academicJournals

Vol. 7(40), pp. 2999-3002, 25 October, 2013
DOI: 10.5897/JMPR12.1120
ISSN 1996-0875 ©2013 Academic Journals
http://www.academicjournals.org/JMPR

Journal of Medicinal Plants Research

Full Length Research Paper

Effect of feeding of morical (*Morinda citrifolia*) based herbal supplement on production and egg quality in Nicobari fowl

Jai Sunder*, Shaktivel Jeyakumar, T. Sujatha and Anandamoy Kundu

Division of Animal Science, Central Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands, 744 101, India.

Accepted 17 October, 2013

Morical, a herbal based feed supplement prepared using *Morinda citrifolia* fruits were fed to the Nicobari fowl at 4% inclusion level in the feed. Higher hen day egg production and egg weight was recorded with morical fed group as compared to control group. The egg shell analysis revealed that the morical fed group showed the better egg shell thickness, calcium and magnesium accretion in egg shell and yolk. Based on the present study, it was explored that *M. citrifolia* fruit powder could be used as feed supplement in Nicobari fowl.

Key words: Egg production, egg quality, *Mroinda citrifolia*, Nicobari fowl.

INTRODUCTION

Herbal based feed additives and supplements have been in poultry industry since several years. It has been reported that the use of herbal supplements improves the growth, production, immunity and several other beneficial effects in poultry (Mahajan et al., 2010; Narahari et al., 2009). Recently, the concerns for usage of antibiotics residue and resistance have aroused great caution in the usage of the antibiotics and inorganic additives in the poultry residue. The use of antibiotics as growth promoter has been banned since 2006 by European Community. The research is now shifted towards the alternative option in the form of organic additives/supplements from the plant based compounds/extracts. Several reports are available for the use of herbal supplement in poultry (Collington et al., 1990; Mahajan et al., 2010; Narahari et al., 2009).

Mroinda citrifolia commonly known as Noni, has been used for treatment of various kinds of illnesses and as a growth tonic in human being (Bruggnecate, 1992; Solomon, 1999). However, very little information is available on the use of *M. citrifolia* in animals (Fugh-Berman, 2003; Sunder et al., 2011). In this regard, the present study was carried out to study the effect of *M. citrifolia* fruit based herbal feed supplement on the egg production and egg qualities of Nicobari fowl, the native indigenous poultry germplasm of Andaman and Nicobar Islands.

MATERIALS AND METHODS

A herbal based feed supplement (morical) (Figure 1) was prepared using *M. citrifolia* dried fruit powder. A total of 60 adult Nicobari fowl layers (32 weeks old) were randomly allotted to two treatments (A and B) with three replicates in each treatment and 10 birds in each replicate in a completely randomized design. Morical powder was mixed in layer commercial feed at the rate of 4% (wt/wt) and was

*Corresponding author. E-mail: jaisunder@rediffmail.com. Tel: 91-09434281840.

(a) (b)

Figure 1. (a) *Morinda citrifolia* fruits and (b) morical supplement.

Table 1. Percent ingredient and nutrient composition of commercial layer ration.

S/No.	Ingredients	Percentage
1	Yellow Maize	49.00
2	Broken rice	4.00
3	Cumbu/Bajra	5.00
4	Ragi	-
5	Deoiled rice bran	4.50
6	Wheat bran	2.00
7	Sunflower oil cake	3.50
8	Soybean oil cake	19.50
9	Dry fish	5.20
10	Rice bran oil	-
11	Mineral mixture*	2.00
12	Dicalcium phosphate	0.29
13	Shell grit	5.20
14	Lysine	-
15	DL-Methionine	-
16	Salt	-
	Total	100
Nutrients composition		
1	Crude protein (%)	17.85
2	Metabolizable Energy (kcal / kg)	2602
3	Calcium (%)	3.12
4	Total phophorus (%)	0.58

fed to group A, while group B was kept as control without addition of morical. The ingredient and nutrient composition of morical feed and control groups is presented in Table 1. The birds were kept under deep litter system of rearing. The birds were fed *ad libitum* and provided with plentiful clean drinking water. No medication, and deworming was given throughout the experiment. Daily record of egg production was taken and hen-day egg production was calculated. Every four weeks, 12 eggs were collected randomly from each dietary treatment in the last three days of production and were used to determine egg quality characteristics. Individual egg weights were recorded to 0.01 g accuracy for all eggs produced each day and this data was used to calculate every day mean egg weight of each of the dietary treatment throughout the experimental period. The height of thick albumen and yolk and egg weight were taken following formula as per Stadelman (1986). The shells were washed to remove the sticking albumen and dried in hot air oven at 105 ± 2°C overnight. Shell thickness was recorded using Ames gauge meter. Later, each shell was weighed individually by using an electronic balance with an accuracy of 0.01 g. Yolk was weighed individually. The egg shell and yolk were ashed at 600°C for 10 h in muffle furnace and the ash was obtained. Mineral analysis of ashed samples was done automatically as per the method of Cransberg et al. (2001). Ash was digested in 15 ml of 1 + 3 HCl: distilled water and sample was assayed for mineral content using atomic absorption spectrophotometer.

RESULTS AND DISCUSSION

Mean per cent hen day egg production of Nicobari fowl reared under morical and control feeding is presented in Table 2. Significant difference was found between the two treatment groups. Hen day egg production in the morical fed group was significantly ($p \leq 0.05$) higher than the control group. During the 3rd week of experiment, the hen day egg production of morical fed group reached peak to 75.1% and later declined and maintained at an average of 54.2 ± 5.4% till the end of 12 weeks of egg production. Whereas, the control group reached peak hen day egg production to 61.4% only and comparatively mean low hen day egg production of 45.5 ± 5.93% was maintained till the end.

Egg quality characteristics of Nicobari fowl as influenced by morical feeding is presented in Table 3. The Morical group recorded significantly ($P < 0.05$) highest

Table 2. Hen day egg production in different weeks.

Week	Control	Morical
1	27.14	40.00
2	61.43	67.14
3	48.57	75.71
4	58.57	67.14
5	55.71	55.71
6	58.57	54.29
7	48.57	61.43
8	48.57	50.00
9	51.43	42.86
10	37.14	37.14
11	32.86	45.71
12	25.71	55.71
Average	46.19±5.58	54.40±5.33

Table 3. Characteristics of egg quality.

Group	Control	Morical
Weight (g)	48.50	51.00
Length (mm)	52.74	52.64
Breadth (mm)	40.66	40.65
Yolk diameter (mm)	38.33	37.41
Yolk height (mm)	10.01	10.03
Albumin height (mm)	5.34	5.33
Albumin weight (g)	23.00	22.00
Yolk weight (g)	15.83	14.67
Shell weight (g)	0.01	0.01
Shell thickness (mm)	0.33	0.35

overall mean egg weight of 51.0 ± 2.11 as compared to control group (48.83 ± 1.84). An overall 4.9% increase in egg weight was observed in the morical group compared to control group. This improvement in egg weight was reflected in higher yolk content with morical fed group. However, no significant difference was observed in terms of albumen-yolk ratio, shell thickness and length and breadth of the eggs though numerically better values were found in morical fed group. The results of the study are in agreement with the finding of earlier studies on *M. citrifolia* by Sunder et al. (2011), where they have reported the beneficial properties in Japanese quail. The fruit is reported to be very rich in neutraceutical compounds, minerals, amino acids which might have played a vital role in absorption of the nutrients from the gut and its efficient utilization for production performance(Singh et al., 2008).

Mineralization status of shell and yolk as influenced by morical feeding is presented in Table 4. The mean concentration of calcium and magnesium was statistically higher with morical fed group than the control in both shell and yolk. The egg shell analysis revealed that the morical fed group showed better shell quality in terms of deposition of calcium. Dietary calcium is very important to sustain the egg production. In the present study, the supplementation of morical increased the egg production as well as the egg shell quality that was evident by higher calcium content of egg shell and yolk. *M. citrifolia*, rich source of vitamins and minerals, might have contributed to improve this mineral content in egg shell and yolk. However, the iron content of yolk and egg shell of the control group was significantly higher than the morical fed group. Interactions among minerals might have lowered the iron content in the morical fed group though it did not fall below the normal content.

Table 4. Micro and macro nutrient in the egg yolk and shell (in ppm).

Parameter		Ca	Fe	Mg
shell	Morical	10.15±0.06	3.91±0.90	11.7±0.09
	Control	10.07±0.01	3.1±0.88	10.66±0.18
Yolk	Control	9.70±0.002	5.76±0.55	2.81±0.30
	Morical	9.75±0.01	3.49±1.10	4.58±0.47

Conclusion

Based on the present study, it is concluded that supplementation of morical powder (*M. citrifolia*) based feed supplement at 4% in the commercial feed of Nicobari fowl enhanced the hen day egg production with better egg quality and higher mineral content of egg shell and yolk.

ACKNOWLEDGEMENTS

Authors are thankful to the Director, CARI for providing all the facilities and financial support to carry out the work.

REFERENCES

Bruggnecate JT (1992). Native plants can heal your wounds. Honululu Star–Bulletin Local News, Feb 2.

Collington GK, Parker DS, Armstrong DG (1990). The influence of inclusion of either an antibiotic or a probiotic in the diet on the development of digestive enzyme activity in the pig. Br. J. Nutr. 64:59–70.

Cransberg PH, Parkinson GB, Wilson S, Thorp H (2001). Sequential studies of skeletal calcium reserves and structural bone volume in a commercial layer flock. Br. Poult. Sci. 42:260-265.

Fugh-Berman A (2003). The 5 minute herbal and dietary supplement consult. Philadelphia Lippincott pp. 236-237.

Mahajan C, Gehlaut BS, Quadri MA, Gupta A, Tiwari R (2010). Effect of polyherbal preparation on the lipid profile of egg yolk in various genotypes of poultry. Liv. Res. Rural Dev. 22:9.

Narahari D, Manohar G, Raj SS, Thiruvengadam R (2009). Performance and egg value enhancing abilities of herbal feed supplements in layer diets. Indian J. Poult. Sci. 44(1):55-58.

Singh DR, Sunder J, Srivastava RC (2008). Peptide and mineral profile of *Morinda citrifolia* fruits and leaves. Int. J. Noni Res. 2(1-2):72-78.

Solomon N (1999). The tropical fruit with 101 medicinal uses, NONI juice. 2nd ed. Woodland Publishing.

Stadelman WJ (1986). The preservation of quality in shell eggs. In W.J. Stadelman. O.J.Cotteril, Eds. Egg science and Tech. Avi.Publishing Corn Inc Westport, Connecticut, U.S.A.

Sunder J, Kundu A, Singh DR, Jeyakumar S, Srivastava RC (2011). Effect of feeding of *Morinda citrifolia* fruit juice on growth, production and immune response in Nicobari fowl. Indian J. Anim. Sci. 81(12):68–71.

Sunder J, Singh DR, Kundu A, Jeyakumar S, Verma SK (2011). Supplementation of *Morinda citrifolia* extract on growth, production and immune response of Japanese quail Indian. J. Vet. Res. 20(2):61-65.