J. Soils and Crops 34 (1) 193-196, June 2024

ISSN 0971-2836 (Print)
ISSN 2582-2756 (Online)

EFFECT OF FEEDING FRESH AZOLLA (*Azolla pinnata*) ON GROWTH PERFORMANCE OF KAVERI POULTRY BIRDS

Dipti S. Zade[1], V. G. Atkare[2], P. R. Kadu[3] and P. R. Gaikwad[4]

ABSTRACT

The present investigation was conducted at Animal Husbandry and Dairy Science section, College of Agriculture, Nagpur during 2023 to assess the effect of feeding fresh Azolla on body weights, feed consumption, body weight gain, feed conversion ratio (FCR). 120-day-old, Kaveri chicks were purchased from Government Hatchery, Seminary Hills, Nagpur, Maharashtra. They were randomly distributed into groups. The experimental chicks were reared in well ventilated shed from 0-8 weeks (56 days). The Azolla was added in experimental diet at the rate of 0, 5, 10, and 15 per cent for T_1, T_2, T_3 and T_4, respectively. The control group (T_1) was without Azolla. The experimental ration was proteinous. The experiment was continued up to 8 weeks. The average body weights at the end of eight weeks of age were 1005.82 g, 1075.64 g, 1160.35 g and 1190.54 g in T_1, T_2, T_3 and T_4 treatment groups, respectively. The body weight of T_4 was significantly superior over others. Average weekly body weight gain at the end of 8th week were 14.32 g, 65.24 g, 103.64 g and 128.21 g in T_1, T_2, T_3 and T_4 treatment groups, respectively. The significantly higher weight was observed in T_4 followed by T_3, T_2 and T_1. Average total weekly feed intake (g bird^{-1}) at the end of 8th week of study was recorded as 675.22 g, 654.21 g, 615.24 g and 610.67 g for T_1, T_2, T_3 and T_4 treatment groups, respectively.

The trend of significantly higher feed intake was observed in T_1 followed by T_2, T_3 and T_4. The average weekly feed conversion ratio at 8th week was 2.54, 2.54, 2.96 and 3.42 in T_1, T_2, T_3 and T_4 treatment groups, respectively. The FCR was found to be statistically significant for different treatment groups from 5th week onwards. It was concluded that Azolla could be included in the native chicken ration up to 15% level. It is therefore inferred that inclusion of Azolla up to 15% was beneficial in Kaveri poultry to improve growth performance and it didn't have any adverse effect on the birds.

(Key words: Fresh Azolla, growth performance, body weight, FCR, feed intake)

INTRODUCTION

Traditionally desi varieties are used for backyard poultry production whose production potential is very low around 60-80 eggs year^{-1}, thus making the backyard poultry less economical. The meat from the native birds is widely preferred especially because of their pigmentation, taste, leanness and suitability for special dishes and often fetches higher prices. Native birds are mainly indigenous and they are kept in small numbers. They are small in body size and poor layers. To overcome the above limitations, several numbers of improved native chicken breeds have developed in our country. These birds have similar phenotypic characters of native birds like plumage pattern, scavenging, adjusting to the adverse village environmental conditions and are better with respect to growth rate, livability and egg production than indigenous birds. Feed is the major cost for poultry production which is estimated to 65-70 % of the total recurring production cost. The cost of feed ingredients is increasing day by day. So, the bird should be fed with the diet that gives maximum growth performance with the minimum cost. In addition, Boyd (1968), Subudhi and Singh (1977) and Maurice *et al.* (1984) stated that inclusion of aquatic plants at low levels in poultry diets had shown better performance, especially when they supply part of the total protein or when they are included as a source of pigment for egg and broiler skin. The water fern Azolla is an unconventional feed ingredient. Azolla is very rich in proteins, essential amino acids, vitamins (vitamin A, B12 and â-Carotene), growth promoter intermediaries and minerals like calcium, phosphorus, potassium, ferrous, copper, magnesium etc. Azolla is having crude protein 26.4%, ether extract 3.42%, crude fiber 15.96%, nitrogen free extract 41.06% and total ash 14.86%. The carbohydrate and fat content of Azolla is very low. Its nutrient composition makes it a highly efficient and effective feed for livestock. (Pillai *et al.*, 2005).Azolla have symbiotic relationship with the nitrogen-fixing blue-green algae, this unique symbiotic relationship that makes Azolla, a wonderful "super plant" with high protein content as it can readily colonize areas of

1 & 4. P. G. Students, Animal Husbandry and Dairying Section, College of Agriculture, Nagpur
2. Professor, Animal Husbandry and Dairying Section, College of Agriculture, Nagpur
3. Assoc. Dean, College of Agriculture, Nagpur

fresh water and grow at great speed doubling its biomass every two to three days. (Rathod *et al.,* 2023) The protein composition of Azolla varies from 25-35% on dry matter basis which is easily digested by poultry. Feeding value of Azolla has been evaluated by several workers in broiler chicken with promising results in growth performance. But very few works have been taken up on the feeding potential of Azolla on the growth performance of improved native chicken breeds. Keeping these in view, present study was focused on the "Effect of feeding fresh Azolla (*Azolla pinnata*) on growth performance of Kaveri Poultry birds".

MATERIALS AND METHODS

In the present study the Azolla was cultivated in poultry unit, section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur. Azolla, required for the preparation of experimental diets was collected from the Azolla pits in poultry unit, section of Animal Husbandry and Dairy Science. After harvesting, the Azolla was rinsed with fresh water for 3-4 times. To remove excess water, it was spread over a moisture absorbing paper for half an hour.

120 day-old chicks of Kaveri poultry bird were procured from government hatchery, Seminary Hills, Nagpur. These 120 chicks were divided into five groups with 4 treatments *viz.* T_1 (basal diet or control), T_2 (5% Azolla + Basal diet), T_3 (10 % Azolla + Basal diet) and T_4 (15% Azolla + Basal diet). All the Kaveri chicks were fed with chick crumb initially, followed by experimental ration. The experimental birds were managed properly including housing environment, providing floor space, feeder and waterer space, litter management, lighting management, sanitation, immunization and medication. During managemental period, body weight, feed intake, body weight gain, feed conversion ratio dressing percentage and mortality percentage were recorded.Observations were recorded of day old chick up to VIII week. The data generated during the experimental period was statistically analyzed by RBD given by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Chemical composition

Data regarding chemical composition of starter, finisher and fresh azolla are presented in Table 1. The starter contained 91.24 per cent dry matter, 21.28 per cent crude protein, 4.56 per cent crude fat, 65.65 per cent NFE and 1.92 per cent total ash, respectively. The finisher contained 88.96 per cent dry matter, 19.34 per cent crude protein, 68.55 per cent NFE, 5.63 per cent crude fiber and 1.75 per cent total ash, respectively. Fresh azolla contained, dry matter (DM) 94.40%, organic matter (OM) 80.67%, crude protein (CP) 21.67%, ether extract (EE) 3.27%, crude fiber (CF) 12.38%, nitrogen free extract (NFE) 43.35%, total ash (TA) 19.33%, calcium 0.98% and phosphorus 0.59% respectively. It is observed that fresh Azolla (*Azollapinnata*) is a rich source of crude protein (Akhud *et al*., 2017 and Adake *et al*., 2016).

Body weight

The growth performance of experimental bird was assessed by recording the weekly body weight of an individual bird throughout the experimental period. The data pertaining to average weekly body weight are presented in Table 2. The average body weights at the end of eighth weeks of age were 1005.82 g, 1075.64 g, 1160.35 g and 1190.54 g in T_1, T_2, T_3 and T_4 treatment groups, respectively.

Significant difference in weekly body weight was found from second week onwards. The trend of significantly better growth was recorded in T_4 (1190.54 g) as compared to control group. The higher body weight was also observed in T_4 followed by T_3, T_2 and T_1. This indicated that the beneficial effect of feeding fresh Azolla at the rate of 15%. The findings of present study are in accordance with the results of Perianna *et al.* (2018). They reported that body weight of birds (1112 ± 9.1g) fed fresh Azolla @15% was higher (pd™0.05) at 12th and 14th weeks of age when compared to all other treatment groups.

Body weight gain

The data on the average weekly weight gain are presented in Table 3. Average weekly body weight gain at the end of 8th week were 14.32 g,65.24 g, 103.64 g and 128.21 g in T_1, T_2, T_3 and T_4 treatment groups, respectively. Significant differences in weekly body weight gain in Kaveri birds were found from 3rd week onwards. The value of weekly gain in body weight indicated that Kaveri chicks receiving 15% fresh Azolla with basal diet (T_4) had faster weight gain followed by T_3 (10% Azolla + Basal diet, T_2 (5% Azolla + Basal diet) and T_1 (Basal diet).

Similar to present findings, Shinde (2015) studied the effect of dietary levels of Azolla *(Azolla pinnata*) in broilers and reported that average body weight gain observed in treatment group T_2 (10% level of azolla) was 410.74 g, it was highest over other treatment groups. The highest gain in body weight was reported in T_2 (10% level of azolla) followed by T_3 (15% level of azolla), T_1 (5% level of azolla) and T_4 (control) which were recorded as 410.74 g, 383.08 g, 373.30 g and 366.36 g, respectively.

Feed consumption

The data regarding average weekly feed intake of Kaveri chicks are presented in Table 4. Average feed intake at 8th week of age for T_1, T_2, T_3 and T_4 was 675.22 g, 654.21 g, 615.24 g and 610.67 g respectively. The highest feed intake was observed in T_1 (675.22 g), followed by T_2, T_3 and T_4 groups, this might be due to increasing level of consumption of Azolla accordingly. Findings of present study was in accordance with results of Tawasoli (2008). They observed significant changes in the feed consumption i.e. 713.57 g, 723.96 g, 709.84 g and 706.01 g in treatments T_0, T_1, T_2 and T_3 respectively, in feeding Azolla on performance of Vanraja poultry birds.

Table 1. Chemical composition of overall experimental feed (% DM)

Sr. No.	Proximate Principle	Starter	Finisher	Fresh Azolla
1	DM	91.24	88.96	94.40
2	CP	21.28	19.34	21.67
3	CF	6.59	5.63	12.38
4	NFE	65.65	68.55	43.35
5	Total Ash	1.92	1.75	19.33

(**Source:**Agrofab Pvt. Ltd. M.I.D.C. Hingna, Nagpur)

Table 2. Average weekly live body weight of Kaveri poultry bird (g bird^{-1})

Treatments	Weeks									
	Day-old	I	II	III	IV	V	VI	VII	VIII	Mean
T_1	33.2	90.5	142.6	263.87	456.75	642.94	764.25	991.3	1005.62	487.89
T_2	32.65	90.88	145.4	266.39	485.01	671.87	785.24	1010.6	1075.84	507.10^{a}
T_3	33.45	92.1	149.8	274.1	487.82	691.56	815.6	1056.7	1160.35	529.05^{b}
T_4	31.94	94.6	154.7	284.45	499.22	710.52	830.9	1062.3	1190.54	539.91^{c}
SE(m)±	0.33	0.93	2.65	4.63	9.02	14.44	14.97	17.40	41.90	**11.59**
CD at 5%	0.99	2.79	7.95	13.89	27.06	43.32	44.91	52.2	125.7	**35.42**

($p<0.05$) Means having different superscript differed significantly

Table 3. Average weekly body weight gain of Kaveri poultry bird (g)

Treatments	Weeks								
	I	II	III	IV	V	VI	VII	VIII	Mean
T_1	57.3	52.1	121.27	192.88	186.19	121.31	227.05	14.32	121.55^{b}
T_2	58.23	54.52	120.99	210.62	186.86	138.24	225.93	65.24	132.58^{a}
T_3	58.65	57.7	124.3	213.72	203.74	140.04	247.62	103.64	143.68^{b}
T_4	62.66	60.1	129.75	214.77	211.3	153.08	278.8	128.21	154.83^{b}
SE(m)±	1.18	1.76	2.03	5.12	6.26	6.52	12.37	24.83	**7.16**
CD at 5%	3.54	5.20	6.09	15.36	18.78	19.56	37.11	74.49	**22.51**

($p<0.05$) Means having different superscript differed significantly

Table 4. Average weekly feed consumption of Kaveri birds (g bird^{-1})

Treatments	Weeks									
	I	II	III	IV	V	VI	VII	VIII	Total	Mean
T_1	74.29	175.75	308.28	537.76	520.11	515.61	670	675.22	3477.02	256.99^b
T_2	74.19	156.56	305.57	517.51	482.29	510.91	629.7	654.21	3330.94	240.84^b
T_3	73.7	154.24	305.43	510.06	474.06	494.43	614.25	615.24	3241.41	223.29^a
T_4	72.04	132.8	295.93	487.68	407.6	452.96	584.83	610.67	3044.51	203.08^b
SE(m)±	0.52	8.79	2.70	10.34	23.40	14.25	17.74	15.57	93.30	**11.58**
CD at 5%	1.56	26.37	8.10	31.02	70.2	42.75	53.22	46.71	279.90	**34.99**

($p<0.05$) Means having different superscript differed significantly

Table 5. Average weekly feed conversion ratio of Kaveri poultry birds

Treatments	Weeks								
	I	II	III	IV	V	VI	VII	VIII	Mean
T_1	1.26	2.34	2.36	2.37	2.44	3.06	2.36	2.54	2.31
T_2	1.27	2.75	2.47	2.39	2.65	3.41	2.53	2.54	2.50
T_3	1.25	2.85	2.41	2.46	2.53	2.91	2.77	2.96	2.45
T_4	1.27	2.9	2.58	2.53	2.74	3.7	2.89	3.42	2.66
SE(m)±	0.10	0.13	0.05	0.04	0.07	0.18	0.12	0.21	**0.07**
CD at 5%	-	0.39	0.15	0.12	0.21	0.54	0.36	0.63	**0.21**

Alaldade and Iyayi (2006) also observed more or less similar results, who observed that the average weekly feed intake was 286.95 g, 270.73 g, 231.28 g and 224.38 g for T_0 (0% azolla), T_1 (5% azolla), T_2 (10 % azolla) and T_3 (15% azolla), respectively. The results are in line with the findings of present investigation.

Feed conversion ratio

The data regarding weekly feed conversion ratio (feed intake kg^{-1}) at different weeks of age are given in Table 5. The average weekly feed efficiency at 8th week of age was 2.54, 2.54, 2.96 and 3.42 in T_1, T_2, T_3 and T_4 treatment groups, respectively. The FCR was found to be statistically significant for different treatment groups from 5th week onwards. T_4 group was significantly superior over control group followed by T_3, T_2 and T_1 groups. Feed conversion ratio of T_4 was significantly superior over other treatments. However, FCR of T_1 and T_2 treatment groups were comparable with each other.

Results of the present findings are in agreement with the results obtained by Swain *et al.* (2018). They studied the effect of feeding Azolla*(Azolla pinnata)* on the performance of layers and reported that FCR was significantly higher in the diet containing 5% and 10% Azolla along with the basal diet i.e. T_2 and T_3 treatment groups, respectively.

REFERENCES

Adake, Jyoti, A. S. Ingole, V. G. Atkare, Rohini Darade and A. A. Patil, 2016. Effect of Azolla (*Azolla pinnata*) feeding on growth performance of Osmanabadi goat kids. J. Soils and Crops. **26** (1): 162-165.

Akhud, M. W., A. S. Ingole, V. G. Atkare, S. M. Khupse and S. V. Deshmukh, 2017. Effect of feeding different levels of concentrate replacement with azolla on Nagpuri buffalo calves. J. Soils and Crops, **27** (2): 105-108.

Alalade, O. A. and E. A. Iyayi, 2006.Chemical composition and the feeding value of Azolla (*Azollapinnata*) meal for egg-type chicks. Int. J. Poult. Sci. **5** (2):137-141.

Boyd, C. E. 1968. Fresh water plants, a potential source of protein. Econ. Bot. **22**: 359-365.

Maurice, D. V., J. E. Jones, C. R. Dillon and J. M. Weber, 1984. Chemical composition of Nutritional value of Brazilian elodea (*Egeri adensa*) for chick.Poult. Sci. **63**: 317-323.

Perianna, V., B. Naliathambi and A. Natarajan, 2019. Growth Performance of Vanaraja Birds fed Fresh Azolla incorporated diets under Intensive Production System. Int. J. Livestock Res. **9** (1): 202-205.

Pillai, P. K., S. Premalatha and S. Rajamony, 2005.Azolla: A sustainable feed for livestock. LEISA Magazine India, **21** (3): 15-17.

Rathod, N. M., S. A. Dhage, S. T. Mane, J. J. Pawar, R. S. Pawar and P. P. Inamdar, 2023. Effect of Dietary Inclusion of azolla (*Azolla pinnata*) on growth performance and meat characteristics of Satpuda poultry. J. Soils and Crops. **33** (1): 190-194.

Shinde, P. N. 2015. Effect of Dietary levels of Azolla*(Azolla pinnata)* in Broilers. Unpublished M.sc. thesis submitted to Dr. B.S.K.K.V., Dapoli.

Snedecor, G. W. and W. G. Cochran, 1994.Statistical methods, 8thedn.IOWA State University Press, Ames, IOWA, USA.

Subidhi, B. P. R. and P. K. Singh, 1977.Nutritive value of water fern *Azolla pinnata* for chicks.Poult. Sci. **57:** 378-380.

Swain, B., P. Naik, S. Mishra and D. Kumar, 2018.Effect of feeding Azolla*(Azolla pinnata)* on the Performance of White Pekin Laying Ducks.Int. J. Livestock Res. **8** (8): 248-253.

Tawasoli, M. J. 2018. Effect of feeding Azolla (*Azolla pinnata*) Meal on Performance of Vanraja poultry birds. Unpublished M.sc. thesis submitted to Dr. P.D.K.V., Akola.

Rec. on 16.01.2024 & Acc. on 01.02.2024