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Effect of supplementary feeding of azolla (*Azolla pinnata*) on carcass quality and biochemical parameters of broiler

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Abstract

An experiment was conducted at Poultry unit, Deptt of Animal Husbandry and Dairy Science, Dr. B.S. Konkan Krishi Vidyapeeth Dapoli, Maharashtra to determine effect of Azolla feeding on carcass quality and biochemical parameters of broilers. A total 120 chicks (144) were reared together until 9 days of age in brooding stage. On 10th day, the chicks were weighed individually and distributed randomly into four dietary groups with five replications and each replication have six chicks. A control diet (T₀) containing 0.0 % *Azolla* and three experimental diets in which *Azolla* was partially (5% - T₁), (10% -T₂) and T₃ replaced (15%) by *Azolla* (*Azolla pinnata*) were prepared. The results showed that 10 per cent azolla meal significantly improved live weight (2464.46 g), carcass weight (1932.20 g) and dressing percentage (72.47 %). The blood biochemical parameters investigated are viz., hemoglobin (Hb), glucose and total protein. The data revealed that Hb, glucose and total in normal range. Therefore, it can be concluded that *Azolla* meal @ 10 per cent in the diet of broilers used for improved carcass quality and biochemical parameters.

Keywords: *Azolla* meal. Broilers, carcass and biochemical parameters

1. Introduction

Poultry contribute substantially to enhance the meat production by being prolific and it can turn 22 to 23 per cent of the proteins what they eat into edible meat, comparable figures for other species are 20 per cent in rabbit, 16 to 18 per cent in pigs and 8 to 12 per cent in beef. The shortage of fodder is therefore compensated with commercial feed, resulting in increased costs in meat production. Moreover, as commercial feed is mixed with urea and other artificial milk boosters, it has a negative effect on health of the livestock. The search for alternatives to concentrates led us to a wonderful plant *Azolla*, which is natural protein source, holds the promise of providing an unconventional feed for livestock.

Azolla is waterborne blue green algae, mainly used as a bio fertiliser in rice fields in many parts of the world. It is also being promoted as a feed supplement for livestock in many countries including India. Available reports indicate that *Azolla* is an economic and efficient feed supplement for livestock [1, 2], *Azolla* is very rich in proteins, essential amino acids, as well as fibre, vitamins (vitamin A, vitamin B-12 and Beta- Carotene), growth promoter intermediaries and minerals like calcium, phosphorous, potassium, ferrous, copper and magnesium etc.

Feeding of *Azolla* in poultry improves growth performance in terms of body weight, daily weight gain and feed conversion efficiency [3, 4], feed intake increase with increase of *Azolla* [5, 6]. Blood analysis is an established means of assessing clinical condition and health status of animal on feeding trials since ingestion of dietary components has measurable effect on blood composition. It may be an appropriate measure for long term nutritional status and also and to assess the feed toxicity especially with feed constituents that affect the formation of blood. Keeping these points into consideration, the study was carried out to find the effect of supplementary feeding of *Azolla* on biochemical profile of broilers.

2. Materials and Methods**2.1 Experimental location**

The present investigation was conducted at "Poultry Unit" Department of Animal Husbandry and Dairy Science, Dr. B.S. Konkan Krishi Vidyapeeth (Agricultural University) Dapoli,

Maharashtra, India during 12th January, 2015 to 23th February, 2015. Dapoli is situated at 17° North latitude and 73° East longitude on the west coast of Maharashtra at 280 meters above mean sea level. The climate is warm and humid with the annual average rainfall of 3500 mm. The relative humidity ranges from 55 to 96 per cent.

2.2 Experimental design, housing and their management

In the experiment, there were four dietary treatment groups each with five replications and each replication have six birds. The first treatment (T₀) served as control in which basal diets was offered without *Azolla* supplementation while in T₁, T₂ and T₃ groups basal diet was replaced with *Azolla* meal at 5 %, 10 %, and 15 % levels, respectively. For experimental feeding trial, 120 days old broiler chicks (*Vencobb*) were procured from M/S Venkateshwara Hatcheries Pvt. Ltd., Pune and reared for 7 weeks. Chicks were kept on deep litter system in brooder house under standard management and hygienic conditions for 9 days and temperature was regulated to 30 to 35°C. They were provided standard broiler starter ration on newspaper spread on the floor. After 9 days, chicks were individually weighed and randomly divided into four groups of 30 chicks each, on the basis of average uniform body weights, discarding the extreme ranges of body weights. The chicks were transferred replicate wise (6 birds) in the compartments of similar dimensions. The chicks were housed in deep litter system. All the housing and management conditions were similar for different treatment groups. Fresh and clean water was provided *ad libitum* to the chicks of different treatment groups. Throughout the experimental period, the chicks were provided artificial light by electric bulbs of sufficient intensity.

2.3 Feeds and feeding schedule

Standard broiler feeds for starter (0-4 weeks) and finisher (4-8 weeks) periods as per [9] were provided. The composition of feeds for the starter and finisher periods are presented in Table-1. In the treatment group, calculated amount of *Azolla* replaced basal diets at different levels. *Azolla* was collected from Livestock Instructional Unit of Department of Animal Husbandry and Dairy Science, Dr. B.S. Konkan Krishi Vidyapeeth (Agricultural University) Dapoli and then it was dried under the sun for 10-15 minute. Feed was offered daily to the birds at 8.00 A.M. Representative samples of *Azolla pinnata* powder and experimental feed of starter and finisher was analyzed for their nutrient composition *viz.* dry matter (DM), crude protein (CP), ether extract (EE), total ash and crude fiber (CF), as per [7].

2.4 Carcass quality traits

End of experiment, two birds were selected randomly from each treatment, live weight of all the birds were recorded in the evening and they were allowed to fast for 16 hours (overnight), however, drinking water was provided *ad libitum*. These birds were killed in slaughter cones by severing the carotid artery and jugular veins by *Jhatka* method. Birds were allowed to bleed for four minutes until there was no blood oozing from the carcasses. Head and shanks were removed using a sharp knife which had been used to sever the jugular vein. Evisceration was carried out by making a circular incision around vent to cut open the abdominal cavity and removing all the internal organs. After the removal of heads and shanks, carcasses were weighed to determine their dressing percentages and manually eviscerated to determine other carcass traits. Birds of all the five treatment groups were

dressed and weighed in same manner. The following traits were measure in each carcass. Dressing percentage was calculated by [8].

2.5 Blood collection and analysis producers

For analyzing of serum biochemical parameters, 1 bird per replication randomly selected at six weeks of age and blood collected from wing vein with syringe in the morning time between 08:00 am and 09:00 am hours before birds were accessed to feed. The blood collected in sterilized glass test tube keeping in a slant position and serum was separated. All the serum samples were stored in a deep freeze at -20 °C until it processed. All samples of serum were analyzed in Amay Pathology Laboratory, Dapoli, Dist. Ratnagiri, Maharashtra. The total protein (g/dl) and glucose (mg/dl) was estimated by the procedure given by [9], Haemoglobin (mg/dl) by [10].

2.6 Statistical analysis

The statistical analysis of the data obtained for serum biochemical parameters was carried out as per Snedecor and Cochran (1994) [11] using Randomized Block Design.

3. Results and Discussion

3.1 Chemical composition of experimental feed

Commercial broiler starter, broiler finisher and *Azolla* meal were used for this experimental trial. The chemical composition of broiler starter, broiler finisher and *Azolla* meal is indicated in Table 1. The DM, CP, EE, NFE, CF and AT as 91.24, 21.28, 4.56, 65.65, 6.59 and 1.92 per cent in broiler starter and DM (88.96%), CP (19.34%), EE (4.73%), NFE (68.55%), CF (5.63%) and TA (1.75%) in finisher diet. The *Azolla* contained DM (89.91%), CP (21.56%), EE (3.37%), NFE (43.69%), CF (15.05%) and TA (16.33%), respectively. Similar results was reported by [12] as 21.17, 3.39, 14.6 and 19.91 per cent CP, EE, CF and TA, respectively

3.2 Carcass characteristic of broiler fed diet with *Azolla* meal

3.2.1 Live body weight (g)

The average live weight gain of experimental birds are given in Table 2. The results showed that highest live weight was recorded in T₁ (2464.46 g) followed by T₀ (2298.49 g), T₂ (2239.81g) and T₃ (2198.16 g), respectively. The statistical result denoted that average gain in body weight in treatment T₁ (5 % AZM) was significantly ($P < 0.05$) higher over other treatments. The highest gain in body weight was observed in T₁ followed by T₀, T₂ and T₃, treatments, respectively. The gain in body weights of present investigation were found to be higher than the results of [13] who observed average weekly weight gain as 322.54 g, 332.25 g, 321.05 g and 279.95 g for treatments 0, 5, 7.5 and 10 per cent, respectively and [14] reported improved nutritive value of *Azolla* (*Azolla pinnata*) meal in the diets of growing pullets fed 0, 5, 10 and 15 per cent dietary levels of *Azolla* meal and observed weekly body weight gain as 95.02, 101.7, 92.2 and 91.4 g/bird/week, respectively. The result of present findings were also higher than the reports of [15] in average weekly weight gains as 95.43 g, 95.22 g, 98.62 g and 93.44 g for the treatment 0, 5, 10 and 15 per cent of *Azolla*, respectively. Therefore, results of the present study were superior to the earlier reports in average weekly weight gain.

3.2.2 Total carcass weight (g)

The average total carcass weight presented in Table 2. The average carcass weight significantly higher observed in T₁

(1932.20 g) and T₀ (1891.00 g) than T₃ (1885.60 g) and T₂ (1869.80 g). This may be due to the higher body weights recorded in T₁ and T₀ treatment than T₂ and T₃. The results of present experiment are agreement with [4, 6, 5].

3.2.3 Dressing percentage

The average dressing percent in different groups are presented in Table 2. The significantly higher dressing percentage observed in T₁ (72.47%) followed by T₀ (72.23%), T₂ (71.89%) and T₃ (71.93%), respectively. Dressing percentage in experimental groups superior may be due to the higher body weights gain recorded in experiment groups. The findings of present study were in accordance with results of [4] who observed that treatment T₁ (control), T₂ (5% *Azolla*), T₃ (10% *Azolla*) and T₄ (15% *Azolla*) resulted in 69.38, 72.16, 68.24 and 68.78 per cent dressing, respectively [16]. Also recorded significantly higher dressing percentage (69.66 %) at 8 weeks of age for 5 per cent *Azolla* meal.

3.3 Lipid profiles of blood of broiler chickens in different dietary groups

3.3.1 Serum total protein (mg/dl)

The amount of serum total protein ($p < 0.05$) were significantly different among the dietary groups. From the data, it was revealed that the values for average serum total protein were 3.84, 3.98, 3.90 and 4.30 mg/dl in treatment T₀, T₁, T₂ and T₃, respectively. The significant highest value of serum total protein found in T₃ (4.30 mg/dl) than T₀ (3.84 mg/dl), T₁ (3.98 mg/dl) and T₂ (3.90 mg/dl), respectively. Results of present experiment are comparable with [17] who recorded 5.94±0.090 mg/dl serum protein fed by 1.5 per cent dried *Azolla* meal than control 5.91 ± 0.103 mg/dl.

3.3.2 Serum glucose (mg/dl)

The average serum glucose value (mg/dl) in different experimental groups are presented in 3. From the data, it was revealed that the average serum total glucose as 206.80, 222.40, 242.40 and 150.20 mg/dl for the treatments T₀, T₁, T₂ and T₃, respectively. The value of serum glucose ($p < 0.05$) were significantly different among the dietary groups. There was significant reduction ($p < 0.05$) in serum glucose values in T₃ (150.20 mg/dl) as compared to (206.80 mg/dl). There was increase in serum glucose with increase in *Azolla* in 10 per cent. This results was in agreement with reports by [18] who reported increment in serum glucose supplemented by 1.5 per cent dried *Azolla* meal in broiler rabbits as 127.10±5.201 mg/dl. Jaff (2011) also observed reduction in serum glucose at 2 per cent (175.00±0.32 mg/dl) than 1 per cent (185.62±0.82 mg/dl), 3 per cent (178.50±0.21 mg/dl) of coriander and control (187.66±0.46 mg/dl). However [19], reported increment in the serum glucose supplemented by coriander seed in broiler diet than while un-supplemented group.

3.3.3 Haemoglobin concentration (mg/dl)

The average haemoglobin values (mg/dl) in different groups are presented in Table 3. From the data, it was showed that the haemoglobin value was recorded as 9.40, 9.78, 10.72 and 10.68 mg/dl in T₀, T₁, T₂ and T₃, treatments, respectively. Thus, there was significant increase in haemoglobin values observed in T₂ (10.72 mg/dl) and T₃ (10.68 mg/dl) as compared to control T₀ (9.40 mg/dl) and T₁ (9.78 mg/dl). Treatments T₂ and T₃ were at par with each as well as treatments T₀ and T₁ were at par with each other. Present finding, it was showed that, the average haemoglobin value increased with increase in *Azolla* in broilers feed up to 10 per

cent level. But it numerically lowered in 15 per cent *Azolla* (T₃) then 10 per cent *Azolla* (T₂). The similar finding was observed by [20] who reported haemoglobin value as 10.66, 11.50 and 11.61 mg/dl for 0, 5 and 10 per cent with supplemented by ashwagandha, respectively [21]. Also reported significant increase in haemoglobin concentration in 1.0 per cent ashwagandha as 9.71± 0.49 to 11.33 ± 0.35 g/dl than 0.5 per cent ashwagandha 9.33±0.37 to 9.79±0.73 mg/dl. However [17], observed reduction in Hb content fed by dried *Azolla* meal as 1.5 per cent (14.12±0.34) and 3.0 per cent (14.01±0.40), respectively.

Table 1: Chemical composition of experimental feed (% DM basis)

Proximate Principle	Broiler starter	Broiler finisher	Azolla meal
Dry matter	91.24	88.96	89.91
Crude protein	21.28	19.34	21.56
Crude fat	4.56	4.73	3.37
Nitrogen Free Extract	65.65	68.55	43.69
Crude fibre	6.59	5.63	15.05
Total ash	1.92	1.75	16.33

Table 2: Average serum biochemical parameters in broilers

Treatment	Haemoglobin (mg/dl)	Serum glucose (mg/dl)	Serum protein (mg/dl)
T ₁	9.40 ^b	206.80 ^b	3.84 ^b
T ₂	9.78 ^b	222.40 ^b	3.98 ^b
T ₃	10.72 ^a	242.40 ^a	3.90 ^b
T ₄	10.68 ^a	150.20 ^c	4.30 ^a
S.E.±	0.20	5.93	0.09
C.D. at 5%	0.63	18.28	0.27

Table 3: Average carcass weight and dressing percentage of broilers

Treatment	Live weight	Carcass weight	Dressing percentage
T ₁	2298.49 ^b	1891.00 ^{ab}	72.23 ^{ab}
T ₂	2464.46 ^a	1932.20 ^a	72.47 ^a
T ₃	2239.81 ^b	1869.80 ^b	71.89 ^b
T ₄	2198.16 ^b	1885.60 ^b	71.93 ^b
S.E.±	46.43	15.00	0.11
C.D. at 5%	143.09	46.21	0.35

4. Conclusion

Results of present experiment showed that 10 per cent *azolla* meal significantly improved live weight, carcass weight, dressing percentage and as well as blood biochemical parameters viz., hemoglobin (Hb), glucose and total protein. Therefore, it can be concluded that *Azolla* meal @ 10 per cent in the diet of broilers used for improved carcass quality and biochemical parameters.

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6. References

- Lumpkin TA. Assessing the potential for the *Azolla* use in the humid tropics International Rice Commission news, 1994; 33:30-33.
- Pannaerker S. *Azolla* as a livestock and poultry feed. Livestock Adv. 1988; 13:22-26.

3. Tamany Y, Samanta G, Chakraborty N, Mondal L. Nutritive value of *Azolla pinnata* and its potentiality of feeding in goats. *Environ. Ecology*, 1992; 10:755-756.
4. Basak B, Pramanik MAH, Rahman MS, Tarafdar SU, Roy BC. *Azolla pinnata* as feed ingredient in broiler ration. *Int. J. Poult. Sci.* 2002; 1(1):29-34.
5. Bhuyan MAH, Hasanat MR, Ali MA, Rahman MA. Effect of feeding *Azolla pinnata* on the performance of broiler. *Bangladesh J. Anim. Sci.* 1998. 27(1-2):77-82.
6. Saikia N, Sapkota D, Hazarika R. Effect of feeding *Azolla pinnata* meal to broilers: A field study in Assam. *Indian J. Poult. Sci.* 2014. 49(1):113-114.
7. AOAC. *Official Methods of Analysis*. 18th ed. Association of Official Analytical Chemists. Washington, D.C., 1995.
8. Mahapatra CM, Mohapatra SC. Effect of stocking density on meat yield and quality of broilers. *Indian J. Ani. Sci.* 1989; 59(7):903-904.
9. Godkar PB. *Textbook of medical laboratory technology*. Bhulani publishing house, Mumbai. 1994, 219-222.
10. Richmond W. HDL cholesterol Kit for determination of HDL cholesterol in serum/plasma. *Clin. Chem.* 1973, 19-1350.
11. Snedecor and Cochran *Statistical Methods. Applied to Experiments in Agriculture and Technology*. Statistical methods 8th Calcutta, India: Oxford & IBH Publishing Co.
12. Sujatha T, Kundu A, Jeyakumar S, Kundu MS. *Azolla* supplementation feed cost benefit in duck ration in Andaman Islands. *Division of Animal Science, Tamilnadu J. Vet. Anim. Sci.* 2012; 9(2):130-136,
13. Jeberlin PB, Kumar K. Dried *Azolla* as a nutritionally rich cost effective and immuno-modulatory feed supplement for broiler. *J. Anim. Sci.*, 2010; 5:20-22.
14. Alalade OA, Eustace AI, Alalade TO. The nutritive value of *Azolla pinnata* meal in the diets of growing pullets and subsequent effects on the laying performance. *Int. J. Poult. Sci.* 2007; 44:273-277.
15. Alalade OA, Iyayi EA. Chemical composition and the feeding value of *Azolla pinnata* meal for egg-type chicks. *Int. J. Poult. Sci.* 2006; 5(2):137-141.
16. Parthasarathy R, Kadirvel R, Kathaperumal V. Studies on economics of utilizing *Azolla* in broiler rations. 2001; 30(1-2):24-26.
17. Anitha KC, Rajeshwar YB, Shree JS. Effect of Supplementary Feeding of *Azolla* on Biochemical Parameters of Broiler Rabbits. Effect of supplementary feeding of *Azolla* on biochemical parameters of broiler rabbits, 2016; 6(10):605-607.
18. Anitha KC, Rajeshwar YB, Mahadevapa DG, Shree SJ. Effect of inclusion of *Azolla pinnata* on the haematological parameters of broiler rabbits. *Int. J. Appl. Pure Sci. and Agric.* 2016; 02(10):93-97.
19. Jung JP. Effect of different levels of coriander oil on performance and blood parameters of broiler Chickens. *Annals of Bio. Res.* 2011; 2(5):578-583.
20. Alka PB. Effect of feeding Ashawagandha root powder on physiological characteristics and performance of layer. (Unpublished) Ph.D. Thesis submitted to PDKV, Akola (Maharashtra), 1998.
21. Samarth VR, Dakshinkar NP, Jagtap DG, Bhojhe GR. Effect of Ashawagandha (*Withania somnifera*) on hemato-biochemical profile of broilers. *Ind. J. Anim. Sci.* 2003; 73(6):618-619.