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# Growth Performance of Broiler Fed Diet Containing Ashwagandha (*Withania somnifera*) Root Powder

***Pallavi Mali[1*], V.S. Lawar[2], D.K. Deokar[3], S.B. Adangale[4], D.K. Kamble[5] and P.S. Sakhare[6]***

*[1]Ph.D. Scholar, Department of Animal Husbandry and Dairy Science, M.P.K.V. Rahuri (Maharashtra), India.*

*[2]Associate Professor, Department of Animal Husbandry and Dairy Science, M.P.K.V. Rahuri (Maharashtra), India.*

*[3]Senior Scientist on RCDP, Department of Animal Husbandry and Dairy Science, M.P.K.V. Rahuri (Maharashtra), India.*

*[4]Assistant Professor, Department of Animal Husbandry and Dairy Science, College of Agriculture, Pune (Maharashtra), India.*

*[5]Head, Department of Animal Husbandry and Dairy Science, M.P.K.V. Rahuri (Maharashtra), India.*

*[6]Associate Professor, Veterinary Science, College of Agriculture Pune (Maharashtra), India.*

*(Corresponding author: Pallavi Mali*)*

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**ABSTRACT: Since usage of antibiotics is forbidden owing to their residual effects and also development of resistance strains, a number of scientists have been considering the development of a novel class of feed additives derived from medicinal herbs. These feed additives possessing antibiotic, antistress general tonic and immunostimulatory qualities Therefore, present research trail was undertaken in a completely randomized design to study the effect of ashwagandha root powder on growth performance of broiler chicken. A total of 120-day-old chicks were randomly assigned into four dietary treatments with 30 birds in each. The treatments were: $T_0$ as control fed with basal diet without supplementation of ashwagandha root powder and $T_1$, $T_2$ and $T_3$ fed basal diet with 0.5, 1.0 and 1.5% ashwagandha root powder, respectively. The data on body weight and feed consumption were recorded weekly, from which gain in body weight and feed conversion ratio were calculated. The results showed that significantly ($P<0.05$) higher body weight and weekly weight gain were in $T_2$ (1.0 % Ashwagandha root powder) treatment group along with better feed efficiency. The treatment $T_2$ (1.00% ashwagandha root powder) had superior feed conversion ratio than the other treatment groups. It can be concluded that supplementation of 1% Ashwagandha root powder is beneficial for better feed efficiency and growth of broilers.**

**Keywords:** Body weight gain, FCR, Broiler, Feeding, Ashwagandha.

## INTRODUCTION

Poultry production is one of the significant segments of agricultural economy. As per 20th livestock census estimates of India has 851.81 million poultry population, which has increased by 16.8% over previous census. India now holding the third place for egg production and eighth place in the world for poultry meat production in the world. India's poultry sector represents one of the biggest success stories of the country over the past decade. For a poultry business to be gainful and sustainable, feed utility effectiveness is pivotal factor. As a result, the present trend is increasing in broiler production to offer diets that include medicinal herbs as natural feed additives and growth promoters. Among the various medicinal plants, *Withania somnifera* commonly known as Ashwagandha is popular which belonging to *Solanaceae* family. The plant's roots have been used for therapeutic uses. Starch, proteins, free amino acids, folic acid, alkaloids and steroidal lactones are all abundantly found in it. As a result, it has stimulant and nutritional tonic properties (Rane *et al*., 2012). Withaferin and Withanine, the main alkaloid found in its roots and leaves is thought to be responsible for its biological activity. Additionally, it boasts active ingredients such as rutinisides, withanone, withanolides, sonmiglucose (Murthy *et al*., 2009) tannins, carbohydrate, somniferinine, sitoindosides, lactones and flavonoids (Tripathi *et al*., 2020), that have growth promoting, antioxidant, immunomodulatory, anti-bacterial, anti-stress, adaptogenic, liver tonic and immune adjuvant properties (Verma *et al*., 2012). Ashwagandha has been used in traditional medicine system as an anti-stress, for against worms, liver disease, anti-inflammatory, cardiovascular problem, antibacterial, nervous system disorders and arthritis etc. (Behl *et al*., 2020; Paul *et al*., 2021). Moreover, use of ashwagandha in broilers might be improves the feed intake, body weight gain, FCR and immunological status, neuro-protective and rejuvenates muscles. (Ansari *et al*., 2008). In previous study by Jogi *et al.* (2023) observed use of ashwagandha root powder with

ration, exhibited positive effect on the live weight, weight gain and overall growth performance in kuroiler chicks. Therefore, present study was aimed to evaluate the growth performance of broiler fed diet containing ashwagandha root powder.

## MATERIAL AND METHODS

The present study was attempted at the Poultry Unit, Veterinary Polyclinic and A.I. Center, Department of Animal Husbandry and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India. The experiment was conducted in January-March during the year 2023.

One hundred and twenty, day old broiler chicks of Ven-cobb strain-400were used on a completely randomized design into four treatment groups. Each treatment groups having 30 chicks and was further divided into three replicates of 10 chicks each. All the broiler chicks were fed with ground maize for first two days of age. For the experiment, a pre-starter (0-1 week), Starter (1-3 weeks) and finisher (4-6 weeks) feed were used during experimental period of 6 weeks. The treatments included the control group ($T_0$) fed basal diet as per BIS, 2007 specification, and three treatments with basal diet supplemented with Ashwagandha root powder @ 0.5% ($T_1$), 1.0% ($T_2$) and 1.5% ($T_3$) in feed, respectively. The chicks were housed in separate compartments on deep litter system. Access to feed and water was provided on an *adlibitum* basis.

After day-old chicks arrived, the initial weights of birds were recorded and subsequent on, birds were weighed for weekly using electronic balance. The weekly feed intake was determined as the difference between the fed and leftover feed. The ratio of feed to body weight gain was used to calculate the feed conversion ratio. The data obtained were subjected to statistical analysis by ANOVA using Completely Randomized Design (CRD)as per Snedecor and Cochran (1994).

## RESULTS AND DISCUSSION

*A. Proximate composition of experimental feed*

The proximate composition of experimental feed was analysed and presented in Table 1. The crude protein of pre-starter, starter and finisher diet were 23.06 per cent, 22.19 per cent and 20.11 per cent. Calculated metabolizable energy content of 2915 Kcal/kg, 3007 Kcal/kg and 3012 Kcal/kg in that order.

*B. Growth performance*

**(i) Cumulative Body Weight.** The effect of supplementation of ashwagandha root powder on average cumulative body weight changes of experimental broiler chicks are set out in Table 2. Initial two weeks of experiment there was non-significant changes in body weight of birds. From the table, it is revealed from third to sixth weeks of age significant ($P<0.05$) change in body weight were noticed in broiler chickens. During third and fourth weeks of age significantly ($P<0.05$) higher weight was recorded in $T_2$treatment group. In the fifth week, the birds supplemented diet with 1.0% ashwagandha root powder ($T_2$) had statistically ($P<0.05$) superior average body weight. At end of sixth week cumulative body weight were observed 2213.96, 2238.43, 2343.29 and 2249.92 gm, for $T_0$, $T_1$, $T_2$ and $T_3$, respectively. Significantly ($P<0.05$) higher average body weight was noted in $T_2$ (2343.29 gm) treatment group supplemented diet with 1.00 % ashwagandha root powder. However, the treatment $T_1$ and $T_3$ were at par to each other. Result of present investigation are in support with Hanafy *et al*. (2023) recorded increased body weight and weekly gain in weight of broiler on addition of ashwagandha root powder in diet. Supplementation of ashwagandha root powder with diet in broiler significantly ($P<0.05$) enhanced in body weight which was agreement with Bharavi *et al*. (2011); Ahmed *et al*. (2014); Ansari *et al*. (2013). The increase in body weight of broiler could be due to anabolic effects of *Withania somnifera* which in turns enhances the protein synthesis in liver which leads to increasing in body weight animal (Anabalagan and Sedique 1981).

**(ii) Body Weight Gain.** Weekly body weight gain of broilers fed diet with ashwagandha root powder at different levels are presented in Table 3. From table, indicated that there was non-significant difference in weekly body weight gain of chicks among the dietary treatment groups during the 1st and 2nd weeks of the experiment. Statistical analysis of data revealed significant ($P<0.05$) difference in body weight gain among the treatments from third weeks onwards. The highest weight gain in 3rd, 4th and 5th weeks of age was observed in treatment $T_2$as compared to other treatment groups. However, treatments $T_1$, $T_2$ and treatments $T_1$, $T_3$ were at par to each other. The statistically treatment $T_2$ was significantly ($P<0.05\%$) superior over rest of the treatments. At the end of experiment, body weight gain for treatment $T_0$, $T_1$, $T_2$ and $T_3$ were 489.65, 473.00, 518.76 and 499.89 gm, respectively. It was observed that treatment $T_2$ was significantly ($P<0.05\%$) superior over other treatments. This result is corresponding to Fulpagare *et al*. (2017) revealed that birds in group supplemented 2% ashwagandha root powder had higher weekly gained in body weight with superior feed conversion ratio. The improvement in growth performance of broiler in terms of body weight and weight gains might be due to ashwagandha roots contain active constituents *viz*., with anolides and withaferin, alkaloids, polyphenols and flavonoids which have attributes to antistress activity, health restorative effects, general tonic property and antioxidant properties (Bhattacharya and Ghosal 1994). Because of these active principles stimulate the digestive enzymes production in intestinal mucosa and pancreas which could be improve the nutrients digestion and subsequently increasing the growth rate (Ali, 2011).

*C. Feed consumption*

The weekly feed consumption of broiler chicks showed in Table 4. It was observed that higher feed consumption in 1st and 3rd weeks of age in treatment groups $T_0$ followed by $T_1$, $T_3$ and $T_2$. The higher feed consumption in 2nd week examined in $T_0$ (323.90), followed by $T_3$ (321.48), $T_1$ (319.76) and $T_2$ (317.37). Statistically, during first three weeks of age the feed consumption in all treatments $T_0$, $T_1$, $T_2$ and $T_3$ were non-significant. The average feed consumption at

fourth week of age, were 846.22, 828.75, 819.79 and 828.15 g, for treatment $T_0$, $T_1$, $T_2$ and $T_3$, respectively. The numerically higher feed consumption was seen in $T_0$ (846.22). It was revealed that average weekly feed consumption significantly (P<0.05) lower in treatment $T_2$ as compared to other treatment groups. The higher feed consumption at 5th and 6th weeks of age observed in the $T_0$ (937.27 and 1053.60 g) followed by $T_3$, $T_1$ and $T_2$ treatment. Whereas statistically it showed that in treatment $T_2$ less feed was consumed as compared to all other treatments. However, the treatment $T_0$, $T_1$ and $T_3$ were at par to each other. Also, the treatment $T_1$, $T_2$ and $T_3$ were at par to each other. Similarly, Jyotsana *et al.* (2019) observed that inclusion of ashwagandha root powder @ 1% in diet significantly (P<0.05) increased feed intake and body weight gain. Contrary to present findings Mane *et al*. (2012) reported that feed consumption of broilers did not influence by inclusion of ashwagandha root powder at 0.5% level in broiler diet for 42 days of experiment.

*D. Feed conversion ratio*

Table 5 represents the mean weekly feed conversion ratio at different weeks of age. Statistically the average mean weekly feed conversion ratio for all treatments were non-significant up to second weeks period. During 3rd weeks of age better FCR was observed in $T_2$ treatment compared to other treatment groups. However, treatment $T_0$ with $T_1$ and $T_3$ were at par to each other. However, significantly (P<0.05) superior FCR was recorded in the $T_2$ treatment during 4th and 5th weeks of age. At the end of experimental period significantly (P<0.05) better feed conversion ratio observed in $T_2$ (1.98), followed by $T_3$ (2.10), $T_1$ (2.16) and $T_0$ (2.21), respectively. It was found that feed conversion ratio significantly improved by supplementation of different levels of ashwagandha root powder in broilers. The findings are in agreement with Shisodiya *et al*. (2008); Kale *et al*. (2014) that the feed conversion ratio significantly better in treatment groups as compared control group. Present findings also collaborate Gnanaraj *et al*. (2023) examined feed consumption and FCR considerably improved on addition of phytogenic feed additives in basal feed of birds. Active ingredients of ashwagandha enhance the population of beneficial microbes in birds' gut and further promoting intestinal health. As a result, altered gut microflora, which improves feed conversion ratio and growth performance by assisting in the absorption and utilization of nutrients. The results of present study showed increasing body weight, gain in weight and improvement in feed efficiency by increasing the level of ashwagandha root powder in diet.

**Table 1: Per cent proximate composition of experimental broiler ration (on % dry matter basis).**

| Nutrients | Broiler ration | | |
|---|---|---|---|
| | Pre-Starter | Starter | Finisher |
| Crude protein | 23.06 | 22.19 | 20.11 |
| Crude fiber | 3.90 | 3.95 | 4.20 |
| Ether extract | 3.22 | 4.76 | 4.54 |
| Total ash | 7.72 | 7.20 | 6.85 |
| Nitrogen free extract | 60.41 | 62.32 | 65.15 |
| ME (kcal/kg) | 2915.00 | 3007.00 | 3012.00 |

**Table 2: Effect of supplementation of ashwagandha root powder at different levels on body weight of broilers (g/bird).**

| Parameters | Treatments | | | | CD @ 5% |
|---|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | $T_3$ | |
| Initial | 46.30 | 46.62 | 46.23 | 46.14 | NS |
| 1 Week | 151.43 | 150.83 | 151.8 | 150.98 | NS |
| 2 Week | 380.40 | 382.65 | 384.86 | 381.65 | NS |
| 3 Week | $734.06^{d}$ | $747.51^{b}$ | $759.16^{a}$ | $741.56^{c}$ | 5.66 |
| 4 Week | $1195.12^{c}$ | $1215.40^{b}$ | $1245.89^{a}$ | $1217.51^{b}$ | 6.10 |
| 5 Week | $1724.32^{d}$ | $1766.38^{b}$ | $1824.53^{a}$ | $1750.03^{c}$ | 7.14 |
| 6 Week | $2213.96^{c}$ | $2238.43^{b}$ | $2343.29^{a}$ | $2249.92^{b}$ | 15.13 |

The mean values in same row with different superscripts differ significantly (P< 0.05)

**Table 3: Effect of supplementation of ashwagandha root powder at different levels on weekly body weight gain of broilers (g/bird).**

| Parameters | Treatments | | | | CD @ 5% |
|---|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | $T_3$ | |
| 1 Week | 105.10 | 104.20 | 105.57 | 104.83 | NS |
| 2 Week | 228.97 | 231.81 | 233.06 | 230.67 | NS |
| 3 Week | $353.66^{c}$ | $364.86^{ab}$ | $374.11^{a}$ | $359.91^{bc}$ | 9.31 |
| 4 Week | $461.06^{c}$ | $467.90^{bc}$ | $486.91^{a}$ | $475.95^{b}$ | 9.90 |
| 5 Week | $529.20^{c}$ | $550.02^{b}$ | $578.63^{a}$ | $532.52^{c}$ | 11.43 |
| 6 Week | $489.65^{b}$ | $473.00^{c}$ | $518.76^{a}$ | $499.89^{b}$ | 14.13 |

The mean values in same row with different superscripts differ significantly (P< 0.05)

**Table 4: Effect of supplementation of ashwagandha root powder at different levels on weekly feed intake of broilers (g/bird).**

| Parameters | Treatments | | | | CD @ 5% |
|---|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | $T_3$ | |
| 1 Week | 131.40 | 130.81 | 129.90 | 130.36 | NS |
| 2 Week | 323.9 | 319.76 | 317.37 | 321.48 | NS |
| 3 Week | 522.01 | 519.24 | 508.65 | 516.20 | NS |
| 4 Week | $846.22^{a}$ | $828.75^{b}$ | $819.79^{c}$ | $828.14^{b}$ | 11.90 |
| 5 Week | $937.27^{a}$ | $925.37^{a}$ | $895.48^{b}$ | $931.05^{a}$ | 16.79 |
| 6 Week | $1053.60^{a}$ | $1039.37^{ab}$ | $1025.57^{b}$ | $1043.33^{ab}$ | 18.23 |

The mean values in same row with different superscripts differ significantly (P< 0.05)

**Table 5: Effect of supplementation of ashwagandha root powder at different levels on feed conversion ratio of broilers.**

| Parameters | Treatments | | | | CD @ 5% |
|---|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | $T_3$ | |
| 1 Week | 1.26 | 1.26 | 1.24 | 1.25 | NS |
| 2 Week | 1.41 | 1.39 | 1.36 | 1.39 | NS |
| 3 Week | $1.48^{a}$ | $1.43^{a}$ | $1.36^{b}$ | $1.43^{a}$ | 0.06 |
| 4 Week | $1.84^{a}$ | $1.77^{b}$ | $1.68^{c}$ | $1.74^{b}$ | 0.04 |
| 5 Week | $1.77^{a}$ | $1.68^{b}$ | $1.55^{c}$ | $1.75^{a}$ | 0.05 |
| 6 Week | $2.16^{a}$ | $2.21^{a}$ | $1.98^{c}$ | $2.10^{b}$ | 0.06 |

The mean values in same row with different superscripts differ significantly (P< 0.05)

## CONCLUSIONS

From the findings of study, it is concluded that inclusion of 1.0 per cent of ashwagandha root powder in diet of broiler is beneficial in improving the body weight, weight gain, feed consumption and also have better feed conversion ratio.

## FUTURE SCOPE

Ashwagandha possesses properties that are antimicrobial, anti-fungal, immunomodulatory, antioxidant and health restorative properties. It is safe to be utilized as natural growth promoter in poultry diet.

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**Conflict of Interest**. None.

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