**Effectof supplementation of spirulina (*Spirulina platensis*) on growth performance of broiler in Konkan region**


## ABSTRACT

The experimental trial of six weeks was conducted on 200day-old broiler chicks. They were randomly distributed into five experimental treatment groups. Eachtreatmentgroupwasreplicatedintofourwith 10birdsperreplication.The control ($T_1$) group was fed standard ration and $T_2$, $T_3$, $T_4$ and $T_5$group were provided same standard ration supplemented with 1.00 g, 2.00 g, 3.00 g and 4.00 g spirulina powder, respectively.The result of experimental trial showed that supplementation of spirulina powder was significantly highest live body weight in treatment $T_5$ (1944.50 g/bird) as well as average live body weight gain (277.79 g/bird). It is concluded that, 4.00 g of spirulina powder significantly improved growth performanceof broiler chicks than other treatments groups.



**Keywords:** Spirulina powder, Broiler chicks, Growth performance, Body weight.


## INTRODUCTION

The word "poultry" is derived from the French word "poule," meaning a small animal. Poultry (*Gallus domesticus*) has been domesticated since over 150 million of years ago, when the first wild jungle fowl evolved on earth. Poultry encompasses chickens, ducks, geese and other types of fowl. It is currently one of the fastest growing section in Indian agriculture. It is conclusive to the country's economic growth.

According to the 20$^{th}$ livestock census (2019), there are 851.8 million poultry birds in India, increased by 16.8% over previous census. This makes India to second largest poultry market in world. The total backyard poultry in the country is 317.07 million in 2019. The total commercial poultry in the country is 534.74 million in 2019, increased by 4.5% over previous census. In India Tamilnadu state having highest poultry population (120.80 million). Chickens, turkeys, ducks, geese, etc. are reared in poultry farms for meat and egg purpose. In 2022-2023, India produced 138.38 billion eggs, which is increased by 7.35% over previous nine years. This puts India as the worlds third largest producer of eggs and poultry meat and the per capita availability of eggs in India is 101eggs per year. Andhra Pradesh is highest egg producer state in the country. The 6-8% increase in layers and the 10-12% increase in broilers have a detrimental influence on agriculture's total growth, which is approximately 4.5%. The total meat production in the country is 9.77 MT in the year 2022-23. The per capita availability of meat is reached 6.82 kg/annum in the year 2022-23. Nearly 51.44% of meat production is contributed by poultry respective to total meat production of country. Nutritionists suggested that humans consume 11 kilograms of meat and 180 eggs per year. Broiler production is increasing at an annual pace of 12-15%. (Anonymous, 2022).

The researchers are currently focusing on locally available natural feed resources that can be employed as feed additives to improve broiler performance. Furthermore, the discriminating use of antimicrobials and other medications to increase growth rate has a variety of negative consequences for both the health of birds and customers. As a result, poultry experts are once again focusing on the use of our old medicinal system to identify beneficial herbs and plants that can be safely utilized to improve productivity. The use of herbs and other medicinal plants, as well as their extracts in poultry food may be more advantageous as a growth booster and prevention of many common chicken diseases. Furthermore, these herbs would be freely available, widely known among laymen.

Therefore, experts studying poultry are once more focusing on using our traditional medical system to uncover useful herbs and plants that can be utilised safely to improve production. It may be more advantageous to use herbs, other medicinal plantsand their extracts in chicken feed as a growth promoter and a defence against many common poultry diseases. Additionally, these herbs would be easily accessible, well-known by laymen and capable of being used in poultry diet.

## MATERIAL AND METHODS

### Treatments and Experimental design

Theexperimental trialwasconductedon200,day-oldbroilerchicks,obtainedfromIshaPoultryServices, Chiplun, District-Ratnagiri. The chicks were from the same hatch and reared under uniformmanagement condition up to the sixth weeks of age. On arrival, the chicks were weighed individually andrandomly divided into five treatments including control were formulated.The experiment was conductedinaRandomizedBlockDesignwithfollowingdietarytreatments.The control ($T_1$) group was fed standard ration and $T_2$, $T_3$,$T_4$, $T_5$ group were provided same standard ration supplemented with 1.00 g, 2.00 g3.00 g and 4.00 g spirulina powder, respectively. The experimental trial was conducted at poultry unit of instructional farm, Department of Animal Husbandry and Dairy Science, College of Agriculture, Dapoli. District – Ratnagiri, Maharashtra.

## RESULT AND DISCUSSION

### Growth Performance

1. **Feed Consumption (g/bird)**

Throughout the six-weektrial, the average feed intake of the broiler chicks was noted at weekly intervals. The average weekly feed consumption of broiler chicks presented in Table 1.

In the present study, the total amount of feed consumed throughout the experimental trial of six weeks was 3869.00, 3868.25, 3859.50, 3840.00 and 3805.75 g/bird for treatments $T_1$, $T_2$, $T_3$, $T_4$and $T_5$, respectively.

Higher feed intake was noted in $T_1$ than treatments $T_2$, $T_3$, $T_4$ and $T_5$. Treatment $T_5$ resulted in lower feed consumption than other four treatment groups. This is because of herbs, spices and various plant extracts have appetite and digestion stimulating properties and antimicrobial effects that's why birds fed with spirulina powder shows lower feed consumption (Kamel, 2001). In treatments $T_1$, $T_2$, $T_3$, $T_4$ and $T_5$, the average feed consumption(g/bird) at the end of the six week was 644.83, 644.70, 643.25, 640.00 and 634.29 g. However, treatments $T_1$, $T_2$and$T_3$,wereatpartoeachother.

Kharde (2012) conducted experiment on effect on spirulina supplementation on growth performance of broilers He reported thatcontrol ($T_0$) which was fed standard broiler diet had higher feed consumption (660.92 g.) than $T_1$ and $T_2$ which were provided same broiler diet supplemented with 300 and 500 mg of spirulina per kg feed had lower values $T_1$(657.82 g.) and $T_2$ (659.82 g.).

**Table 1. Weeklyfeedconsumption(g/bird)**

| Treatment | Week1 | Week2 | Week3 | Week4 | Week5 | Week 6 | Total | Mean |
|---|---|---|---|---|---|---|---|---|
| **$T_1$** | 155.25 | 303.00 | 491.25 | 823.00 | 981.00 | 1115.50 | 3869.00 | 644.83[a] |
| **$T_2$** | 154.50 | 303.00 | 490.25 | 821.00 | 975.50 | 1124.00 | 3868.25 | 644.70[a] |
| **$T_3$** | 154.25 | 301.75 | 488.50 | 819.00 | 974.00 | 1122.00 | 3859.50 | 643.25[a] |
| **$T_4$** | 152.50 | 301.25 | 482.25 | 817.00 | 969.00 | 1118.00 | 3840.00 | 640.00[b] |
| **$T_5$** | 152.00 | 301.50 | 475.25 | 810.00 | 955.00 | 1112.00 | 3805.75 | 634.29[c] |
| **S.E. m** | 0.85 | 0.55 | 1.53 | 1.64 | 1.95 | 1.82 | 3.28 | 0.61 |
| **CD** | NS | NS | 4.71 | 5.06 | 6.01 | 5.60 | 10.11 | 1.87 |

**2.Body Weight (g)**

Throughout the duration of the six-week trial, the experimental birds were weighed by weighing balance at weekly interval. From birth of the chicks to the age of sixweeks,eachtreatmentgroup was weighed by weighing balance at weekly interval, liveweightmeasurementsweretakenandare shownin Table No.2 and graphically in Fig No.1

Theday-old experimental broiler chicks have averagebodyweightsforthefivedifferenttreatments i.e. $T_1$, $T_2$, $T_3$, $T_4$ and $T_5$ were 48.50, 48.00, 48.50, 47.00 and 48.00 g, respectively. The experimental chicks atsix weeks of age

had an average body weight of 1612.75, 1653.25, 1712.00, 1818.75 and 1944.50 g, respectively. Up tothefirsttwoweeksofthe experimental trial,therewasnosignificant difference observed betweenthetreatmentgroupsbased on the weekly body weight variations of the experimental chicks. However, beginning in the third week, there was significant ($P<0.05$)difference.

The body weight in the treatment $T_5$was considerably ($P<0.05$) greater than the control group in the fourth week. In the fifth week of taking T5,thebirdsaveragebodyweightwashigher.Treatments$T_1$and$T_2$werecomparabletooneanother. At the end of the six weeks, the $T_5$group had significantly ($P<0.05\%$) higherbodyweight.Ithasbeen determinedspirulina, a algae-based feed supplement had a better effect on body weight in broilers due to higher protein content.

Higher values were observed by Hanafy (2022) than present investigation He documented that the broilers supplemented with 0.7 g/kg spirulina powder gained the significantly higher ($P<0.05$) live body weight (2300.00g/bird)comparedto untreatedcontrol (1700.00g/bird)group.

**Table 2.Weeklylivebodyweight(g/bird)**

| Treatment | Initial | Week1 | Week2 | Week3 | Week4 | Week5 | Week 6 | Mean |
|---|---|---|---|---|---|---|---|---|
| **$T_1$** | 48.50 | 179.75 | 370.75 | 672.75 | 945.50 | 1271.00 | 1612.75 | $728.71^{e}$ |
| **$T_2$** | 48.00 | 182.50 | 378.00 | 678.00 | 992.00 | 1301.00 | 1653.25 | $747.54^{d}$ |
| **$T_3$** | 48.50 | 181.00 | 376.25 | 680.00 | 1016.50 | 1393.00 | 1712.00 | $772.46^{c}$ |
| **$T_4$** | 47.00 | 185.00 | 373.75 | 687.75 | 1077.25 | 1462.00 | 1818.75 | $807.43^{b}$ |
| **$T_5$** | 48.00 | 183.25 | 380.25 | 724.00 | 1094.00 | 1506.25 | 1944.50 | $840.04^{a}$ |
| **S.E.m** | 0.99 | 5.78 | 5.84 | 5.05 | 6.97 | 11.38 | 5.88 | 2.24 |
| **C.D.** | NS | NS | NS | 15.57 | 21.47 | 35.07 | 18.13 | 6.91 |

**3.Body Weight Gain(g)**

Thebodyweightgainof experimental broilerchicksatweeklyintervalon the inclusionofspirulina (*Spirulina platensis*)

powderin the feed hasbeenpresentedinTable No.3 andgraphically presentedin the Fig No.2

The results showed that the day-old experimental broiler chicks in the treatment groups had an average initial liveweightof48.5,48.0, 48.5, 47.0and48.0g.,for $T_1$, $T_2$,$T_3$,$T_4$and$T_5$,respectively.Theaverage of weekly body weight gain were 230.39, 236.18, 244.57, 259.82, 277.79g for the treatment groups $T_1$, $T_2$, $T_3$, $T_4$ and $T_5$, respectively.

During the first two weeks of the trial, the weekly live body weight gain of the chicks showed no significant difference between each of the treatment groups. From the third week of age, there is asignificant ($P<0.05$) difference between the treatments. After the data being analyzed by statistical methods, it was observed that the average live body weight gain was seen in treatment group $T_5$ (4 gspirulina) – 277.79 g. It shown significantly higher live body weight gain than other treatment groups followed $T_1$ (control) – 230.39, $T_2$ (1 gspirulina) – 236.18, $T_3$ (2 gspirulina) – 244.57, $T_4$ (3 g spirulina) – 259.82 g. The lowest average live body weight gain among the treatment groups was observed in $T_1$ control (230.39g/bird). In the sixth week, the $T_5$ registered significantly ($P<0.05\%$) higher bodyweightgain.

The findings of present study are lower than the result of Pisariwar (2005) who observed the body weight gain for the treatments varied significantly and ranged between 321.58 ± 11.10 to 366.44±14.04 g, g/bird for control, treatment group 0.05per cent spirulina powder, 0.1per cent spirulina powder,0.2per cent spirulina powder and 0.3per cent spirulina powder.

**Table 3. Weeklylivebodyweightgain(g/bird)**

| Treatment | Initial | Week1 | Week2 | Week3 | Week4 | Week5 | Week 6 | Mean |
|---|---|---|---|---|---|---|---|---|
| **$T_1$** | 48.50 | 131.25 | 191.00 | 302.00 | 272.75 | 325.50 | 341.75 | $230.39^{e}$ |
| **$T_2$** | 48.00 | 134.50 | 195.50 | 300.00 | 314.00 | 309.00 | 352.25 | $236.18^{d}$ |
| **$T_3$** | 48.50 | 132.50 | 195.25 | 303.75 | 336.50 | 376.50 | 319.00 | $244.57^{c}$ |
| **$T_4$** | 47.00 | 138.00 | 188.75 | 314.00 | 389.50 | 385.25 | 356.25 | $259.82^{b}$ |
| **$T_5$** | 48.00 | 135.25 | 197.00 | 343.75 | 370.00 | 412.25 | 438.25 | $277.79^{a}$ |
| **S.E.m** | 1.00 | 2.11 | 6.78 | 7.09 | 8.51 | 13.50 | 13.00 | 0.94 |
| **C.D.** | NS | NS | NS | 21.84 | 26.23 | 41.59 | 40.06 | 2.90 |

## Conclusion

In comparison to control and other treatment groups, it was shown that adding 4.00 g/kg of spirulina powder to the feed significantly enhanced the growth performance in terms of feed intake, live body weight, body weight gain. Hence, it can be concluded that commercial broiler feed can be successfully added with spirulina powder up to the level of 4.00 g/kg of feed without affecting productive performance of broiler birds that results in good health and better economic returns.



## References

Hanafy A (2022) *Spirulina platensis* a promising growth promoter for poultry industry.10(1): 27-33

Kharde S D ,Shirbhate R N, Bahiram K B and Nipane S F (2012) Effect of Spirulina supplementation on growth performance of broilers. Indian J.Vet. Res.21(1): 66-69

Kamel C (2001) Tracing methods of action and roles of plant extracts in non-ruminants.Recent Adv. Ani. Nutri. 130 – 150

Pisariwar GN (2023) Effect of supplementation of spirulina on performance of broilers.M. V. Sc. thesis submitted to MAFSU, Nagpur. (Maharashtra state)