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Effect of supplementation of phytobiotic shatavari (*Asparagus racemosus*) on the growth performance and carcass characteristics in raja II broilers

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Abstract

The experiment was conducted for a period of six weeks on 300, day old straight run RAJAI broiler chicks, wing banded and randomly assigned to five groups with 60 chicks with four replicates of 15 chicks in each T₁, T₂, T₃, T₄ and T₅ groups. The diets were fed ad libitum to chicks by adding 0, 0.25, 0.5, 1 and 1.5% *Asparagus racemosus* (Shatavari) root powder in the ration of T₁, T₂, T₃, T₄ and T₅ groups respectively. Significant difference was observed (P<0.05) in body weight, feed consumption and FCR in treatment groups T₂, T₃, T₄ and T₅ as compared to T₁ (control) at the end of sixth week. However the data reveals that no significant difference among the respective treatments T₂, T₃, T₄ and T₅ groups. Similarly the findings related to dressing percentage in treatment T₂, T₃, T₄ and T₅ groups were non significant compared to T₁ (control). The giblet weight viz, (Liver and Heart) were observed non-significant difference among all treatments. While giblet weight (gizzard) was found significant difference among various treatment groups as compared to control group (T₁).

Keywords: Broilers, shatavari, growth performance, carcass characteristics

1. Introduction

Poultry is one of the important components of the farmer's economy. It provides additional income and job opportunities to a large number of rural populations in the shortest possible time. Poultry farming has attained much importance due to the growing demand of poultry products especially in urban areas because of their high food value. Feed is a major component, affecting net return from the poultry because cost of the feed accounts about 65 to 70% for broiler production and is a major factor which affects the production cost. To ensure more net return and to minimize high expenditure on feed many extensive efforts have been taken. A variety of products are used in poultry to enhance performance. Further, the restricted use of antibiotics diversified the use of biological and herbal products under nutraceuticals. Herbal feed additives as growth promoters in broiler diet found a better response in terms of performance efficiency of broiler chicks (Sisodhiya *et al.*, 2008; Manwar and Mandal, 2009) [16, 9]. One among these is shatavari. Tuberos roots of Shatavari (*Asparagus racemosus wild.*) having a properties like nutritive tonic, anti-stress, anabolic properties viz. growth promotion, laxative, antacid and appetizer, beneficial for eye sight. (Sharma *et al.*, 1986 Rege *et al.*, 1989 Kamat *et al.*, 2000) [21-20]. In view of this, efforts were made to study the effect of Shatavari supplementation on the growth performance and carcass characteristics parameters of broilers.

2. Materials and Methods

Study was conducted in Raja II broilers from 1 to 6 weeks of age. A total of 300 day old straight run raja II chicks were procured and the experiment was conducted at the Department Of Poultry Science, Veterinary College KVAFSU Hebbal, Bengaluru. Chicks were wing banded, weighed and randomly distributed into five treatment groups (T₁- T₅) with four replicates (R1-R4) in each treatment group (60 chicks per treatment) and with 15 chicks in each replicate. The diet T₁ control (without Shatavari), T₂ (control + 0.25 per cent Shatavari), T₃ (control + 0.5 per cent Shatavari), T₄ (control + 1 per cent Shatavari) and T₅ (control + 1.5 per cent Shatavari). The chicks were reared in deep litter system with all standard managemental practices till six weeks of age. Standard vaccination schedule was followed for immunizing the chicks. Feed ingredients required for the formulation of the experimental diets

were procured from the feed mill unit of the Department of Poultry Science, Veterinary College, KVAFSU, Hebbal, Bengaluru-24 and prepared as per the recommendations of BIS (2007) [19]. The sample of Shatavari root powder was procured from Classic Medi. Herbs Pvt. Limited 253/2, 3rd main road, Roopena Agrahara, Bommanahalli, Bengaluru, Karnataka 560068.

2.1 Growth performance

During the course of experiment the data on growth performance parameters viz., body weight, feed consumption and feed efficiency were collected as follows.

2.1.1 Body weight (Weekly Cumulative)

To record the body weights all the chicks were weighted individually on day one and at the end of each week. For entire six weeks of the trial the cumulative body weights were also taken.

2.1.2 Feed consumption (Weekly Cumulative)

The feed consumption in each replicate was recorded weekly by subtracting the weight of residual feed from the total quantity of feed supplied during the respective week.

2.1.3 Feed conversion ratio (FCR)

The feed conversion ratio (FCR) expressed as the relationship between amount of feed consumed (kg) to the body weight gain (kg) under each treatment of birds was determined. The FCR was calculated by using the following formula,

$$\text{Feed conversion ratio} = \frac{\text{Average feed consumption per bird during the week (Kg)}}{\text{Average weight gain per bird during the week (Kg)}}$$

2.2 Carcass characteristics

The data pertaining to carcass characteristics viz dressing percentage, abdominal fat percentage and giblet weight like relative weight of heart, liver and gizzard at the end of the experiment was collected and analyzed as follows.

2.2.1 Dressing percentage

Three birds from each replicate were randomly selected and a total of 60 birds were sacrificed on 42nd day of the experiment. The birds were fasted for 12 hours and given access only to *ad-libitum* drinking water before slaughter. Live weight of the birds was recorded, birds were slaughtered by humane method by severing jugular vein and carotid artery on one side of the neck, allowed to bleed for 1-2 minutes and scalded at 54 °C for two minutes in dunking scald, defeathered mechanically for 30-60 seconds in a rotary drum picker. The birds were dressed by cutting the head at atlanto-occipital joint, legs at hock joint and the carcass was eviscerated by making a slit opening at the abdominal area to remove gastrointestinal tract, separable fat, edible and non-edible organs from the carcass. The dressing percentage was calculated as follows and expressed as % of live body weight.

$$\text{Dressing percentage} = \frac{\text{Eviscerated Carcass Weight (g)}}{\text{Live weight before slaughter (g)}} \times 100$$

2.2.2 Giblets weight

From the birds sacrificed on 42nd day the heart, liver and

gizzard were carefully collected to know the effect of different dietary treatments on their weights.

Heart: The average weight of the heart without pericardium from each treatment was recorded. Heart weight was expressed as per cent of average live body weight by using following formula.

$$\text{Heart weight (per cent)} = \frac{\text{Heart weight (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

Liver: The average weight of the liver without gallbladder from each treatment was recorded. Liver weight was expressed as per cent of average live body weight by using following formula.

$$\text{Liver weight (per cent)} = \frac{\text{Liver Weight (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

Gizzard: The average weight of the gizzard without feed contents and internal lining membrane from each group was recorded. Gizzard weight was expressed as per cent of average live body weight by using following formula.

$$\text{Gizzard weight (per cent)} = \frac{\text{Gizzard Weight (g)}}{\text{Pre slaughter live weight (g)}} \times 100$$

Table 1: Per cent ingredient and nutrient composition of basal experimental diet (as per BIS-2007)

Ingredients	Prestarter (0-7 days)	Starter (8-21 days)	Finisher (22-42 days)
Yellow maize	51	55	58.5
Soya bean meal (46%)	41.92	37.5	32.5
Vegetable oil	3.1	4	5.5
Dicalcium phosphate	1.0	1.0	1.0
Common salt	0.3	0.3	0.3
Mineral mixture*	2.0	2.0	2.0
Vitamin premix **	0.1	0.1	0.1
DL-Methionine	0.1	0.1	0.1
Liver tonic	0.13	0.13	0.13
Mycotoxin Binder	0.1	0.1	0.1
Coccidiostat	0.09	0.09	0.09
Total	100.0(99.84)	100.0 (100.32)	100.0 (100.32)
Nutrient composition			
ME (Kcal/kg) ^b	2966.6	3074.89	3138.22
Crude protein (%) ^b	22.89	19.22	18.09
Calcium (%) ^a	1.01	0.91	0.855
Phosphorous (%) ^a	0.46	0.37	0.355
Lysine (%) ^a	1.4	1.18	1.03
Methionine (%) ^a	0.49	0.39	0.342

Mineral mixture: Each 100 g contains Magnesium oxide- 1.48g, Ferrous sulphate- 6.0g, copper sulphate- 0.05g, Manganese Sulphate- 0.04 g, Potassium Iodide- 0.001g, Potassium Chloride-17.09g and Sodium selenite- 0.001g.

** Vitamin-mineral Premix: Each 100g contains Vitamin AD3 (Vitamin A-10,00,000 IU/g, Vitamin D-200000 IU/g)- 0.165g, Vitamin K3-0.103g, Vitamin E- 2.4g, Thiamine Mononitrate- 0.206 g, Riboflavin- 0.513g, Pyridoxine hydrochloride- 0.309g, Cyanocobalamine- 0.00031g, Folic acid- 0.103g, Niacin-4.124 g, Ca-D-Pantothenate- 1.031g, Biotin- 1.5g, Maltodextrine- 89.545g.

^a calculated values; ^b analyzed values

2.2 Statistical analysis

Data pertaining to various parameters obtained during the trial was analyzed statistically by ANOVA using SPSS 20 statistical software. Differences between the means were tested using Duncan's Multiple Range Test (Duncan, 1995) [3] at $P < 0.05$.

3. Results and Discussion

3.1 Weekly Cumulative body weight

From the results in table 2 it was observed that the various levels of Shatavari supplemented groups exhibited significant difference ($P \leq 0.05$) in weekly cumulative body weight when compared to control group and non-significant difference was observed among Shatavari supplemented groups in all weeks except 2nd week. The chicks in T4 group (1% Shatavari) attained higher body weight at 6th week (1613.23 g). The cumulative body weight obtained in this study is in agreement with the reports of (Sud 1982) [18], (Rekhate *et al.*, 2004) [11], (Pedulwar *et al.*, 2007) [10], (Bhardwaj *et al.*, 2009) [1], (Narayanswami *et al.*, 2004) [15] and (Srivastava *et al.*, 2013) [17], (Dahale *et al.*, 2014) [2] regarding the weekly body weight in broilers.

3.2 Weekly Cumulative feed consumption

From the results in table 3 it was observed that the various

levels of Shatavari exhibited significant difference ($P \leq 0.05$) in weekly cumulative feed consumption among different dietary treatments during 3rd, 4th, 5th and 6th week period and non-significant difference was observed in 1st and 2nd week. The cumulative feed consumption of broilers for the treatment groups was lesser as compared to control. This study is in agreement with the reports of (Narayanswamy *et al.*, 2004) [15], (Rekhate *et al.*, 2004) [11], (Mane *et al.*, 2012) [8], (Dahale *et al.*, 2014) [2], (Gaikwad *et al.*, 2015) [7] and in disagreement with the report of (Pedulwar *et al.*, 2007) [10], (Ram niwas *et al.*, 2013) [13] regarding the weekly cumulative feed consumption in broilers.

3.3. Weekly Feed conversion ratio

The statistical analysis of data (Table.4) revealed that various levels of Shatavari supplemented groups exhibited significant difference ($P \leq 0.05$) in weekly FCR values when compared to control group. Improved feed utilization efficiency due to shatavari root powder supplementation have been reported (Sundaramanna and Seshadri 1986), (Pedulwar *et al.*, 2007) [10], (Bhardwaj *et al.*, 2009) [1], (Mane *et al.*, 2012) [8] in the article. The feed conservation efficiency improved as level of SRP increased similar observations have noted by (Rekhate *et al.*, 2010) [14].

Table 2: Effect of supplementation of Shatavari on cumulative body weight (g/ chick/bird/week) (Mean \pm SE) of Raja II broilers at the end of each week.

Experimental group	Description of the treatment	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week
T ₁	Control(without Shatavari)	129.57 \pm 2.63 ^b	286.87 \pm 6.14 ^c	467.033 \pm 9.39 ^b	761.933 \pm 15.7 ^b	1083.75 \pm 18.01 ^b	1471.58 \pm 10.42 ^b
T ₂	Control+ 0.25% Shatavari	133.85 \pm 2.214 ^{ab}	291.28 \pm 4.65 ^{bc}	484.50 \pm 9.91 ^{ab}	789.98 \pm 14.46 ^{ab}	1129.67 \pm 16.49 ^{ab}	1564.60 \pm 21.07 ^a
T ₃	Control + 0.5% Shatavari	137.47 \pm 2.51 ^a	308.05 \pm 6.04 ^a	512.467 \pm 11.76 ^a	823.97 \pm 17.93 ^a	1161.97 \pm 23.05 ^a	1563 \pm 36.16 ^a
T ₄	Control + 1% Shatavari	136.18 \pm 1.96 ^{ab}	303.200 \pm 4.79 ^{ab}	513.083 \pm 7.68 ^a	827.30 \pm 14.02 ^a	1169.77 \pm 16.89 ^a	1613.23 \pm 23.79 ^a
T ₅	Control + 1.5% Shatavari	137.25 \pm 2.10 ^a	298.32 \pm 4.62 ^{abc}	487.367 \pm 10.71 ^{ab}	796.01 \pm 15.89 ^{ab}	1137.10 \pm 15.58 ^a	1570.12 \pm 22.76 ^a

Means bearing different superscript column wise differ significantly ($P \leq 0.05$)

Table 4: Effect of supplementation of Shatavari on cumulative Feed consumption (g/chick/bird/Week) (Mean \pm SE) of Raja II broilers at the end of each week

Experimental group	Description of the treatment	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week
T ₁	Control (without Shatavari)	93.05 \pm 7.95 ^a	334.52 \pm 6.35 ^a	681.90 \pm 11.63 ^a	1267.53 \pm 3.03 ^a	1960.75 \pm 6.57 ^a	2812.55 \pm 10.01 ^a
T ₂	Control + 0.25% Shatavari	56.38 \pm 1.47 ^b	311.01 \pm 19.0 ^{ab}	617.53 \pm 34.78 ^{ab}	1153 \pm 26.05 ^{bc}	1787.60 \pm 20.50 ^{bc}	2627.11 \pm 17.25 ^{bc}
T ₃	Control + 0.5 % Shatavari	55.37 \pm 1.89 ^b	279.85 \pm 4.57 ^b	677.58 \pm 317.21 ^a	1211.9 \pm 16.35 ^{ab}	1835.70 \pm 13.76 ^b	2661.35 \pm 17.08 ^b
T ₄	Control+1% Shatavari	53.73 \pm 1.34 ^b	304.48 \pm 28.08 ^{ab}	618.68 \pm 6.10 ^{ab}	1131.13 \pm 8.39 ^c	1744.18 \pm 9.61 ^{cd}	2558.70 \pm 24.09 ^{cd}
T ₅	Control + 1.5% Shatavari	55.78 \pm 2.28 ^b	313.42 \pm 11.46 ^{ab}	582.76 \pm 30.19 ^b	1105.46 \pm 33.17 ^c	1712.81 \pm 27.043 ^d	2539.43 \pm 36.99 ^d

Means bearing different superscript column wise differ significantly ($P \leq 0.05$)

Table 3: Effect of supplementation of Shatavari on weekly feed conversion ratio (Mean \pm SE) of Raja II broilers.

Experimental group	Description of the treatment	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week
T ₁	Control (without Shatavari)	0.72 \pm 0.072 ^a	1.17 \pm 0.029 ^a	1.46 \pm 0.023 ^a	1.67 \pm 0.032 ^a	1.81 \pm 0.032 ^a	1.91 \pm 0.020 ^a
T ₂	Control + 0.25% Shatavari	0.42 \pm 0.010 ^b	1.06 \pm 0.068 ^{ab}	1.28 \pm 0.082 ^b	1.46 \pm 0.040 ^b	1.58 \pm 0.020 ^b	1.68 \pm 0.020 ^b
T ₃	Control + 0.5% Shatavari	0.40 \pm 0.012 ^b	0.91 \pm 0.021 ^b	1.32 \pm 0.027 ^b	1.47 \pm 0.009 ^b	1.58 \pm 0.008 ^b	1.67 \pm 0.019 ^{bc}
T ₄	Control+ 1% Shatavari	0.39 \pm 0.009 ^b	1.01 \pm 0.098 ^{ab}	1.21 \pm 0.009 ^b	1.37 \pm 0.020 ^c	1.49 \pm 0.015 ^c	1.58 \pm 0.031 ^c
T ₅	Control + 1.5% Shatavari	0.41 \pm 0.016 ^b	1.05 \pm 0.046 ^{ab}	1.19 \pm 0.036 ^b	1.39 \pm 0.023 ^{bc}	1.51 \pm 0.020 ^c	1.61 \pm 0.041 ^{bc}

Means bearing different superscript column wise differ significantly ($P \leq 0.05$)

3.4. Carcass characteristics

3.4.1 Dressing percentage

The mean dressing percentage ranged from 71.11 per cent in T4 to 73.05 per cent in T3 group. Analysis of variance revealed non-significant ($P > 0.05$) difference in dressing

percentage among all treatment groups. This study is in agreement with the reports of Neelamani Kerkatta (2012) [5], Gaikwad *et al.* (2015) [7] and in disagreement with the report of Pandey *et al.* (2013) [6], Dahale *et al.* (2014) [2]. (Table. 5)

Table 5: Effect of supplementation of various levels of Shatavari on dressing percentage of Raja II broilers

Experimental group	Description of the treatment	Dressing percentage (%)
T ₁	Control (without Shatavari)	72.17±0.728
T ₂	Control + 0.25% Shatavari	72.39±0.842
T ₃	Control + 0.5% Shatavari	73.05±0.684
T ₄	Control+ 1% Shatavari	71.11±1.450
T ₅	Control + 1.5% Shatavari	71.27±1.239

Means bearing different superscript column wise differ significantly (P≤0.05)

3.4.2 Giblets weights

The giblet weight observed at 42nd days and found that there was non-significant difference in relative weights of liver, heart and significant difference in gizzard among various treatment groups when compared to control group (T₁). Similar finding also reported by Bhardwaj *et al.* (2009) [1],

Dahale *et al.* (2014) [2]. No conclusive evidence could be drawn from the findings with respect to heart, liver weight Durrani *et al.* (2008) [4]. Presence of antioxidants and phenolic substance in plants causes improvement of carcass yield in chicken. (Table.6)

Table 6: Effect of supplementation of various levels of Shatavari on Giblets weight (g/100g body weight) (Mean ± SE) of Raja II broilers

Experimental group	Description of the treatment	Giblets weight (g/100g body weight)		
		Heart	Liver	Gizzard
T ₁	Control (without Shatavari)	0.61±0.026	2.48±0.067	2.85±0.052 ^a
T ₂	Control + 0.25% Shatavari	0.56±0.044	2.58±0.069	2.64±0.13 ^{ab}
T ₃	Control + 0.5% Shatavari	0.59±0.021	2.46±0.11	2.56±0.073 ^b
T ₄	Control+ 1% Shatavari	0.59±0.029	2.50±0.097	2.69±0.0092 ^{ab}
T ₅	Control + 1.5% Shatavari	0.59±0.022	2.52±0.075	2.52±0.093 ^b

Means bearing different superscript column wise differ significantly (P≤0.05)

4. Conclusion

Indigenous herbal drugs like Shatavari as a feed additive in broiler ration does substantially improve body weight gain, feed consumption, feed conversion ratio (FCR), performance efficiency and giblet weight but does not have any effect on dressing percentage. *Asparagus racemosus* root powder has no negative impact on performance of RAJAI broilers.

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