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Effect of dietary supplementation of Shatavari root powder along with Vitamin E on egg production and egg quality parameters of laying Japanese quail

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ABSTRACT

The present study was conducted on laying Japanese quail to evaluate the effect of optimum dietary level of Shatavari root powder (SRP) along with vitamin E supplementation on egg production and egg quality parameter. Two hundred laying Japanese quail of 7 week age were randomly distributed in 5 dietary treatment groups (40 birds in each treatment with 4 replications) and reared on standard managemental conditions. A maize, soybean and rice bran-based basal diet (BD) having all the nutrients in the required quantity was prepared for layeras per NRC (1994) standard.The SRP was added over the BD at 1.0% level (T2), 1.5% level (T3), BD with SRP @ 1% + vitamin E @ 250 mg/kg (T4) and BD with SRP @ 1.5% + vitamin E @ 250 mg/kg(T5), whereas the T1 group was feeding only BD and serves as control. Each of such diets was offered as mash ad libitum to laying Japanese quails reared on deep litter for a period of 7 weeks (7-14 weeks of age). The results indicated significantly (P<0.05) higher egg production (33.25±0.47) in treatment T5 containing 1.5 per cent SRP along with vitamin E @ 250 mg/kg compare to rest of treatment group and control on 14th weeks age of laying quail. Similarly, the results revealed that the egg weight and shell weight showed significant difference among different treatment groups at all the stages except total egg production. The average egg weight from 7th to 14th week age was significantly (P<005) higher (12.00±0.40) in T5 group as compared to rest of the treatment groups. The shell weight of eggs were significantly (P<0.05) higher in T5, T3, T1 as compared to rest of the treatment groups. It was concluded that inclusion of SRP with vitamin E combination 1.5% and @ 250 mg/kg levels to common feedstuffs is sufficient to support the optimum egg production and improve egg quality traits of Japanese quails and there is no need to supplement the diet with additional ingredients.

Key words: *Japanese quail, Shatavari, Root powder, Egg production, Egg quality*

Introduction

In the past decade commercial quail farming witnessed a tremendous growth in our country and became a viable alternate farming due to their delicious and rich nutritive value of meat and eggs. During this period a number of breeding-cum-commercial quail units were established dealing with production of specialized meat and egg type strains to meet the needs of quail growers (Goswami *et al.*, 2022). Use of natural additives such asmedicinal plants,their essential oils, or extracts in poultry nutrition as antioxidants are gaining attention to the last few years (Mehri *et al.*, 2015). There are various

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promising natural herbs as liver tonic, Immunomodulators and adoptogenic to stress and toxins, leading to lower mortality, morbidity and enhance growth and production performance. Supplementation of Shatavari root powder (SRP) had beneficial effecton body weight and feed conversion efficiency and improves general health status of the bird (Rekhate *et al*., 2010). Vitamin E is anatural antioxidant and its supplementation has been reported to improve feeding efficiency, egg production and overall growth performance of poultry (Chikwa *et al*., 2018). Studies related to SRP and vitamin E effect on performance of Japanese quail are scanty and almost lacking in literature which are presently used under commercial quail production in the many parts of the country. Considering nutritional benefits of SRPand vitamin E, the present experiment was planned to assess its effect as a single and combined form onegg production and egg quality parameters of laying Japanese quail.

Materials and Methods

This experiment was carried out in the Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur. The experiment lasted 49 days conducted during February-March 2021. The total of two hundred Japanese quail layers of seven weeks of age were allocated randomly to five dietary treatment groups of 40 birds in each and housed in laying pens on deep litter under similar managemental conditions. Birds are allowed to free access to feed and water and fed the basal diet (BD) formulated meet the nutrient requirements twice in a day in the morning and evening for a period of 7 weeks (7^{th}-14^{th} week of age). The Shatavari root powder (SRP) was added over the BD at 1.0% level (T2), 1.5% level (T3), BD with SRP @ 1% + vitamin E @ 250 mg/kg (T4) and BD with SRP @ 1.5% + vitamin E @ 250 mg/kg in diet (T5), whereas the T1 was fed only BD and serve as control group. Egg production was recorded daily. The chemical composition of SRP was found to be Moisture (6.6), Protein (21.8), Fat (3.76), Carbohydrate (48.54), CF (14.8) and Ash (4.5) per cent and calorific value was 315.2 Kcal/100g (Saini *et al*., 2016). For egg quality studies, ten eggs from each dietary group laid on 14^{th} week per treatment were taken for egg quality parameters with respect to egg weight and shell weight. The eggshell weight was taken after drying the shell and was expressed as a percentage of egg weight. The statistical data were analyses through ANOVA technique using SPSS software (2016) and tested for statistical significance using Duncan multiple range test (DMRT) (Duncan, 1955).

Table 1. Ingredient and nutrient composition of layer ration(NRC, 1994)

Feed ingredients (layer ration)	Treatments (%)				
	T_1	T_2	T_3	T_4	T_5
Maize	44	44	44	43	43
Soya cake	21	21	21	21	21
DORB	32	31	30.5	31	30.5
DCP	3	3	3	3	3
Shatavari	-	1	-	-	-
Shatavari	-	-	1.5%	-	-
Shatavari + Vitamin E	-	-	-	1%+250mg/kg	-
Shatavari + Vitamin E	-	-	-	-	1.5 %+250 mg/kg
Nutrient Composition					
Moisture (%)	10.57	10.61	10.39	10.15	10.33
Dry matter %	89.42	89.38	89.60	89.84	89.66
Crude protein (%)	17.6	17.32	17.57	17.37	17.41
Total Ash (%)	6.90	7.03	6.93	7.36	7.16
Total Ether (%)	3.93	2.63	3.06	3.51	4.00
Crude Fiber (%)	5.56	5.53	5.44	5.68	5.64
Nitrogen free extract	66.01	67.48	67.08	66.06	65.78
Metabolizable energy (Kcal/kg)	2600	2600	2600	2600	2600

*DORB= Deoiled rice bran DCP= Digestible crude protein

Results

The effect of dietary supplementation with Shatavari root powder (SRP) single or combined with Vitamin E on the egg production performance of laying quail is presented in Table 2. The weekly egg production showed non-significant difference among different treatment groups at all the stages of growth except in 14th week, in which it was found significant (P<0.05). The weekly egg production in 14th week was 30.75±0.47, 32.00±0.40, 31.50±0.64, 32.25±0.25, and 33.25±0.47 in T_1, T_2, T_3, T_4, and T_5 respectively. At 14th week of age weekly egg production was significantly higher in (33.25±0.47) T_5, (32.25±0.25) T_4 and (32.00±0.40) T_2as compared to rest of the treatment groups. However, the difference between T_2-T_4-T_5 and T_1-T_3 were non-significant.

Data of total egg production, egg weight and shell weight of Japanese quails from 7th week of age to 14th week of age is presented in Table 3 reveals significant (P<0.05) difference among different treatment groups except total Egg production, in which it was found non-significant. The average egg weight from 7th to 14th week was 9.75±0.47, 10.25±0.25, 10.00±0.40, 10.50±0.64 and 12.00±0.40 in T_1, T_2, T_3, T_4, and T_5 respectively. At average egg weight from 7th to 14th was significantly higher in T_5 (12.00±0.40) as compared to rest of the treatment groups. However, the difference between T_1-T_2-T_3-T_4 was non-significant. The shell weight of egg was 1.30±0.01, 1.29±0.01, 1.29±0.01, 1.31±0.01 and 1.32±0.00 in T_1, T_2, T_3, T_4, and T_5 respectively. At shell weight of egg was significantly higher in T_5, T_3, and T1 as compared to rest of the treatment groups. However, the difference between T_1-T_3-T_5 and T_2-T_3 were non-significant.

Discussion

The weekly egg production showed non-significant difference among different treatment groups at all the stages of growth except in 14th week (Table 2). The supplementation of combination of Shatavari root powder (SRP) @ 1.5% + vitamin E @ 250 mg/kg has significantly (P<0.05) improved weekly egg pro-

Table 2. Effect of supplementation of different levels of Shatavari root powder alongwith vitamin E on weekly egg production

Treatments	Weeks							
	7th	8th	9th	10th	11th	12th	13th	14th
T_1	25.75±0.47	26.25±0.25	25.75±0.47	27.25±0.62	27.75±0.25	28.25±0.75	30.00±0.70	30.75^b±0.47
T_2	25.75±0.47	25.25±0.47	26.25±0.25	27.25±0.62	28.75±0.47	28.50±0.50	31.25±0.62	32.00^a±0.40
T_3	25.00±0.00	25.50±0.50	25.75±0.25	26.75±0.25	28.00±0.00	28.50±0.50	30.25±0.47	31.50^b±0.64
T_4	25.50±0.28	25.00±0.40	26.00±0.00	27.00±0.00	28.50±0.50	28.00±0.57	30.00±0.57	32.25^a±0.25
T_5	25.25±0.25	26.00±0.40	25.50±0.28	27.00±0.00	28.75±0.47	28.50±0.64	30.75±0.85	33.25^a±0.47
SEm±	0.334	0.339	0.292	0.410	0.354	0.600	0.590	0.422
CD at 5 %	NS	NS	NS	NS	NS	NS	NS	1.273

*Significant at (P < 0.05) level of significance, T1 (Control), T2 (1% SRP), T3 (1.5% SRP), T4 (SRP @ 1% + vitamin E @ 250 mg/kg), T5 (SRP @ 1% + vitamin E @ 250 mg/kg), SEm= Standard Error of mean, CD= Critical Difference

Table 3. Effect of supplementation of different levels of Shatavari root powder alongwith vitamin E on Total Egg production, egg weight (g) and shell weight (g)

Treatments	Total Egg Production	Egg weight	Shell weight
T_1	221.75±2.32	9.75^b±0.47	1.30^a±0.01
T_2	225.00±1.95	10.25^b±0.25	1.29^b±0.01
T_3	221.25±1.75	10.00^b±0.40	1.29^b±0.01
T_4	222.25±1.54	10.50^b±0.64	1.31^a±0.01
T_5	225.00±1.78	12.00^a±0.40	1.32^a±0.00
SEm±	1.763	0.34	0.008
CD at 5 %	NS	1.04	0.025

*Significant at (P < 0.05) level of significance, T1 (Control), T2 (1% SRP), T3 (1.5% SRP), T4 (SRP @ 1% + vitamin E @ 250 mg/kg), T5 (SRP @ 1% + vitamin E @ 250 mg/kg), SEm= Standard Error of mean, CD= Critical Difference

duction in laying Japanese quail at 14th week of age. Ali *et al*. (2012) reported that the egg production with the supplementation of vitamin E-selenium was highest (77%) in ratio 1:4 while the least (52%) in 1:1 mating ratio (Male:Feamale). Krishna *et al.* (2015) conducted a study to assess three varieties, CARI, PES and White Breasted of Japanese quails during the growing and laying periods and stated that the performance and production of these three varieties were significant and there was no difference. Further, Ibrahim *et al*. (2018) and Kumar *et al*. (2020) reported that the per cent hen day egg production was increased in treatment groups as compared to control groupwith the inclusion OP (olive pulp) up to 60 g/kg diet and laying hens fed diets supplemented with different levels (0.75 and 1%) of Ashwagandha root powder, respectively. In this context present results are in agreement with the results of Goswami *et al.* (2022) who found that weekly egg production was increased withdiet containing 1.5 percent SRP when conducted an experiment on an hundred laying Japanese quail. The results of the present study are not in agreement with the findings of the Tahmasbi *et al.* (2012) and Jothie (2014) those reported that egg production was significantly not affected by supplementation of SRP in poultry diet.

The total egg production (Table 3) showed no significant (P>0.05) differences due to SRP supplementation in the diet in single or in combination with vitamin E. Similarly, Yardibi and Turkey (2008) stated that there was no evidence of a beneficial effect on egg production during heat stress within the dietary range investigated. The results of the present study are also in agreement with the findings of the Tahmasbi *et al.* (2012) and Jothie (2014) those reported that total egg production was significantly not affected by supplementation of *W.somnifera* and *A.racemosus* in poultry diet, respectively.

The results of the present study (Table 3) revealed significant difference (P<0.05) in the average egg weight of Japanese quails under different treatment groups supplemented with SRP and Vitamin E during 14th weeks of experimental period. The results are in accordance with the finding of Aydin *et al*. (2008) observed that weights of eggs from chickens fed a diet supplemented with 2 and 3% black cumin were found to be significantly (P <0.05) greater than in the chickens fed control. The results also supported by Bhardwaj (2009), Ibrahim *et al*. (2018) and Herve *et al.* (2019) those reported that the egg weights in all treated groups of Japanese quails were increased significantly (P<0.05) compared to that of birds in control group when experimental diet supplemented with SRP @ 1%, IOP (irradiated olive pulp)up to 60 g/kg diet and ginger rhizomes essential oil, respectively. Our results are in contradictory with previous research conducted by Tahmasbi *et al.* (2012), Jothie (2014) and Kumar *et al.* (2020) reported that cumulative mean of egg weight of different dietary treatment groups supplemented with *W.somnifera* and *A.racemosus* upto 1.5 per cent and different levels (0.5, 0.75 and 1%) of Ashwagandha root powder in the diet of layers, respectively did not differ significantly (P>0.05) when compared to control diet.

The egg quality parameters shown in (Table 3) viz. shell weight on per cent egg weight basis was significantly (P<0.05) higher in group T5 (SRP @ 1% + vitamin E @ 250 mg/kg) than other treated levels. Similarly, £ukaszewicz *et al*. (2007) obtained that females feed supplementation with organic selenium and vitamin E increased significantly (P<0.05) egg weight, egg shell weight and shell thickness for entire cycle than control group. In contrast, shell weights of the eggs in the dietary groups were not influenced when supplementing diets with 2 or 3% crushed black cumin (Aydin *et al*. 2008). Further, Biswas *et al*. (2010) reprted that the effects of increasing level of diet containing vitamin E fed to Kadaknath hens found that egg quality traits in terms of shell weight and shell thickness did not differ significantly (p>0.05).

Conclusion

It could concluded from the results of this study that Shatavariroot powder 1.5% with vitamin E @ 250 mg/kg combination could be incorporated in quail's diet 1.5 percent level with vitamin E without affecting the feed consumption and egg production performance more importantly, it did not exhibit any untoward incidence and was considered as feed ingredients, growth promoter with increased egg production performance and egg quality traits. The present study may be useful in carrying out further research on working out effective feed additives and optimum levels of supplementation for enhancing productivity.

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Conflict ofInterest

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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