INTERNATIONAL JOURNAL OF ADVANCED BIOLOGICAL RESEARCH

www.scienceandnature.org

EFFECT OF DIETARY SUPPLEMENTATION OF *WITHANIA SOMNIFERA* ON EGG PRODUCTION AND EGG QUALITY PARAMETERS IN JAPANESE QUAILS

Bhardwaj, R.K. & Gangwar, S.K.
Department of Animal, Rangeland and Wildlife Science, College of Agriculture, Mekelle University, Ethiopia

ABSTRACT
An experiment was conducted on laying quails to determine optimum dietary level of Ashwagandha supplementation on egg production and egg quality traits at Instructional poultry farm Nagla, GBPUA&T. Hundred quails were randomly distributed in four treatments and reared on standard managemental conditions. The root powder of Ashwagandha was added over the basal ration at 0.5% level (T_2), 1% (T_3), 1.5% level (T_4), whereas the T_1 was control group. A maize, soybean and fish meals based quail layer basal diet having all the nutrients in required quantity was prepared. Each of such diets was offered as mash *ad libitum* to Japanese laying quails reared in individual laying cages for a period of 15 weeks (8-23 weeks of age) significantly ($P<0.05$) higher per cent egg production was observed in diet T3 containing 1 percent Ashwagandha groups, but the groups T2 & T4 in diet did not differ significantly from each other. Egg weight was also significantly ($P<0.05$) higher in diet containing 1 percent Ashwagandha than T1 group. Cumulative feed intake (g/b) for 8-23 weeks feeding period was significantly ($P < 0.05$) higher in T1 and lower in the entire Ashwagandha treated groups. FCR (feed intake/egg mass) and net FCR were significantly ($P<0.05$) poor in T1 group than other Ashwagandha supplemented groups. Shell thickness weight was found higher in birds fed with Ashwagandha @ 1.00 per cent (T3) group than T1, T2 and T4 group, whereas groups fed T2, T3 and T4 diet did not differ significantly from each other. Shell weight on per cent of egg weight was significantly ($P<0.05$) higher in diet fed T3 than other dietary groups. The results of present study on production performance of laying quails indicated that supplementing dietary level of 1.0 percent Ashwagandha (*Withania somnifera*) in diet to common feedstuffs is sufficient to support the optimum egg production, performance of laying quails under tropical climate and there is no need to supplement the diet with additional ingredients.

KEY WORDS: Japanese laying quail, Ashwagandha, egg production, egg quality.

INTRODUCTION

Ashwagandha (*Withania somnifera*) is one of the well known medicinal plants. A number of macro and micro-minerals as well as number of active principles like withanolides, somnitalglucose, inorganic salt withanone are found. Recently di-hydroxy kaempferol-3 and rutinosides have been so far isolated from it which has been reported to possess immunomodulatory, antistress, hepatoprotective, haematinics, growth promoter and antioxidant effect in human practice (8). The use of roots and leaves of medicinal plants as feed additives can avoid wide spread abuses and occurrence of hormone, antibiotic etc. residues in eggs and meat. (1) Previous researcher reported that Satavar (*Asparagus racemosus) root* supplementation in feed of crossbred layers increased egg production, egg weight and age at sexual maturity. However such reports on Ashwagandha are scanty.Therefore, In light of the conflicting and scanty reports the effect of dietary supplementation of Ashwagandha on egg production and egg quality parameters of laying Japanese quails.

MATERIALS AND METHODS

A total of hundred Japanese quail layers of eight weeks of age were allocated randomly to four dietary treatment groups of 25 birds each and housed individually in laying cages under similar managemental conditions. A practical basal diet was formulated based on common feedstuffs such as maize, soybean meal and fish meal to meet the nutrient requirements of Japanese quail layers, which was adequate in all the nutrients. The root powder of ashwagandha was added at 0.5% level (T_2), 1% (T_3), 1.5% level (T_4), whereas the T_1 was control group. Weighed quantity of each diet was offered as mash *ad libitum* daily in the morning to laying quails reared in individual laying cages for a period of 15 weeks (8-23 weeks of age). Feed consumption and egg production of individual quail was recorded daily. The chemical composition of ashwagandha root powder was found to be OM (97.15), CP (14.15), EE (1.90), CF (11.05), Ash (2.85) and NFE (70.06), per cent and ME was 3915 Kcal/kg. Initial and final body weights of the laying quails were recorded. Feed efficiency ratio both for feed intake/kg egg mass and net feed efficiency and the change in body weight were calculated according to standard procedures.

For egg quality studies, ten eggs from each dietary groups laid on 15th week per treatment were taken for egg quality parameters with respect to shape index, albumen index, yolk index, shell weight and shell thickness. The shape index was determined by measuring the length and width of the eggs using vernier caliper. Egg shell was broken and the albumen and yolk height were measured with Spherometer, whereas, the length and width of albumen and yolk was measured using vernier caliper. The albumen index and yolk index were determined as per the method

(6). The shell thickness was measured at three points of the shell using screw gauge and averaged. The egg shell weight was taken after drying the shell and was expressed as percentage of egg weight.

Data were tested for statistical significance using Duncan multiple range test (DMRT) (5).

RESULTS AND DISCUSSION

The Results on production performance of laying quails on hen day egg production, egg weigh, egg mass, feed intake, feed conversion ratio and change in body weight as influenced by Ashwagandha supplementation are presented in Table 1.

TABLE 1. Effect of Ashwagandha supplementation on production performance of Laying Japanese quails (8-23 weeks of age)

Dietary Treatments of Withania somnifera (%)	Hen day egg production (%)	Egg weight (g)	Egg mass	Cumulative feed intake (g)	FCR (feed intake/kg mass)	Net FCR	Change in body weight (g)
T1	74.54 ±1.42^{ab}	12.33 ±0.21^{ab}	973.22 ±26.56^{ab}	3154.18 ±33.21^{a}	3.29 ±0.07^{a}	3.16 ±0.05^{a}	27.70 ±2.46^{NS}
T2	75.85 ±2.39^{abc}	12.15 ±0.16^{a}	976.61 ±31.66^{ab}	3174.24 ±38.69^{a}	3.33 ±0.12^{a}	3.17 ±0.15^{a}	33.85 ±3.64^{c}
T3	81.37 ±1.45^{c}	12.76 ±0.15^{b}	1096.10 ±19.38^{c}	3536.35 ±7.68^{c}	3.26 ±0.065^{a}	3.14 ±0.07^{b}	32.72 ±4.65^{a}
T4	76.44 ±2.10^{abc}	12.62 ±0.17^{ab}	1047.21 ±31.82^{bc}	3300.14 ±29.44^{b}	3.19 ±0.14^{a}	3.12 ±0.11^{c}	28.54 ±2.82^{b}
Over all averages	77.55 ±1.84^{a}	12.46 ±0.17^{ab}	1023.28 ±27.35^{a}	3463.68 ±27.55^{c}	3.26 ±0.09^{b}	3.14 ±0.09^{b}	31.91 ±4.13^{a}

The values having at least one common superscript does not differ significantly

TABLE 2. Egg quality traits of Japanese quails on inclusion of *Withania somnifera*

Dietary Treatments of Withania somnifera (%)	Shape index	Albumin index	Yolk index	Shell thickness (mm)	Shell weight (% egg weight)
T1	77.02±0.48^{a}	0.111±0.002^{a}	0.456±0.003^{a}	0.216±0.002^{a}	9.31±0.15^{a}
T2	79.46±0.47^{c}	0.113±0.001^{ab}	0.483±0.004^{c}	0.215±0.001^{a}	9.43±0.35^{a}
T3	78.82±0.78^{bc}	0.113±0.002^{ab}	0.464±0.003^{ab}	0.223±0.002^{b}	10.18±0.30^{b}
T4	77.76±0.41^{ab}	0.124±0.003^{c}	0.470±0.005^{bc}	0.220±0.003^{ab}	9.57±0.06^{a}

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

Results indicated significantly (P<0.05) higher per cent hen day egg production in group T3 containing 1 percent Ashwagandha groups, but the groups T2 & T4 in diet did not differ significantly from each other in T3 than T2 and T1 diets, but the groups fed T2 and T4 diet did not differ significantly from each other. Egg weight was also higher in Ashwagandha (*Withania somnifera*) supplemented group (T3) than T2 & T4 group. Cumulative feed intake (g/b) for 8-23 weeks feeding period was significantly (P<0.05) higher in T1 group than other groups. FCR (feed intake/egg mass) and net FCR were significantly (P<0.05) poorer in T1 group than other groups supplemented group. The change in body weight (Final-initial body weight) remained statistically higher in all the treated groups. Similar observations were reported by (7) who studied the effect of feeding root powder of *Withania somnifera* (L.) Dunal. (Ashwagandha) on growth rate, feed consumption, feed conversion efficiency and mortality rate in broiler chicks. These results are also in agreements with the results of (4). (1) Reported higher average egg production, higher average egg weight on supplementation of Satawar root powder in feed of layers. (8) has recommended a slightly lower (60 mg/kg diet) dietary Mn level for laying quails. The trace mineral requirement of birds are known to be affected by breed, variety, type of productivity, age, sex, physiological condition, overall nutritional adequacy of the diet, climatic conditions besides other factors.

The egg quality traits of laying quails as influenced by graded levels of Ashwagandha (*Withania somnifera*) are presented in Table 2. The egg quality parameters viz. shape index, albumen index and yolk index were not found to differ significantly among different supplemental levels of Ashwagandha (*Withania somnifera*). The eggs shell thickness was significantly (P < 0.05) higher in group T3 than control group. However, the birds consuming Ashwagandha diets having 0.50, 1.00 and 1.50 percent, shell thickness did not differ significantly from each other. Shell weight on per cent egg weight basis was significant (P < 0.05) higher in group T3 than other treated levels of *Withania somnifera*. The present results are in agreement with (1) reported shape index, albumen index, yolk index of eggs has not been found to be affected significantly due to Satawar root powder supplementation; however there was increase in shape index with increased level of Satawar supplementation. (1) also reported that shell thickness and shell weight was not affected significantly due to Satawar root powder, however the increase in shell weight has been observed in all the supplemented groups. Similarly, (10) have recommended 30-60 mg Mn/kg in diet of laying hens for optimum egg quality traits. (12)

also observed significantly ($P < 0.05$) higher egg shell weight in diets having higher Mn level than lower level. (3) also observed an increase in the breaking strength of the eggs with increasing manganese level in the diet from 65 ppm to 100 ppm.

CONCLUSION

The results of present study on production performance of laying quails indicated that a supplementation of Ashwagandha (*Withania somnifera*) in common feedstuffs is sufficient to support the optimum egg production performance of Japanese quails under tropical climate and there is no need to supplement the diet with additional calcium and manganese as its coming naturally in diet from Ashwagandha (*Withania somnifera*).

REFERENCES

Ahmad Javed, Kumar Ashok, Shukla, S. K.. and Singh, S.K.. (2008) Effect of Satavar Root(*Asparagus racemosus)* supplementation on the performance of crossbred layers. M.VSc. Thesis (Poultry science), G.B.P.U.A. & T., Pantnagar.

AOAC (1990) Official methods of analysis (15thed.) Association of official analytical Chemists, Washington, D.C. USA.

Caskey, C.D., Gallup, W.D. and Norvis, L.C. (1939) Effect of manganese level on the egg quality traits of layers. *J. of Nutr.,* 17: 407-417.

Daisy Kumari (2006) Growth Performance of Broiler Chicken on Inclusion of Ashwagandha & Amla Extracts in Drinking Water. M.V.Sc. Thesis (Livestock Production and Management), G.B.P.U.A. & T., Pantnagar.

Duncan, D.B. (1955) *Biometrics,* 11: 1-42.

Heiman, V. and Corver, J.S. (1936) Fundamentals and testing of egg quality. *Poult. Sci.,* 15: 991-994.

Mishra, S. J. and Singh, D. S. (2000) Effect of feeding root powder of *Withania sominifera* Dunal (Ashwagandha) on growth, feed consumption, efficiency of feed conversion and mortality rate in broiler chiucks. *Bioved*., 11(1/2): 79-83.

NRC (1994) *Nutrients Requirements of Poultry*. 9th Edn. National Research Council, National Academy Press, Washington, D.C.

Pandey, C. B. and Vijaykumar (19940 Symposium on Recent Advances in Veterinary Microbiology. BCKVV, Nadia, West Bengal, India.

Saly, J., Fried, K., Jantosovic, J., Kusev, J. and Benhatchi, M. (1985) *Folia Veterinaria,* Optimum level of manganese on performance of laying hens.29: 1-2, 91-99.

Shrivastav, A. K. and Panda, B. (1988) *In* : Proc. 3rd Scientific Symposium on the Latest Research Trends in Livestock and Poultry Nutrition. Animal Nutrition Society of India, BHU, Varanasi, 23-26 March. pp. 42-47.

Shukla, P. K., Shrivastava, A.K., Singh, R.P. and Bedi, S.P.S. (1993) Comparision of added and normal levels of manganese level on the egg quality traits of layers *Indian J. Poult. Sci.,* 28: 116-119.

Snedecor, G.W. and Cochran, W.G. (1989) *Statistical Methods.* 8th Edn. Iowa State University Press, Ames, Iowa.