/10.18805/IJAR.B-4819>.
- El-Deghadi, A.S., Ali, W.A.H. and Gharib, M.G. (2022). Study for some body weight and egg traits in Domyati and Khaki Campbell ducks. *Open Journal of Agricultural Research*. 2(1): 29–36. <https://doi.org/10.31586/ojar.2022.260>.
- Giri, S.C., Sahoo, S.K., Karna, S.K., Saran, S., Sastry, K.V.H. and Kandi, N. (2014). Production performance of ducks under extensive system of management in tribal districts of Odisha. *Indian Journal of Poultry Science*. 49(1): 97–100.
- Harikrishnan, S. and Ponnuvel, P. (2012). A glance at internal and external qualities of Kuttanad, White Pekin and commercial duck eggs. *Indian Journal of Field Veterinary Science*. 7(4): 38–40.
- Nath, N.C., Sharma, P., Saikia, J. and Mahanta, J.D. (2021). Evaluation of some external and internal egg quality traits of Pati duck reared in Assam. *International Journal of Livestock Research*. 11(2): 162–164. <https://doi.org/10.5455/ijlr.20200901015943>.
- Padhi, M.K., Panda, B.K. and Sahoo, S.K. (2009). Comparative performance of Khaki Campbell, Desi ducks and their crossbreds. *Indian Veterinary Journal*. 86: 942–945.
- Phookan, A., Das, B., Das, A., Islam, R., Sharma, M., Bharali, K. and Basumatary, K. (2018). Morphology, morphometry and certain egg quality traits of indigenous ducks of North Eastern region of India. *International Journal of Chemical Studies*. 6(2): 3131–3133.
- Sahana, V.N., Abraham, B.L. and Chacko, B. (2024). Genetic characterization of growth and adaptive biometrics in Kuttanad ducks of Kerala. *Indian Journal of Poultry Science*. 59(2): 105–110.
- Sankaralingam, S. (2017). Prospects of duck farming in India. In: *Training Manual on Prospects of Diversified Poultry and its Impact in Enhancing the Rural Economy*. Centre for Advanced Faculty Training, Veterinary College and Research Institute, Namakkal, India. pp. 123–141.
- Sarmah, A., Barman, B., Das, B.K. and Hafiz, A. (2024). Production performance and economics of Khaki Campbell ducks in the backyard system of rearing at the NICRA-adopted village in Darrang district of Assam. *Indian Journal of Animal Production Management*. 40(4): 225–229.