RESEARCH ARTICLE

# Impact of Shatavari *(Asparagus racemosus)* Root Meal Supplementation on Growth Performance, Haematology and Carcass Quality of Broiler Chickens

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## Abstract

The goal of this study was to evaluate the effects of Shatavari (*Asparagus racemosus*) root meal supplementation on the growth, haematology and carcass quality of broiler chickens. Two hundred day-old chicks (Vencobb 400) were randomly divided into four groups with 50 chicks in each using two replicates each of 25 chicks under completely randomized design. Control group TC was fed commercial diet without Shatavari root powder, while group T1, T2 and T3 were fed commercial diet supplemented with 0.5%, 1.0 % and 1.5% Shatavari root powder, respectively, for 42 days. The results showed that T2 had the highest body weight (2547.76 g), followed by T1, TC and T3. The TC group exhibited the highest overall feed intake (4339.64 g), followed by T1, T2, and T3. At 42$^{nd}$ day of treatment, the mean Hb concentration of the T2, T3, and T1 groups of birds was considerably greater and TLC was lower ($p<0.05$) than TC group. Birds in the T2 group had considerably greater PCV% than those in the TC, T1, and T3 groups. For the groups TC, T1, T2, and T3, the H:L ratios were 0.47, 0.49, 0.54, and 0.52, respectively. Overall carcass characteristics were better in T2 group, regarding slaughter yield. The wing, neck and abdominal fat contents decreased significantly ($p<0.05$), while Giblet percent increased as the level of Shatavari root meal increased in the diet. Thus, it was inferred that the inclusion of 1% Shatavari (*Asparagus racemosus*) root powder supplementation in the commercial diet of broiler chickens improves growth performance, haematological parameters and carcass quality much better than higher or lower levels of Shatavari.

**Key words:** Broiler chicken, Carcass quality, FCR, Haematology, Shatavari root powder, Supplementation.

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## Introduction

One of the key elements of a farmer's economy is poultry farming. Recently, efforts have been put to use herbs with medicinal potential to prevent the negative effects of varying levels of stresses and increase the production potential in broilers. Numerous herbal remedies, such as herbal growth promoters, have been studied on various chicken species to improve their feed intake, aid in amino acid synthesis, increasing protein content while notably lowering blood cholesterol levels, and lessen the impact of aflatoxin (Kumar *et al*., 2006; Nagar *et al*., 2021). All Ayurvedic classics such as the Charak Samhita, Susruta Samhita, and Astanga Samgraha refer Shatavari (Singh *et al*., 2009; Raghav and Kasera, 2012) in a variety of pharmaceutical formulations for its' nutritional, antistress, adaptogenic, immunomodulatory, galactagogue, anabolic, and performance-enhancing properties (Kamat *et al*., 2000; Bopana and Saxena, 2007; Bharati and Kumar, 2019). According to current chemical studies, Shatavari contains Shatavarins 1 to 4, and four steroid saponins. Shatavari may serve as a calming tonic, alternate demulcent and overall refrigerant. It enhances vigour and power while nourishing and rejuvenating the tissue. It is utilized for general senility as well as blood illnesses and nervous system abnormalities. Shatavari root meal affects broiler growth (Mane *et al*., 2012; Kumar *et al*., 2019; Nagar *et al*., 2020), immunity, blood biochemical features, and carcass quality traits (Dahale *et al*., 2014; Kant *et al*., 2016; Jediya *et*

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*al*., 2022). However, further detailed studies are required to evaluate the effects of Shatavari root meal in the commercial diet on the productive performance and immunity of chicken. With this perspective, the current study was undertaken to evaluate the effect of Shatavari root meal supplementation on growth performance, haematology and carcass quality of broiler chickens.

## Materials and Methods

The study was carried out at Livestock Farm Complex, College of Veterinary Science and Animal Husbandry, Kumarganj, Ayodhya, U.P., India, on 200 day-old chicks (Vencobb 400) for 42 days. In a completely randomized design, the broiler chicks were divided into four groups with fifty chicks in each having two replicates each of 25 chicks. The chickens of control (TC) group were fed commercial diet without Shatavari root powder, while the diets (both starter and finisher) of T1, T2 and T3 treatment groups were supplemented with 0.5%, 1%, and 1.5% Shatavari root powder, respectively.

### Body Weight Gain, Feed Intake and FCR

With the help of a computerised weighing balance, the body weight of each individual chick was measured on day 0 and then at weekly intervals up to 42 days. The average feed intake per bird and FCR was determined following the standard procedure in practice.

### Haematological Parameters and Carcass Characteristics

Blood samples were taken from the wing veins of 10 birds from each group and each replicate on day 42. The haemoglobin concentration was estimated by the Sahli's acid haematin method. Packed cell volume was determined as per method of Jain (1986). WBCs were counted manually using Neubauer counting chamber. Following DLC count, the Heterophil and Lymphocyte ratio was computed. At the end of feeding trial on day 42, 4 representative birds from each group were randomly selected and slaughtered for carcass traits studies following the standard procedure in practice.

### Statistical Analysis

Data were statistically analysed using the SPSS 20.0 programme. ANOVA was performed and Duncan's Multiple Range Test (DMRT) was applied to compare the means.

## Results and Discussion

### Body Weight

The result obtained for average weekly body weight gain from the experiment is presented in Table 1. It was observed that the body weight in T2 group was significantly ($p<0.05$) higher as compared to other three groups TC, T1 and T3 during 3rd to 6th week. The results are consistent with earlier findings of Mane *et al*. (2012), Dahale *et al*. (2014), Gaikwad *et al*. (2015, 2018) and Kumar *et al*. (2019), who found that adding Shatavari root meal @ 0.5% and 1% in broiler diet significantly ($p<0.05$) improves body weight as compared to control group.

### Feed Intake

Table 2 shows the average weekly feed intake of broiler chickens fed various levels of Shatavari root meal. Feed intake during the first week did not differ significantly between groups. During 2nd week, the feed intake was highest in T3 group ($p<0.05$) followed by T1 and T2 than the control TC.

**Table 1:** Effect of supplementation of Shatavari root meal on average weekly body weight (g) of boiler chickens

| Age in week | Dietary groups | | | | SEM | P-value |
|---|---|---|---|---|---|---|
| | TC | T1 | T2 | T3 | | |
| 1st Wk | 185.30 | 185.67 | 186.35 | 186.06 | 1.815 | 0.9788 |
| 2nd Wk | 432.20 | 434.03 | 436.10 | 428.58 | 3.720 | 0.5329 |
| 3rd Wk | 815.97$^{b}$ | 817.51$^{b}$ | 831.45$^{a}$ | 777.78$^{c}$ | 2.137 | <.0001 |
| 4th Wk | 1307.38$^{c}$ | 1324.74$^{b}$ | 1374.63$^{a}$ | 1252.45$^{d}$ | 3.694 | <.0001 |
| 5th Wk | 1858.37$^{b}$ | 1888.76$^{a}$ | 1896.20$^{a}$ | 1727.10$^{c}$ | 6.599 | <.0001 |
| 6th Wk | 2423.03$^{b}$ | 2442.39$^{b}$ | 2547.76$^{a}$ | 2273.97$^{c}$ | 14.248 | <.0001 |

Means with different superscripts differ significantly ($p<0.05$) between groups.

**Table 2:** Effect of Shatavari root meal supplementation on average weekly feed intake (g) of boiler chickens

| Age in week | Dietary groups | | | | SEM | P-value |
|---|---|---|---|---|---|---|
| | TC | T1 | T2 | T3 | | |
| 1st Wk | 176.12 | 176.56 | 175.64 | 177.64 | 0.620 | 0.1353 |
| 2nd Wk | 365.60$^{c}$ | 375.20$^{b}$ | 374.44$^{b}$ | 387.16$^{a}$ | 0.774 | <.0001 |
| 3rd Wk | 572.84$^{a}$ | 564.76$^{b}$ | 537.40$^{c}$ | 533.88$^{d}$ | 0.906 | <.0001 |
| 4th Wk | 831.32$^{a}$ | 810.84$^{b}$ | 781.56$^{c}$ | 742.36$^{d}$ | 0.533 | <.0001 |
| 5th Wk | 1,067.00$^{a}$ | 1,038.32$^{b}$ | 997.00$^{c}$ | 947.32$^{d}$ | 0.724 | <.0001 |
| 6th Wk | 1,326.76$^{a}$ | 1,301.60$^{b}$ | 1,258.04$^{c}$ | 1,222.08$^{d}$ | 0.727 | <.0001 |

Means with different superscripts differ significantly ($p<0.05$) between groups.

At the third, fourth, fifth and sixth weeks, the T3 group had significantly (p<0.05) lowest feed consumption followed by T2, T1 groups than the TC group, indicating that with increase in the level of Shatavari meal in the diet, there was gradual and significant reduction in the weekly feed consumption. These results are consistent with the earlier studies of Dahale *et al*. (2014), Gaikwad *et al*. (2018) and Kumar *et al*. (2019) that the broiler TC group consumed more feed on average than the 0.5% Shatavari supplemented group.

## Feed Conversion Ratio (FCR)

The least-square means of FCR of broiler chicken under different levels of Shatavari root meal supplementation presented in Table 3 revealed that at 1st week, no significant difference was found in FCR among the four groups. In the 2nd week, FCR of T2 and T3 groups was significantly (p<0.05) higher than T1 and TC groups. During the 3rd week, FCRs of TC and T3 groups were significantly (p<0.05) higher than T1 and T2 groups. In the 4th week, FCR of TC group was found to be significantly (p<0.05) higher than the T1 and T3, which did not differ significantly, and all these had significantly higher FCR than T2. During 5th week, FCR of T1 group was significantly (p<0.05) lower than other three groups, which were statistically at par. At the end of 6th week, the FCR of T1, T3 and TC groups did not differ significantly from one another, and all had significantly (P<0.05) higher FCR than T2 group. These observations concurred with the earlier findings of Rekhate *et al*. (2010), Pandey *et al*. (2013), Kant *et al*. (2015), Gaikwad *et al*. (2018) and Kumar *et al*. (2019), who reported that supplementing broiler chickens with Shatavari root powder at concentrations of 0.5%, 1%, and 1.5% improved feed conversion efficiency when compared to the control group.

## Haematological Parameters

Table 4 shows the observations on the haematological parameters of broiler chickens at the 42nd day of feeding trial. Most of the haematological parameters differed significantly (p<0.05) between treatments and control groups. TC group had significantly (p<0.05) lower Hb and PCV values than other groups, wherein T2 had highest values than T1 and T3 groups. The total leukocyte and heterophils count were the lowest (p<0.05) in TC and highest in T2 group. Lymphocytes were significantly (p<0.05) higher in T1 group followed by T2 than TC and T3 groups, which were almost same. The eosinophils and monocytes were significantly (p<0.05) higher in T2 group than T1, and other two groups. TC was shown to have considerably (p<0.05) higher basophils than all treatment groups. H/L ratios observed were significantly (p<0.05) higher in T2 and T3 groups than in TC and T1 group suggesting that adding Shatavari meal to the diet raised the stress level of the birds. These findings concurred with the earlier reports of Dahale *et al*. (2014), Kant *et al*. (2016) and Jediya *et al*. (2022), who reported that supplementing broiler chickens with Shatavari root powder improved Hb, PCV and TLC count when compared with the control group.

**Table 3:** Effect of Shatavari root meal supplementation on average weekly feed conversion ratio of boiler chickens

| Age in week | Dietary groups | | | | SEM | P- value |
|---|---|---|---|---|---|---|
| | TC | T1 | T2 | T3 | | |
| 1st Wk | 1.25 | 1.23 | 1.22 | 1.23 | 0.018 | 0.8460 |
| 2nd Wk | 1.49$^{b}$ | 1.52$^{b}$ | 1.61$^{a}$ | 1.61$^{a}$ | 0.030 | 0.0069 |
| 3rd Wk | 1.50$^{ba}$ | 1.47$^{b}$ | 1.37$^{c}$ | 1.54$^{a}$ | 0.017 | <.0001 |
| 4th Wk | 1.70$^{a}$ | 1.60$^{b}$ | 1.44$^{c}$ | 1.57$^{b}$ | 0.013 | <.0001 |
| 5th Wk | 1.94$^{a}$ | 1.84$^{b}$ | 1.93$^{a}$ | 1.99$^{a}$ | 0.022 | <.0001 |
| 6th Wk | 2.40$^{a}$ | 2.35$^{a}$ | 1.96$^{b}$ | 2.32$^{a}$ | 0.066 | <.0001 |

Means with different superscripts differ significantly (p<0.05) between groups.

**Table 4:** Effect of Shatavari root meal supplementation on haematological parameters of boiler chickens

| Haematological Parameters | Dietary groups | | | | SEM | P-value |
|---|---|---|---|---|---|---|
| | TC | T1 | T2 | T3 | | |
| Hb (g/dL) | 7.93$^{c}$ | 8.36$^{b}$ | 8.78$^{a}$ | 8.39$^{b}$ | 0.0192 | <.0001 |
| PCV (%) | 29.71$^{c}$ | 30.39$^{b}$ | 33.28$^{a}$ | 30.91$^{b}$ | 0.2260 | <.0001 |
| TLC (x10$^{3}$/µL) | 25.12$^{d}$ | 27.51$^{b}$ | 28.29$^{a}$ | 26.35$^{c}$ | 0.1293 | <.0001 |
| Heterophils | 29.22$^{d}$ | 33.89$^{b}$ | 34.40$^{a}$ | 32.03$^{c}$ | 0.1201 | <.0001 |
| Lymphocytes | 60.63$^{c}$ | 67.94$^{a}$ | 63.30$^{b}$ | 60.47$^{c}$ | 0.1588 | <.0001 |
| Eosinophils | 3.90$^{c}$ | 4.10$^{b}$ | 4.66$^{a}$ | 3.82$^{d}$ | 0.0268 | <.0001 |
| Monocytes | 3.84$^{d}$ | 5.73$^{b}$ | 5.81$^{a}$ | 4.88$^{c}$ | 0.0255 | <.0001 |
| Basophils | 0.50$^{a}$ | 0.00$^{b}$ | 0.00$^{b}$ | 0.00$^{b}$ | 0.0000 | <.0001 |
| H:L ratio | 0.47$^{b}$ | 0.49$^{b}$ | 0.54$^{a}$ | 0.52$^{a}$ | 0.0069 | <.0001 |

Means with different superscripts differ significantly (P<0.05) between groups

**Table 5:** Effect of Shatavari root meal supplementation on carcass characteristics of boiler chickens

| Carcass Traits | Dietary groups | | | | SEM | P- value |
|---|---|---|---|---|---|---|
| | TC | T1 | T2 | T3 | | |
| Skin | 5.42 | 5.23 | 4.94 | 4.81 | 0.1277 | 0.0834 |
| Thigh | $14.82^{a}$ | $14.13^{ab}$ | $13.61^{bc}$ | $13.23^{c}$ | 0.1839 | 0.0138 |
| Breast | $31.27^{b}$ | $32.16^{a}$ | $31.28^{b}$ | $30.13^{c}$ | 0.1191 | 0.0013 |
| Drumstick | 12.22 | 12.33 | 11.89 | 11.83 | 0.1442 | 0.1678 |
| Back | 19.76 | 18.83 | 21.22 | 19.72 | 0.4230 | 0.0675 |
| Wing | $8.36^{ab}$ | $7.99^{b}$ | $8.48^{a}$ | $8.01^{ab}$ | 0.0530 | 0.0214 |
| Neck | $2.93^{a}$ | $2.77^{ab}$ | $2.95^{a}$ | $2.57^{b}$ | 0.0277 | <.0001 |
| Giblet | $4.14^{c}$ | $4.17^{c}$ | $5.00^{b}$ | $5.27^{a}$ | 0.0277 | <.0001 |
| Abdominal fat | 3.72 | 3.81 | 3.46 | 3.26 | 0.1098 | 0.0725 |

Means with different superscripts differ significantly (P<0.05) between groups.

### Effect on Carcass Characteristics

The carcass quality of broiler chickens fed different levels of Shatavari root meals are presented in Table 5. The skin & thigh percentages were higher in TC and T1 than T2 and T3 groups with significant difference in thigh percentage, and decreased with increased level of Shatavari in diet. The percentage of breast was significantly higher in T1 and lower in T3 group, while TC and T2 did not differ significantly from each other. There was no significant difference in Drum stick percentage under different treatment groups. Back and wing percentages were higher in T2 and lowest in T1 group with significant (p<0.05) difference in wing percentage. The neck percentage was highest in T2 and Giblet in T3. For abdominal fat there was no significant difference among groups, yet the value was apparently higher in T2 and lowest in T3 group. These results are similar with the earlier observations of Kant *et al.* (2015) and Dohale *et al.* (2014). They reported significantly (p<0.05) higher percentage of dressing field in 0.5% and 1% *Asparagus racemosus* (Shatavari) root powder supplemented groups as compared to control broilers.

## Conclusion

By investigating the effect of supplementation of Shatavari (*Asparagus racemosus*) root powder in the diet on broiler chickens performance, it may be concluded that inclusion of 1% Shatavari (*Asparagus racemosus*) root powder supplementation in commercial diet is significantly beneficial for growth performance, haematological parameters and carcass quality of broiler chickens.

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