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Seasonal effect of azolla powder supplementation on cost of production of Giriraja poultry birds

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Abstract

The present investigation entitled seasonal effect of azolla (*Azolla pinnata*) powder supplementation on cost of production of Giriraja poultry birds, was carried out in the Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyepeeth, Akola. The profit per kg of Giriraja poultry birds were 47.45, 53.47, 70.67, and 47.54 in T₁, T₂, T₃, T₄ and T₅ during rainy season while in winter season recorded 72.33 75.85 101.29 74.23 and 65.11 in terms of rupees for treatment T₁, T₂, T₃, T₄ and T₅. During summer season the net profit recorded were 33.82, 36.92, 50.81, 41.82 and 45.27 for T₁, T₂, T₃, T₄ and T₅ treatment. The feeding of 5% azolla powder in all season in the diet of Giriraja birds did not showed adverse effect on growth performance and meat quality in respect of cost of production. The 5% azolla powder supplementation in the feed of Giriraja poultry birds was suitable in respect of cost of production.

Keywords: Azolla powder, cost of production, season, chicks, giriraja poultry birds, standard ration, feed consumption

Introduction

Poultry farming is an economic activity, especially to women and poor population. It creates job opportunities and employment for the growing population of the country. The persons from low income group may also start the business on a small scale. The poultry is important because it is the significant source of protein role in meat. Poultry industry has made a tremendous and remarkable progress evolving from a small scale backyard venture to the status of commercial, full fledge, self-sufficient and most progressive agro based industry and become an attractive enterprise particularly because of the small capital investment, increased returns, quick turn over, comparatively less risk involved, low land requirement, easy to production and high feed efficiency.

Due to increasing demand for poultry meat, short supply of mutton and limited acceptability of beef and pork in some countries as considering of religious and cultural points like India. The poultry production is under rapid expansion in the world. Broilers are much more prolific than other livestock and through careful scientific breeding policies; they have become efficient converters of vegetables protein into high quality animal protein food for human consumption. The poultry has exported 255686.92 MT of poultry products to the world for the ward of Rs. 651.21435.53 crors during the year 2020-21.

The most importance of backyard poultry is well recognized by Government of India and special programs are formulated for its promotion. Hence, efforts have been diverted into producing dual purpose native hybrids with improved production profiles. These breeds grown fast and produce more number of eggs, require low input like feed, management, health care, housing etc. and sustain different vagaries of climatic and environmental changes. However, poultry seems to be particularly sensitive to temperature-associated environmental challenges, especially heat stress.

Azolla is a free floating water fern that floats in water and fixes atmospheric nitrogen in association with the nitrogen fixing blue green alga, *Anabaena azollae*. Azolla is considered to be a potential biofertilizer in terms of nitrogen contribution to rice crop (Kannaiyan, 1992). Long before its cultivation as a green manure, azolla was used as a fodder for domesticated animals such as pigs and ducks. In recent days, azolla is very much used as a sustainable feed substitute for livestock especially dairy cattle, poultry, piggery and fish. Azolla contains 25-35% protein on dry weight basis and rich in essential amino acids minerals, vitamins and

carotenoids including the antioxidant β carotene (Ivan *et al.*, 1989).

Recently, there is an increased emphasis in the use of aquatic plants in poultry rations because the protein and other nutrient content in them are comparable to certain leguminous plants. Aquatic plants pieces accumulate secondary plant compounds and therefore offer greater potential than many other types of leaf protein sources (Balaji *et al.*, 2009). Among the aquatic plants floating fern *Azolla pinnata* can be used as unconventional high potential feed resource and it contains almost all essential amino acids, minerals such as iron, calcium, magnesium, potassium, phosphorus, manganese etc. apart from appreciable quantities of vitamin A precursor beta carotene and vitamin B₁₂. *Azolla* have symbiotic relationship with the nitrogen-fixing blue-green algae. The fern provides nutrients and a protective cavity in each leaf to *Anabaena* colonies in exchange for fixed atmospheric nitrogen and possibly other growth-promoting substances. It is this unique symbiotic relationship that makes *azolla*, a wonderful “super plant” with high protein content, as it can readily colonize areas of fresh water and grow at great speed doubling its biomass every two to three days. It is also found to contain probiotics and biopolymers (Pillai *et al.*, 2005).

Important features of Giriraja poultry breed are multi-color feather pattern, immunity to disease, perform with less nutrition, grow faster and produce more eggs as well meat, produce brown eggs like local hens. High nutritive value and rapid biomass production make *Azolla* a potential and effective feed substitute for livestock, particularly poultry birds. In view of this the present investigation the objective was to find out the cost of production of Giriraja poultry birds in rainy, winter and summer seasons.

Methodology

Experimental site and climate

The research trial was carried out at Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidypeeth, Akola, Maharashtra State. The Akola city located at latitude on 20°41'32" N and longitude at 77°41'32" E with the height 307.4 m above the mean sea level. In summer season the maximum temperature reached upto 42 to 45 °C with the humidity ranges from 11 to 16%. With the annual rainfall of 750.0 to 900.0 mm. The experiment was conducted in three different season i.e Rainy, Winter and Summer season. The material used and methodology's that adopted in the course of experimentation were detailed in the chapter.

Drying and preparation of Azolla Powder

Preparation of green *azolla* will be collected from the demonstration unit of the department to dry in an air circulating oven at 50 °C followed by 105 °C until there were no further changes at these two temperatures. Grind *azolla* will be priced by the grinder in power form. The powder will be sieved through 300 μ m mesh and store at air tight cellophane bag as stock sample till further analysis.

Procurement of DOC

The 150 number of day old chicks of Giriraja Poultry birds were purchase from Private supplier through Government Hatchery, C.P.D.O., Seminary Hill, Nagpur

Immunization schedule

All the chicks were vaccinated as per the schedule carried out

at Central Poultry Development Organization, Mumbai.

Table 1: Vaccination schedule for Giriraja chicks

| SN | Disease | Vaccine | Age | Dose |
|----|----------|--------------------|----------------------|-------------------------|
| 1 | Ranikhet | Lasota (F1 strain) | 7 th day | One drop (intra ocular) |
| 2 | Gumboro | Gumboro | 14 th day | One drop (intra ocular) |
| 3 | Gumboro | Gumboro | 21 st day | One drop (intra ocular) |
| 4 | Ranikhet | Lasota | 28 th day | One drop (Eye) |
| 5 | Gumboro | Gumboro | 35 th day | One drop (Eye) |
| 6 | Fowl pox | R2B | 42 th day | Intra muscular |

Treatments

The dietary treatment formulated were as below

Dietary treatment details

| | T ₁ | S.R. | - | - | - |
|-------------------------------|--------------------------------|----------------|------|----|------|
| | Rainy season (June to Sept) | T ₂ | S.R. | + | 4% |
| T ₃ | | S.R. | + | 5% | A.P. |
| T ₄ | | S.R. | + | 6% | A.P. |
| T ₅ | | S.R. | + | 7% | A.P. |
| Winter season (Oct to Jan) | | T ₁ | S.R. | - | - |
| | T ₂ | S.R. | + | 4% | A.P. |
| | T ₃ | S.R. | + | 5% | A.P. |
| | T ₄ | S.R. | + | 6% | A.P. |
| | T ₅ | S.R. | + | 7% | A.P. |
| Summer season (Feb to May) | T ₁ | S.R. | - | - | - |
| | T ₂ | S.R. | + | 4% | A.P. |
| | T ₃ | S.R. | + | 5% | A.P. |
| | T ₄ | S.R. | + | 6% | A.P. |
| | T ₅ | S.R. | + | 7% | A.P. |

Where

SR - Standard Ration

AP - Azolla Powder

Observation recorded

Weekly feed consumption

Weekly feed consumption was measured by the amount of feed offered on the beginning of week and deducted whatever left over at the end of the week. The cumulative feed consumption was work out for all the replicate under treatment groups.

$$\text{Feed consumption} = \text{Feed offer} - \text{Feed left over}$$

Weekly and cumulative feed efficiency

It was measured by using following formula

$$FE = \frac{\text{Feed consumption in week (gm)}}{\text{Gain in body wt. in a week (gm)}}$$

Result and Discussion

It was observed from the table 2 that, *azolla* supplementation powder was containing 21.56, 15.08 and 15.88 Crude Protein, crude fibre and ash on dry matter basis, respectively

Table 2: Proximate composition of *Azolla* feed supplementation on percent

| | |
|---------------|-------|
| Dry matter | 89.91 |
| Crude protein | 21.56 |
| Crude fat | 3.37 |
| Crude fiber | 15.08 |
| Total Ash | 15.88 |

Cost of production during rainy season

The cost of production of Giriraja poultry birds fed on *azolla*

powder during rainy season was worked out by comparing the expenditure incurred on total amount of feed consumed by giriraja poultry birds up to end of 7th week from income obtained after selling. The cost of day old chick of all birds in treatment T₁(Control), T₂, T₃, T₄ and T₅ is Rs. 29 respectively. The total cost of feed recorded were Rs(kg) 31.33, 32.93, 33.45, 33.79 and 34.03 for T₁ (control) T₂, T₃, T₄ and T₅, respectively. The cost of azolla powder for T₁ (control), T₂, T₃, T₄ and T₅ was 0, 1.60, 2.12, 2.46 and 2.70 respectively. Total cost of feed for T₁ (control), T₂, T₃, T₄ and T₅ was 31.33, 32.93, 33.45, 33.79 and 34.03 respectively. Average total feed consumed for per bird (kg) for T₁ (control), T₂, T₃, T₄ and T₅ was 2.64, 2.66, 2.82, 2.75 and 2.57, respectively. Cost of feed consumed per bird (Rs) T₁ (control), T₂, T₃, T₄

and T₅ was for 82.55, 87.73, 94.33, 92.92, 87.46 respectively. Average body weight (Kg) at the end of 7th for T₁ (control), T₂, T₃, T₄ and T₅ was 1.05, 1.10, 1.22, 1.13, and 1.07 kg respectively. Rearing cost per bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ was Rs 50 for all treatments respectively. Total cost of production (cost of day old chicks + cost of feed consumed per bird + rearing cost per bird) for T₁ (control), T₂, T₃, T₄ and T₅ was 161.55, 166.73, 173.33, 171.92 and 166.46 respectively. Average price realized @Rs 200 per kg live weight (average body at the end of 7th week × 200) for T₁ (control), T₂, T₃, T₄ and T₅ were Rs. 209, 220.2, 244, 226.6 AND 214 respectively. Final net profit per kg of bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ were calculated as Rs. 47.45, 53.47, 70.67, 54.68 and 47.54 under treatment respectively.

Table 3: Cost of production of Giriraja poultry birds fed on azolla powder during rainy season

| SN | Particulars | T1 | T2 | T3 | T4 | T5 |
|----|--|--------|--------|--------|--------|--------|
| 1 | Cost of day old chick (Rs.) | 29 | 29 | 29 | 29 | 29 |
| 2 | Cost of feed (Rs/kg) | 31.33 | 31.33 | 31.33 | 31.33 | 31.33 |
| 3 | Cost of Azolla powder (Rs 150/kg) | 0 | 1.6 | 2.12 | 2.46 | 2.7 |
| 4 | Total cost of feed (Rs/kg) | 31.33 | 32.93 | 33.45 | 33.79 | 34.03 |
| 5 | Average total feed consumed per bird (Kg) | 2.64 | 2.66 | 2.82 | 2.75 | 2.57 |
| 6 | Cost of feed consumed per bird (Rs.)(Col.No.4 X5) | 82.55 | 87.73 | 94.33 | 92.92 | 87.46 |
| 7 | Average body weight at the end of 7th week (Kg) | 1.05 | 1.10 | 1.22 | 1.13 | 1.07 |
| 8 | Rearing Cost per bird (Rs.) | 50 | 50 | 50 | 50 | 50 |
| 9 | Total cost of production (Rs.) (1+6+8) (Cost of Cultivation) | 161.55 | 166.73 | 173.33 | 171.92 | 166.46 |
| 10 | Average price realized @ Rs. 200/- per kg live weight (Rs.) (col. 7X200) | 209 | 220.2 | 244 | 226.6 | 214 |
| 11 | Net profit / kg of bird (Rs.) | 47.45 | 53.47 | 70.67 | 54.68 | 47.54 |

Cost of production during winter season

The cost of production of Giriraja poultry birds fed azolla powder during winter season was worked out by comparing the expenditure incurred on total amount of feed consumed by Giriraja poultry birds up to end of 7th week from income obtained after selling. The cost of day old chick of all birds in treatment T₁ (control), T₂, T₃, T₄ and T₅ was Rs. 30/-. The cost of feed consumed by birds were Rs(kg) 31.33 for T₁ (control), T₂, T₃, T₄ and T₅, respectively. The cost of azolla powder for T₁ (control), T₂, T₃, T₄ and T₅ was 0, 1.69, 2.16, 2.54 and 2.96 respectively. Total cost of feed for T₁ (control), T₂, T₃, T₄ and T₅ was 31.33, 33.02, 33.49, 33.97 and 34.29 respectively. Average total feed consumed per bird (kg) for T₁ (control), T₂, T₃, T₄ and T₅ was 2.79, 2.82, 2.87, 2.83 and 2.82 respectively. Cost of feed consumed per bird (Total cost of feed Rs × average total feed consumed per bird. Kg) for T₁

(control), T₂, T₃, T₄ and T₅ were calculated as Rs. 87.43, 93.11, 96.28, 95.87, 96.89 respectively. Average body weight (Kg) at the end of 7th for T₁ (control), T₂, T₃, T₄ and T₅ recorded were 1.20, 1.24, 1.39, 1.25, and 1.21 respectively. Rearing cost per bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ was Rs 50/- for all treatments respectively. Total cost of production (cost of day old chick + cost of feed consumed per bird + rearing cost per bird) for T₁ (control), T₂, T₃, T₄ and T₅ was 167.43, 173.11, 176.28, 175.87 and 176.89 respectively. Average price realized @Rs 200 per kg live weight (average body at the end of 7th week × 200) for T₁ (control), T₂, T₃, T₄ and T₅ were calculated as Rs. 239.76, 248.96, 277.56, 250.1 and 242 respectively. Final net profit per kg of bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ was calculated as Rs.72.33, 75.85, 101.29, 74.23 and 65.11 respectively.

Table 4: Cost of production of Giriraja poultry birds fed on azolla powder during winter season

| SN | Particulars | T1 | T2 | T3 | T4 | T5 |
|----|--|--------|--------|----------|--------|--------|
| 1 | Cost of day old chick (Rs.) | 30 | 30 | 30 | 30 | 30 |
| 2 | Cost of feed (Rs/kg) | 31.33 | 31.33 | 31.33 | 31.33 | 31.33 |
| 3 | Cost of Azolla powder (Rs 150/kg) | 0 | 1.69 | 2.16 | 2.54 | 2.96 |
| 4 | Total cost of feed (Rs/kg) | 31.33 | 33.02 | 33.49 | 33.87 | 34.29 |
| 5 | Average total feed consumed per bird (Kg) | 2.791 | 2.820 | 2.875 | 2.831 | 2.826 |
| 6 | Cost of feed consumed per bird (Rs.)(Col.No.4 X5) | 87.43 | 93.11 | 96.28 | 95.87 | 96.89 |
| 7 | Average body weight at the end of 7th week (Kg) | 1.20 | 1.24 | 1.39 | 1.25 | 1.21 |
| 8 | Rearing Cost per bird (Rs.) | 50 | 50 | 50 | 50 | 50 |
| 9 | Total cost of production (Rs.) (1+6+8) (Cost of Cultivation) | 167.43 | 173.11 | 176.28 | 175.87 | 176.89 |
| 10 | Average price realized @ Rs. 200/- per kg live weight (Rs.) (col. 7X200) | 239.76 | 248.96 | 277.5667 | 250.1 | 242 |
| 11 | Net profit / kg of bird (Rs.) | 72.33 | 75.85 | 101.29 | 74.23 | 65.11 |

Cost of production during summer season

The cost of production of giriraja birds fed azolla powder during summer season was worked out by comparing the expenditure incurred on total amount of feed consumed by giriraja poultry birds up to end of 7th week from income obtained after selling. The cost of day old chick of all birds in

treatment T₁ (control), T₂, T₃, T₄ and T₅ is Rs. 30 respectively. Cost of feed consumed by birds were Rs (kg) 31.33 for T₁ (control), T₂, T₃, T₄ and T₅ respectively. Cost of azolla powder for T₁ (control), T₂, T₃, T₄ and T₅ was 0, 1.37, 1.76, 2.07 and 2.41 respectively.

Table 6: Cost of production of Giriraja poultry birds fed on azolla powder during summer season

| SN | Particulars | T1 | T2 | T3 | T4 | T5 |
|----|--|--------|--------|--------|--------|--------|
| 1 | Cost of day old chick (Rs.) | 30 | 30 | 30 | 30 | 30 |
| 2 | Cost of feed (Rs/kg) | 31.33 | 31.33 | 31.33 | 31.33 | 31.33 |
| 3 | Cost of Azolla powder (Rs 150/kg) | 0 | 1.37 | 1.76 | 2.07 | 2.41 |
| 4 | Total cost of feed (Rs/kg) | 31.33 | 32.7 | 33.09 | 33.4 | 33.74 |
| 5 | Average total feed consumed per bird (Kg) | 2.27 | 2.29 | 2.35 | 2.31 | 2.30 |
| 6 | Cost of feed consumed per bird (Rs.)(Col.No.4 X5) | 70.984 | 75.036 | 77.756 | 76.998 | 77.744 |
| 7 | Average body weight at the end of 7th week (Kg) | 0.924 | 0.960 | 1.043 | 0.994 | 1.015 |
| 8 | Rearing Cost per bird (Rs.) | 50 | 50 | 50 | 50 | 50 |
| 9 | Total cost of production (Rs.) (1+6+8) (Cost of Cultivation) | 150.98 | 155.04 | 157.76 | 157.00 | 157.74 |
| 10 | Average price realized @ Rs. 200/- per kg live weight (Rs.) (col. 7X200) | 184.80 | 191.96 | 208.57 | 198.81 | 203.01 |
| 11 | Net profit / kg of bird (Rs.) | 33.82 | 36.92 | 50.81 | 41.82 | 45.27 |

Total cost of feed for T₁ (control), T₂, T₃, T₄ and T₅ was 31.33, 32.70, 33.09, 33.40 and 33.74 respectively. Average total feed consumed for per bird (kg) for T₁ (control), T₂, T₃, T₄ and T₅ was 2.27, 2.29, 2.35, 2.31 and 2.30 respectively. Cost of feed consumed per bird (Total cost of feed Rs × average total feed consumed per bird. Kg) for T₁ (control), T₂, T₃, T₄ and T₅ was 70.98, 75.03, 77.75, 76.99 and 77.74 respectively. Average body weight (Kg) at the end of 7th week for T₁ (control), T₂, T₃, T₄ and T₅ was 0.924, 0.960, 1.043, 0.994, and 1.015 respectively. Rearing cost per bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ was Rs 50/- for all treatments. Total cost of production (cost of day old chicks + cost of feed consumed per bird + rearing cost per bird) for T₁ (control), T₂, T₃, T₄ and T₅ was Rs. 150.98, 155.04, 157.76, 157 and 157.74 respectively. Average price realized @Rs 200 per kg live weight (average body at the end of 7th week × 200) for T₁ (control), T₂, T₃, T₄ and T₅ was Rs. 184.80, 191.96, 208.57, 198.81 and 203.01 respectively. Final net profit per kg of bird (Rs) for T₁ (control), T₂, T₃, T₄ and T₅ were calculated as Rs. 33.82, 36.92, 50.81, 41.82 and 45.27 respectively.

It is revealed from the data that, out of the above three season most profitable season was winter followed by rainy season and summer season. The present results are similar with the Naeem *et al.* (2019) reported that, the revenue and production are higher in the winter season than the summer season, due to more demand and consumption of broiler in the winter season. Further, the prices of broiler are comparatively more in the winter season than the summer season which results in higher productions and revenue.

Sarma (2019) observed that the cost benefit ratio was recorded highest during winter season (1.20). Therefore, the best season for the small-scale broiler farmers to earn profitability in all the selected agro climatic zones was winter though they need to take extra care during chick period.

Ali *et al.* (2015) observed that profitability also was found to be higher in winter compared to summer season. The return was increased with the farm sizes increased ($P < 0.01$). Therefore, productive performance and profitability may be improved for intensive meat purpose farming if bio-security intervention is made.

Joshi *et al.* (2020) reported that the result of this trial indicated that supplementation of azolla in instrumental in increased body weight gain along with higher egg production with better benefit cost ratio. Therefore, it can be concluded that feeding of Azolla to poultry birds under intensive condition Rs. 200 kg/ bird may be highly effective method to get more profit. Under the prevailing situation of change in climatic condition.

Conclusion

The higher net profit per kg live weight at 5% azolla supplementation group among all the seasons indicates that winter season was more favorable in respect of cost of production of Giriraja poultry rearing as compared to rainy and summer season.

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