# Effect of feeding of Morical:a herbal based supplement on production and egg quality in Japanese quails

**Article** *in* Advances in Animal and Veterinary Sciences · January 2013



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Advances in Animal and Veterinary Sciences. 1 (5): 157 – 160
http://www.nexusacademicpublishers.com/journal/4

# Short Communication

## Effect of Feeding of Morical; A Herbal Based Supplement on Production and Egg Quality in Japanese Quail

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ARTICLE HISTORY

Received: 2013–09–28
Revised: 2013–10–12
Accepted: 2013–10–12

**Key Words:** Feed efficiency, Growth, Immune response, Japanese Quail, *Morinda citrifolia.*

**ABSTRACT**

In the present study, a herbal based feed supplement (Morical) was prepared by using *Morinda citrifolia* fruits. The supplement was fed to the Japanese quail at different concentration viz. 2%, 4% and 8% in the feed. The birds were kept under deep litter and maintained with standard ration and *adlib* water. The birds of the group B, fed with 4 % of Morical, showed highest annual egg production of 238.5 followed by group A (237.2), group C (222.5) and group D i.e. control (215.4) respectively. The FCR for per dozen of eggs of the group B was also found to be best compared to other groups. Best weight of the egg was obtained in the group C fed with 8% of the Morical powder. Similarly, the total weight of the egg yolk was also found better in the group C than in the other groups. The egg–shell analysis revealed that the group C birds fed with 8% Morical powder showed the highest percentage of Calcium than the other groups. In conclusion, the study revealed that the feeding of Morical enhanced the egg production and quality of the egg in Japanese quail.



**ARTICLE CITATION**: Sunder J, Jeyakumar S, Sujatha T and Kundu A (2013). Effect of feeding of Morical; a herbal based supplement on production and egg quality in Japanese quail**.** *Adv. Anim. Vet. Sci.* 1 (5): 157 – 160.

Herbal based feed additives and supplements have been in poultry industry since several years. It has been reported that use of the herbal supplements improves the growth, production, immunity and several other beneficial effects in poultry. 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. European Community has banned the use of antibiotics as growth promoter since 2006. 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 (Aminzade et al., 2012, Collington et al., 1990, Mahajan et al., 2010 and Narhari et al., 2009) *Morinda citrifolia* is commonly known as Noni, has been used for treatment of various kinds of illness and as a growth tonic in human being (Bruggnecate 1992 and Solomon, 1999). However, very little information is available on the use of *Morinda citrifolia* in animals (Fugh–Berman 2003 and Sunder et al., 2007, 2011). In the present study *Morinda citrifolia* fruit based herbal feed supplement was prepared and fed to the Japanese quail to see its effect on the egg quality and egg production.

A herbal based feed supplement (Morical) (Figure 1) was prepared by mixing *Morinda citrifolia* dried fruit powder (10% wt/wt). A total of 100 adult layers (six week old) were divided into four groups with 25 birds in each group. Morical powder was mixed in feed and fed to the Japanese quail at different concentration viz. 2%, 4%, 8% level while one group was kept as control. The birds were kept under deep litter system of rearing. No medication, deworming was given throughout the experiment. The observation such as egg production, mortality, feed conversion per dozen eggs, egg quality and mineral estimation were recorded and analyzed. Statistical analysis of data was carried as per Snedecor and Cochran (1994) and the significance of the difference among the groups was determined by Duncan's multiple range tests (Petrie and Watson, 1991).

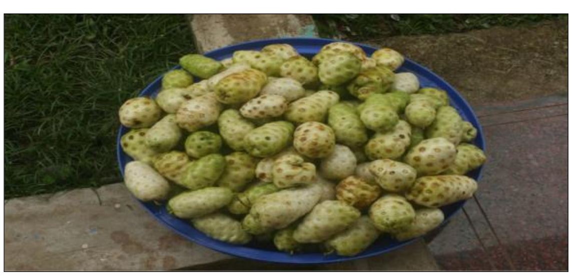

Figure 1: *Morinda citrifolia* fruits and Morical supplement


ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)

The results of the egg production of different group of birds are presented in table 1. The data revealed that the egg production in the group A started in the 8th week with average hen day egg production (HDEP) of 28.57%. The egg production increased steadily and reached peak at 10th week with HDEP of 98.21%. The egg production then declined to 35.71 % at the end of 16th week of egg production. The annual egg production of the group A bird was calculated to be 237.2.Egg production of group B birds started at 8th week of age with average of 15.71%. The production increased to 87.30 % at the end of 10th week of production; thereby it declined to 39.63% at the end of 16th week of egg production. The annual egg production of group B was calculated to be 238.5. The group C birds showed the peak production of 92.86% at the end of 15th week of production. However, between 10–12 weeks of egg production phase the production was found to be in the range of 73.0 to 79.0 %. The annual egg production of this group was calculated to be 222.54. The group D bird's i.e. control showed the peak egg production of 90.48% at 11th week of egg production. The egg production pattern was found to be variable in different week's period. The peak production observed during the 10–12 week of production phase. The annual egg production was calculated to be 215.42 eggs.

Table 1: Hen day egg production in different weeks

| Week | Group A | Group B | Group C | Control |
|---|---|---|---|---|
| 1 | 28.57 | 15.71 | 14.29 | 21.43 |
| 2 | 51.43 | 58.57 | 55.56 | 60.00 |
| 3 | 48.57 | 61.43 | 57.14 | 25.71 |
| 4 | 62.86 | 73.02 | 63.49 | 50.00 |
| 5 | 58.57 | 85.71 | 68.25 | 64.29 |
| 6 | 81.43 | 77.78 | 46.03 | 32.14 |
| 7 | 55.56 | 66.67 | 47.62 | 37.50 |
| 8 | 71.43 | 77.78 | 50.79 | 66.67 |
| 9 | 82.14 | 82.54 | 47.62 | 78.57 |
| 10 | 98.21 | 87.30 | 79.37 | 83.33 |
| 11 | 90.48 | 69.64 | 73.02 | 85.71 |
| 12 | 71.43 | 62.50 | 76.19 | 73.81 |
| 13 | 88.10 | 51.79 | 68.25 | 80.95 |
| 14 | 85.71 | 39.68 | 82.54 | 71.43 |
| 15 | 57.14 | 46.03 | 92.86 | 66.67 |
| 16 | 35.71 | 39.68 | 64.29 | 68.57 |

The average feed intake per day per bird of Group A, B, C & D was recorded as 55.10±1.91, 41.82±1.87, 41.12±1.62 & 53.93± 2.57 g respectively. The feed conversion ratio in terms of production of per dozen eggs showed that the best feed conversion ratio (FCR) was recorded for the group B (0.80±0.04) followed by group A (0.95±0.07), group C (0.97±0.12) and group D (1.31±0.25) respectively. Significant difference ( $p<0.05$) was obtained between the groups D and other groups of birds, however, no significant difference was obtained between groups A, B & C but numerically the FCR of group B was found to be best compared to the other groups. An overall increase of 38.56 % for group B followed by 27.43 % for group A and 26.18% for group C were recorded compared to the FCR of control group. Feed intake of different groups revealed that the less intake was observed in group C (41.12 g) followed by group B (41.82 g), group D (53.93 g) and group A (55.10 g) respectively. The group c birds showed that they consumed less feed to produce the eggs compared to the other groups.

Egg weight of group C was found to be best compared to other group of birds. The group C showed 11.8±0.49 g followed by group B (11.2±0.58 g), group A (10.6±0.51 g) and group D (10.8±0.37 g) respectively. The results revealed that the feeding of morical had influenced the total egg weight. The feeding of morical at increasing concentration improved the total weight of the egg compared to the control birds (Table 2.). Similarly, the yolk weight of group C was found to be more than the group A, B and group D. An overall 25% more yolk weight was obtained in the group C compared to 10.0 % for group B and 5.2 % for group A respectively than the control group.

The shell thickness of the treated group was also found to be more than the control group. An overall increase of 6–12 % was recorded in the treated group compared to the control group; this showed that it enhanced the deposition of the Ca at the time of formation of egg and shell. The best results were obtained in the group C i.e. the group given with maximum dosage of the morical supplements.

The egg shell and yolk were examined for presence of Ca content by atomic absorption spectrophotometer. The results revealed that the group C birds showed maximum concentration of Ca (28.24 ppm) followed by group A (27.69 ppm), group B (25.05 ppm) and group D (24.91 ppm) respectively. The group C showed 11.3 % more Ca deposition in the egg shell than the control egg shell. This indicated that the feeding of morical had influenced the deposition of Ca in the egg shell and yolk.

The egg production pattern of all the groups showed that no significant difference was observed in all the groups, however, the production was found better in treated groups than the control group. The annual egg production of the group B recorded the highest eggs i.e. 238.5 eggs followed by group A (237.2), group C (222.54) and control group D (215.42) respectively. The results showed that the best auual egg production was recorded from the group B fed with 4% of the morical supplement. However, no significant difference was observed between all the groups. The use of herbal tonic and plants has been reported by several workers for the growth and egg production in poultry. In the present study, *Morinda citrifolia* fruit was used. The beneficial properties of *M. citrifolia* have been reported by several workers, however, use in the animals and poultry are reported to be very rare (Sunder et al., 2007, 2011). Reports revealed that fruits and leaves have been used for feeding of animal (Fugh–Berman 2003). The results of the study are in agreement with the finding of earlier studies on *M.citrifolia* by Sunder et al.,2007 and 2011, where they have reported the beneficial properties in broiler, Japanese quail and Nicobari fowl.

Table 2: Characteristics of eggs of different groups

| | Group A | Group B | Group C | Control |
|---|---|---|---|---|
| Egg wt (g) | 10.6±0.51 | 11.2±0.58 | 11.8±0.49 | 10.8±0.37 |
| Yolk wt (g) | 3.8±0.20 | 4.0±0.31 | 4.8±0.20 | 3.6±0.25 |
| Int Shell thickness (in mm) | 0.178±0.03 | 0.206±0.02 | 0.196±0.04 | 0.138±0.01 |
| Apex Shell thickness (in mm) | 0.194±0.01 | 0.198±0.01 | 0.198±0.02 | 0.162±0.02 |
| Broad Shell thickness (in mm) | 0.16±0.03 | 0.168±0.03 | 0.17±0.02 | 0.138±0.03 |


ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)

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 efficient utilization of the nutrients for growth and production (Singh et al.,2008). The results revealed that the supplementation of 4% of morical powder had better production performance than the 2 % and 8% level. The total number of eggs i.e. annual egg production was found better in the 4% level than the other groups. However, the average HDEP % was also found to be best in group A i.e. supplemented with 2% followed by 4 % and 8% respectively.

The FCR for per dozen of eggs of the group B was found to be best compared to other groups. The results showed that the feeding of Morical @ 4% had more beneficial effect in terms of efficient utilization of the nutrients and converting in to egg mass. The intake of feed was reported to be high in group D, however, the conversion of feed into the egg mass was lowest in the control group, thus indicated that the *Morinda citrifolia* has some influencing factors which might have played a role in better utilization of the feed for production of eggs. The effect of *Morinda citrifolia* on egg production was also reported by Sunder et al., 2011. Wherein, they have found the beneficial effect of *M.citrifolia* fruits on the egg production and better FCR.

The egg quality characteristics mainly the egg weight increased with the increase in concentration of morical in the feed. Best weight of the egg was obtained in the group C fed with 8% of the morical powder. Similarly, the total weight of the egg yolk was also found better in the group C than in the other groups. The results showed that the supplementation of morical powder increased the weight of the egg in terms of total weight and content of the egg yolk. The egg shell analysis revealed that the group C birds fed with 8% morical powder showed the highest percentage of Ca than the other groups. This is in correlation with the total egg weight and egg yolk content. The role of Ca is very important in the egg production. Its requirement is low during the growing period; however, at the time of production phase the requirement is increased to at least four times, mainly for use in the production of egg shell. Inadequate supplementation of the Ca at this stage will lower down the egg production as well as the egg shell quality. In the present study the supplementation of morical increased the egg production as well as the egg shell quality in terms of Ca content. During the laying phase additional requirement of protein, minerals and vitamins might have been supplied by the *Morinda citrifolia* which is a very rich of vitamins and minerals. The egg shell thickness also increased with the increasing concentration of morical supplementation. Egg shell is mainly made up of Ca which gives the strength to the egg shell to avoid breaking during collection and transport. Poor quality of egg shell results in huge loss to the poultry industry mainly due to breaking i.e. up to 10% of total eggs. Average egg shell contains 2.3 gm Ca (2–2.5), this quantity is equivalent to approximately 10% of total calcium content in the skeleton of layer, and considering that estimated amount of this macro element in skeleton of layers is approximately 20 g. The group C showed 11.3 % more Ca deposition in the egg shell than the control egg shell. This indicated that the feeding of morical had increased the deposition of Ca in the egg shell and yolk.

*Morinda citrifolia* is rich in Vitamins A, C, E, B, B2, B6, B12, Calcium, Iron, Niacin, Folic Acid, Pantothenic Acid, Phosphorus, Magnesuim, Zinc, Copper and other minerals like Chromium, Manganese, Molybdenum, Sodium, Potassium, Carbo–hydrates and more than 200 isolated nutraceuticals (Wang et al., 2002). Numerous factors are responsible for the egg production and egg shell quality. Both excess and deficiency of Ca will negatively affect the shell quality. An egg contains almost 2 grams calcium; hence an average of 4 grams of calcium intake per day is required by a layer to maintain good shell quality since only 50 – 60% of dietary calcium is actually used in shell formation. Vitamin C is also essential for synthesis of organic matrix which are required for formation of egg shell. The minerals such as Zn, Mn and Cu are involved in the metabolic process of egg shell formation. They act as co–factors for the enzyme carbonic anhydrase involved in deposition of calcium carbonate in shell matrix formation. The other enzymes which are responsible for formation of egg shell is the polymerase which is dependent on Mn. Supplementation of amino–acids and minerals also increases the egg shell thickness and weight. All these co–factors and minerals are present in the *Morinda citrfolia* fruits which enhanced the egg production and quality of the egg shell. Copper is also responsible for the synthesis of shell membrane by acting as a co–factor for the enzyme lysyl oxidase. There are reports available on the supplementation of herbal extracts in the diet of the layer quail for improving the egg shell quality and egg production ( Akdemir and Sahin 2009, Onderci et al., 2004), however, use of *Morinda citrifolia* fruits is reported for the first time. The Ca is mainly supplied in the form of inorganic Ca however, *M. citrifolia* fruit supply Ca and other essential nutrients in the form of organic compounds.

The use of *M. citrifolia* is reported for the first time in the form of a supplement powder which can be added in the feed. In the present study, the supplentation of Morical powder at the rate of 4% showed the best response in terms of egg production, however, the egg quality and shell thickness increased with the increasing concentration of Morical powder.

## ACKNOWLEDGMENT

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

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ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)

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ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)