RESEARCH ARTICLE

EFFECT ON PERFORMANCE TRAITS OF JAPANESE QUAILS ON INCLUSION OF SHATAVARI (*ASPARAGUS RACEMOSUS* WILD.) IN THE DIET

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Abstract: The study investigated the body conformation, performance index, production and reproduction traits of Japanese quail chicks administered with different levels of *Asparagus racemosus* root powder mixed in their feed. A 150-day old quail chicks were randomly distributed in 5 treatments 30 chicks in each treatment with 3 replicate having 10 chicks in each and reared on standard managemental conditions. The root powder of Shatavari was added over the basal ration at 1.0% level (Ts1), 1.5% (Ts2), 2.0% level (Ts3), 2.5% level (Ts4), whereas the Ts0 was the control group. A maize, soybean and rice bran-based quail starter (0-3rd week), grower (3-7th week) and layer (7th week to 23rd week) ration having all the nutrients in the required quantity was prepared. Each of such diets was offered as mash *ad libitum* to Japanese quails chicks. After the trial, marked ($P<0.05$) overall improvements were evidenced in the form of an increase in average egg production, per cent fertility and hatchability. The mortality rate was decreased in Shatavari-treated groups and improvement was observed in body conformation of Japanese quail. The age at sexual maturity was lower in the Shatavari-treated group.

Keywords: Shatavari, Conformation, Production, Reproduction, Japanese quail

INTRODUCTION

Asparagus racemosus also known as "Shatavari, means "she who possesses a hundred husbands" which indicates that this herb is highly effective in problems related to the female reproductive system (Hasan *et al*., 2016).In modern Ayurvedic practices the roots of the plant are considered to be effective as an antispasmodic, appetizer, stomach tonic, aphrodisiac, galactagogue, astringent, antidiarrhoeal, antidysenteric, laxative, anticancer, anti-inflammatory, blood purifier, antitubercular, antiepileptic and also in night blindness, kidney problems and in throat complaints (Garde, & Sarth 1970).The plant contains triterpene saponins, Shatavarin I, II, III and IV which are phytoestrogen compounds (Roots) Quercetin, rutin and hyperoside (Flowers and fruits), Diosgenin and Quercetin–3. Glucuronide (Leaves). Rani, (2019) reported that Shatavariroot powder has an ash content of 6.13 per cent and a moisture content of 6.03 per cent. Protein content 2.65 per cent and fat 3.52 per cent. Dietary fiber estimated by the AOAC enzymatic – gravimetric method and total dietary fibre was 16.06 per cent while insoluble and soluble dietary fibre were 13.4 and 2.66 per cent, respectively in SRP. Shatavari root powder contained 5.44 percent saponins, 212 Kcal energy, and 2.17 mg of iron and 26mg of calcium (Kumari and Gupta 2016).

MATERIALS AND METHODS

A total of 150-day old Japanese quail chicks were allocated randomly to five dietary treatment groups of 30 birds each and housed in deep litter floorup to three weeks and after reared in cages up to 23rd weeks age of chicks under similar managemental conditions. A practical basal diet was formulated based on common feed stuffs such as maize, soybean and rice bran meal to meet all nutrient requirements of Japanese quail. The root powder of Shatavari was added at 1% level (Ts1), 1.5% (Ts2), 2.0%level (Ts3), 2.5% level (Ts4) whereas the Ts0 was the control group. Weighed quantity of each diet was offered as mash *ad libitum* daily in the morning to chicks and layers reared in cages for a period of 16 weeks (7-23 weeks of age). At the end of the 7th-week conformation parameters, performance index, reproduction traits and 7th week to 23rd week production parameters were observed.

RESULTS AND DISCUSSION

The breast angle, Keel bone length and Shank length for all treatment groups are presented in Table 1. The breast angle (^{o}) in different treatment groups i.e. Ts0, Ts1, Ts2, Ts3, and Ts4 was 54.204±0.50, 55.9±0.83, 59.25±0.80, 64.64±1.03 and 65.46±1.20, keel bone length 5.50±1.30, 5.41±0.12, 5.63±0.11, 5.79±0.15 (cm) and 5.88±0.05 and shank length was 3.5±0.09, 3.70±0.08, 3.79±0.10, 3.73±0.13 and 3.87±0.12 (cm), respectively. The maximum and minimum value of breast angle, keel bone length and shank length was observed in Ts4 and Ts0 group respectively and differed significantly with control group but Ts3 and Ts4 group were nonsignificant to each other i.e. similar values were observed in both treated groups. However, present findings are supported by views of Bhardwaj, (2009) observed mean conformation traits i.e. breast angle^0, keel bone length (cm) and Shank length (cm) in Japanese quails were found to be as 64.15±0.08, 5.87±0.08 and

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3.69±0.01 respectively at 6th week of age in Japanese quails reared under tropical climate. Chikwa *et al*. (2018) observed all single supplements T1, T2 and T3 were significantly improved in breast angle, shank length and keel length over T0 control group. Group T1 was significantly better than T2and T3. Lerner, (1993) and Chabra *et al*. (1972) shank length has been reported to be closely related to the bodyweight particularly upto the age of 12 weeks thereafter the relationship trend was not definite. Therefore Shank length might serve as are a liable index of body weight during most of the growing period, particularly up to 12 weeks of age.

Table 1. Effect on Conformation traits of Japanese quails on the inclusion of *Asparagus racemosus*, (Mean±SE)

Conformation traits	Ts0 (control)	Ts1 (1.0% SRP)	Ts2 (1.5% SRP)	Ts3 (2.0% SRP)	Ts4 (2.5% SRP)	SEM	CD 5%
Breast angle°	54.204[c] ±0.50	55.9[c] ±0.83	59.25[b] ±0.80	64.64[a] ±1.03	65.46[a] ±1.20	1.21	3.82
Keel bone length (cm)	5.50[c] ±1.30	5.41[cd] ±0.12	5.63[b] ±0.11	5.79[a] ±0.15	5.88[a] ±0.05	0.24	NS
Shank length (cm)	3.5[d] ±0.09	3.70[bc] ±0.08	3.79[b] ±0.10	3.73[b] ±0.13	3.87[a] ±0.12	0.14	NS

***** The values having at least one common superscript does not differ significantly (<0.05) in a column.

The means of performance index at different weeks are presented in Table 2 respectively. The mean value of PI in Ts0, Ts1, Ts2, Ts3 and Ts4 groups at zero to three weeks were 64.53±0.84, 76.61±1.48, 87.27±2.92, 99.50±3.61 and 95.43±1.92, at three to six week 25.96±2.09, 29.04±1.39, 34.94±0.84, 44.43±2.32 and 49.69±2.58, at four to seven week 6.62±0.26, 8.79±0.43, 11.29±0.60, 15.10±0.80 and 14.53±0.01, at zero to six week 75.72±3.05, 87.46±1.65, 102.01±3.0, 123.13±2.10 and 128.53±2.01 and at zero to seven week 67.47±1.03, 81.78±1.30, 96.92±2.77, 117.80±0.14 and 117.53±1.67 respectively. The highest value of PI was observed between zero to three week and lowest in four to six week in all the treatment groups. The overall better cumulative PI index was observed during zero to six week which was highest in Ts4 than Ts3 group respectively. The group Ts4 and Ts3 were not significant to each other but differed significant to other treated and control group. The results on supplementation of shatawari on performance index of Japanese quails in the present experiment were similar to the finding of Pandey *et al*. (2013) reported performance efficiency (121.90±0.18%) in chicken and higher than the finding of Bhardwaj, (2009). Senani *et al*. (2004) concluded lower performance index on supplementation of probiotics from 0-3 weeks of age in Japanese quails.

Table 2. Effect on Performance index (PI) of Japanese quails on the inclusion of *Asparagus racemosus*, (Mean±SE)

Performance Index	Ts0 (control)	Ts1 (1.0% SRP)	Ts2 (1.5% SRP)	Ts3 (2.0% SRP)	Ts4 (2.5% SRP)	SEM	CD 5%
Zero to three week	64.53±0.8[d]	76.61±1.8[c]	87.27±2.9[b]	99.50±3.6[a]	95.43±1.9[a]	2.37	7.48*
Three to six week	25.96±2.9[d]	29.04±1.9[c]	34.94±0.84[b]	44.43±2.32[a]	49.69±2.58[a]	1.95	6.15*
Four to seven week	6.62±0.26[d]	8.79±0.43[c]	11.29±0.0[b]	15.10±0.0[a]	14.53±0.01[a]	0.67	2.13*
Zero to six week	75.72[d] ±3.05	87.46[c] ±1.65	102.01[b] ±3.0	123.13[a] ±2.10	128.53[a] ±2.01	2.43	7.65*
Zero to seven week	67.47[d] ±1.03	81.78[c] ±1.30	96.92[b] ±2.77	117.80[a] ±0.14	117.53[a] ±1.67	1.63	5.13*

***** The values having at least one common superscript does not differ significantly (<0.05) in a column.

Table 3. Effect on Production traits of Japanese quails on inclusion of *Asparagus racemosus,* (Mean±SE)

Production traits	**Ts0 (control)**	**Ts1 (1.0% SRP)**	**Ts2 (1.5% SRP)**	**Ts3 (2.0% SRP)**	**Ts4 (2.5% SRP)**	**SEM**	**CD 5%**
Egg production (7 to 23rd week)	67.30^{d} ±0.90	70.07^{c} ±0.26	73.27^{b} ±0.69	77.40^{a} ±0.69	74.80^{b} ±1.16	0.80	2.50
Egg weight (g)	10.92 ±0.31	11.54 ±0.29	11.77 ±0.09	11.89 ±0.50	11.50 ±0.15	0.30	NS

***** The values having at least one common superscript does not differ significantly (<0.05) in a column.

The average egg productions and egg weight during seven to twenty three weeks phase are presented in Table 3. The average egg productions in various groups were 67.30±0.90, 70.07±0.69, 73.27±0.69, 77.40±0.69 and 74.80±1.16 in Ts0, Ts1, Ts2, Ts3 and Ts4, respectively. The average egg production showed significant (P<0.05) differences due to Satavari root powder supplementation in the diet. Maximum average egg production was observed in Ts3 group (77.40 per cent) which differed significantly from average egg production in group Ts0, Ts1, Ts2 and Ts4 group. Minimum average egg production was observed in Ts0 group (67.30 per cent) which differs significantly (P<0.05) from average egg production in Ts1, Ts2,Ts3 and Ts4 group due to Satavari*(Asparagus racemosus*) root powder supplementation in quails. The per cent egg production was significantly (P<0.05) higher in all groups supplemented with Satavari root powder fed to Japanese quails as compare to control (group Ts0). The present results are in agreement with the finding and reported significant increase in egg production on supplementation of dietary protein during brooding, growing and breeding stage in Japanese quails. Similarly Zeweil *et al.* (2006) revealed that the supplementation of 1.0or 2.0 g probiotic / kg diet brought about a significant (p ≤ 0.01) improvements in egg production in laying hens. Ibrahim *et al.* (2018) were observes the overall egg production (%) and egg weight (g) during the whole trail period which shown a slight improvement was detected in egg production and egg weight with the inclusion OP (olive pulp) up to 60 g/kg diet. While, the highest increase (P≤0.05) was obtained with the inclusion IOP (irradiated olive pulp) up to 60 g/kg diet.

The maximum value of average egg weight was found in group Ts3 and was significantly (P≤0.05) higher than group Ts0. All other groups Ts1, Ts2, Ts3 and Ts4 were not significantly related, among themselves. Herve *et al.* (2019) found the egg weight in the ginger rhizomes essential oil treated groups were increased significantly (p<0.05) compared to that of birds in control group.

The age at sexual maturity (days) and per cent of fertility, hatchability and mortality for all treatments groups are presented in Table 4. The age at sexual maturity, per cent fertility and hatchability observed highest in Ts3 group as 44.0±0.58, 94.85±0.17, and 69.06±0.24 respectively and lower in the control group Ts0. The mortality rate was higher in the control group (6.67%) than Ts1 (3.34%) and no mortality was observed in the other treated group i.e. Ts2, Ts3 and Ts4. Therefore mortality has been reduced by supplementing Shatavari root powder in the diet. The age at sexual maturity was highly significant (p<0.01) in *Asparagus racemosus* supplemented groups. The hatchability and fertility studies revealed that the hatchability on total eggs set from eight to twelve weeks was significantly (p<0.05) higher in 1.0 and 1.5 supplemented groups. Samuel *et al.* (2017) observed that weight of first egg at laid were statistically (P<0.05) significant across the dietary treatments. Ashok and Reddy (2010) resulted that the age at first egg ranged from 51-53 days in the three strains. Ibrahim *et al.* (2018) found the highest significant (P≤0.05) increase in fertility, hatching% and hatching weight in laying quail fed Irradiated olive pulp up to 60 g/kg diet as compared to control.

Table 4. Effect on Reproduction traits of Japanese quails on inclusion of *Asparagus racemosus,* (Mean±SE)

Reproduction traits	**Ts0 (control)**	**Ts1 (1.0% SRP)**	**Ts2 (1.5% SRP)**	**Ts3 (2.0% SRP)**	**Ts4 (2.5% SRP)**	**SEM**	**CD 5%**
Age at sexual maturity (Days)	48.33^{a} ±0.33	46.33^{b} ±0.88	45.67^{c} ±0.88	44.0^{d} ±0.58	45.33^{c} ±0.88	0.74	2.35*
Fertility (%)	84.28^{d} ±0.54	90.74^{c} ±0.08	92.55^{b} ±0.04	94.85^{a} ±0.17	91.16^{c} ±0.08	0.26	0.82*
Hatchability (%)	59.28^{d} ±0.06	61.57^{d} ±0.14	65.49^{b} ±0.14	69.06^{a} ±0.24	67.37^{b} ±0.12	0.15	0.48*
Mortality (%)	6.67^{a}	3.34^{b}	0.00^{c}	0.00^{c}	0.00^{c}	-	-

CONCLUSION

The use of antibiotics has been found to have negative effects on poultry health and its production therefore; there is a need for supplementation of herbal ingredients in the feed of layer. This study provides information about the body conformation, PI index, production and reproduction parameters of Japanese quails on supplementation of Shatavari root powder. Results from this study suggest that improved conformation and production of egg was obtained from supplementation of Shatavari root powder in the diet. Hence, from this study it can be concluded that Japanese quails supplemented with 2.0% Shatavari root powder with feed may perform well in caged conditions in terms of improved body weight, average total egg production, age at sexual maturity, per cent fertility, hatchability and decrease in mortality percentage. Herbal additives such as Shatavari powder may be added in the Japanese quail's dietfor better growth performance.

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Conflict of Interest

The authors declare that they do not have any conflict of interest. Every author participated and approved in drafting this manuscript.

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