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Effect of Shatavari (*Asparagus racemosus*) Root Meal Supplementation on Growth Performance and Hematological Attributes of Broiler Chickens

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ABSTRACT: In the commercial poultry industry, antibiotics are applied for various intents, including feed as growth promoters that elaborate antimicrobial resistance (AMR). We're facing challenge to disrate AMR without affecting the growth performance. The goal of the current study was to find out how Shatavari (*Asparagus racemosus*) root meal supplementation affects broiler chicken growth and haematological characteristics. At the Livestock Farm Complex, C.V.Sc.&A.H., Kumarganj, Ayodhya, U.P., the study was conducted for 42 days. One control group and three treatment groups, each with 50 chicks, were given the following treatments: TC (0% Shatavari root powder), T1 (0.5% Shatavari root powder), T2 (1% Shatavari root powder), and T3 (1.5% Shatavari root powder). A completely randomized design (CRD) was used to divide each group into two replicates of 25 chicks each. At the conclusion of the trial, T2 had the largest body weight (2547.76g), followed by T1, TC, and T3. The TC group exhibited the highest overall feed intake (4339.64g), followed by T1, T2, and T3. T2 and T1 had the lowest FCR (1.58), which was followed by T3 and TC. In comparison to the TC, the mean Hb concentration of the T2, T3, and T1 groups of birds was considerably greater (p 0.05). Birds in the T2 group had considerably greater PCV% than those in the TC, T1, and T3 groups. In comparison to the treatment groups, the TLC of TC was considerably (p 0.05) lower. For the groups TC, T1, T2, and T3, the H:L ratios were determined to be 0.47, 0.49, 0.54, and 0.52, respectively. Therefore, it can be inferred that broiler chickens growth performance and haematological parameters are much higher when 1% Shatavari (*Asparagus racemosus*) root powder supplementation is added to their commercial diet.

Keywords: Shatavari root powder, Supplementation, Broiler birds, FCR, haematological attributes.

INTRODUCTION

One of the key elements of a farmer's economy is poultry farming. In the shortest amount of time, it gives a huge number of rural populations new income and employment prospects. Due to the rising demand for poultry products, particularly in urban areas due to their high food value, poultry farming has gained major importance. Despite many obstacles, there has been a discernible rapid growth in development and production, largely due to local scientific approaches and improvements in chicken production equipment. Due to the promising productivity results from the upgraded broiler birds, broiler poultry has been used in India as a source of income for farmers who are struggling financially.

With an annual growth rate of 8%, the poultry business is one of Indian agriculture's fastest-growing segments. The number of chickens in the country has climbed by 16.81% since the most recent census, reaching 851.81 million. However, the population was 729.12 million at the previous census in 2019 (20th Livestock Census, 2019). Even though the Indian chicken sector saw amazing expansion, it has been plagued by a number of issues due to high ambient temperatures in the tropics and high humidity levels. Therefore, broiler poultry farming is encouraged in order to continue chicken output and improve the socioeconomic standing of Indian farmers.

Recently, efforts have been undertaken to use herbs with medicinal potential to prevent tshe negative effects of varying levels of stress and increase the production potential in broilers. Numerous herbal remedies, such as herbal growth promoters that improve the hepatic functions of birds, have been researched on various

chicken species. They improve feeding, aid in amino acid synthesis, and lessen the impact of aflatoxin. The promoter increases protein content while notably lowering blood cholesterol levels. By making feed more digestible, herbal feed additives are known to increase feed consumption (Kumar *et al*., 2006; Nagar *et al*., 2021). The "Queen of herbs" is shatavari (*Asparagus racemosus*), a woody climber with finger-like, clumsy roots that can reach heights of 1 to 2 meters. Because the leaves are uniformly small and shaped like pine needles, the inflorescence contains tiny white flowers on short spikes. This plant is a member of the Liliaceae family, which is widespread in tropical areas at low altitudes in India, Asia, Australia, and Africa. Ayurvedic classics such the Charak Samhita, Susruta Samhita, and Astanga Samgraha all reference shatavari (Singh *et al*., 2009; Raghav and Kasera 2012). Shatavari is employed in a variety of pharmaceutical formulations because it has nutritional, antistress, adaptogenic, immunomodulatory, galactogogue, anabolic, and performance-enhancing characteristics (Kamat *et al*., 2000; Chopra *et al*., 1986; Mandal *et al*., 2000; Bopna and Saxena 2007; Bharati and Kumar 2019). Shatavari contains Shatavarins 1 to 4, four steroid saponins, according to current chemical studies. The main glycoside of sarsasapogenin is shatavarin 1, which has three glucose and one rhamnose sugar moiety. Shatavari 4 comprises two glucose and one rhamnose and is structurally related to shatavarin 1. Shatavari may serve as a calming tonic, alternate demulcent and refrigerant overall. It enhances vigour and power while nourishing and rejuvenating the tissue. It has astringent, emollient, cooling, nervine, and bitter properties. It is utilized for general senility as well as blood illnesses and nervous system abnormalities. Given these nutritional advantages of the herb shatavari (*Asparagus racemosus*), research has been done to determine the impact of adding shatavari root powder to the diet of broiler chicks to support the growth of broilers (Sharma *et al*., 1986; Mane *et al*., 2012; Kumar *et al*., 2019; Nagar *et al*., 2020; Gaikwad *et al*., 2018). Recent research has also examined how Shatavari root meal affects broiler immunity, blood biochemical features, and carcass quality traits (Kant *et al*., 2014; Dahale *et al*., 2014; Ukey and Mangle 2010; Kant *et al*., 2016). To evaluate the effectiveness of Shatavari root meal at different levels on the productive performance and immunity of different varieties of chicken, however, detailed studies are required. Determining the "Effect of Shatavari (*Asparagus racemosus*) root meal feeding on growth performance and biochemical attributes of broiler chickens" was the goal of the current study.

MATERIALS AND METHODS

The goal of the current study was to find out how Shatavari root meal, a nutritional supplement, and affected broiler chicken production parameters like feed intake, body weight gain, feed conversion ratio, and haematological markers. The study was carried out at Livestock Farm Complex, College of Veterinary Science and Animal Husbandry, Kumarganj, Ayodhya, U. P. (224229), India. In the present study of 42 days of experimentation period was conducted on day old chicks. In a completely randomized experimental design, 200 straight-run commercial broiler chicks were divided into four groups: control (TC), three treatment groups (T1, T2 and T3), each of which contained 50 chicks. T1 contained 0.5% Shatavari root powder, T2 contained 1% Shatavari root powder, and T3 contained 1.5% Shatavari root powder. Both the starter and finisher rations were supplemented with Shatavari root powder at the dosage level chosen for the individual treatment groups.

Body weight and Body weight gain. With the help of a computerised weighing balance, the body weight of each individual chick was measured on day 0 and at weekly intervals up to 42 days of the experimentation period.

Feed intake and Feed conversion ratio. The average feed intake per bird was calculated by dividing the total feed intake by the number of births while accounting for mortality, if any, in the particular pain. Each replicate of the treatment group was given a fixed amount of feed on a daily basis. At the end of each week, feed consumption was calculated by subtracting the residual feed from the total feed offered during different days of the week. Every week, the feed conversion ratio was calculated.

Haematological parameters. To study the haematological parameters, blood was taken from the wing veins of 10 birds from each group and each replication on day 42 of the trial.

Haemoglobin (Hb) and Packed Cell Volume:

The haemoglobin concentration in blood was estimated by the Sahli,s method. The colour produced by identical treatments of blood with known haemoglobin contents and expressed in g/dl was compared with the colour obtained when haemoglobin in the blood combines with acid to make acid hematin. According to Jain (1986), packed cell volume was calculated using the micro-hematocrit method employing capillary tubes and a micro-hematocrit reader. PCV was represented in the percentage.

Total leukocyte count and Differential leukocyte count:

WBCs where counted in the four large squares Neubauer Chamber. This number multiplied by 50 to estimate the TLC count (103 cells / mm^3).

$$TLC = Y \text{ cells counted} \times 50 \text{ cm}$$

Accounting is usually carried out using a manual differential cell counter. The differential white blood cell count is expressed as a percentage of the individual cell group. The percentage of each cell group is then converted into absolute number by reference to the total WBC. Heterophil and Lymphocyte ratio was computed to assess any stress associated to feeding of Shatavari root powder on the birds.

Statistical Analysis. Data were statistically analysed using the IBM SPSS 20.0 programme. ANOVA was performed on the collected data, and Duncan's Multiple Range Test (DMRT) was used to compare means.

RESULTS AND DISCUSSION

Body Weight Gain. In Table 1, the least expensive methods for increasing the body weight of broiler chickens fed various levels of Shatavari root meal are

shown. In weeks 1 and 2, there was no discernible difference between the body weight gains of the various groups of broiler chicken. The T2 group had the highest body weight at the end of the third week, which was significantly greater than the weights of the other three groups. However, there was no significant difference between T1 and TC's body weight gain while significantly greater than T3 group. At the end of the fourth week, the T2 group had a significantly greater body weight gain (13741.63 g), followed by the T1, TC, and T3 groups (1252.45 g). The body weight gain of the T2 and T1 groups did not differ significantly at week 5, but both were higher than the TC and T3 groups, which differed considerably from one another. At week 6, the T2 group had considerably higher body weight gain (2547.76g), while the T3 group had the lowest (2273.97g). At week 6, there was no discernible difference in body weight gain between the T1, and TC groups.

The results are consistent with earlier findings by Dahale *et al*. (2014); Gaikwad *et al.* (2015); Mane *et al*. (2012); Gaikwad *et al.* (2014); Kumar *et al*. (2019); Gaikwad *et al*. (2018) who found that adding Shatavari root meal in broiler diet have Significantly (P<0.05) higher body wit gain in 0.5% and 1% *Asparagus racemosus* (shatavari) root powder supplemented group as compared to control in broilers.

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

Attributes	TC	T1	T2	T3	SEM	P-value
1WK	185.30	185.67	186.35	186.06	1.815	0.9788
2WK	432.20	434.03	436.10	428.58	3.720	0.5329
3WK	815.97^{b}	817.51^{b}	831.45^{a}	777.78^{c}	2.137	0.5329
4WK	1,307.38^{c}	1,324.74^{b}	1,374.63^{a}	1,252.45^{d}	3.694	<.0001
5WK	1,858.37^{b}	1,888.76^{a}	1,896.20^{a}	1,727.10^{c}	6.599	<.0001
6WK	2,423.03^{b}	2,442.39^{b}	2,547.76^{a}	2,273.97^{c}	14.248	<.0001

Means with different small letters upper scripts between groups differ significantly(P<0.05).

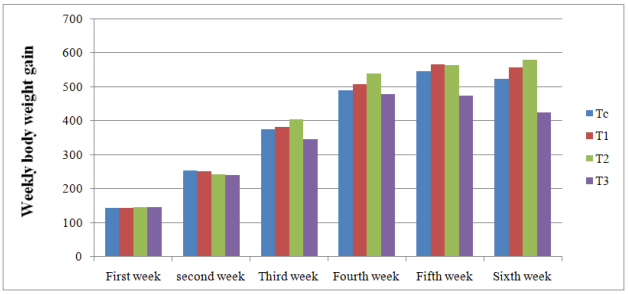

Fig. 1. Weekly body weight gain of broilers for different treatment groups.

Feed Intake. Table 2 shows the least necessary meal of feed consumed per bird on a weekly basis for grill chickens fed various levels of Shatavari root meal. The T3 group had the highest feed intake during the first week, which was significantly (P<0.05) higher than that of the other three groups. The feed intake of the TC and T1 groups, however, did not significantly differ from one another, but they were significantly lower than the T2 group. The T3 group had the highest feed intake during the second week, and this was considerably (P<0.05) higher than the feed intake of the other three groups. However, the feed intake of the T1, and T2 groups did not differ substantially from one another (P<0.05), but it was much higher than that of the TC group. At the third, fourth, and fifth weeks, the TC group had significantly (P<0.05) higher feed consumption than the T1, T2, and T3 groups. At week 6th, the Tc group recorded the highest feed intake (1326.76g) and the T3 group the lowest (1222.08g), both significantly (P<0.05). Additionally, there was a significant difference in feed intake (P<0.05) between the T1 and T2 groups at week 6th, yet the T1 group had a much higher feed intake than the T2 group.

The results are consistent with an earlier finding by Dahale *et al*. (2014); Kumar *et al*. (2019); Gaikwad *et al*. (2018) that the broiler TC group consumed more feed on average than the 0.5% Shatavari supplemented group.

Table 2: Effect of Shatavari root meal supplementation on average weekly feed intake of boiler chickens.

Attributes	TC	T1	T2	T3	SEM	P-value
1 wk	176.12ba	176.56ba	175.64b	177.64a	0.619919	0.1353
2nd wk	365.60c	375.20b	374.44b	387.16a	0.773929	<.0001
3rd wk	572.84a	564.76b	537.40c	533.88d	0.906127	<.0001
4th wk	831.32a	810.84b	781.56c	742.36d	0.532571	<.0001
5th wk	1,067.00a	1,038.32b	997.00c	947.32d	0.723671	<.0001
6th wk	1,326.76a	1,301.60b	1,258.04c	1,222.08d	0.726683	<.0001

Means with different small letters upper scripts between groups differ significantly (P<0.05).

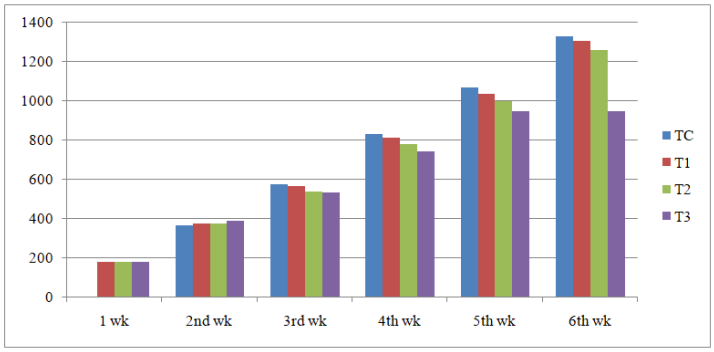

Fig. 2. Weekly feed intake of broilers for different treatment groups.

Feed Conversion Ratio. The least require means of feed conversion ratio of broiler chicken feed different levels of Shatavari root meal are presented in Table 3. In the first week, there was no significant (P<0.05) difference between the feed conversion ratios of the several groups of broiler chicks. The T2 and T3 groups had the highest feed conversion ratio at the end of the second week, which was noticeably greater than the TC and T1 group. T2, however, and T3 did not appreciably differ from one another. At the third week, TC and T3 had a significantly (P<0.05) greater feed conversion ratio than T1 and T2, which was thereafter followed by them. The TC group had the highest feed conversion ration at week 4 compared to the other three groups. T1 and T3 did not significantly differ from one another, whereas T2 group had much greater levels. By the fifth week, there was no significant (P<0.05) difference between the TC, T2 and T3 groups, but there were significantly (P<0.05) higher than T1 group. T1, T3, and TC did not significantly differ from one another at week 6 but were significantly higher than the T2 group. The findings concur with earlier findings by Kant *et al.* (2015); Pandey *et al*. (2013). Rekhate *et al*. (2010); Kumar *et al*. (2019); Gaikwad *et al*. (2018) 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.

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

Attributes	TC	T1	T2	T3	SEM	P- value
1WK	1.25	1.23	1.22	1.23	0.018	0.846
2WK	1.49^{b}	1.52^{b}	1.61^{a}	1.61^{a}	0.030	0.0069
3WK	1.50b^{a}	1.47^{b}	1.37^{c}	1.54^{a}	0.017	<.0001
4WK	1.70^{a}	1.60^{b}	1.44^{c}	1.57^{b}	0.013	<.0001
5WK	1.94^{a}	1.84^{b}	1.93^{a}	1.99^{a}	0.022	<.0001
6WK	2.40^{a}	2.35^{a}	1.96^{b}	2.32^{a}	0.066	<.0001

Means with different small letters upper scripts between groups differ significantly (P<0.05).

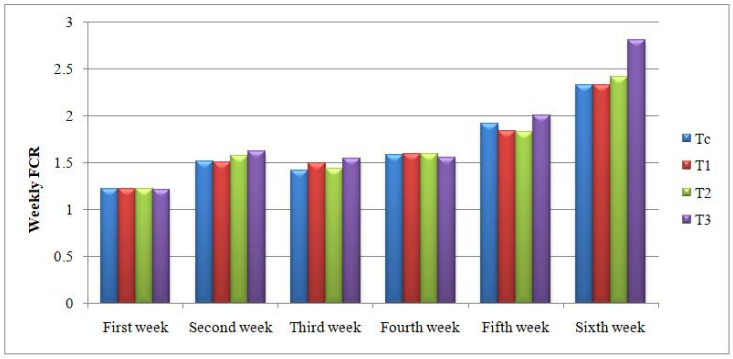

Fig. 3.

Haematological Parameters. Table 4 shows the results of the observation of the haematological parameters, including Hb, PCV, and leukocytes profile in terms of TLC, Eosinophils, heterophile, lymphocytes, besophils, monocytes, and H/L ratio, in broiler chickens fed various amounts of Shatavari root meal at the 42nd day, at the end of the trail. The treatment and control groups' haematological parameters differed significantly (P<0.05). Although there was no significant difference between T1 and T3 group's Hb values and they were significantly higher than TC group, T2 group's Hb value was significantly higher than the other three groups. A very same outcome was seen in PCV valves. At the conclusion of the study (the 42nd day), the leukocyte profiles of the various treatment groups of broiler chickens were

substantially (P<0.05) different from one another. The total leukocyte count was found to be significantly (P<0.05) higher in the T2 group following by T1, T3, and TC groups. The T2 group had considerably (P<0.05) more heterophile than the T1, T3 and TC groups. T1 group lymphocytes were found to be significantly (P<0.05) higher than T2 group lymphocytes, but TC and T3 group lymphocytes showed no significant difference. The T2 group had considerably (P<0.05) more eosinophils than the T1, TC, and T3 groups. T2 has significantly (P<0.05) more monocytes than T3, while T3 has less monocytes. TC is shown to have considerably (P<0.05) higher basophile levels than any other treatment group. For TC, T1, T2, and T3, the H/L ratios were determined to be 0.47, 0.49, 0.54, and 0.52, respectively. All treatment groups differed significantly from one another. H/L ratio was observed significantly (P<0.05) higher in T2 group and lower in TC group. In the current study, it was found that adding Shatavari supplement to the meal raised the stress level of the birds in comparison to the control group. This stress level is represented by the H/L ratio in the birds.

The findings concur with earlier findings by Kant *et al.* (2014); Dahale *et al*. (2014); Kant *et al.* (2016); Ukey and Mangle. (2010) reported that supplementing broiler chickens with Shatavari root powder improved Hb concentration, PCV and TLC count when compared to the control group.

Table 4: **Effect of Shatavari root meal supplementation on Haematological Parameters of boiler chickens.**

Attributes	TC	T1	T2	T3	SEM	P-value
Hb	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	25.12^{d}	27.51^{b}	28.29^{a}	26.35^{c}	0.1293	<.0001
H	29.22^{d}	33.89^{b}	34.40^{a}	32.03^{c}	0.1201	<.0001
L	60.63^{c}	67.94^{a}	63.30^{b}	60.47^{c}	0.1588	<.0001
E	3.90^{c}	4.10^{b}	4.66^{a}	3.82^{d}	0.0268	<.0001
M	3.84^{d}	5.73^{b}	5.81^{a}	4.88^{c}	0.0255	<.0001
B	0.50^{a}	0.00^{b}	0.00^{b}	0.00^{b}	0.0000	<.0001
H:L	0.47^{b}	0.49^{b}	0.54^{a}	0.52^{a}	0.0069	<.0001

Means with different small letters upper scripts between groups differ significantly(P<0.05).

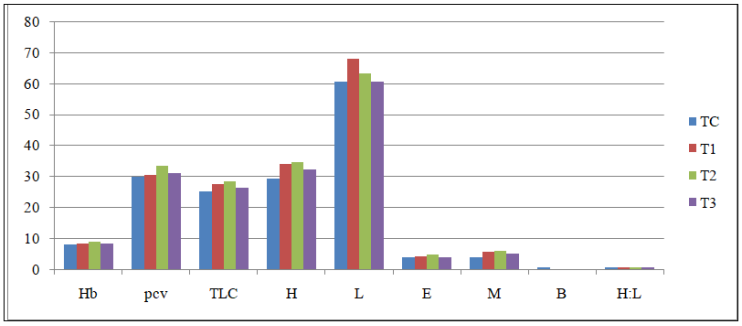

Fig. 4. Haematological Parameters of broilers for different treatment groups.

CONCLUSIONS

Investigating the effect of *Shatavari* (*Asparagus racemosus*) root powder supplementation on broiler chickens performance it may be concluded that inclusion of 1% Shatavari (*Asparagus racemosus*) root powder supplementation on commercial diet is significantly higher for growth performance and haematological parameters of broiler chickens.

FUTURE SCOPE

Shatavari root meal has multidimensional uses and it is used in poultry and livestock since long back. Shatavari root meal may also be used for increase production of milk yield in livestock animal. The literature cited by various scientists as well as recent experiments, the following studies can be done as future scope of research. Similar study can be conducted in commercial layer production. A detail study may be conducted by using Shatavari powder in commercial broiler chicken. Various studies of use of Shatavari root meal in dairy cattle, sheep and goat may be performed.

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Conflict of Interest. None.

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