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Anu Gopalakrishnan

SMS (Veterinary), KVK-
Rastakuntubai, Parvathipuram-
Manyam, Andhra Pradesh, India

Amrutha Veena G

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Uma Jyothi Y

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Sravanthi S

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Anantha Vihari M

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Sreenivasa Raju S

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Sanyasi Dhurua¹

Krishi Vigyan Kendra,
Rastakuntubai, ANGRAU,
Andhra Pradesh, India

Corresponding Author:

Anu Gopalakrishnan

SMS (Veterinary), KVK-
Rastakuntubai, Parvathipuram-
Manyam, Andhra Pradesh, India

Azolla supplementation in diet contributes to improved body weight gain and egg production in backyard poultry

**Anu Gopalakrishnan, Amrutha Veena G, Uma Jyothi Y, Sravanthi S,
Anantha Vihari M, Sreenivasa Raju S and Sanyasi Dhurua**

Abstract

The study was conducted in 10 tribal villages of Parvathipuram-Manyam district to assess the effect of supplementing Azolla in backyard poultry feed, during the period of November 2022 to December 2023. Twenty backyard poultry units rearing native variety of chicken were selected and divided into two groups viz; control and treatment, with each unit comprising of around 30 birds. Out of twenty locations ten were kept as control where there was no dietary azolla supplementation to poultry and for treatment group azolla was supplemented at rate of 50 per cent on wet weight basis. Average body weight at 16th and 20th weeks of age and average annual egg production were recorded. The study revealed that mean average body weight of birds during 16th week and 20th weeks were significantly higher in azolla supplemented groups as compared to farmer's practice of feeding grain ration. Also, the average annual egg production in azolla fed birds increased significantly (P value <0.01) with a production of 88.1 ± 7.38 eggs/year as compared to control flock where it was 78.6 ± 4.27 eggs/year. The results indicated that supplementing azolla in backyard poultry feed as a secondary protein source can help to improve the body weight gain and egg production of birds.

Keywords: Backyard poultry, azolla, protein, body weight, egg production

Introduction

Livestock and poultry farming are major contributors to the Indian economy and these enterprises are gaining preference due to its potential to contribute to sustainable livelihood and socio-economic equality of rural families [1]. Backyard poultry rearing is a traditional supplementary livelihood activity of tribal farmers of Parvathipuram Manyam district of Andhra Pradesh, India. In majority of the household, there will be a unit of minimum ten poultry birds and have been reared for both egg and meat purpose which ensures nutritional security to the tribal population. Though the practice of poultry rearing is followed here erstwhile, low egg production, poor weight gain, incidence of various diseases and higher mortality rates remained as constraints which cause economic backlash to poultry farmers. To curb the problem of poor egg production in desi birds, improved poultry varieties like Rajasri, Gramapriya, Vanaraja etc were introduced in this region [2].

In poultry farming 65-70 per cent of total cost of production accounts for feed cost, hence low-cost feed formulation by using locally available feeds should be considered. The incorporation of nonconventional feed or feeds of plants origin in poultry diet can mitigate the production cost and can improve the productive and economic performance of poultry birds [3]. *Azolla pinnata* is a free-floating aquatic fern of the family Azollaceae which is rich in protein, minerals, vitamins etc. and is a well identified unconventional feed and protein supplement for animals like ruminants, pigs, poultry and fish [4]. Azolla has good potential to proliferate without inorganic nitrogen fertilization and has high rate of growth in water. The most important characteristic is its symbiotic relationship with the nitrogen-fixing blue-green algae (Cyanobacterium) *Anabaena azollae*, which contributes to the protein richness of Azolla. It naturally grows in drains, ponds, rivers, canals, rice fields, water bodies and soggy lands in humid regions with temperature range of 15-35 °C.

Azolla has been utilized as biofertilizer and green manure in enriching rice crop by virtue of its nitrogen fixing abilities. The utilization of Azolla as an unconventional feed ingredient for poultry feeding had been proven with beneficial effects like improved bodyweight gain [7]. Supplementing azolla in poultry feed helps in imparting rich yellow colour to egg yolk due to the presence of carotene pigment [6]. The poultry farmers of this region mainly rely on grain feeding, rice in particular, to meet the additional nutrient requirements in free range system of rearing birds. In view of this, the present study was undertaken to assess the effect of feeding. Azolla as a supplementary protein source to backyard poultry in the upland tribal mandals of Parvathipuram Manyam district, Andra Pradesh, India.

Materials and Methods

1. Study area and study design

The present study was conducted at farmer's fields in ten selected villages of Kurupam, Gummalakshampuram and Parvathipuram mandals of Parvathipuram Manyam district. Twenty backyard poultry units rearing native varieties of chicken were selected for the trial, two from each village. The feeding practices of the poultry farmers in all locations were more or less similar. Almost 60% of their dietary requirement of the birds will be met by scavenging through fields. Additionally, the farmers feed rice grains, maize and bran to the birds. Before the start of intervention, the selected farmers were given training on preparation of Azolla beds, azolla cultivation and incorporation of azolla in poultry diet. The trial was conducted for a period of one year from November 2022 to December 2023 and parameters recorded were average body weight at 16th and 20th weeks of age and average annual egg production. Out of twenty locations ten were kept as control where there was no dietary azolla supplementation to poultry and for treatment group azolla was supplemented at rate of 50 per cent on wet weight basis. From each unit data pertaining to a minimum of 30 birds belonging to same age were recorded. Male and female birds were present in almost equal ratio.

2. Azolla cultivation and dietary supplementation

Azolla seedlings grown at Krishi Vigyan Kendra (KVK), Rastakuntubai were distributed to the selected farmers along with 8 x 4 x 1 ft sized azolla growing beds. To meet the daily requirement of azolla, farmers also

prepared additional beds using tarpolene sheets on leveled land preferably at shady area in their fields. Beds were filled uniformly with sieved soil mixed with cow dung before adding water and azolla seedlings were placed. After inoculation of culture, the Azolla beds were covered with a shade net to ensure optimum growth. Under ample environment azolla would multiply in 15-20 days to cover the entire bed. Azolla was harvested daily using strainers and was washed thoroughly to remove the dung smell before feeding to the birds. Azolla was supplemented along with concentrate feed comprising of rice, maize and bran, at rate of 50 per cent on wet weight basis viz; for 50 gm feed 50 gm azolla was mixed and fed the birds daily.

3. Statistical analysis

The data on body weight and egg production were recorded. Statistical analysis was done as per Snedecor and Cochran (1994) [8]. Results are expressed as Mean $\pm$ standard deviation. The means were compared between the treated and control groups using unpaired T test.

Results and Discussion

Our study revealed that out of 10 trial locations, the mean average body weight of birds during 16th week was significantly higher in azolla supplemented group in 8 locations, as compared to farmer's practice of feeding grain ration. Whereas in 20th week the body weights recorded in azolla group were significantly higher than the control population in all 10 locations (Table 1). Bidya Shankar *et al.*, (2018) [9] conducted a similar trial in Sheikhpura district of Bihar wherein backyard poultry birds were fed with fresh azolla at the rate of 100 g per day per bird for 16 weeks. Their results indicated a 161.85 g increase in mean bodyweight of birds fed with azolla than the farmer's practice which is in agreement with the present study. Another study conducted by Surender Singh *et al.*, (2023) [7] showed an improved weight gain at 20 weeks of age in Rhode Island Red (RIR) birds supplemented with azolla in their basal feed in backyard system of rearing. Similar results of gain in the body weight was found in the Azolla supplemented group of backyard poultry bird by Sujatha *et al.*, (2013) [10] Pilla *et al.*, (2002) [11] suggested that gain in the body weight in azolla fed birds may be attributed to rich nutrient contents of azolla particularly protein.

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

Location	16 th week		20 th week	
	Azolla group	Control group	Azolla group	Control group
1.	1025.5 ^{**} $\pm$ 46.39	881 $\pm$ 49.77	1294.28 ^{**} $\pm$ 45.14	1087.60 $\pm$ 54.05
2.	916.8 $\pm$ 51.36	900.2 $\pm$ 59.12	1340.24 ^{**} $\pm$ 59.37	1094.28 $\pm$ 68.65
3.	1002.6 ^{**} $\pm$ 49.26	923.0 $\pm$ 40.21	1281.34 ^{**} $\pm$ 65.26	1101.07 $\pm$ 51.18
4.	996.6 $\pm$ 38.65	1000.2 $\pm$ 52.57	1344.05 ^{**} $\pm$ 40.40	1200.50 $\pm$ 48.45
5.	986.3 ^{**} $\pm$ 30.85	856.5 $\pm$ 86.23	1370.32 ^{**} $\pm$ 68.23	1203.37 $\pm$ 38.45
6.	950.4 [*] $\pm$ 60.54	913.0 $\pm$ 47.18	1226.28 [*] $\pm$ 72.07	1157.42 $\pm$ 42.73
7.	1020.7 ^{**} $\pm$ 50.52	887.8 $\pm$ 46.17	1314.06 ^{**} $\pm$ 57.11	1050.25 $\pm$ 40.17
8.	1056.3 ^{**} $\pm$ 49.32	992.0 $\pm$ 60.58	1265.09 ^{**} $\pm$ 39.45	1102.08 $\pm$ 39.33
9.	889.2 [*] $\pm$ 30.45	845.6 $\pm$ 47.92	1305.10 ^{**} $\pm$ 54.65	1201.88 $\pm$ 30.43
10.	956.3 ^{**} $\pm$ 48.31	789.2 $\pm$ 66.45	1285.00 ^{**} $\pm$ 41.22	1161.02 $\pm$ 27.89

The means were compared between the 2 groups at each location within different intervals of age. *, ** The means vary significantly with* *P* value <0.05, ** *P* value <0.01

While considering egg production, the mean average annual egg production in azolla fed birds increased significantly (*P*

value <0.01) with a production of 88.1 $\pm$ 7.38 eggs/year as compared to control flock where the mean annual egg production recorded was 78.6 $\pm$ 4.27 (table 2). In their study Bidya Shankar *et al.*, (2018) [9] also found out a similar increase in egg production in backyard poultry birds fed with

azolla. They reported an average annual egg production of 53.2 per bird which was 6.2 more than the farmer's practice.

Table 2: Average annual egg production per bird

Location	Azolla group	Control group
1.	92	78
2.	84	81
3.	80	83
4.	76	74
5.	89	80
6.	94	86
7.	90	75
8.	101	77
9.	92	80
10.	83	72
Average	88.1 ^{**} ±7.38	78.6±4.27

^{**}The means vary significantly with *P* value <0.01

Conclusion

Backyard poultry rearing is an integral part of tribal economy and also has an inevitable role in nutritional security, in Parvathipuram Manyam district. The results of present study pave a way to decrease the cost of production in backyard poultry rearing by utilizing azolla as a rich protein supplement in poultry ration. Azolla production can be done through minimum cost by the farmers and it has a good potential to incorporate in poultry feed either in fresh or dried form for economic production of meat and egg.

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Conflict of Interest

Not available

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Not available

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