www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(7): 1232-1235

www.thepharmajournal.com
Received: 06-04-2022
Accepted: 11-05-2022

NK Poonia
Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

G Choudhary
Department of Animal Genetics and Breeding, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

V Kumar
Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

Manju Nehara
Department of Animal Genetics and Breeding, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

Kusumlata Jhajhria
Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

Pushpa Lamba
Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

Corresponding Author
NK Poonia
Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, India

Effect of dietary supplementation of giloy (*Tinospora cordifolia*) herb and ascorbic acid along with different bedding materials on egg quality traits of Japanese quail

NK Poonia, G Choudhary, V Kumar, Manju Nehara, Kusumlata Jhajhria and Pushpa Lamba

Abstract
The present study investigates the effects of Giloy and ascorbic acid supplementation along with different bedding materials (sand, saw dust and wheat straw) on egg production status of Japanese quails. 432 laying Japanese quails (7 day old) were divided into three of different bedding material and each bedding material group further subdivided into four groups on the basis of supplementation (control, Giloy, ascorbic acid and combination of both). Thus birds were randomly and uniformly distributed in total 12 treatment groups comprising of 36 birds in each group and each group further divided into two replicates comprising 18 birds in each replicate. Quails were fed a basal diet and the basal diet supplemented with 5 g/kg giloy supplement of diet, 240 mg of ascorbic acid/kg supplement of diet and a combination of 5 g/kg giloy and 240 mg of ascorbic acid/kg supplement of diet. Highly significant (P<0.01) effect of incorporation of supplements and different bedding material was found on egg weight of Japanese quail. The effect of dietary supplementation on egg shape index was found non-significant (P>0.05) and highly significant (P<0.01) effect of bedding materials was found on the egg shape index. Non-significant effect of interaction between incorporation of dietary supplementation and different bedding materials was reported on egg weight and egg shape index of Japanese quail during experiment.

Keywords: Ascorbic acid, giloy, Japanese quail, egg weight, egg shape index

Introduction
Poultry plays an important role as animal protein source in human diet in terms of egg and meat. India ranks fourth in total production of poultry meat in the world (Basic Animal Husbandry Statistics, 2019) [3]. The popularity of poultry meat is on the rise during the last two decades. The total poultry population in the country has increased by 16.80% over the previous census and the total poultry in the country is 851.81 million numbers in 2019 (All India Report on 20th Livestock census, 2019) [2].

Japanese quail (*Coturnix coturnix japonica*) is one of the most efficient biological machines for converting feed into animal protein of high biological value (Das *et al*., 2012) [7]. Japanese quails have less feeding requirement (about 20-25 g per day) compared to chicken (120-130 g per day) (Ani *et al*., 2009) [1]. Japanese quail eggs have mottled brown colour and are often covered with a light blue, chalky material. Each hen appears to lay eggs with a characteristic shell pattern or colour. Some strains lay only white eggs. The average egg weighs about 10 g, about 8% of the bodyweight of the quail hen. Young chicks weigh 6–7 g when hatched and are brownish with yellow stripes. The shells are fragile, so require careful handling.

Recent trend in broiler production is to provide feed containing the feed additives to improve efficiency and get maximum returns in shortest possible time. Various types of feed additives. such as antibiotics, enzymes, hormones, prebiotics, probiotics, herbal products *etc*., are being used as growth stimulants in poultry production. *Tinospora cordifolia*, which is known by the common names heart-leaved moonseed, guduchi, and giloy, is an herbaceous vine of the family Menispermaceae indigenous to tropical regions of the Indian subcontinent (Sengupta *et al*., 2011) [13]. Giloy is a rich source of protein and micronutrients, such as iron, zinc, copper, calcium, phosphorus, and manganese. (Saeed *et al*., 2020) [12]. The most clearly established functional role for vitamin C involves collagen biosynthesis. Beneficial effects result from ascorbic acid in the synthesis of "repair" collagen (Bera *et al*., 2010) [5].

Wood sawdust is the most common used bedding material, however there were many alternative materials that may be used such as peanut hulls (Lien *et al*., 1998) [11], rice and wheat straw (Benabdeljelil and Ayachi, 1996) [4], rice hull ash (Chamblee and Yeatman, 2003) [6], and other dry, absorbent, low-cost organic materials. Moreover, sand is occasionally used as a bedding material (Shields *et al*., 2005) [14]. Birds spend their entire life in contact with the litter material. Therefore, its quality is considered a crucial factor of poultry welfare.

Hence, the present experimental design was planned to find out study of effect of bedding materials such as sand, wheat straw and saw dust with dietary supplementation of giloy herb (*Tinospora cordifolia*) and ascorbic acid and their combination on egg weight and egg shape index in Japanese quail.

Materials and Methods

Location of study area

The present study was conducted at Poultry unit, Livestock Farm Complex, College of Veterinary and Animal Science, Bikaner, Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan.

Experimental design of study

The study was undertaken on four hundred thirty two (432) seven day-old Japanese quail chicks which were purchased from central poultry development organization, Chandigarh. Out of 432 birds 72 birds were slaughtered at the age of 8 weeks for evaluating carcass characteristics and remaining 360 birds were further used for remaining traits (growth traits and egg production traits) entire the end of experimental trail. The study was conducted for a period of 24 weeks.

The factorial design (3x4) was adopted for the present study. The 432 seven day old Japanese quail chicks were equally and randomly divided into twelve treatments groups according to feed supplements and different bedding materials and each treatment group was further replicated into two sub-groups (R1-R2) to make sure uniformity in various treatments groups. The chicks were reared on sand, saw-dust and wheat straw in group B_1, B_2 and B_3 respectively, to study effect of bedding material on various traits. Further, each bedding material were subdivided in one control and three dietary treatment groups (giloy, ascorbic acid and combination of both) equally and denoted by T_0, T_1, T_2 and T_3, respectively to study dietary effect on traits. Thus total number of interaction groups was 12 in present study.

Composition of experimental ration and feeding

Commercially available readymade starter and finisher and layer rations were procured and feed additives such as giloy (*Tinospora cordifolia*) and ascorbic acid were supplemented. The giloy and ascorbic acid were supplemented at 5 g/kg and 240 mg/kg in alone and combination, respectively.

Parameters studied

Egg quality parameters

Two eggs from each replicate (4 from each group) were collected at fortnightly interval to measure the egg quality parameters.

Average Egg weight (g)

Eggs were weighed using an electronic weighing balance.

Egg shape index

The length and width of eggs was measured by using Vernier Caliper and the egg shape index was calculated by the following formula.

$$\text{Egg shape index} = \frac{\text{Greatest width of egg}}{\text{Greatest length of egg}} \text{ X } 100$$

Results and Discussion

Effect of dietary supplementation, bedding materials and their interaction on egg weight

The highest average egg weight was found in T_3 group and followed by T_2, T_1 and T_0 with values 13.47, 12.20, 11.73 and 10.76 (gm), respectively. The overall mean of average egg weight (g) of Japanese quail for various bedding material groups were recorded to be 10.80 in B_1, 12.75 in B_2 and 12.58 in group B_3, respectively (Table 1). The effect of incorporation of supplements and various bedding materials on average egg weight was found to be highly significant (P<0.01) in present study. There was non-significant effect of interaction during 8th, 10th, 12ndand 14th week of the experiment (Table 2). Afterwards highly significant effect of interaction was reported in remaining weeks upto 24th weeks in which overall highest average egg weight was recorded in T_{33} group (wheat straw with supplementation of both giloy and ascorbic acid).

The results observed in present study were in agreement with the findings of Ipek (2006) [9] who found significant effect of vitamin E and vitamin C on mean egg weight of Japanese quails (*Coturnix coturnix japonica*) reared under heat stress during the growth and egg production period. Similarly, Karimi *et al*. (2015) [10] and Sigolo *et al*. (2019) [15] observed significant effect of supplementation of vitamin C on egg weight in Japanese quails.

The effect of bedding material on egg weight was supported by Dhaliwal *et al*. (2018) [8] who conducted an experiment to determine the selection of bedding material used in poultry birds during the rearing period. Total 72 chicks (Rhode Island Red, Punjab Red and Kadaknath) were used on a completely randomized design in four treatments of deep litter materials *i.e.* wheat straw, rice husk, mustard stalk and sand. Differences in egg production and egg weight of birds reared on wheat straw, rice husk and mustard stalk were significantly higher than those of sand.

Table 1: Effect of dietary supplementation and bedding materials on Average Egg weight (g) at different weeks

Supplement effect	Age in weeks									
	8W	**10W**	**12W**	**14W**	**16W**	**18W**	**20W**	**22W**	**24W**	**8-24W**
T_0	9.54^a	9.58^a	10.13^a	10.17^a	10.76^a	11.44^a	11.74^a	11.73^a	11.75^a	10.76^a
T_1	10.32^b	10.39^b	11.10^b	11.13^b	11.67^b	12.44^b	12.82^b	12.84^b	12.88^b	11.73^b
T_2	10.50^b	10.58^b	11.43^c	11.49^c	12.39^c	13.08^c	13.46^c	13.44^c	13.46^c	12.20^c
T_3	12.30^c	12.42^c	13.04^d	13.07^d	13.56^d	14.01^d	14.32^d	14.26^d	14.25^d	13.47^d
SEM	0.12	0.13	0.09	0.09	0.12	0.12	0.12	0.11	0.11	0.09
Bedding effect	**8W**	**10W**	**12W**	**14W**	**16W**	**18W**	**20W**	**22W**	**24W**	**8-24W**
B_1	9.96^a	9.98^a	10.03^a	10.08^a	10.73^a	11.39^a	11.69^a	11.65^a	11.67^a	10.80^a
B_2	11.04^b	11.18^b	12.16^b	12.19^b	12.88^b	13.57^b	13.93^b	13.89^b	13.90^b	12.75^b
B_3	11.00^b	11.07^b	12.08^b	12.13^b	12.66^b	13.26^b	13.64^b	13.67^b	13.68^b	12.58^b
SEM	0.11	0.11	0.08	0.08	0.10	0.11	0.10	0.10	0.10	0.08

Means having different superscripts in a column differ significantly ($P \leq 0.05$)

Table 2: Effect of dietary supplements × bedding materials Interaction on Average Egg weight (g) at different weeks

Interaction Effect	Age in weeks									
	8W	**10W**	**12W**	**14W**	**16W**	**18W**	**20W**	**22W**	**24W**	**8-24W**
T_{10}	8.63	8.65	8.71	8.76	8.98^a	9.66^a	9.76^a	9.68^a	9.71^a	9.17^a
T_{11}	9.71	9.74	9.79	9.83	10.31^b	11.13^b	11.47^b	11.43^b	11.46^b	10.54^b
T_{12}	9.81	9.9	9.96	10	11.15^{bc}	11.79^{bc}	12.18^{bc}	12.16^{bc}	12.17^{bc}	11.01^{bc}
T_{13}	11.69	11.65	11.68	11.73	12.51^{de}	12.96^{de}	13.34^{de}	13.34^{de}	13.36^{de}	12.47^{ef}
T_{20}	10.03	10.09	10.87	10.9	11.84^{cd}	12.46^{cd}	12.9^{cd}	12.93^{cd}	12.94^{cd}	11.66^{cd}
T_{21}	10.65	10.76	11.80	11.83	12.74^{de}	13.63^{ef}	13.98^{ef}	14.03^{ef}	14.06^{ef}	12.61ef
T_{22}	10.84	10.91	12.32	12.36	12.94^e	13.64^{ef}	14.05^{ef}	13.98^{ef}	14.00^{ef}	12.78^f
T_{23}	12.64	12.97	13.65	13.68	14.01^f	14.57^f	14.82^f	14.61^f	14.61^f	13.95^g
T_{30}	9.96	10.00	10.80	10.87	11.46^c	12.19^{cd}	12.57^{cd}	12.59^{cd}	12.60^{cd}	11.45^{cd}
T_{31}	10.61	10.69	11.71	11.73	11.96^{cd}	12.55^{cd}	13.01^{cd}	13.07^d	13.12^d	12.05^{de}
T_{32}	10.86	10.94	12.02	12.10	13.08^e	13.80^{ef}	14.16^{ef}	14.18^{ef}	14.21^{ef}	12.82^f
T_{33}	12.57	12.66	13.79	13.81	14.16^f	14.52^f	14.81^f	14.83^f	14.80^f	13.99^g
SEM	0.22	0.23	0.16	0.16	0.20	0.22	0.21	0.20	0.20	0.16

Means having different superscripts in a column differ significantly ($P \leq 0.05$)

Effect of dietary supplementation, bedding materials and their interaction on egg shape index

The overall means of egg shape index for various dietary treatment groups were recorded to be 76.34 in T_0, 76.51 in T_1, 76.59 in T_2 and 76.54 in group T_3, respectively. In present experiment, the effect of dietary supplementation on egg shape index was found non-significant ($P>0.05$). While highly significant ($P<0.01$) effect of bedding materials was found on the egg shape index of Japanese quail during entire experiment. Numerically highest egg shape index (76.80) was found in B_1 (sand) as compared to other bedding material (Table 1). Non-significant effect of interaction between incorporation of dietary supplementation and different bedding materials was reported on overall mean of egg shape index of Japanese quail during experiment (Table 2).

The findings of the above experiment are in close agreement with Karimi *et al*. (2015) [10] who conducted a study to determine whether dietary chromium (1200 µg Cr/kg diet) and vitamin C (300 mg/kg) attenuated adverse effects of heat stress on external and internal egg quality traits in Japanese quails. Results showed that Chromium-vitamin C decreased the shape index ($P<0.01$).

Table 3: Effect of dietary supplementation and bedding materials on Egg shape index at different weeks

Supplement effect	Age in weeks									
	8W	**10W**	**12W**	**14W**	**16W**	**18W**	**20W**	**22W**	**24W**	**8-24W**
T_0	75.59^a	76.28	76.20^a	76.21	76.43	76.59	76.61	76.58	76.58	76.34
T_1	75.57^a	76.74	76.63^{ab}	76.57	76.27	76.70	76.70	76.70	76.73	76.51
T_2	76.31^b	76.54	76.98^b	76.56	76.28	76.70	76.65	76.60	76.65	76.59
T_3	76.61^b	76.46	76.81^b	76.70	76.65	76.37	76.37	76.41	76.44	76.54
SEM	0.17	0.19	0.18	0.18	0.22	0.16	0.16	0.15	0.15	0.10
Bedding effect	**8W**	**10W**	**12W**	**14W**	**16W**	**18W**	**20W**	**22W**	**24W**	**8-24W**
B_1	76.62^b	76.84^b	77.08^b	76.76^b	76.65	76.82^b	76.83^b	76.79^b	76.82^b	76.80^b
B_2	75.18^a	75.97^a	76.14^a	76.02^a	76.07	76.27^a	76.23^a	76.22^a	76.25^a	76.04^a
B_3	76.27^b	76.72^b	76.74^b	76.72^b	76.50	76.66^{ab}	76.67^b	76.69^b	76.71^b	76.63^b
SEM	0.15	0.17	0.16	0.15	0.19	0.13	0.14	0.12	0.13	0.08

Means having different superscripts in a column differ significantly ($P \leq 0.05$)

Table 4: Effect of dietary supplements × bedding materials Interaction on Egg shape index at different weeks

Interaction Effect	Age in weeks									
	8W	10W	12W	14W	16W	18W	20W	22W	24W	8-24W
T_{10}	76.36	76.93	76.86	76.88	76.66	76.89	76.90	76.76	76.77	76.78
T_{11}	76.17	76.79	76.69	76.66	76.83	76.65	76.71	76.68	76.70	76.65
T_{12}	76.99	76.67	77.70	76.68	76.23	76.96	76.96	76.91	76.96	76.90
T_{13}	76.99	76.97	77.09	76.85	76.89	76.81	76.78	76.84	76.86	76.90
T_{20}	74.55	75.27	75.27	75.25	75.99	76.15	76.17	76.15	76.19	75.67
T_{21}	74.73	76.61	76.52	76.45	75.89	76.35	76.36	76.38	76.40	76.19
T_{22}	75.49	76.02	76.10	75.83	76.18	76.46	76.32	76.28	76.33	76.11
T_{23}	75.96	75.99	76.69	76.59	76.25	76.13	76.10	76.08	76.10	76.21
T_{30}	75.88	76.67	76.48	76.48	76.65	76.71	76.78	76.82	76.78	76.58
T_{31}	75.85	76.84	76.69	76.61	76.08	77.09	77.03	77.04	77.09	76.70
T_{32}	76.46	76.95	77.16	77.17	76.45	76.67	76.66	76.61	76.65	76.75
T_{33}	76.91	76.45	76.66	76.65	76.82	76.19	76.24	76.32	76.35	76.51
SEM	0.31	0.34	0.32	0.31	0.37	0.28	0.28	0.26	0.26	0.16

Conclusion

Combination of giloy and vitamin C provides the highest positive effect on egg weight and egg shape index in Japanese quails. The effect of incorporation of supplements and various bedding materials on average egg weight was found to be highly significant ($P<0.01$) in present study, while non-significant for egg shape index.

Acknowledgement

Authors are thankful to the Poultry Unit, Livestock Farm Complex, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences, Bikaner for providing all facilities for conducting research.

References

1. Ani AO, Okeke GC, Emeh MB *et al*. Response of growing Japanese quail (*Cortunix Cortunix japonica*) chicks to diets containing different energy and protein levels. In: OJ Ifut, UA Inyang, IP Akpan, IE Ebeso (Eds). Diversifying Nigerian Economy Animal production option. Proceedings of the 34th Annual Conference of the Nigerian Society for Animal Production Uyo., 15-16th March, 2009, 328-331.
2. Anonymous. 20th Livestock Census, Statistical Division, Department of Animal Husbandry, Dairying and Fisheries, Government of India, 2019.
3. Anonymous, Basic Animal Husbandry Statistics (BAHS), Statistical Division, Department of Animal Husbandry, Dairying and Fisheries, Government of India, 2019.
4. Benabdeljelil K, Ayachi A. Evaluation of alternative litter materials for poultry. Journal of Applied Poultry Research. 1996;5(3):203-209.
5. Bera AK, Rana T, Das S, Bandyopadhyay S, Bhattacharya D, Pan D, *et al*. L-Ascorbate protects rat hepatocytes against sodium arsenite—induced cytotoxicity and oxidative damage. Human Experimental Toxicology. 2010;29(2):103-111.
6. Chamblee TN, Yeatman JB *et al.* Evaluation of rice hull ash as broiler litter. Journal of Applied Poultry Research. 2003;12:424-427.
7. Das D, Mukhopadhyayay SK, Ganguly S, Kar I, Dhanalakshmi S, Singh YD, *et al* Mannan oligosaccharide and organic acid salts as dietary supplements for Japanese quail (*Coturnix coturnix japonica*). International Journal of Livestock Research. 2012;2:211-214.
8. Dhaliwal APS, Dhillon BS, Brar JS *et al.* Effect of various deep litter systems on the performance and profitability in egg laying birds. Journal of Pharmacognosy and Phytochemistry. 2018;7(6):433-436.
9. Ipek A, Canbolat O, Karabulut A, *et al*. The effect of vitamin E and vitamin C on the performance of Japanese quails (*Coturnix coturnix japonica*) reared under heat stress during growth and egg production period. Asian-Australasian Journal of Animal Sciences. 2006;20(2):252-256.
10. Karimi N, Ahangari YJ, Zerehdaran S, Akhlaghi A, Hashemi SR, Lotfi E, *et al*. Effects of the dietary supplementation of chromium and vitamin C on egg quality traits in heat-stressed Japanese quails (*Coturnix cot*. *japonica*). Archiv fur Geflugelkunde/European Poultry Science, 2015, 79.
11. Lien RJ, Hess JP, Conner DE, Wood CW, Shelby RA, *et al.* Peanut hulls as a litter source for broiler breeder replacement pullets. Poultry Science. 1998;77:41-46.
12. Saeed M, Naveed M, Leskovec J, Kakar I, Ullah K, Ahmad F, *et al*. Using Guduchi (Tinospora cordifolia) as an eco-friendly feed supplement in human and poultry nutrition. Poultry Science. 2020;99(2):801-811.
13. Sengupta M, Sharma GD, Chakraborty B, *et al.* Hepatoprotective and immunomodulatory properties of aqueous extract of *Curcuma longa* in carbon tetra chloride intoxicated Swiss albino mice. Asian Pacific Journal of Tropical Biomedicine. 2011;1(3):193-199.
14. Shields SJ, Garner JP, Mench JA, *et al*. Effect of sand and wood-shavings bedding on the behavior of broiler chickens. Poultry Science. 2005;84(12):1816-1824.
15. Sigolo S, Khazaei R, Seidavi A, Ayasan T, Gallo A, Prandini A *et al*. Effects of supra-nutritional levels of vitamin E and vitamin C on growth performance and blood parameters of Japanese quails. Italian Journal of Animal Science. 2019;18(1):140-146.