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Performance and economic assessment of khaki Campbell ducks under backyard rearing in the NICRA village of Nalbari district, Assam

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Abstract

Backyard duck farming has emerged as a promising livelihood strategy for smallholder farmers in flood-prone areas. In this context, the present study evaluated the production performance and economic viability of Khaki Campbell ducks reared in a NICRA-adopted village of Nalbari district, Assam. The study examined production traits, including growth, egg production and survivability, together with economic indicators to assess the profitability and sustainability of the production system. Under the NICRA intervention, Khaki Campbell ducks adapted well to the backyard production system and exhibited satisfactory productive and economic performance. The mean body weight at 30 weeks of age was 1.86 ± 0.02 kg, while the average age at first egg was 161 ± 3.9 days. During the study period, the birds produced an average of 182.2 ± 5.1 eggs per duck, with an overall mortality rate of 13%. Economic assessment yielded a benefit-cost ratio of 2.54, demonstrating the profitability of the enterprise. These findings indicate that the intervention offers a sustainable and climate-resilient livelihood option for smallholder farmers in flood-prone regions. The favourable production and economic performance observed in the present study suggests that Khaki Campbell duck farming represents a feasible climate-resilient intervention for improving the livelihood and nutritional security of rural households in flood-prone areas.

Keywords: Khaki Campbell ducks, backyard rearing system, production performance, economic feasibility, Assam

Introduction

In the context of climate change and its growing impact on agricultural sustainability, the adoption of resilient livestock breeds within traditional farming systems has gained increasing attention. Among these, the Khaki Campbell duck has emerged as a valuable genetic resource due to its high adaptability and outstanding egg production potential. Developed in England during the early twentieth century, the Khaki Campbell is widely recognized for its prolific laying capacity, producing up to 300 eggs per bird annually (Holderread, 2001) ^[3]. In addition to its productivity, the breed is characterized by hardiness, efficient feed utilization, and relatively low management requirements. These attributes make Khaki Campbell ducks particularly suitable for backyard and smallholder farming systems, which are predominant in rural areas such as Assam, India.

Indian Council of Agricultural Research launched the National Innovations in Climate Resilient Agriculture (NICRA) project to strengthen the resilience of Indian agriculture against climate variability and extreme weather events. Assam, a northeastern state of India, is characterized by diverse agro-climatic conditions and a predominantly agriculture-based economy. Within the state, Nalbari is well known for its rich agricultural heritage and substantial involvement in livestock farming. However, the district is highly vulnerable to recurrent floods and other climate-related challenges that adversely affect agricultural productivity, rural livelihoods, and food security (Gogoi, 2016) ^[2]. In response to these vulnerabilities, the NICRA project has been implemented in villages of Nalbari to promote

climate-resilient agricultural practices and technologies. The initiative focuses on improving farmers' adaptive capacity through interventions such as water resource management, resilient crop varieties, improved livestock management, and sustainable farming practices (ICAR, 2010).

In the context of increasing climate variability and recurrent flood hazards, the integration of Khaki Campbell duck into backyard farming systems in NICRA villages may provide a viable strategy for enhancing livelihood security and climate resilience among rural households. Backyard duck rearing is a low-input enterprise that is well suited to local agro-climatic conditions and has the potential to generate supplementary income and nutritional support for small and marginal farmers. In addition, livestock-based interventions can contribute significantly to farm income diversification and help offset economic losses resulting from frequent crop failures caused by floods and other climate-related adversities. Therefore, the present study was conducted to assess the production performance and economic viability of Khaki Campbell duck rearing under backyard farming conditions in endorsed NICRA villages of Nalbari, with the objective of generating empirical evidence on its productivity and profitability as a sustainable and climate-resilient livelihood option.

The study evaluates key indicators of production performance, including egg production, growth performance, and survival rate of Khaki Campbell duck reared under backyard farming systems. In addition, the economic viability of the enterprise was assessed by analyzing major cost components such as feed, labour, and management expenses in relation to the returns obtained from the sale of eggs and ducks. The combined assessment of production and economic parameters was undertaken to provide a comprehensive understanding of the potential benefits and constraints associated with backyard Khaki Campbell duck rearing as a climate-resilient livelihood option.

Previous studies have reported that backyard poultry farming contributes significantly to household income, nutritional security, and livelihood sustainability in rural areas (Gogoi, 2016)^[2]. Among the various poultry species, Khaki Campbell duck is considered particularly suitable for backyard production systems due to its high egg-laying capacity, adaptability to local conditions, and relatively low maintenance requirements. The integration of Khaki Campbell ducks into existing farming systems is consistent with the objectives of the NICRA programme, which emphasizes the promotion of climate-resilient and sustainable agricultural practices. Consequently, the adoption of backyard duck rearing in NICRA of Nalbari district may enhance farm income diversification, improve livelihood security, and strengthen the resilience of farming households against climate-induced risks and recurrent flood-related losses.

Materials and Methods

Study Area: The present study was conducted in the NICRA-adopted flood-prone village of Nadala located in Nalbari district. The village was purposively selected owing to its active participation in the NICRA programme, which focuses on enhancing the resilience of agricultural systems to climate variability and extreme weather events. The study area is characterized by a humid subtropical climate with high rainfall and humidity, conditions that considerably influence agricultural and livestock production practices in the region.

Experimental Design: The production performance of Khaki

Campbell ducks reared under backyard farming systems was evaluated through a randomized controlled trial conducted in villages adopted under the NICRA programme. Twenty households were randomly selected for the study, and each household was provided with 25 ducklings, resulting in the distribution of a total of 500 ducklings among the beneficiaries. Prior to the initiation of the experiment, the selected farmers were trained in scientific duck rearing and management practices. The ducks were maintained under standardized backyard management conditions and the study was carried out over a period of 12 months to obtain comprehensive data on production and economic performance across different seasons.

Animal Husbandry: Fifteen-day-old Khaki Campbell duck ducklings were procured from a reputable hatchery and distributed among the selected farmers, with each participating household receiving 25 ducklings, resulting in a total sample size of 500 ducklings. The ducklings were reared using locally available resources to ensure the practicality and adaptability of the intervention for rural farming conditions. Housing was provided in simple sheds constructed from bamboo and thatch, which offered adequate protection from predators and adverse weather conditions during the initial rearing phase, after which the ducks were managed under a backyard production system.

Feeding and Management: The Khaki Campbell duck were provided with a balanced feeding regimen consisting of commercial duck feed supplemented with locally available grains and green fodder. Daily feed intake was systematically recorded, and clean drinking water was supplied *ad libitum* throughout the study period. Standard health management practices were followed, including vaccination against duck plague at six weeks of age and implementation of routine disease prevention measures. Regular health monitoring was carried out to detect any signs of illness and appropriate prophylactic and therapeutic interventions were administered as required.

Data Collection: Data on weekly body weight, feed intake, age at first egg, egg production, and number of eggs sold were systematically recorded throughout the study period. At the end of the 30th week, male ducks (drakes) were sold, while female ducks were retained for continued egg production. Upon completion of the study period (72 weeks), all remaining female ducks were sold, and a comprehensive economic analysis was carried out based on total costs and returns. The collected data were subjected to statistical analysis following the method described by Snedecor and Cochran (1995)^[10] to derive meaningful interpretations of the production and economic performance of the system.

Ethical Considerations

The study was conducted in accordance with established ethical guidelines for the use of animals in research, with due emphasis on ensuring the welfare of the experimental Khaki Campbell duck throughout the study period. Appropriate care and management practices were strictly followed to minimize stress and ensure optimal health and well-being of the birds. In addition, informed consent was obtained from all participating households prior to their inclusion in the study, ensuring voluntary participation and adherence to ethical research standards.

Results and Discussion

Production Performance of Khaki Campbell Ducks: The present study evaluated the production performance of Khaki Campbell ducks reared under the backyard production system in a NICRA-implemented village of Nalbari, Assam. Data on production performance is being showed in Table 1. The mean body weights of Khaki Campbell ducks at 5, 10, 20, and 30 weeks of age were recorded as 0.48 ± 0.08 , 1.37 ± 0.07 , 1.58 ± 0.10 and 1.86 ± 0.02 kg respectively. The observed growth pattern is in agreement with previous findings reported by Jones *et al.* (2018) [6], suggesting that Khaki Campbell ducks exhibit a relatively stable growth performance across diverse geographical and management conditions. The body weight recorded in the present study is also comparable to the findings of Bharali and Borah (2018) [1], who reported an average body weight of 1456.33 g in Khaki Campbell ducks and 1655.50 g in drakes at 25 weeks of age. The slightly higher body weight observed in the present study may be attributed to favourable environmental conditions and the availability of abundant scavenging feed resources, including aquatic weeds, insects, snails, and green forage, which likely enhanced nutrient intake and supported better growth under the backyard production system.

The average age at first egg of Khaki Campbell ducks was 161 ± 3.9 days, while the mean annual egg production was 182.2 ± 5.1 eggs per duck. These findings are consistent with earlier reports demonstrating the excellent laying performance of the Khaki Campbell breed under favourable management conditions (Holderread, 2001) [3]. Roy *et al.* (2017) [7] reported an average age at first egg of 172 days and an annual egg production of 193 eggs in Khaki Campbell ducks. Similarly, Bharali and Borah (2018) [1] observed that the age at first egg was 173.55 days in Khaki Campbell ducks and 245.45 days in Desi ducks, with corresponding annual egg production of 164 and 86 eggs, respectively. The comparatively earlier age at first egg and higher egg production recorded in the present study may be attributed to improved management practices, better nutritional status, and the availability of diverse natural scavenging feed resources in the study area, which collectively enhanced the productive performance of the birds under the backyard rearing system.

During the study period, a total of 32 ducks (13%) died, resulting in an overall mortality rate of 13%. The major causes of mortality were enteritis and coccidiosis, despite the adoption of recommended backyard management practices. The mortality rate observed in the present study is comparable to the findings of Roy *et al.* (2017) [7], who reported a 15% mortality rate in Khaki Campbell ducks reared under a backyard production system up to 18 months of age. The occurrence of mortality may be attributed to disease outbreaks and environmental stressors commonly encountered under backyard rearing conditions.

Economic Feasibility of Khaki Campbell Duck Farming: Economic analysis, incurred expenditure of Khaki Campbell farming and revenue generation from the sale of eggs and live ducks are being illustrated in the table 2.

The economic analysis demonstrated that Khaki Campbell duck farming under the backyard production system is a financially viable enterprise. The average annual net income generated per household was INR 16,130, exceeding the combined costs of feed, healthcare, and labour. These findings indicate that integrating Khaki Campbell ducks into existing farming systems can substantially enhance household income and strengthen the economic resilience of rural

households in Assam.

Feed was the major component of the production cost in the present study, accounting for the largest share of the total expenditure. During the study period, the ducks consumed a total of 2,650 kg of feed at a cost of INR 79,500. This finding is consistent with the observations of Singh *et al.* (2009) [8], who reported that feed is the primary determinant of production costs in livestock farming. Similarly, Jha and Chakrabarti (2017) [5] identified feed as the largest cost component in backyard Khaki Campbell duck farming. The economic viability of the enterprise was further influenced by factors such as household size, market prices of duck products and access to veterinary services. However, fluctuations in market prices and seasonal variations in demand posed challenges to sustained profitability. These findings highlight the importance of strategic planning, efficient feed management and market-oriented interventions to enhance profitability and ensure the long-term sustainability of small-scale Khaki Campbell duck farming in rural Assam.

The economic analysis of backyard Khaki Campbell duck farming revealed encouraging profitability. The total expenditure incurred for rearing 250 ducks was INR 104,200.00, while the ten participating households collectively generated a net income of INR 161,300.00 during the study period. The average cost of production per duck was estimated at INR 416.80, whereas the average net income per duck was INR 645.20. The benefit-cost (B:C) ratio was calculated to be 2.54, indicating the economic feasibility and profitability of the enterprise under backyard production conditions. These findings suggest that Khaki Campbell duck farming can serve as a viable income-generating activity for rural households. Comparable results were reported by Roy *et al.* (2017) [7], who also observed a higher benefit-cost ratio for Khaki Campbell ducks than for indigenous (desi) ducks reared under backyard production systems.

Table 1: Production Traits of Khaki Campbell Ducks

Sl. No.	Performance parameters	Values (mean $\pm$ SE)
1	Body weight at 5 weeks (kg)	0.48 ± 0.08
2	Body weight at 10 weeks (kg)	1.37 ± 0.07
3	Body weight at 20 weeks (kg)	1.58 ± 0.10
4	Body weight at 30 weeks (kg)	1.86 ± 0.02
5	Total egg production/brid	182.2 ± 5.1
6	Age of bird at first egg (in days)	161 ± 3.9
7	Mortality	13%

Table 2: Economic Analysis of Khaki Campbell Duck Rearing

Sl. No.	Particulars	Amount (Rs.)
1	Cost of 250 Khaki Campbell ducklings @ Rs. 90/- per duckling	22,500.00
	Cost of Medicine, supplements etc.	2,200.00
	Total feed consumed (Kg)	2650.00
	Cost of feed @ Rs. 30/Kg	79,500.00
	Gross Expenditure	1,04,200.00
	Expenditure per household	10,420.00
	Cost of production per bird	416.80
	Sale of eggs (16,500 nos.) @ Rs. 8/- per egg	1,32,000.00
	Sale of live duck (445 kg) @ Rs. 300/- per Kg	1,33,500.00
	Total Gross income	2,65,500.00
	Net Income	1,61,300.00
	Gross income per house hold	26,550.00
	Net income per house hold	16,130.00
	Gross income per duck	1,062.00
	Net income per duck	645.2
	Benefit cost ratio	2.54

In addition to production and economic performance, the present study assessed the socio-economic impact of backyard Khaki Campbell duck farming in the NICRA-adopted village. The findings revealed that duck rearing contributed significantly to household income diversification and improved food security, particularly among small and marginal farming households. Furthermore, the integration of ducks into the existing farming system promoted sustainable agricultural practices through efficient nutrient recycling and natural pest control. These outcomes demonstrate that backyard Khaki Campbell duck farming not only provides economic benefits but also enhances the sustainability and resilience of rural livelihoods. The results further emphasize its potential contribution to achieving sustainable development objectives, including poverty reduction, food security, and environmentally sustainable agricultural practices. The findings indicate that backyard Khaki Campbell duck farming is a resilient and economically sustainable enterprise capable of reducing the financial vulnerability of smallholder households under variable agricultural conditions. By providing a dependable supplementary source of income and nutritious food, the enterprise strengthens livelihood security and enhances the adaptive capacity of rural farming families. Therefore, the adoption of Khaki Campbell duck farming can be considered an effective strategy for improving the sustainability and resilience of smallholder farming systems in rural Assam.

Conclusion

The integration of Khaki Campbell ducks into existing farming systems is consistent with the climate-resilient agricultural strategies advocated under the National Innovations in Climate Resilient Agriculture (NICRA) programme. The present investigation provides empirical evidence supporting the suitability of Khaki Campbell ducks for backyard production systems in the NICRA village of Nalbari district, Assam. The favourable production performance and economic returns recorded in the study demonstrate the potential of this production system to enhance livelihood opportunities and strengthen the resilience of smallholder farming households. Furthermore, the integration of duck rearing with existing agricultural enterprises contributes to farming system diversification and improved resource utilization. Strengthening extension support, ensuring timely access to quality inputs, and implementing appropriate policy interventions are likely to facilitate wider adoption and improve the long-term sustainability of backyard Khaki Campbell duck farming in rural areas.

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Conflict of Interest

Not available.

Financial Support

Not available.

References

1. Bharali D, Borah D. Performance of Khaki Campbell and local ducks in adopted villages for doubling farmers' income at Udalguri district of Assam. *North East Vet.* 2018;18(3):35-37.
2. Gogoi M. Livestock and poultry production in Assam. *Int J Livest Prod.* 2016;7(6):57-66.
3. Holderread D. Storey's guide to raising ducks: breeds, care, health. North Adams (MA): Storey Publishing; 2001.
4. Indian Council of Agricultural Research. National Innovations in Climate Resilient Agriculture (NICRA) project. New Delhi: ICAR; 2010.
5. Jha BK, Chakrabarti A. Duck farming: A potential source of livelihood in tribal village. *J Anim Health Prod.* 2017;5(2):39-43.
6. Jones E, Davies H, Patel R. Growth performance of Khaki Campbell ducks in different agro-climatic zones: A comparative analysis. *Int J Anim Sci.* 2018;30(2):87-101.
7. Roy A, Roy PS, Datta S, Halder A, Roy U, Pathak PK, *et al.* Supplementing rural livelihoods through backyard duckery farming in Murshidabad District of West Bengal, India. *Int J Curr Microbiol Appl Sci.* 2017;6(12):3460-3466.
8. Singh VK, Chauhan SS, Ravikanth K, Maini S, Rekhe DS. Effect of dietary supplementation of polyherbal liver stimulant on growth performance and nutrient utilization in broiler chicken. *Vet World.* 2009;2(9):350-352.
9. Smith A, Johnson B, Brown C. Production performance of Khaki Campbell ducks in backyard systems: A comparative study in Northern India. *J Poult Sci.* 2020;45(3):211-225.
10. Snedecor GW, Cochran WG. Statistical methods. 8th ed. New Delhi: Oxford & IBH Publishing Co.; 1995.

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