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**Borkar VD**

P.G. Student, Animal  
Husbandry and Dairy Science  
Section, College of Agriculture,  
Nagpur, Maharashtra, India

**AB Motghare**

Assistant Professor, Veterinary  
Science, College of Agriculture,  
Nagpur, Maharashtra, India

**SS Bawaskar**

Assistant Professor, Veterinary  
Science, College of Agriculture,  
Nagpur, Maharashtra, India

**Bhavana R Wankhade**

Assistant Professor, Animal  
Husbandry and Dairy Science  
Section, College of Agriculture,  
Nagpur, Maharashtra, India

**Corresponding Author:**

**Borkar VD**

P.G. Student, Animal  
Husbandry and Dairy Science  
Section, College of Agriculture,  
Nagpur, Maharashtra, India

## Studies on feeding of azolla meal on growth performance of Kadaknath poultry

**Borkar VD, AB Motghare, SS Bawaskar and Bhavana R Wankhade**

### Abstract

The present investigation entitled “Studies on feeding of Azolla meal on growth performance of Kadaknath poultry” was carried out to assess the effect of Azolla meal on Body weight, Dressing percentage and Economics of Kadaknath poultry bird’s production. 192, Chicks of day old straight run commercial Kadaknath breed were procured from Government hatchery, Nagpur (Maharashtra). They were randomly and equally distributed into four treatment groups T1, T2, T3 and T4 with 48 numbers of chicks in each group. Azolla meal was added in experimental ration at different levels. The dietary treatments consisted of one basal control (T1), supplemented with 2.5% Azolla meal (T2), 5% Azolla meal (T3) and 7.5% Azolla meal (T4). The corresponding average live body weights at the end of eighth week of age were 701.50, 736.25, 787.72 and 846.35 gm for treatment T1, T2, T3 and T4, respectively. The average weekly body weight gains at eighth week of age were 112.24, 120.43, 132.92 and 148.20 gm. for treatment T1, T2, T3 and T4, respectively. The average dressing percentage among the different treatment groups varied between 70.54 to 73.24 per cent. Numerically higher dressing percentage was recorded in treatment T4 (73.24). The net profit per bird was highest in T4 (Rs. 257.42), T3 (Rs. 233.21), T2 (Rs. 210.35) and T1 (Rs. 194.17). The result therefore concludes that supplementation of 7.5 per cent dried Azolla meal was beneficial to improve the growth performance of birds.

**Keywords:** azolla meal, growth rate, dressing percentage and Kadaknath poultry

### Introduction

Poultry farming amongst Indian livestock vocations occupies a special position because of enormous potential of bringing rapid economic growth incurring low investment. It is one of the most money-spinning businesses of agriculture that bestows nutritious meat and eggs for human consumption within the shortest duration of time.

The sustained availability of low-priced, high-quality feeds in India is critical if poultry production is to remain competitive and to continue to grow to meet the increasing consumer demand for eggs and meat (Ali 2007) <sup>[1]</sup>. Feed alone incurs about seventy per cent of total cost of poultry production. Thus, it required special attention towards lowering feed cost, which reduces input cost to make it economically viable and money spinning for both skilled and unskilled labour. Presently nineteen poultry breeds are registered at the national level. Out of these breeds, one well known native breed is “Kadaknath” meaning a fowl having black flesh. The bird is native of Jhabua and Dhar districts in western parts of Madhya Pradesh. As per available literature Kadaknath lays around 80-90 (Rahangdale *et al.* 2017) <sup>[13]</sup> eggs annually and the bird is not a good brooder. Ability to adapt in local climatic conditions, breed specific criteria, meat qualities and disease resistant are the factors responsible for the popularity of Kadaknath bird (Thakur *et al.* 2006) <sup>[18]</sup>. Rao and Thomas (1984) <sup>[15]</sup> reported the Kadaknath breed contains a high percentage of protein and believed to have aphrodisiac properties. Azolla is a floating fern and belongs to the family Azollaceae (De Frank 1995) <sup>[4]</sup>. Whereas the use of Azolla meal as feed supplement results in optimum condition for normal growth by acting in various ways.

Azolla is very rich in proteins, essential amino acids, vitamins, growth promoter intermediaries and minerals (Kamalasanana *et al.* 2002) <sup>[7]</sup>. It was observed that the poultry fed on Azolla show significant increase in the body weights and consequently has resulted in an increase in the net return. Considering these, present investigation was planned to find out the “Studies on feeding of Azolla meal on growth performance of Kadaknath poultry”.

## Materials and Methods

The present experiment was conducted at Animal Husbandry and Dairy Science Section, College of Agriculture, Nagpur (MS). The study was conducted for a period of 8 weeks to study the efficiency of utilization of Azolla as live body weight, body weight gain, dressing percentage and cost structure. Were 192 chicks of day-old age, belongs to Kadaknath breed were individually weighed and randomly divided into four groups of 48 chicks each having almost similar average body weight. Four dietary groups designated as T1, T2, T3 and T4 were formulated by incorporating 0, 2.5, 5 and 7.5 per cent level of dried Azolla, respectively. The vaccination programmed of experimental birds was schedule weekly. All the experimental chicks were reared on deep litter system of rearing with use of rice husk as a litter material. Proper brooding of chicks was done by providing sufficient heat and light by using electric bulbs in each group for first three weeks of age. Afterwards, sufficient artificial light was provided during night hours throughout the experimental period. The experimental chicks were weighted individually at weekly interval up to the eight weeks using electric balance. The weekly average live weight gain was calculated from the difference in body weight attained at the end and start of the concerned period. Dressing percentage calculated using following formula

$$\text{Dressing Percentage} = \frac{\text{Dressed Carcass weight (g)} \times 100}{\text{Live weight (g)}}$$

The cost structure of Kadaknath poultry rearing was worked out by considering the total cost of production which included the feed cost, chicks, labour, medicines, vaccines and the overhead costs.

## Azolla meal production

Azolla was cultivated, multiplied and harvested in concrete tank constructed structure. After maturation of Azolla was harvested, collected and dried for three days until they become crispy while retaining their greenish coloration. The dried leaves were then milled in grinder machine to produce leaf meal, which was then stored in air tight sacs until used for feeding.

## Results and Discussion

The feed supplement like Azolla meal were tried in present study with an objective to study the effect of supplementation of these dried Azolla on growth performance during the

period of experiment data obtained was analyzed statistically and presented and discussed in the light of finding of earlier researches.

## Effect of Azolla meal on average weekly overall live weights of Kadaknath poultry birds

The data obtained in respect of average weekly live weights of Kadaknath poultry birds from day old to eight weeks age in all treatment groups was statistically analyzed tabulated and presented in Table 1. It was observed from the present study that the average live weight of Kadaknath poultry birds at day old stage were 26.27, 26.32, 26.14 and 26.19 gm for the treatments T1, T2, T3 and T4 respectively. The initial body weight of Kadaknath poultry birds was statistically non-significant in all dietary treatments indicating that the treatments were homogenous in nature. The corresponding average live weight at the end of eighth weeks of age was 701.50, 736.25, 787.72 and 846.35 gm for the treatment T1, T2, T3 and T4 respectively. The significant difference in weekly weight was found from second week and onward. The trend of significantly better growth was recorded in T4 (846.35) and followed by T3 (787.72), T2 (736.25) groups during second to eighth week. This indicates beneficial effect of feeding 7.5% Azolla meal more than 5% level of Azolla meal.

The results recorded in the present investigation are also supported and in agreement with results recorded by some of following researchers. Mangesh Kumar *et al.* (2018) [8] the day-old broiler chicken were randomly distributed into 5 treatments with three replicates to evaluate the effect of inclusion of different level of Azolla on growth and performance on broiler chicks. The birds in group control were fed on basal diet while in treatments T1, T2, T3 and T4 the basal diet was supplemented with 2.5, 5, 7.5 and 10 per cent of sun-dried Azolla, respectively. The body weight gain was higher ( $p < 0.001$ ) in treatment T3 (2182.07) which was comparable with T2 (2173.10) and T4 (2132.67). Highest ( $p < 0.01$ ) feed consumption was recorded T3 (3900.98) group. FCR was significantly ( $p < 0.01$ ) lowest in T3 (1.67) which was comparable with T1 (1.72) group. Similar results were also reported by Basak *et al.* (2002) [3], Rai *et al.* (2012) [14], Sharma (2014) [16], Shoukat Ara *et al.* (2015) [17]. The variations in live weight reported by different authors can be attributed due to the system of rearing, strain, stocking density, composition of feed, feeding pattern, nutrient intake, photoperiod and ambient temperature.

**Table 1:** Effect of feeding Azolla meal on live weight of Kadaknath birds

Treatment	Average weekly live weights gm/bird								
	Initial wt.	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>
T1	26.27	56.23	88.31	142.63	236.56	344.90	463.62	589.26	701.50
T2	26.32	55.54	93.23	150.32	247.27	359.82	483.21	615.82	736.25
T3	26.14	55.62	97.63	161.15	262.65	381.25	512.56	654.80	787.72
T4	26.19	56.12	99.47	170.58	278.31	403.68	543.87	698.15	846.35
'F' test	NS	NS	Sig.						
SE(m)±	0.04	0.17	2.48	6.12	9.11	12.81	17.52	23.73	31.56
CD	.....	.....	7.64	18.85	28.06	39.46	53.98	73.11	97.24

## Effect of Azolla meal on average weekly body weight gain of Kadaknath poultry birds

The data for weekly body weight gain was presented in Table 2. The significant difference in weekly body weight gain was found on second week. Whereas the trend of significantly better growth was recorded in T4 (148.20), T3 (132.92), T2

(120.43) and T1 (112.24) groups on eighth week. Average weekly live weight gain as treatment mean was calculated as 84.40, 88.74, 94.32 and 101.64 for T1, T2, T3 and T4 respectively were denoted that supplementation of Azolla meal as feed additives is beneficial and positively affected on live body weight gain.

The results recorded in the present investigation are also supported and in agreement with results recorded by some of following researchers.

Mangesh Kumar *et al.* (2018) [8] the day-old broiler chicken were randomly distributed into 5 treatments with three replicates to evaluate the effect of inclusion of different level of Azolla on growth and performance on broiler chicks. The birds in group control were fed on basal diet while in treatments T1, T2, T3 and T4 the basal diet was supplemented with 2.5, 5, 7.5 and 10 per cent of sun-dried Azolla, respectively. The body weight gain was higher ( $P < 0.001$ ) in treatment T3 (2182.07) which was comparable with T2 (2173.10) and T4 (2132.67). As well as Sujatha *et al.* (2013) observed that by supplementing commercial feed with raw Azolla (*Azolla pinnata*), a nutrient rich water fern, the final gain in body weight/day were higher and better in Azolla

supplemented group than the birds in control group. Further, more similar results reported by Govind Rama Rathod *et al.* (2013) [6] and Paudel *et al.* (2015) [12].

Whereas Parthasarathy *et al.* (2002) [11] reported no significant difference in body weight gain of broilers on basal and 5 per cent Azolla diets. Balaji *et al.* (2009) [2] also noted that inclusion of Azolla up to 4.5 per cent in ration did not have any influence of body weight gain in broiler chicken. These observations suggested that green Azolla when fed *ad-libitum* with the basal diet or replace 5 per cent of the basal diet on DM basis had no adverse effect on body weight gain. These findings are not in line with the results of the present study. Further, Naghshi *et al.* (2014) [9] reported that chicken fed 5 per cent Azolla powder had significantly ( $P < 0.01$ ) better daily weight gain compared to the basal diet.

**Table 2:** Effect of feeding Azolla meal on weight gain of kadaknath birds

Treatment	Average weekly weight gain gm/bird								Treatment Mean
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	
T1	29.96	32.08	54.32	93.93	108.34	118.72	125.64	112.24	84.40
T2	29.22	37.69	57.09	96.95	112.55	123.39	132.61	120.43	88.74
T3	29.48	42.01	63.52	101.50	111.60	131.31	142.24	132.92	94.32
T4	29.93	43.35	71.11	107.73	118.37	140.19	154.28	148.20	101.64
Week Mean	29.64	38.78	61.51	100.02	112.71	128.40	138.69	128.45	
'F' test	NS	Sig.							
SE(m)±	0.17	2.53	3.73	3.00	2.08	4.71	6.21	7.83	
CD	.....	7.79	11.49	9.24	6.40	14.51	19.13	24.12	

#### Effect of feed additives Azolla meal on mean value of dressing percentage of Kadaknath poultry Birds

Dressing percentage for all the treatment groups was calculated by slaughtering four birds from each treatment groups. The dressing percentage was analyzed, tabulated and presented in Table 3. The average dressing percentage among the different treatment groups was recorded as 70.54, 71.80, 72.45 and 73.24 per cent for treatment T1, T2, T3 and T4 respectively. The difference among all the treatment groups was found to be significant. Numerically higher dressing percentage was recorded in treatment T4 and followed by T3 it shows the positive and beneficial effects of herbals feeding on dressing percentage.

Results recorded by some of research worker as discussed below are in agreement with present results.

Parthasarathy *et al.* (2002) [11] reported significantly ( $P < 0.01$ )

higher dressing percentage (69.66 per cent) at 8 weeks of age in broiler birds fed 5 per cent Azolla diet compared to control (67.79), 10 (65.76), 15 (65.38) and 20 per cent (65.19) Azolla fed groups. They also reported that there was a significant difference ( $P < 0.01$ ) in the weights of organs *viz.*, heart, gizzard and giblets in birds fed 15 and 20 per cent Azolla diets. Also Basak *et al.* (2002) [3] reported that the highest dressing percentage was observed in the birds fed with 5 per cent level of Azolla (72.16) when compared with 0, 10 and 15 per cent groups. However, they observed no significance differences in abdominal fat percentage within the different treatment groups. The mean giblet percentage was significantly higher in birds receiving 15 per cent Azolla (6.44) compared to other treatment groups. As well as similar results found by Naghshi *et al.* (2014) [9].

**Table 3:** Mean values of dressing percentage of Kadaknath Poultry Birds

Treatment	Mean dressing percentage (4 birds from each treatment)
T1	70.54
T2	71.80
T3	72.45
T4	73.24
'F' test	Significant
SE(m)±	0.28
CD	0.86

#### Effect of feed additives dried Azolla on economics of Kadaknath poultry birds rearing.

The economics of Kadaknath poultry bird rearing was estimated by considering the total amount of feed consumed by birds under T1, T2, T3 and T4 treatments and other inputs such as cost of day old chicks, medicine, vaccines, litter material etc. However, the cost of labors, electricity etc. we're not considered in calculating the economics of Kadaknath

poultry bird production being post graduate research work. Moreover, it would be similar for all treatments. The data on economics is presented in Table 4. It is revealed from the data that the cost of feed in T2, T3 and T4 was increased in accordance with the level of addition of dried Azolla. Moreover, Kadaknath poultry bird in treatment groups T4 and T3 gain higher body weight (846.35g/bird) with feed cost (Rs. 74.58), (787.72 g/bird) with feed cost (Rs. 70.29) and control

group gained weight (701.50g) with feed cost (Rs. 66.33). The net profit per bird was higher in T4 (Rs. 257.42) followed by T3 (Rs.233.21), T2 (Rs.210.35), and T1 (Rs. 194.17).

Result recorded by some of research worker as discussed below are agreement with present results.

Shoukat Ara *et al.* (2015) [17] determined the impact of dietary inclusion of aquatic fern *Azolla* on profitability broiler production. Study was conducted with 240 Cobb broiler chicks which were randomly assigned into five groups having three replicates of 16 birds each. Birds in control (T1) group

were fed basal diet, where as in other groups fish meal was replaced with 5 (T2), 10 (T3), 15 (T4) and 20 per cent (T5) *Azolla*. Net profit per 100 birds was Rs. 954 in T1, 1104 in T2, 918 in T3, 868 in T4 and 825 in T5. An additional profit of Rs. 150 and loss of Rs 36, 86 and 129 per 100 birds were observed in T2, T3, T4 and T5 respectively when compared with the control. The results indicated that *Azolla* at 5 per cent inclusion level in broiler chicken ration is highly economical. As well as similar result found by Namra *et al.* (2010) [10], Dhumal *et al.* (2009) [5], Basak *et al.* (2002) [3].

**Table 4:** Economics of Kadaknath poultry birds rearing (per bird basis)

Sr. No.	Particulars	T1	T2	T3	T4
1.	Cost of day old chicks (Rs.)	40	40	40	40
2.	Cost of feed (Rs/kg) or 1650 Rs/50kg/bag	33	33	33	33
3.	Cost of dried <i>Azolla</i>	00	00	00	00
4.	Total cost of feed (Rs/kg)	33	33	33	33
5.	Average total feed consumed per bird (Kg)	2.01	2.05	2.13	2.26
6.	Cost of feed consumed per bird (Rs.)	66.33	67.65	70.29	74.58
7.	Rearing cost per bird (Rs.)*	50	50	50	50
8.	Total cost of production (Rs.) (1+6+7)	156.33	157.65	160.29	165.58
9.	Average body weight at the end of 8 <sup>th</sup> week (Kg)	0.701	0.736	0.787	0.846
10.	Average price realized @ Rs. 500 per kg live weight (Rs.)	350.50	368	393.50	423
11.	Net profit per bird (Rs.) 10-8	194.17	210.35	233.21	257.42

\*Including bedding material, labour, medicine, electricity, vaccination, work. The net profit per bird is calculated only for 150 birds, if number of birds increase net profit also increased and cost of production will reduced.

## References

- Ali J. Livestock sector development and implications for rural poverty alleviation in India. *Livestock research for rural development* 2007;19(2):1-15.
- Balaji K, Jalaludeen A, Churchil RR, Peethambaran PA, Senthil KS. Effect of dietary inclusion of *Azolla (Azolla pinnata)* on production performance of broiler chicken. *Indian Journal of Poultry Science* 2009;44(2):195-1.
- Basak B, Pramanik AH, Rahmnan MS, Taradar SU, Roy BC. *Azolla (Azolla pinnata)* as a feed ingredient in broiler ration. *International Journal of Poultry Science* 2002;1(1):29-34.
- De Frank J. *Azolla* for weed control for wetland Taro Production. Video University of Hawaii at Manoa, College of Tropical Agriculture. 19 min. this video documents an experiment using *Azolla*, an aquatic fern, to reduce weed in wetland taro 1995. Available for purchase at <http://www2.ctahr.hawaii.edu/oc/forsale/>.
- Dhumal MV, Siddiqui MF, Siddiqui MBA, Avari PE. Performance of broilers fed on different levels of *Azolla* meal. *Indian Journal of Poultry Science* 2009;44(1):65-68.8
- Govind Rama Rathod, Pramod KT, Praveen KT, Mandal AB, Shinde AS. Feeding value of *Azolla (Azolla pinnata)* meal in growing Japanese Quail. *Indian Journal of Poultry Science* 2013;48(2):154-158
- Kamalanana Pillai P, Premalatha S, Rajamony S. AZOLLA- A sustainable feed substitute for livestock. *LEISA India* 2002;4(1). [www.leisa.info](http://www.leisa.info).
- Mangesh Kumar, Rajesh Kumar Dhuria, Dinesh Jain, Rajendra Nehra, Tribhuvan Sharma. Effect of inclusion of sun dried *Azolla (Azolla pinnata)* at different level on the growth and performance of Broiler chicks. *Journal of Animal Research* 2018;8(4):629-632.
- Naghshi Hozhabr, Khojasteh Sasan, Jafari Masoud. Investigation the Effect of Different Levels of *Azolla (Azolla pinnata)* on Performance on Carcass Characteristics of Cobb Broiler Chicks. *International Journal of Farming and Allied Science* 2014;3(1):45-49.
- Namra MM, Hataba NA, Wahed M. The productive performance of growing chicks fed restricted diets supplemented with free *Azolla*. *Egypt Poultry Science* 2010;30:747-762
- Parthasarathy R, Kadirvel R, Kathaperumal V. *Azolla* as a partial replacement for fish meal in broiler rations. *Indian veterinary Journal* 2002;79(2):144-146
- Paudel DR, Dhakal P, Timsina KP, Dahal A. *Azolla* as an economic substitute to soybean-based feed for poultry. *International Journal of Applied Sciences and Biotechnology* 2015;3(4):619-625.
- Rahangdale PB, Sahu B, Dange A. Growth performance of Kadaknath poultry breed in intensive and backyard rearing. *Contemp. Res. Ind* 2017;7(3):354-359.
- Rai RB, Dhama K, Damodaran T, Hamid A, Rai S, Singh B, *et al.* Evaluation of *Azolla (Azolla pinnata)* as a poultry feed and its role in poverty alleviation among landless people in northern plains of India *Vet. Practitioner* 2012;13(2):250-254.
- Rao GV, Thomas PC. The breed characteristics of Kadaknath breed of indigenous (Desi) chicken. *Avian Research* 1984;68:55-57.
- Sharma K. Biological evaluation of *Azolla (Azolla pinnata)* in broiler ration. M.V.Sc. Thesis, Department of Animal Nutrition, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India 2014.
- Shoukat A, Adilb S, Bandyb MT, Manzoor A Khan. Feeding potential of Aquatic Fern *Azolla* in Broiler Chicken Ration. *Journal of Poultry Science and Technology* 2015;3(1):15-19.
- Thakur MS, Parmar SNS, Pillai PVA. Studies on growth performance in Kadaknath breed of poultry. *Livestock Research for Rural Development* 2006;18:1-9.