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Effect of azolla feeding on the growth performance of improved native chicken breeds under Backyard rearing

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Abstract

The study aimed to evaluate the effect of azolla supplementation on body weight gain and economic efficiency in improved native chicken breeds under intensive rearing. Twenty chicks were randomly assigned to two treatment groups, each with three replicates of ten birds. The control group (T₁) was fed a standard basal diet, while the treatment group (T₂) received a diet supplemented with 10% fresh azolla. The feeding trial lasted for 16 weeks. No significant differences were observed in body weight gain between the azolla fed and control groups. However, cost benefit analysis indicated higher economic efficiency in the azolla fed group. The findings suggest that incorporating fresh azolla up to 10% level in the diet of native chickens can enhance economic returns without adversely affecting growth performance.

Keywords: Azolla, weight gain, backyard poultry, egg production and B:C ratio

Introduction

Livestock and poultry farming play a significant role in the Indian economy and are increasingly recognized for their potential to promote sustainable livelihoods and socio-economic equity among rural households. Backyard poultry rearing, in particular, is a traditional supplementary livelihood activity practiced by farmers in the Krishna district of Andhra Pradesh, India. Most households maintain a small flock of at least ten birds, reared for both egg and meat production, thereby contributing to nutritional security in rural communities.

Despite the long-standing tradition of backyard poultry rearing in the region, farmers often face challenges such as low egg production, poor growth performance, disease incidence, and high mortality rates, all of which lead to economic setbacks. To address the issue of low productivity in indigenous breeds, improved poultry varieties such as Ghagus and Khadaknath have been introduced in the region. Feed cost constitutes approximately 65-70% of the total production cost in poultry farming. Therefore, formulating low-cost rations using locally available feed resources is essential. Incorporating non-conventional or plant-based feed ingredients can help reduce production costs while enhancing the productive and economic performance of poultry birds.

Among the various alternatives, Azolla—a floating aquatic fern belonging to the family Azollaceae—has emerged as a

promising feed resource. Azolla maintains a symbiotic association with the blue-green algae *Anabaena azollae*, which fixes atmospheric nitrogen. In this mutualistic relationship, Azolla provides carbon sources and a suitable habitat for the algae, while benefiting from the nitrogen fixed by the symbiont. This unique biological association contributes to the plant's exceptionally high protein content. Azolla is rich in proteins, essential amino acids, vitamins (notably vitamin A, vitamin B₁₂, and β-carotene), growth-promoting intermediaries, and minerals such as calcium, phosphorus, potassium, iron, copper, and magnesium. Incorporation of Azolla up to 5% in poultry diets has been shown to improve growth performance, feed conversion efficiency, protein and energy utilization, and overall economic returns without adverse health effects in birds (Parthasarathy *et al.*, 2001; Basak *et al.*, 2002)^[4, 2].

To further assess its potential, frontline demonstrations were conducted over two consecutive years (2023-2024) with the objective of evaluating the effect of fresh Azolla supplementation on egg production and growth rate in backyard poultry.

Materials and Methods

The study was carried out at farmers' fields within the operational area of Krishi Vigyan Kendra (KVK), Ghantasala, Andhra Pradesh. A total of 20 poultry birds, each 4 weeks old, were selected and randomly divided into

two groups of 10 birds each. The trial was conducted for duration of 16 weeks, up to 20 weeks of age, under the Farmers' Participatory Front Line Demonstration (FLD) programme.

Harvesting and Feeding of Azolla

Azolla was introduced and multiplied at KVK, Ghantasala, and subsequently distributed to five farmers for further cultivation. The harvested Azolla was thoroughly washed to remove any cow dung odor before feeding.

Control group (T₁): Birds were maintained under the traditional backyard poultry system with only foraging as well as concentrate mixture.

Treatment group (T₂): Birds were provided with a daily supplement of 50 g of concentrate mixture along with 10% fresh Azolla per bird, in addition to foraging.

Both groups were reared under similar housing and management conditions throughout the experimental period.

Data Collection and Statistical Analysis

Data on body weight and egg production were recorded during the trial. The benefit-cost ratio was calculated based on body weight gain and total egg production. Statistical analysis was performed following the procedures outlined by Snedecor and Cochran (1994)^[5]. Results are presented as mean $\pm$ standard deviation (SD), and mean differences between the treatment and control groups were analyzed using an unpaired t-test.

Results and Discussion

Average change in body weight

The study revealed that the mean average change in body weight during the 16-week trial period (up to 20 weeks of age) was 1197.5 g in the Azolla-fed group, which was

significantly higher than that observed in the farmers' practice group (1092.5 g) that received only foraging and concentrate mixture (Table 1). The supplementation of fresh Azolla in the diet evidently enhanced the body weight gain of backyard poultry birds.

Similar findings were reported by Anu Gopalakrishnan *et al.* (2025)^[1], who concluded that supplementing Azolla as a secondary protein source in backyard poultry feed improved both body weight gain and egg production. Likewise, Bidya Shankar *et al.* conducted a comparable study in Sheikhpura district of Bihar, where backyard poultry birds were provided 100 g of fresh Azolla per day per bird for 16 weeks. Their results showed a 161.85 g higher mean body weight in Azolla-fed birds compared to the farmers' practice, corroborating the present findings.

Consistent results were also reported by Sujatha *et al.*, (2013)^[7], who observed a significant increase in body weight among Azolla-supplemented backyard poultry birds. The improvement in body weight could be attributed to the rich nutrient composition of Azolla, particularly its high protein, vitamin, and mineral content (Pillai *et al.*, 2002)^[8]. Notably, no additional vitamin or mineral supplements were provided to the Azolla-fed group, yet there were no signs of nutritional deficiencies, suggesting that Azolla adequately supplied these essential nutrients. This property is especially advantageous in rural areas where commercial mineral-vitamin premixes are either unavailable or costly.

Supporting evidence from Surender Singh *et al.* (2023)^[6] also indicated improved weight gain in Rhode Island Red (RIR) birds supplemented with Azolla in their basal diet under a backyard rearing system. These findings collectively demonstrate that Azolla supplementation serves as an effective, low-cost feed component that enhances growth performance in backyard poultry.

Table 1: Average body weight (g) recorded in the two groups at different intervals of age

Treatments	Avg. body weight gain (g)			Avg. No. eggs per bird			Net returns	B:C ratio
	2023-2024	2024-2025	Mean	2023-2024	2024-2025	Mean		
Control	895.5 $\pm$ 32.60	1290 $\pm$ 36.75	1092.75	65	72	68	4092	2.91
Treatments	995.6 $\pm$ 24.40	1400 $\pm$ 45.60	1197.50	72	86	79	5780	3.24

Egg production

The performance of the two groups was evaluated based on the average number of eggs produced per bird, net returns, and the benefit-cost (B: C) ratio over two successive years. In the control group, the average egg production was 65 eggs per bird in 2023-24 and 72 eggs in 2024-25, with an overall mean of 68 eggs. This group recorded net returns of Rs.4092 and a B:C ratio of 2.91. In contrast, the treatment group produced 72 eggs per bird in 2023-24 and 86 eggs in 2024-25, resulting in a higher mean production of 79 eggs. However, despite the increased productivity, the treatment group registered higher net returns (Rs.5780-00) and a reduced B:C ratio of 3.24 compared to the control group.

Conclusion

The present study clearly demonstrates that supplementation of fresh Azolla at 10% level in the diet of poultry birds under backyard rearing conditions has a positive impact on growth performance, egg production, and economic returns. Birds fed with azolla showed higher body weight gain and increased egg production compared to the farmer practice,

without any adverse effects on health or performance. The improvement in net returns and benefit-cost ratio highlights the economic advantage of azolla supplementation, mainly through reduction in feed costs and enhanced productivity. Adoption of Azolla-based feeding practices can thus contribute significantly to improving livelihood security, nutritional status, and income of rural households engaged in backyard poultry farming

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