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Effect of *Azolla* Supplementation on Production Performance of Narmadanidhi Birds

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ABSTRACT

The present work was carried out in the Department of Livestock Production Management, College of Veterinary Science and Animal Husbandry, Rewa to study the production performance of Narmadanidhi birds under *Azolla* supplemented diet on day old chicks. In this study 72 straight run chicks were divided into three groups, comprising three replicates and eight birds in each replicate. The birds of the control group (T1) was fed a basal diet while the other groups (T2) and (T3) was fed 5% and 10% of basal diet replaced by sun dried *Azolla* powder on DM basis. The birds were reared up to the attainment of market weight (1.0 kg live body weight). Body weight shows significant differences in different groups. Highest body weight was observed in group 2 which was supplemented with 5% *Azolla* in the diet. Growth rate data in the experimental birds clearly indicated that there was highly significant difference between the groups. The feed intake values revealed significantly lower in both the *Azolla* fed groups compared to the control group. The Overall FCR was significantly better in T2 group as compared T1 and T3 groups. The study will help to reduce feeding cost and improve the livelihood of rural farmers as additional income source.

HIGHLIGHTS

- A 5% *Azolla* supplemented with basal diet may be economic for raising of Narmadanidhi birds than 10% *Azolla* supplementation.
- Overall FCR was Significantly better in 5% *Azolla* supplemented with basal diet than 10% *Azolla* supplemented with basal diet.
- Highest body weight gain was observed in 5% *Azolla* supplemented with basal diet.

Keywords: Body weight, Feed intake, FCR, Growth rate, Narmadanidhi

Poultry farming is one of the most profitable businesses among agriculture and allied sector that provides nutritious meat and egg for human consumption. The poultry population of India was 851.81 million in 2019. The total meat production is 8.11 million tonnes above which poultry meat production were 50.06%. India ranks 5th in chicken meat production in the world (Basic A.H. & Fisheries statistics-2019, DAHD, GOI). Availability of quality feed at a reasonable cost is a key to successful poultry operation. Since the feed cost incurred about 60-65% of the total cost of poultry production (Banerjee, 1992). To sustain in the competitive market it would be wise to use unconventional feed ingredients in the diet formulation to reduce the production cost for poultry. FAO program focuses on increasing the feed-based production systems to locally available feed resources this can be achieved by effective use of non-conventional feed resources like *Azolla* either by replacing a certain quantity

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of their diet or under choice feeding. *Azolla pinnata* is a rich source of protein (25.64% on DM basis), calcium (1.11% on DM basis) and it contains almost all essential amino acids, minerals like iron, magnesium, potassium, phosphorus, manganese, carotenoids, and other vitamins (Pillai *et al.,* 2004). Narmadanidhi is an improved dual-purpose bird developed by the AICRP on Poultry Breeding, Nanaji Deshmukh Veterinary science university, Jabalpur. The breed has been developed in such a way that terminal cross has 25% inheritance of Kadaknath breed and 75% inheritance of Jabalpur colour birds. Narmadanidhi has a very attractive multicolour plumage pattern (black, brown, grey, and mixed) and strong body conformation and moves fast in free-range. These features help in scavenging and also to protect these birds from predators. Narmadanidhi birds thrive well and adapt to harsh climatic conditions and are preferred by farmers even in urban slum areas. The breed resembles to native chicken in appearance but has higher growth and production potential results survive better in sub-optimal nutritional management. The birds attain approx. 1000 gram body weight at 8 weeks of age under the intensive system (Bhagat *et al.,* 2017).

Though a lot of work has been carried out on the effects of *Azolla* supplementation on production performance of poultry birds (Dhumal *et al.,* 2009; Bhattacharyya *et al.,* 2015; Kashyap *et al.,* 2017; Shukla *et al.,* 2018 and Tawasoli *et al.*, 2018). The information regarding above stated for rural poultry farming is scanty. In view of the above, the proposed investigation was planned to study the effect of dried *Azolla* on growth, body weight, feed intake, feed conversion ratio of Narmadanidhi birds.

MATERIALS AND METHODS

The present work was carried out in the Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry, Rewa (M.P.). The day old, 72 straight run Narmadanidhi chicks were divided into three groups, comprising three replicates and eight birds in each replicate. The chicks were wing banded, weighed individually, and distributed randomly on a uniform body weight basis in different treatment groups. The birds were housed in a deep litter system. The birds of the control group (T1) were fed a basal diet while the other groups (T2) and (T3) were fed 5% and 10% of basal diet replaced by sun-dried *Azolla* powder on DM basis. The basal diet (Layer chick ration) was procured from the market containing 20% CP and ME 2800 Kcal/ Kg feed (BIS, 2007). The bird was reared up to the attainment of market weight (1.0 kg live body weight). The Institutional Animal Ethics Committee had examined and approved the experimental procedure and animal usage in the current investigation. Committee (No.03/IAEC/Vety/Rewa/2019; Dated: 04 November 2019), College of Veterinary Science & A.H. (M.P). A representative sample of *Azolla* meal was analyzed for their proximate value. Individual body weights and growth rate was recorded from day old age to market weight (1.0 Kgs) after every 14 days of interval. The daily feed intake was calculated by subtracting the weight of residual feed to the feed offered. The feed conversion ratio was obtained as a ratio of total feed consumed (g) and total gain in body weight (g).

RESULTS AND DISCUSSION

Composition of Dry *Azolla*

The crude protein of *Azolla* was 24.46%. This was in agreement with the values obtained by Singh and Subudhi (1978), Titus and Pereira (2007), Parthasarathy *et al.* (2002), Balaji *et al.* (2009). The ether extract was 2.25%. This was in accordance with the values obtained by Singh and Subudhi (1978), Titus and Pereira (2007). Crude fiber was found to be 8.34%, which was in accordance with Singh and Subudhi (1978). Total ash was found to be 3.82% which was in agreement with the value obtained by Titus and Pereira (2007). The moisture content of *Azolla* was 15% this was in concurrence with the value determined by Balaji *et al.* (2009).

Body Weight and Body Weight Gain

The body weights of birds were shown in table 1. The body weight differed significantly from the 5th interval onwards. In this experiment, the diet containing a 5% level of *Azolla* meal was best in respect of body weight (1658 g) in the 7th interval of age. The result is similar to the observation of Singh and Subudhi 1977. On the other hand, Basak *et al.* (2002) observed significant improvement in live weight of broiler chicks than that of control diet when they were fed with 5% *Azolla* meal replacing sesame meal at 6 weeks of age, while lower live weight was recorded in 10 and 15 %

Table 1: Bodyweight (g) of Narmadanidhi in a biweekly interval

Group	No.	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5	Interval 6	Interval 7
1	24	31.28 ± 1.35^{aA}	59.9 ± 1.67^{aA}	248.81 ± 9.54^{bA}	381.11 ± 19.53^{cA}	784.44 ± 38.98^{dA}	1206.66 ± 47.60^{eA}	1459 ± 39.04^{fA}
2	24	34.07 ± 0.89^{aA}	56.25 ± 1.55^{aA}	262.55 ± 8.55^{bA}	375.55 ± 11.10^{cA}	844.44 ± 32.79^{dAB}	1340 ± 66.33^{eA}	1658.88 ± 63.32^{fB}
3	24	34.07 ± 1.02^{aA}	57.66 ± 1.84^{aA}	266.66 ± 7.45^{bA}	374.44 ± 12.14^{cA}	902.22 ± 32.04^{dA}	1315.55 ± 55.45^{eA}	1584.44 ± 47.37^{fAB}

Table 2: Feed intake (g/biweekly) of Narmadanidhi in a biweekly interval

Group	No.	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5	Interval 6
1	24	232.98 ± 2.66^{aB}	634.6 ± 7.22^{bB}	976.5 ± 8.93^{cC}	1160 ± 3.16^{dC}	1349.5 ± 49.48^{eB}	2268.4 ± 27.36^{fC}
2	24	210.1 ± 3.96^{aA}	622 ± 2.45^{bB}	743 ± 5.18^{cA}	905.01 ± 1.21^{dB}	1149.3 ± 11.61^{eA}	1550.2 ± 19.60^{fB}
3	24	212.8 ± 0.90^{aA}	469.2 ± 12.24^{bA}	769 ± 9.27^{cB}	851.9 ± 6.18^{dA}	1150 ± 21.65^{eA}	1395.5 ± 15.91^{fA}

Table 3: Feed conversion ratio of Narmadanidhi at a biweekly interval

Group	No.	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5	Interval 6
1	24	8.31 ± 0.38^{bcA}	3.42 ± 0.17^{aB}	7.95 ± 0.69^{bA}	3.52 ± 0.79^{aB}	3.72 ± 0.57^{aA}	10.07 ± 1.06^{cB}
2	24	9.70 ± 0.46^{cB}	3.06 ± 0.13^{aB}	7.53 ± 0.94^{bA}	2.03 ± 0.18^{aA}	2.89 ± 0.52^{aA}	6.69 ± 1.15^{bA}
3	24	9.26 ± 0.48^{dAB}	2.27 ± 0.09^{abA}	7.50 ± 0.56^{cdA}	1.65 ± 0.08^{aA}	3.64 ± 0.79^{bA}	6.94 ± 1.04^{cAB}

Azolla incorporated diets. Growth is usually measured by weight gain at every fortnight. The mean value of growth rate along with their standard errors at first interval (0 to 14 days) of age was 28.61 ± 1.69, 22.18 ± 1.39, and 23.58 ± 1.48 g respectively for the group 1, group 2, and group 3 birds. All the chicks were reared in a brooder house till the age of 15 days. The means values and standard error at the 2nd interval of the experimental period (14 to 28 days) were 188.91 ± 9.22, 206.3 ± 9.01, and 209.01± 8.35 g, for the group 1, group 2 and group 3 birds. The means values and standard error at the 6th interval were recorded 252.33 ± 34.38, 318.89 ± 63.97, and 268.88 ± 60.45 g, respectively for group 1, group 2, and group 3 birds. Growth rate data in the experimental birds clearly indicated that there was a significant difference ($p<0.05$) between the groups. Our results are in full agreement with the previous reports of *Azolla* as a feed ingredient for broiler birds (Rai *et al*., 2012). Whereas Basak *et al.* (2002) and Parthasarathy *et al. (*2002) reported significant ($P<0.01$) improvement in the live weight of broiler chicks than that of control diet-fed birds when they were fed with 5% *Azolla*.

Feed intake and feed conversion ratio

Feed intake has been obtained by subtracting the residual feed from the feed offered. The feed intake was given in table 2. In group 1 the total feed offered from interval 1st, 2nd, 3rd, 4th, 5th, and 6th were recorded 232.98 g, 634.06 g, 976.50 g, 1160 g, 1349.50 g, and 2268.40 g although, in group 2 210.10 g, 622 g, 743 g, 905.01 g, 1149.30 g, 1550.20 g and in group 3 were 212.8 g, 469.2 g, 769 g, 851.9 g, 1150 g, and 1395.5 g, respectively.

Feed intake revealed that feed intake was significantly lower in both the *Azolla* fed groups compared to the control group. However, there was no significant difference in feed intake among the treatment groups. Querubin *et al.* (1986), Basak *et al.* (2002), Balaji *et al.* (2009) reported that the inclusion of *Azolla* in the broiler diet did not affect feed consumption up to 15% level of inclusion. However, Bested and Morento (1985) stated that *Azolla* affected the palatability of the feed and reduced feed consumption. The feed conversion ratio computed for different groups is presented in Table 5.The feed conversion ratio value were observed in group 1 to be 8.31 ± 0.38, 3.42 ± 0.17, 7.95 ± 0.69, 3.52 ± 0.79, 3.72 ± 0.57, and 10.07 ± 1.06, in group 2 were 9.70 ± 0.46, 3.06 ± 0.13, 7.53 ± 0.94, 2.03 ± 0.18, 2.89 ± 0.52, and 6.69 ± 1.15 and in group 3 the value were 9.26 ± 0.48, 2.27 ± 0.09, 7.50 ± 0.56, 1.65 ± 0.08, 3.64 ± 0.79, and 6.94 ± 1.04 at 1st interval, 2nd interval, 3rd interval, 4th interval, 5th interval and 6th interval, respectively.

Results indicated that biweekly FCR was significantly better in the control treatment group compared to the other two experimental groups at the 6th interval (table 3). The FCR was significantly better in the experimental group 2 and 3 as compared to control group during intervals 1 to 6 (6.69 & 6.94 vs 10.07). The Overall FCR was significantly better in the treatment group 2. Balaji *et al.* (2009) noted that there was no significant difference in the cumulative feed efficiency of broiler fed on 1.5%, 3%, and 4.5% *Azolla* incorporated diets. Similar results were also reported by Parthasarathy *et al*. (2002). The Naghshi *et al.* (2014) reported that chicken fed with 5% *Azolla* powder had significantly improved FCR compared to control. In the present study, Overall FCR was significantly better in treatment group 2. However, there was no significant difference between the 5% *Azolla* fed group 2 and the 10 % *Azolla* treatment group 3, this might be due to the palatability of *Azolla*.

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REFERENCES

Banerjee, G.C. 1992. Poultry. 3rd Ed., Oxford and IBH public Cooperative Private Limited, New Delhi.

Basak, B., Pramanik, A.H. and Siddiqui, R.M. 2002. Azolla (*Azolla pinnata*) as a feed ingredient in broiler ration. *Int. J. Poult. Sci*., **1**: 29.

Balaji, K., Jalaludeen, A., Churchil, R. R., Peethambaran, P. A. and Senthilkumar, S. 2009. Effect of dietary inclusion of Azolla (*Azolla pinnata*) on production performance of broiler chicken. *Indian J. Poult. Sci.,* **44**(2): 195-198.

Basic Animal Husbandry and Fisheries Statistics. 2019. Animal Husbandry Statistics Division, Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India.

Bested, S.B. and Morento, S.E. 1985. The effect of different percentage of *Azolla* on fattening pigs. *MSAC J.,*17:31.

Bhattacharyya, A., Shukla, P.K., Roy, D. and Shukla, M. 2015. Effect of feeding Azolla (*Azolla pinnata*) on growth and immune competence of commercial broilers. In: Proceedings of the Seminar 9th International Poultry Show and Seminar Safe food Healthy Nation, 2015. Dhaka, Bangladesh, pp. 19-21**.**

Bhagat, P.K., Mishra, A.K., Goyal, G. 2017. Studies on the effect of different rearing system of performance of Narmadanidhi breed of poultry. MVSC (LPM) thesis, NDVSU (MP).

Dhumal, M.V., Siddiqui, M.V., Siddiqui, M.B.A. and Avai, P.E. 2009. Performance of broiler fed on different levels of Azolla meal. *Indian J. Poult. Sci.,* **44**(1): 65.

Kashyap, S.S., Shukla, K.P., Bhattacharyya, A. and Sirohi, R. 2017. Effect of dietary inclusion of *Azolla* (*Azolla pinnata)* in raw and meal forms on the production performance, immunocompetence, Development of digestive organs and carcass quality traits of coloured chicken. *J. Anim. Res.,* **8**: 73-78.

Naghshi, H., Khojasteh, S. and Jafari, M. 2014. Investigation the effect of different levels of Azolla (*Azolla pinnata*) on performance and carcass characteristics of cobb broiler chicks. *Int. J. Farming Allied Sci*., **3**: 45-9.

Parthasarathy, R., Kadirvel, R. and Kathaperumal, V. 2002. *Azolla* as a partial replacement for fish meal in broiler rations. *Indian Vet. J.,* **79**(2): 144-146.

Pillai, P.K., Premalatha, S. and Rajamony, S. 2004 .Azolla-A sustainable feed substitute for livestock. with special emphasis on silapauline based production and feeding technique. *Biofertiliser Tech*., 209-218.

Querubin, L.J., Alcantara, P.F., Luis, E.S. and Princesa, A.O. 1986. Chemical composition and feeding value of *Azolla* in broiler ration. *Anim. Prod. Tech.,* **12**: 65.

Rai, R.B., Dhama, K., Damodaran, T., Ali, H., Rai, S., Singh, B. and Bhatt, P. 2012. Evaluation of Azolla (*Azolla pinnata*) as a poultry feed and its role in poverty alleviation among landless people in northern plains of India. *Vet. Pract.*, **13**(2): 250-254.

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

Singh, P.K. and Subudhi, B.P.R. 1978. Utilization of Azolla in poultry feed. *Indian Farming,* **27**: 37-39.

Shukla, M., Bhattacharya, A., Shukla, K.P., Roy, D., Yadav, B. and Sirohi, R. 2018. Effect of *Azolla* feeding on the growth, feed conversion ratio, blood biochemical attributes and immune competence trait of growing turkeys. *Vet. World*, **11**(4): 459-463.

Titus, A and Pereira, G.N. 2007. *Azolla* as a biofertilizers in coffee plantations. Retrieved from https://ecofriendlycoffee.org/azolla-as-a-biofertilizer-in-coffee-plantations/ .

Tawasoli, M.J., Kahate, P.A., Shelke, R.R., Chavan, S.D. and Shegokar., S.R. 2018. Effect of feeding *Azolla* meal on feed intake and feed conversion efficiency of Vanraja poultry birds. *Int. J. Agric. Sci.,* **10**(14): 6733-6736.