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## Influence of supplementing fresh *Azolla caroliniana* on the growth rate of Rhode islands red (RIR) chicks reared under backyard poultry farming

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### Abstract

The present experimental trial was conducted to see the influence of supplementing azolla on the birds body weight gain reared under backyard poultry farming. Thirty six RIR birds were grouped in to three groups (T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>) each group contains twelve birds. The RIR birds in T<sub>1</sub> group reared under scavenging practice only, T<sub>2</sub> group birds were allowed to scavenge along with supplementation of fifty percent of basal feed and T<sub>3</sub> group birds were practice scavenging plus provision of fifty percent basal feed plus supplementation along with supplementation of azolla 90 gram per bird per day. The T<sub>3</sub> group bird's shows significant higher body weight at the age of 20 week in comparison to birds reared under T<sub>1</sub> and T<sub>2</sub>. Hence supplementation of azolla along with basal feed in backyard system of rearing RIR birds shows better weight gain.

**Keywords:** Azolla, Rhode islands red, backyard poultry, body weight

### Introduction

Backyard poultry farming is the rearing of the few number of birds at the household level for the domestic consumption or for sale locally which scavenge during the day time along with little supplementation of feed and or grain, provision of little health care and shelter during night (Sharma and Chatterjee 2009; Rajkumar *et al.* 2010; Sheikh *et al.* 2018; Islam *et al.* 2020) <sup>[1, 2, 3, 4]</sup>. Backyard Poultry farming has potential to decrease poverty, provide nutritious nutrients source, a source of additional income, employment and economic empowerment of the women in the rural and tribal area (Sharma and Chatterjee 2009; Rajkumar *et al.* 2010; Rajkumar and Rama Rao 2015; Chatterjee and Rajkumar 2015; Islam *et al.* 2020) <sup>[5, 6, 7, 8, 9]</sup>. More than 65% of the Indian population is still living in the villages whose diet is mainly wheat and rice with lower intake of protein. The provision of nutritious food in the form animals protein in the diet of rural people help in the better growth and goodhealth. For the nutritional security of the rural poor livestock and backyard poultry play important role. Rural people mostly rear indigenous or desi native poultry breed for the backyard poultry but recently some synthetic poultry varieties with colour plumage are developed having better performance under field condition.

More than 60% expenditure which occur in the poultry farming is mainly on feed. To economize the cost of production non conventional aquatic feeds azolla can be a alternative which is rich in protein, vitamins, amino acids and other minerals (Ivan *et al.* 1995; Alalade *et al.* 2006) <sup>[10, 11]</sup> and it can be grown easily under rural field conditions. Azolla is more common in tropic and sub tropic area in the stagnant water of rivers canals. Azolla belongs family Azollaceae and order Pteridophyta which is a free floating fern having containing Anabaena-azollae in their leafs can prepare nitrogen from atmospheric air (Becking 1979) <sup>[12]</sup>. Parashuramulu *et al.* 2013 <sup>[13]</sup> reported that azolla is rich in protein percentage and it varies from 25-35% on dry matter basis and it is easily digested by the poultry. Azolla as reported by the different researcher that it can be used up to 5% on dry matter basis without any side effects on the poultry health, and azolla fed birds show better growth rate in comparison to other groups (Parathasarathy *et al.* 2001; Basak *et al.* 2002 and Subhudhi *et al.* 1978) <sup>[14, 15, 16]</sup>. Iyayi, and Alalade 2007) <sup>[17]</sup> reported that up to 15% level azolla on dry matter basis can be used in the diet of the poultry without any adverse effect. Few studies are conducted on the use of azolla on the desi poultry breeds birds but few studies are conducted on the improved varieties of native birds. The present study was conducted at the farmers field in the Pathankot district. The aim of the present study to assess the effects of azolla supplementation on the

growth rate of the improved native varieties of dual purpose Rhode Islands Red (RIR) chicks reared under backyard poultry farming system of rearing.

**Material and Methods**

The present study was conducted under the farmers filed condition at village Khalah of Pathankot district, Punjab, India for the time period of 16 week. The trial was started from april 2023 up to august 2023 at the farmers field. Azolla (*azolla caroliniana*) production unit of azolla was established at farmers field under farmer participatory mode prior to the start of experimental trail. A adaptation period of 2 week prior to start of trial were given and 36 chicks of RIR chicks of same age and body weight were selected and thereafter they were randomly distributed in to three groups T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group each of 12 chicks. Thereafter trial on the azolla supplementation on the growth rate of RIR chicks reared under backyard poultry started. The T<sub>1</sub> group birds were reared under traditional practice of rearing backyard poultry on scavenging practice fully with no supplementation of any basal feed. T<sub>2</sub> groups were reared under backyard poultry on scavenging practices plus supplementing fifty percent of the basal feed in the evening in the shed and T<sub>3</sub> group birds involve the supplementation of azolla plus the adoption of the T<sub>2</sub> practice. Fresh azolla were collected from the azolla unit and thereafter washed four times with fresh water and after draining of water raw azolla were weighted and offer to the birds, thereafter net amount of fresh Azolla intake was calculated. Monthly weight gain and average intake of azolla was calculated. The data were analyzed using SPSS (Version 11.0, SPSS Inc, Chicago, USA).

**Results and Discussion**

**Body weight Changes**

The results of present study revealed that supplementation of azolla at the rate 90 gram (dry matter percent 9%) per day per bird in T<sub>3</sub> group shows significant higher body weight gain in RIR birds in comparison to T<sub>1</sub> and T<sub>2</sub> group. The T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group birds average final body weight at the age of 20 week were 885.00±78.60 and 1310.00±36.10 and 1536.67±57.60 respectively (Table No.1). The azolla supplemented birds in T<sub>3</sub> group bird average monthly weight gain (Table No.2) was 338.75 gram which was highest among the three groups, while in T<sub>1</sub> and T<sub>2</sub> groups were 176.25 and 282.25 grams respectively. The present results were consistent with the finding of the Sujatha *et al.*, 2013 [18], Sinha *et al.* (2015) [19] and they also found higher body weight gain in azolla supplemented birds reared under backyard poultry and better profit on inclusion of fresh azolla at the rate of 100 gram per bird per day in comparison to others birds in their experimental studies. Reported results are consistent with the finding of Joysowal *et al.* 2018 [20] who also reported good results in terms of body weight gain and reported that azolla leaf meal can be used in the feed of poultry (Abdelatty *et al.* 2021) [21]. Ara *et al.* 2015 [22] also reported that azolla supplementation causes significant increase in body weight gain and profit in the azolla fed group in comparison to others. Rawat *et al.* [23] 2015 also reported that azolla supplementation in poultry causes significant higher cumulative weight in comparison to others group. It may be due to higher content of protein percentages on dry matter basis and it ranges from 21-30 percent in azolla (Bhattacharyya *et al.* 2016; Lejeunea, Cagauan, and Vanhove 1999; Mohamed *et al.* 2018; Pullin and Almazan 1983) [24, 25].

[26, 27], rich source of provitamin, vitamin and protein (Lejeunea, Cagauan, and Vanhove 1999 [28], (Lejeune *et al.* 2000) [29], rich sources of essential and non essential amino acids, minerals and vitamin (Anitha *et al.* 2016) [30], secondary metabolite, alkaloids, amino acids, macro and micro minerals in the azolla (Selvaraj, Chowdhury, and Bhattacharjee 2013) [31]. Abdelatty *et al.* 2021) [32] and (Liu *et al.* 2021) [33] founds in their study that azolla supplemented birds shows increased in the intestinal villi length which increased the intestinal adsorption surface area, shows better absorption of nutrients and causes increased secretion of the mucin which promote the caecal microbiota population. In addition to these properties other scientist also reported its anti oxidant, liver protectant, immuno modulator properties as reported by Elrasoul *et al.* 2020 [34] and Attia *et al.* 2021 [35] that azolla inclusion in diet shows hepato protective and anti oxidant activity. Azolla fed chabro birds shows better immune response might be due to higher level of copper, iron content (Mithraja *et al.* 2011, Paoletti *et al.* 1987, Chichilichi *et al.* 2015) [36, 37, 38].

**Benefit: Cost Ratio**

The presents results revealed that supplementation of azolla at the dose rate of 90 gram per day per birds on fresh basis shows better return of Rs 67.75 in comparison to the birds reared under T<sub>1</sub> and T<sub>2</sub> groups which shows return of Rs 35.25 and Rs 56.45 respectively. The B:C ratio was found to be highest in T<sub>3</sub> group (2.56:1) followed by the T<sub>2</sub> (2.22:1) and T<sub>1</sub> group (1.8:1) respectively. The results revealed that the net return was highest in T<sub>3</sub> azolla supplemented group in comparison to T<sub>1</sub> and T<sub>2</sub> group. The results are consistent with the finding of Subudhi and Singh (1978) [39] reported that expenditure could be reduced by replacing 20-25% feed with azolla which economize the cost of production. Present results are consistent with reported results of Basak *et al.* (2002) [40], Seth *et al.* (2013) [41], Chichilichi *et al.* (2013) [42] and Naghshi *et al.* (2014) [43] also reported that azolla use in the concentrates diet of the poultry shows significant decrease in the expenditure cost on the poultry production in comparison to other groups.

**Table 1:** Effect of different treatment on the periodic live weight of experimental birds

Age (Week)	NetBody weight		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
4	180.00±2.82	181.33±2.82	181.67±2.82
8	363.33±41.63 <sup>a</sup>	395.00±143.00 <sup>b</sup>	600.00±50.00 <sup>c</sup>
12	600.00±50.00 <sup>a</sup>	664.33±135.40 <sup>b</sup>	999.67±42.80 <sup>c</sup>
16	770.00±26.45 <sup>a</sup>	900.00±26.50 <sup>b</sup>	1173.33±100.70 <sup>c</sup>
20	885.00±78.60 <sup>a</sup>	1310.00±36.10 <sup>b</sup>	1536.67±57.60 <sup>c</sup>

<sup>a,b,c</sup> values bearing different superscripts within row differ significantly (*p*<0.05)

**Table 2:** Effect of different treatment on periodic average body weight gain in the experimental birds.

Age of Birds (Week)	Average MonthlyBody weight Gain		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
First Month	183.33	214	418.33
Second Month	236.67	269.33	399.67
Third Month	170	235.67	173.66
Average Monthly Weight Gain	176.25 g	282.25g	338.75g

**Table 3:** Effects of different treatment on the cost benefits ratio the experimental birds

Technology Assessed	Parameter	Gross Cost	Gross Return	*Production per unit	Net Return	B:C Ratio
T <sub>1</sub>	Final Body Weight	Rs 98	Rs 177	885Grams	35.25	1.8:1
T <sub>2</sub>	Final Body Weight	Rs 118	Rs262	1310Grams	56.45	2.22:1
T <sub>3</sub>	Final Body Weight	Rs120	Rs307.33	1536.67Grams	67.75	2.56:1

- Rs 200/Kg on Live Weight.
- (Profit) in Rs. / unit

### Conclusion

The raw azolla (*Azolla caroliniana*) on fresh basis can be used in the RIR birds reared under backyard poultry at the dose rate of 90 gram per bird per day in birds of age more than four week with out any adverse affects on the birds. The average weight gain in T<sub>3</sub> group was significantly higher in comparison to T<sub>1</sub> and T<sub>2</sub> group birds. It may be due to the higher nutrients requirement of the developed strains of the Rhode Islands Red poultry birds in comparison to the native backyard poultry breeds. Further study in this regard is needed as limited study is done in this regard.

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