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The Effect of Morinda Citrifolia L Leaf Extract on Quality of Quail Egg

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Abstract

The research was designed to evaluate the effect of Morinda citrifolia L. (Noni) leaf extract as antibacteria of Salmonella typhimurium in quail drink water during 7-15 weeks period on productivity. A Completely Randomized Design (CRD) was used to analyze the data obtained from this research. Ninety six quails with average body weight 108-142 gram were divided into 4 treatment groups with 3 replications and 8 quails in each replicate, with ratio of 3:1, where in one test consisted of 6 females and 2 quail males. The treatments were R1 (drinking water was given vitamin vita chicks), R2 (drinking water was given 5% of Morinda leaf extract), R3 (drinking water was given 10% Morinda leaf extract) and R4 (drinking water was given 15% Morinda leaf extract). The parameters measured were egg quality of eggshell, thickness, albumen weight, yolk weight, haugh unit and yolk colour intensity. The treatments was different significantly on eggshell and yolk weight. Average egg shell thickness in a row was R1(0,22), R2 (0,33), R3 (0,35), R4 (0,37) (mm). While the average yolk weight was R1 (2,63), R2 (3,60), R3 (3,60), and R4 (3,77) (g/grain). However, the teratments were not diferent significantly on thickness, albumen weight and Haugh Unit. There was difference in the intensity of egg yolk. The egg scoring mode produced in this study were R1 (7), R2 (8), R3 (8), R4 (8). The concentration of different morinda leaf extract has significantly influenced the intensity of egg yolk.

Keywords: morinda leaf exctract, quail, quality of egg.

1. Introduction

Quail egg is the best source of protein. One hundred grams of quail egg consist of 13.05 grams of protein, it is higher than chicken egg and duck egg. One of the benefits of egg protein compared to other animal protein is its digestive power that is very high. Every gram of protein will be digested in the body perfectly. Besides fat, vitamins, and minerals, quail eggs are also rich in choline. Choline plays an important role in the body, especially for the development of brain function. This is related to the role of choline as a component of acetylcholine which serves as an introduction to neural signals. Adequate choline intake will help work the nerve signals in the brain, thus improving memory of children and avoid dementia in the elderly (seniors). One hundred grams of quail eggs and duck eggs containing 263.4 mg of choline, it is higher than that found in chicken eggs. The interesting characteristic of the egg, including quail eggs, is the color of the egg yolk. The yolk color is not just a refreshing eye, but also shows that eggs contain lutein and zeaxanthin compounds. Both compounds are the pigments that give yellow color. In addition, the pigment is also having health benefits (Anonymous, 2012).

Various benefits of quail eggs makes it has high-value, therefore the quality of quail eggs should also be considered. One of the natural antibiotics is *Morinda citrifolia L.* leaf. *Morinda citrifolia L.* leaf contains anthraquinone, amino acids, glycosides, phenolic compounds and acid ursulat. The content of alkaloids, phenols, glycosides and anthraquinone contains an active substance i.e., antimicrobial, antibacterial and anti-inflammatory. Therefore *Morinda citrifolia L.* leaf can be used as an herbal solution to synthetic antibiotics. The content of active compounds in *Morinda citrifolia L.* can be used as an alternative of herbal feed additive and it can be seen in the quality of its eggs.

2. Materials and Method

2.1. Location and Time

The study was conducted in the village of Cilangkap, Cikembar Sukabumi and all materials and results analyzed in the Laboratory of Animal Nutrition of Poultry Science, Faculty of Animal Science, Bogor Agricultural University.

2.2. Materials

The experimental materials used 96 quails (6 females and 2 males), aged 7 weeks and maintained for 2 months (15 weeks old quail). However, the quail previously been given Morindra leaf extract on DOQ (One Day Old Quail). This study uses a commercial ration with nutritional substances : dry matter 88%, ash 8%, crude protein 21-23%, crude fibre 4%, calcium 0,9-1,2% and phosporus 0,7-1%. The equipment used was a 12 unit colony cages measuring 182 cm x 100 cm x 60 cm. It has food, drinking water, and a measuring cup. Equipments to test the quality of the eggs were a petri dish, calipers, scales, micrometers tricle, and yolk color fan.

2.3. Method

2.3.1. Production of Morinda leaf extract

Morinda leaves were dried by solar heat. Then, Morinda leaves were boiled for 26 minutes with a ratio of water and Morinda leaf is 1:1, i.e., 1 liter of water with 1 kilogram of dried Morinda leaf. It was based on research results Taryati (2010) on the making of extracts *Physallis peruviana L.* (ciplukan). It was boiled for 26 minutes and the ratio between water and Physallys 1:1 to obtain the maximum content of the extract Physallis. Table of Morinda leaf nutrients is in Table 1.

Table 1: Result of Phytochemical Qualitative Examination of Morinda Leaf.

Compounds	Qualitative Result
Alkaloid	+++
Saponine	++++
Tanine	-
Phelonic	+
Flavonoide	++
Triterphenoide	++++
Steroide	-
Glycoside	++++

Note: (negative), + (Weak Positive), ++ (Positive), +++ (Strong Positive), ++++ (Very Strong Positive) (

Source: Wati, R. A et al., 2008).

2.3.2. Experimental Design

Experimental design used in this research was Completely Randomized Design (CRD) with 4 treatments and 3 repetitions: R1 : Drinking water + chicks; R2: Drinking water + Morinda leaf extract 5% ; R3: Drinking water + Morinda leaf extract 10% ; R4: Drinking water + Morinda leaf extract 15%.

The measured variables were egg quality: shell thickness, shell weight, albumen weight, yolk weight, haugh unit, and yolk colour intensity. Data were analyzed by ANOVA and Duncan Test (Steel dan Torrie, 1993).

3. Results and Discussion

The effects of treatment are in Table 2.

Table 2: The effects of treatment on egg quality.

Variables	Extract Treatment			
	R1	R2	R3	R4
Shell thickness (mm)	0,22±0,01a	0,33±0,07b	0,35±0,03b	0,37±0,03b

Shell weight (g/egg)	1,33±0,31	1,37±0,42	1,40±0,26	1,57±0,06
Albumen weight (g/egg)	4,93±1,11	5,07±1,32	5,53±1,12	5,70±0,85
Yolk weight (g/egg)	2,63±0,60a	3,60±0,21b	3,60±0,30b	3,77±0.60b
Haugh Unit	62,16±1,45	62,19±1,42	62,27±1,55	63,05±1,60

3.1. Shell Thickness

Shell thickness of the quails that were received treatments was thicker than control. It was suggested that the addition of Morinda leaf extract in drinking water had effect on shell thickness. Based on the analysis of variance showed that the treatment significantly different. Shell thickness range in this study was 0.22 to 0.37 mm (Table 3). From Wiradimadja study (2010), it was ranged from 0.219 to 0.237 mm. Furthermore, quail egg shell thickness was 0.13 mm (Rose, 1997). Calcium and phosphorus influence the formation of the egg shell. Calcium in this study ranged from 0.9 -1.2 with 0.7-1% phosphorus balance. While the calcium requirement for quail layer period according to SNI (2006) is from 2.50 to 3.50 with 0.6 to 1% phosphorus balance. This is suggested that Morinda leaf extract in drinking water quail has effect on eggshell thickness and improve eggshell thickness on the low calcium feeding. According to Beck and Hansen (2004), estrogen had an important role in the formation of calcium.

3.2. Shell Weight

The result of analysis of variance showed that the treatment was not significantly different to the shell weight. The average of shell weight in this study ranged from 1.33 to 157 g. Morinda leaf extract with a concentration of 15% had a high shell weight. This indicated that the thicker shell, its weight was also heavier.

3.3. Albumen Weight

The result of analysis of variance showed that the treatment was not significantly different on the weight of the albumen. Table 2 shows that the weight of the albumen R3 (Morinda leaf extract 15%) was higher than the other treatments. The higher the concentration of Morinda leaf extract, the weighter of albumen. The control had the lowest albumen weight. According to Wiradimadja (2010), the presence of albumen and yolk depends on the number of egg-forming nutrients. Romanoff and Romanoff (1963) stated that the content of the albumen and yolk in an egg should be in equilibrium.

3.4. Yolk Weight

The result of analysis of variance showed that the control and treatments was significantly different. However, the concentration of different Morinda leaf extract gave the same effect on yolk weight. The use of 15% Morinda leaf extract in drinking water (R4) had a positive impact on yolk weight (3.77 g /egg), it was higher than the other treatments. The average yolk weight in this study ranged from 2.63 to 3.77 g. Wiradimadja (2010) mentioned, the average yolk weight ranged from 3.043 to 3.224 g.

3.5. Haugh Unit

Haugh Unit as the freshness of the egg quality parameters calculated based on height and weight of the albumen. Meanwhile, according to Iza *et al.*, (1985) Haugh Unit is one of the criteria for determining the quality of the egg by measuring the height of the albumen thickness and egg weight. The result of analysis of variance showed that the treatment had no significant effect on Haugh Unit. Haugh Unit values in this study ranged from 62.16 to 63.05. R3 treatment had the highest Haugh unit value 63.05 compared with other treatments (Table 2). Haugh Unit values in this study belong to the quality of A. Haugh Unit value for the newly hatched egg is 100, while the eggs with the best quality value is above 72. Rotten egg falls below 50 (Buckle *et al.*, 1987). Egg quality is determined by Haugh units according to standard United States Department of Agriculture (USDA, 2011), is as follows: 1. Haugh Unit value less than 31 is classified as quality C; 2. Haugh Unit value 31-60 is classified as quality B; 3. Haugh Unit value 60-72 is classified as quality A; 4. Haugh Unit values more than 72 is classified as quality AA

3.6. Intensity of Yolk Colour

Yolk has a special value. Consumers tend to choose eggs that have more yellowish yolks. Yolk color is the main quality characteristics of eggs that affect consumer tastes (Chung, 2002). Consumers are generally preferred color ranges from golden yellow to orange. The color is equivalent to 8-14 score on the Roche Yolk Colour Fan (Wiradimadja, 2007). The mode of yolk scores generated in this study were R1 (7), R2 (8), R3 (8), R4 (8). The treatments were given Morinda leaf extract in drinking water have more yolk color intensity than the control. The difference of treatment in the concentration of Morinda leaf extract had the same effect on yolk color.

Table 3: Value of Yolk Colour Score.

Observation	Modus of scoring			
	R1	**R2**	**R3**	**R4**
1	9	8	10	8
2	3	7	8	9
3	9	6	9	10
4	8	8	6	9
5	6	4	8	8
6	8	7	9	8

4. Conclusion

The use of Morinda leaf extract in drinking water provides significant effect on the quality of egg including egg shell thickness and yolk. But the effect is not significantly different on the weight of the egg shell, the albumen weight, Haugh unit, and yolk

colour intensity. The treatment with Morinda leaf extract 15% (R4) has the best value compared to other treatments on egg quality test.

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