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Evaluating the performance of Vanaraja chicken under free-ranging conditions in the temperate climates of Kashmir

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Abstract

This study aimed to evaluate the growth performance, egg production, and economic viability of Vanaraja chickens reared under free-range conditions. A total of 217-day old chicks was provided to a progressive broiler poultry farmer for rearing in free range. To ensure proper brooding, vaccination and to reduce early chick mortality, the chicks were brooded for four weeks in the nigh shelter build at the perimeter of 2 kanals of a properly fenced plot of land and afterwards transitioned to free range. Growth performance revealed a steady increase in body weight, reaching 1,958 g at 20 weeks and 3,078.6 g at 52 weeks. Sexual maturity was attained at an average of 189 days, with a mean body weight of 2,070 g at first egg. The average egg weight was 70 g, with annual egg production averaging 95.15 eggs per hen, and 75.5 eggs per hen by 52 weeks. Mortality included two chicks dying of due to yolk sac infection in the first week, four hens lost to predation, and 113 hens due to accidental chemical exposure at 64 weeks. A net income of ₹35,765 with a benefit-cost ratio (BCR) of 1:1.38 was realized from the system. However, mortality-related losses led to an estimated foregone income of ₹41,880. Despite these challenges, the study demonstrates the economic feasibility of Vanaraja poultry farming under free-range conditions. Improved risk management strategies, including secure housing and predator control, could further enhance productivity and profitability.

Keywords: Poultry, Vanaraja, free range, growth performance, temperate climate

Introduction

Free range poultry farming is a system designed to raise chickens that allows the birds more space to roam freely for at least a part of the day; providing them access to the natural environment compared to the confined ones. This low input system is particularly suited for small and marginal farmers, offering seamless integration with other agricultural activities in a harmonious manner. As an eco-friendly approach to food production, this system of rearing birds has gained increased attention. It offers a multitude of benefits for both birds and the farmers, allowing chickens to engage in natural behaviors like dust bathing, foraging and perching, leading to improvement in overall welfare and reduced stress levels (Lay *et al.* 2011) [9]. This system of rearing not only helps in production of quality poultry products but also offers a low cost sustainable and eco-friendly solution for disposal of food waste (Singh *et al.* 2019) [16]. Besides offering a reliable source of income and high-quality nutrition, the system has the potential to offer

round the year employment opportunities particularly for women and economically weaker sections of the society (Das *et al.* 2020) [4]. The activity aligns well with their house hold responsibilities and provides a sense of financial stability, security and empowerment (Kumar & Reddy, 2018) [8]. Additionally, the chickens help in control of pests and weeds and enhance soil fertility through their droppings. The ever-increasing demand for wholesome, hygienic and organic poultry products has provided a much-needed impetus to backyard poultry rearing, through introduction of elite chicken strains.

Vanaraja- a dual-purpose poultry bird has been widely adopted in free range farming across India. The breed is recognized for its adaptability in harsh climatic conditions, disease resistance and contribution to the rural livelihood and economic security (Rao *et al.* 2013) [13]. The breed has been reported to outperform native breeds in overall production under extensive system (Ahmed *et al.* 2020) [1]. The available information mainly highlights the

performance of this bird under backyard scavenging system underscoring its suitability for small scale poultry farming (Shekhar, 2020; Islam *et al.* 2024) ^[15, 6]. Limited information is available on the performance of this bird under free range conditions in temperate climates of Kashmir. Therefore, the present study was undertaken to evaluate the overall performance of Vanaraja birds under free-ranging conditions in Kashmir.

Materials and Methods

For evaluation of performance of Vanaraja poultry birds, a total of 217 unsexed Vanaraja chicks were provided to progressive poultry farmer from village Malangpora. To ensure proper brooding, vaccination and to reduce early chick mortality, the chicks were brooded for four weeks in the high shelter build at the perimeter of 2 kanals of a properly fenced plot of land. Fencing provided a secure and safe environment for the birds to forage, post transitioning to free range. During the brooding period, the chicks were vaccinated as per recommended schedule and fed 'Broiler Chicken Starter'. Afterwards, birds were provided broken mill rice along with foraging in the open, during the day. Supplemental commercial layer feed at the rate of 30g per bird, along with multivitamins and minerals was provided to cope with the deficiency. For maximizing profits, all the male birds were sold as they reached desired market weight and age. This helped to enhance welfare of female birds and reduce competition for resources allowing them to flourish. The performance data with respect to body weight gain, egg production, mortality and feed consumption was collected through personal visits and using a purpose oriented structured questionnaire. The data collected were analyzed statistically by using standard statistical analysis techniques in excel spread sheet.

Results and Discussion

The present study provides an account of the productive and reproductive performance of Vanaraja birds reared under free-range conditions, emphasizing their growth trends, egg production, mortality rates, and economic viability.

Data pertaining to body weight body weight gain, age at first egg/sexual maturity (days), egg production and weight, morbidity, mortality and economics are presented in table 1. Of the 217-day chicks 98 were male and 117 females, with their sex being identifiable by around 8th week. Two chicks died of yolk sac infection during brooding and four hens were preyed upon by a cat. Average weight of the egg was 70g and the farmer sold them directly to the consumers at rupees 10 per egg. Male birds were sold at 170 rupees each. The returns foregone which otherwise could have been realized, were 41880 rupees. An inadvertent and accidental spillover of poisonous chemicals sprayed by a neighboring farmer on his crop resulted in death of 113 hens at around 64th week of age. Despite these losses, the unit yielded positive economic gains with a benefit cost ration of 1:1.38. The body weight progression from day-old to 52 weeks indicating a steady growth trend is in consonance with the available literature. Similar to the results of the present study, Mahanta *et al.* (2021) ^[10] and Islam *et al.* (2024) ^[6], reported that Vanaraja birds under free range and backyard conditions exhibited a body weight of 1.5–2.0 kg at 20 weeks. Chauhan *et al.* (2024) ^[2] reported that Vanaraja birds

under backyard conditions demonstrated growth traits with average body weight of 2.80 kg at 40 weeks of age. Developed as a dual-purpose bird, Vanaraja outperforms the indigenous chickens. The differences are more pronounced with age. The birds performed well under the temperate climatic condition of Kashmir. However, their reduced agility makes them more vulnerable to predators and increases their susceptibility to infectious and non-infectious diseases. This system of rearing allows chickens to engage in natural behaviors like dust bathing, foraging and perching, leading to improvement in overall welfare and reduced stress levels (Lay *et al.* 2011) ^[9]. It promotes health and strengthens immune system, contributing to higher production.

Vanaraja birds are known for their early maturity and egg production. The birds are reported to attain sexual maturity between 160 to 180 days (Kumaresan *et al.* 2008) ^[7]. Egg production at an early age offers faster returns on the investment compared to the native strains-raised under low input systems of rearing. However, productive performance of Vanaraja under low input scavenging systems, under temperate conditions of Kashmir largely unexplored. Further susceptibility to environmental hazards and stressors demands systemic evaluation. The hens on an average produced large sized eggs. As per available literature, the egg production varies widely, with reports suggesting egg production between 98 to 120 eggs per hen in certain regions (Chauhan *et al.* 2024) ^[2] to a high of 170 eggs per hen (Shekhar, 2020) ^[15]. The results of the present study corroborate with Rajkumar *et al.* (2018) ^[12], who reported egg production between 90-110 eggs per bird annually. However, Pathak and Nath, (2013) ^[11] reported slightly lower egg production under free range rearing compared to intensive systems, where birds can lay 110–130 eggs per year, attributed to differences in feeding, climate, and predator threats in extensive systems. The hens produced consistently larger eggs as they aged, indicating its superior egg production traits when compared to indigenous chicken strains. The average weight of egg (70.00 g) and body weight at first egg (2070 g) are in concurrence with Kumaresan *et al.* (2008) ^[7]. Consistent production of eggs of higher weight is a desirable trait as production of larger eggs is crucial for sustaining the poultry production in rural areas. Sexual maturity at 189 days (27 weeks) aligns with findings of Sahoo *et al.* (2019) ^[14], who reported hens reaching sexual maturity between 175 and 195 days under free-range conditions. Similarly, Zuyie *et al.* (2009) ^[18] reported a mean age at first egg between 187 to 189 days.

Mortality during the early period was negligible. Maintaining a healthy flock from the start till the completion of laying cycle is crucial in harvesting maximum returns. Mortality due to infectious causes was negligible and only two chicks died during the brooding period. However, due to inadvertent and accidental exposure to toxic substance, the entire flock of hens was wiped out, which reduced the chances of reaping any financial gains to zero. A common threat to birds under free range, which can significantly contribute to revenue foregone, is predation and exposure to toxic substances. Gagoi *et al.* (2020), reported that external threats; predators (dogs, cats, snakes) and exposure to toxic substances can greatly reduce overall productivity of the system. Conan *et al.* (2021) ^[3], suggested for adopting

improved bio-security measures, secure night shelters and rotational grazing hours, to mitigate such losses. The birds are docile and highly vulnerable to predation by stray animals. The docile nature, fast metabolism and rapid growth rate often predispose Vanaraja to a range of ailments including muscular dystrophy, ascites, leg deformities, development of vices, cannibalism and sudden death syndrome (Sridhar and Reddy, 2012) ^[17].

Despite these losses, the system remained economic viable

yielding a benefit cost ratio of 1: 1.38, due to higher production potential of the birds. Economics of Vanaraja chicken rearing in present study are similar to that of Shekhar, (2022) ^[15]. The returns foregone due to mortality (INR 41,880) emphasize the need for better management practices. Conan *et al.* (2021) ^[3] found that predator control and supplementary feeding can reduce mortality by 15–20%, increasing overall profitability in backyard poultry systems.

Table 1: Productive and Reproductive performance of Vanaraja Birds Under Free Range

Age of bird	Body weight(g)	Grain from Previous observation	Average gain/week(g)
Day old	45.50± 3.56	-	-
4 th weeks	488.75± 25.80	433.25	110.81
8 th weeks	1161.80 ± 35.00	673.05	168.26
12 th weeks	1536.50 ± 55.00	374.70	93.68
20 th weeks	1958.0 ± 90.00	421.50	52.69
40 th weeks	2554.0 ± 150.00	596.00	29.80
52 nd weeks	3078.60 ± 200.00	524.60	43.72
Egg production No./Hen			
Week			
32 nd		25.50±0.11	
40 th		47.5±0.42	
52 nd		75.5±1.10	
Average egg production/bird		95.15±6.7	
Age at first egg/sexual maturity		189±4.30	
Average weight of egg(g)		70.00±3.24	
Body weight at first egg production(g)		2070±38.45	
Mortality events and their contribution to flock losses			
Cause	Period	Number	Mortality%
Yolk sac infection	Brooding	02	0.92
Eaten by cat	Growing	04	3.42
Due to poisonous substance	Laying	117	100
Economics per bird			
Cost of day-old chick (INR)			7595
Cost of brooding, feed, medicine and vaccination			27950.00
Cost of supplemental feed and minerals			58050.00
Cost of production			93595.00
Returns			
Sale of male birds at Rs 170 per bird			16660.00
Sale of eggs at Rs 10/egg			112700.00
Gross returns			129360.00
Net income			35765.00
B:C Ratio			1:1.38
Revenue foregone due to mortality			
Income from sale of spent hens			11700.00
Income from egg production			30180.00
Total			= 41880.00

Conclusion

The performance of Vanaraja under free range observed in the present study is comparable to reported values in existing literature, with slight variations due to management practices. The body weight gain and egg production remained within expected limits, with a slightly lower output than intensive systems. Mortality due to predation and exposure to poisonous chemicals impacted the overall farm operation and reduced chances of economic returns to zero. The data obtained suggests that Vanaraja farming under free-range conditions is a profitable venture, provided that adequate bio-security and predator protection measures are implemented and sufficient and low-cost resources are at disposal. for the birds to perform optimally. However, more such multi-location studies across Kashmir valley need to be

carried out, to ensure accuracy and broader applicability of the results.

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