The Pharma Innovation Journal 2018; 7(11): 205-207

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(11): 205-207

www.thepharmajournal.com
Received: 12-09-2018
Accepted: 14-10-2018

J Subhashini
MVSc Scholar, Department of Animal Nutrition, Madras Veterinary College Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

L Radhakrishnan
Professor and Head, Central Feed Technology Unit, Kattupakkam, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

S Ezhil Valavan
Professor, Instructional Livestock Farm Complex, Veterinary College and Research Institute, Namakkal, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

J Ramesh
Assistant Professor, Department of Animal Nutrition, Madras Veterinary College Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

Correspondence
J Subhashini
MVSc Scholar, Department of Animal Nutrition, Madras Veterinary College Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

Effect of dietary inclusion of chocolate waste on laying performance and egg quality in Japanese quails (*Coturnix coturnix japonica*)

J Subhashini, L Radhakrishnan, S Ezhil Valavan and J Ramesh

Abstract
The aim of this study was to investigate the effect of graded levels of chocolate waste replacing maize on laying performance and egg quality in Japanese quails. The laying performance of Japanese quails was evaluated from 7 to 16 weeks of age on 300 Japanese quails with an average body weight of 216.27±0.94 g at 6 weeks of age. The quails were randomly allotted into 4 different treatment groups. Each treatment contained five replicates; each replicate had 15 quails (10 females and 5 males) with the sex ratio 2:1. Four experimental diets with different levels of chocolate waste were formulated as follows: T_1 (control), T_2 (5%), T_3 (10%) and T_4 (15%). During the experimental period, the feed efficiency per kg egg mass, hen day and hen housed egg production and egg quality were not statistically significant ($p<0.05$) between the treatment groups. No significant variation was observed in the per cent livability across the dietary treatments. Therefore, it could be concluded that chocolate waste can be safely incorporated up to 15 per cent in Japanese quail layer diet without affecting the laying performance and egg quality of Japanese quails.

Keywords: chocolate waste, egg quality, Japanese quails, *coturnix coturnix japonica*

Introduction
The poultry Industry has emerged as the fastest growing segment of the livestock sector both globally and in India (Lisa and Shukla, 2015) [6]. Because of prolific egg production, Japanese quails attain the status of viable commercial enterprises recently. Quail egg is considered to be low in calorie and cholesterol. According to Bamgbose *et al*. (2004) [2], maize accounts for about 45 to 55 per cent of poultry feed. As feed constitutes 60 to 70 per cent of the total cost of production, any attempt to reduce the feed cost may lead to a significant reduction in the total cost of production. Hence, an attempt is made to utilise chocolate waste as an alternate energy source for maize.

Chocolate waste is the waste available during production of chocolates due to spillage or due to irregular sizes. Chocolate waste is a good source of energy and contains about 21.1 MJ/Kg gross energy, 4.7% Crude Protein, 18.6% Crude fat and a slightly higher Nitrogen Free Extract (71.4%) (Rudolf *et al*., 1980) [9]. with a low fibre content (1.1%) and a high NFE, this chocolate wastes are highly digestible. Further, the low moisture content (2.7%) reduces storage problem resulting in longer shelf life than many organic wastes. Hence, this study was conducted to determine the effect of feeding chocolate waste on laying performance and egg quality in Japanese quails.

Materials and Methods
The chocolate waste used in this study was obtained from a private manufacturing firm in Cuddalore. The chemical composition of chocolate waste were analysed according to AOAC (2000) [1]. The chemical composition was as follows: crude protein- 3.11%, ether extract- 10.15%, crude fibre- 0.06%, total ash- 0.68% and nitrogen free extract- 86.00%. Four experimental diets were formulated as follows: T_1 (control), T_2 (5%), T_3 (10%) and T_4 (15%) inclusion levels of chocolate waste. The diets were iso-nitrogenous and iso-caloric and formulated as per the BIS Standards (2007) [3]. The ingredient and nutrient composition of Japanese quail layer diet is presented in table 1.

A total of 300 Japanese quails with the average body weight of 216.27±0.94 gat 6 weeks of age were randomly allotted into 4 treatments with 75 birds in each treatment. Each treatment contained five replicates; each replicate had 15 quails (10 females and 5 males) with the sex

ratio of 2:1. The selected quails were transferred to four tier layer cages and maintained from 7 to 16 weeks of age. Individual breeding cage compartments were 120 x 60 x 30 cm in size, made up of welded mesh. The Japanese quails were provided with 180 sq. cm of floor space and feeding, watering space of 2.5 and 1.25 cm respectively. A total period of 16 hours of light was provided daily. Uniform managemental practices were adopted in all the experimental groups.

Table 1: Percent ingredient and nutrient composition of Japanese quail layer diets fed from 7 to 16 weeks

Ingredients %	0 % (T_1)	5 % (T_2)	10 % (T_3)	15% (T_4)
Maize	41.40	36.20	30.20	25.00
Chocolate waste	0.00	5.00	10.00	15.00
Soyabean meal	24.73	25.63	26.83	27.53
Bajra	16.55	15.65	15.45	14.95
Shell grit	5.55	5.10	5.10	5.10
Vegetable oil	4.80	4.85	4.85	4.85
Dry fish,	4.25	4.25	4.25	4.25
Dicalcium phosphate	1.05	0.85	0.85	0.85
Mineral mixture for poultry	1.00	1.80	1.80	1.8
DL-Methionine	0.05	0.05	0.05	0.05
Salt	0.25	0.25	0.25	0.25
Feed additives	0.37	0.37	0.37	0.37
Total	100	100	100	100
Calculated nutrient composition	0 % (T_1)	5 % (T_2)	10 % (T_3)	15 %(T_4)
ME (K cal/kg)	3054	3053	3052	3054
Crude protein (%)	18.04	18.03	18.04	18.04
Calcium (%)	3.01	3.03	3.04	3.04
Available Phosphorus (%)	0.45	0.46	0.46	0.46

Laying performance and egg quality of Japanese quails fed with chocolate waste

The parameters measured during the layer trial include feed efficiency per kg egg mass, hen day and hen housed egg production, egg weight and egg quality parameters such as shape index, albumen index, yolk index, haugh unit score, yolk colour, shell thickness and sensory attributes.

Six eggs per treatment were randomly collected to measure the egg quality parameters. The weight of each egg, albumen, yolk and shell were recorded to 0.01 g accuracy. The length and width of the egg were measured with dial caliper with 0.05 mm accuracy. Shape index was calculated according to the formula of Shuttz (1953) [11]. Specific gravity was calculated with the help of egg weight (g) and volume of egg (ml). After breaking open the egg, the height of thick albumen and yolk was measured to 0.01 mm accuracy using an "Ames tripod micrometer" and the width of the thick albumen and yolk was measured at two places using a dial caliper with 0.05 mm accuracy and their mean width was arrived at. Albumen index was calculated according to the formula of Heiman and Carver (1936) [4]. The yolk index was calculated as per Sauter *et al.* (1951) [10]. Haugh unit score was calculated as per (Kondaiah *et al*., 1983) [5]. The individual yolk colour was determined by using a standard "Roche yolk colour fan" as per (Vuilleumier, 1969) [13]. Shell thickness (mm) without membrane was measured at three places viz equatorial region, narrow and broad ends by using a shell thickness gauge with 0.01 mm accuracy and mean thickness was calculated. The percentage of egg shell was calculated by the formula, Egg shell % = Shell weight/Egg weight x 100. Sensory evaluation was done as per (Panda *et al*., 1982) [8].

The cost effectiveness of including graded levels of chocolate waste in Japanese quail layer diet was calculated by taking prevailing cost of different feed ingredients, feed consumed and total eggs produced.

The data collected on various parameters in biological trial were subjected for statistical analysis of variance (ANOVA) as per the procedure of statistical analysis system (SPSS, version 20.0 for windows).

Results and Discussion

Laying performance of Japanese quails fed with chocolate waste

The laying performance of Japanese quails fed with chocolate waste is presented in table 2. In the present study, At the end of 16th week, the quails fed with 15 and 10 per cent chocolate waste showed similar and highest feed efficiency followed by quails fed with 5 per cent chocolate waste and control though not statistically significant (p>0.05). The results of the present study agrees with Olafadehan *et al*. (2010) [7] who reported a better feed efficiency in laying hens when the level of bakery waste increased from 0 to 30 per cent. The non significance in the feed efficiency per kg egg mass indicates that inclusion of chocolate waste has not affected the feed efficiency of quails.

The per cent hen day egg production increased with increase in the inclusion levels of chocolate waste from 0 to 15 per cent from 7 to 16 weeks of age. However, the increase was not statistically significant (p>0.05) among the treatment groups. The linear increase in the hen day egg production though non-significant reveals that inclusion of chocolate waste up to 15 per cent level has not interfered with nutrient utilisation for egg production.

The per cent hen housed egg production increased with increase in the inclusion levels of chocolate waste from 0 to 15 per cent though not statistically significant (p>0.05). Per cent hen housed egg production did not vary from the results of hen day egg production confirming that inclusion of chocolate waste has not affected the egg production.

The non significance in the per cent livability indicates that chocolate waste has no toxic factors in it. It could be inferred that chocolate waste can be included in the Japanese quail layer diet without any deleterious effects in birds.

The total feed cost per bird and production cost per egg decreased with increase in the inclusion levels of chocolate waste. The highest return per bird was found in 15 per cent chocolate waste fed group. Thus, chocolate waste can be incorporated in the Japanese quail layer diet to reduce the feed cost and cost of production and to increase the profit.

The egg quality and sensory attributes of Japanese quail eggs fed with chocolate waste is presented in table 3. No significant difference (p>0.05) was observed between the treatments in the egg quality parameters. The non significance in the egg quality parameters indicate that the egg quality of Japanese quail is not affected by inclusion of chocolate waste. The higher yolk index in the present study indicates the high quality of egg.

The non-significant variation (p>0.05) in the sensory attributes indicate that the inclusion of chocolate waste has not affected the sensory attributes of the Japanese quail eggs.

Table 2: Laying performance of Japanese quails (Mean ± S.E) fed with and without chocolate waste at graded levels up to 5 weeks of age

Parameters	T_1	T_2	T_3	T_4	P value
Feed efficiency per kg egg mass ^{NS}	3.57 ± 0.02	3.57 ± 0.02	3.54 ± 0.03	3.54 ± 0.03	0.63
Hen day egg production ^{NS}	79.40 ±6.00	80.27 ± 6.04	80.97 ± 5.86	81.19 ± 5.84	0.77
Hen housed egg production ^{NS}	73.97 ±5.15	74.14 ± 5.13	74.60 ± 4.94	74.74 ± 4.92	0.93
Livability ^{NS}	92.40 ± 0.66	92.80 ± 0.57	92.53 ± 0.60	93.46 ± 0.42	0.79
Total production cost / egg produced (Rs.)	1.22	1.19	1.15	1.12	-

Each value is a mean of 50 observations ^{NS} Values not significant

Table 3: Egg quality and sensory attributes in Japanese quails (Mean±S.E) fed with and without chocolate waste at 16 weeks of age

Parameters	T_1	T_2	T_3	T_4	P value
Egg weight	11.63 ± 0.34	11.66 ± 0.34	11.67 ± 0.33	11.70 ± 0.33	0.76
Shape index ^{NS}	78.59 ± 0.32	78.38 ± 0.20	78.03 ± 0.94	78.26 ±0.22	0.37
Specific gravity ^{NS}	1.071 ± 0.016	1.073 ± 0.006	1.072 ± 0.010	1.073 ±0.006	0.78
Albumen index ^{NS}	0.102 ± 0.001	0.103 ± 0.001	0.103 ± 0.001	0.104 ±0.001	0.41
Yolk index ^{NS}	0.421 ± 0.002	0.424 ± 0.008	0.423 ± 0.010	0.422 ±0.013	0.36
Haugh unit score ^{NS}	82.27 ± 0.12	82.28 ± 0.09	82.29 ± 0.07	82.33 ± 0.11	0.30
Yolk colour ^{NS}	5.23 ± 0.07	5.25 ± 0.08	5.25 ±0.08	5.26 ±0.06	0.76
Shell thickness ^{NS}	0.208 ± 0.001	0.209 ± 0.003	0.208 ± 0.002	0.209 ±0.001	0.69
Shell % ^{NS}	8.46 ±0.11	8.41 ±0.05	8.37 ± 0.07	8.37 ±0.11	0.92
Colour ^{NS}	3.67 ± 0.21	3.67 ± 0.21	3.50 ± 0.22	3.50 ± 0.22	0.90
Texture ^{NS}	3.83 ± 0.17	3.67 ± 0.21	3.67 ± 0.21	3.67 ± 0.21	0.91
Flavour^{NS}	3.67 ± 0.21	3.67 ± 0.21	3.50 ± 0.22	3.50 ± 0.22	0.90
Overall acceptability^{NS}	6.67 ± 0.21	6.67 ± 0.21	6.50 ± 0.22	6.50 ± 0.22	0.90

Each value is a mean of six observations^{NS} Values not significant

Conclusion

The increase in the cost of maize has compelled many animal nutritionists to search for alternate feed resources to combat the rising feed cost of animals. Chocolate waste which is a rich source of energy can be used as an alternate energy replacing maize. It could be safely incorporated up to 15 per cent in Japanese quail layer diet without affecting the egg production performance of Japanese quails.

References

1. AOAC. Official methods of analysis. 16th ed. Association of Official Analytical Chemists, Washington, DC, 2000.
2. Bamgbose AM, Ogungbenro SD, Obasohan EE, Aruna MB, Oteku IT, Igene UF, Otoikhian CSO, Imasuen JA. Replacement value of maize offal/cashew nut for maize in broiler diets. In Proceedings of the 29th Annual Conference of the Nigeria Society for Animal Production. March, 2004, 219-221.
3. BIS (Bureau of Indian Standards). Indian Standard Poultry Feeds - Specification. 5thedn. New Delhi, 2007.
4. Heiman V, Carver JS. The albumen index as a physical measurement of observed egg quality. Journal of Poultry Science. 1936; 15:141-148.
5. Kondaiah N, Panda B, Singhal. Internal egg quality measure of quail eggs. Indian Journal of Animal Sciences. 1983; 53:1261-1264.
6. Lisa A, Shukla R. An analysis of opportunities and challenges in poultry sector in global and indian perspectives. International journal of management and social science research. 2015; 3(1):27-35.
7. Olafadehan OO, Olafadehan OA, Fapohunda JB. Performance and economics of production of laying hens fed dried bakery waste. Animal Nutrition and Feed Technology. 2010; 10:169-175.
8. Panda B, Pandey NK, Mahapatra CM, Verma SS, Shrivastav AK, Chaudhuri D. Laboratory manual on post-harvest technology of avian products, Avian products technology section, Central Avian Research Institute, Izatnagar, UP, India, 1982.
9. Rudolf TS, Sheppard JS, Newkirk DR, Hubbard WD. Individual lipids and proximate analysis of various foods. 5. Candy bars. Journal of Agricultural and Food Chemistry. 1980; 28:889-891.
10. Sauter EA, Stadelman WJ, Harns V, Mclaren BA. Methods for measuring yolk index. Poultry Science. 1951; 30:629-630.
11. Shuttz PT. Analysis of egg shape in chicken. Biometrics. 1953; 9:336.
12. SPSS. Statistical Package for the Social Sciences. Version 20.0 software for Windows.
13. Vuilleumier JP. The roche yolk colour fan-an instrument for measuring yolk color. Poultry Science. 1969; 35:226-227.