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Effect of *Pandanus amarylifolius Roxb* Supplementation on Growth Performance and Egg quality of Japanese Quail.

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Abstract

Study of the Effect of *Pandanus amarylifolius Roxb* Supplementation on Growth Performance and Egg quality of Japanese Quail.By use 60 female quails at 30 days. The experimental design was completely randomized (CRD) into 4 treatment groups, each group with three replications each replication with 5 birds. of *Pandanus amarylifolius Roxb*. The study of *Pandanus amarylifolius Roxb* supplementation on growth performance and egg quality of Japanese quail. The quails fed *Pandanus amarylifolius Roxb.* powder supplementation at different level show that initial weights final weights, weight gain, feed intake, growth rate per day and amount of feed conversion to eggs is not different in statistic ($p>0.05$). For amount of feed conversion ratio, it shows that (9.40, 16.53, 27.28 and 11.79 respectively) are statistically different ($p<0.05$). Feed conversion ratio, it shows that *Pandanus amarylifolius Roxb.* powder Supplementation on productivity of Japanese quails at level, 2, 4 and 6 percent has a higher FCR than control group (9.40 g) significantly statistically ($p<0.05$). For productivity and egg color of Japanese quails, it shows that percentage of egg productivity, feed conversion to a dozen of eggs, shell thickness, yolk height and yolk diameter are not statistically different ($p>0.05$). For the rate of feed conversion to a dozen of eggs, it shows that *Pandanus amarylifolius Roxb*. powder Supplementation on productivity of Japanese quails at level 2 4 and 6 percent (390.08, 411.61 and 478.73 g respectively) gives a higher rate of feed conversion to a dozen eggs than the control group (347.52 g) significantly statistically ($p<0.05$). For the value of egg color of Japanese quails, it shows that brightness value (L*) of quails fed *Pandanus amarylifolius Roxb.* powder Supplementation at level 2 4 and 6 percent are not statistically different ($p<0.05$). Besides, for redness value (a*) (9.38, 9.24 and 10.37 respectively) and yellowness (b*) (51.41, 52.30 and 53.16 respectively) is likely to be higher than the control group (7.79 and 41.39 respectively) significantly statistically ($p<0.05$).

Keywords:, *Pandanus amarylifolius Roxb*, growth performance egg quality Japanese quail

Introduction

Quails are considered an economical animal which is interesting because the space used to feed quails is less than live stocks, such as goats, sheep, and cows. There was not any obvious evidence about the first country that started to feed quails. However, in Asia, the very first country started to feed quails is Japan. In the beginning, people feed quails for its tweet

like Thais feeding doves. Later, quails are developed and improved to layer quails (Muang-ngam, 2014).

Nowadays, the price of a quail is 25 Baht. Quails will give eggs at aged 30 days. When the quail is 10 month old, it will retire to lay eggs. At that time, the quails could be sold at 10 - 12 Baht. On average, a quail costs 10 Baht. Egg productivity is about 70% of all quails. For the average feed cost for a quail, it can be calculated to 0.50 Baht per quail per day because a quail eats feed around 25 g a times, two times a day. For the price of egg sale, eggs are able to be sold at 80-90 Baht. Quail caring take only 4 - 5 hours a day, and it can be periodically done, Quail caring, such as feeding, cleaning, egg collecting, packing, and selling at the market, is detailed works but somewhat easy. These works should be rotated in turn. In Thailand, there is only one species of quails that are fed for trade. That is Japanese quail which has black and white feathers or gold and white feathers, but they give similar eggs with dots on. This species of dove is easy to feed. It grows fast and gives eggs fast. Its eggs are plentiful, durable and resistant to disease. Even though there are more than 12 local species of quails, these species are not as good as Japanese quails on giving egg and meat productivity, so Thais prefer to raise Japanese quails extensively. Although feeding quails are not largely as wide as feeding ducks or chickens, it tends to become the main occupation for farmers because the feeding time is short, but giving return is faster than other animal feeding. Moreover, the amount of investment is small, and the market needs quail eggs (Angthong, 2017). Feed for quails is very important because quails need high protein to lay eggs and to get a proper color of eggs. Synthetic pigments sold in the market are expensive, so it is important to find natural pigments to add color value of yolks and to reduce feed cost. *Pandanus amarylifolius Roxb*, a local vegetation, gives many benefits like nourishing heart, reducing blood sugar, lowering blood pressure, curing measles, restraining scurvy- cold, hepatitis and dysentery. *Pandanus amarylifolius Roxb* flowers can be used to relieve cough and sore throat, help digestion and nourish power. Moreover, *Pandanus amarylifolius Roxb* leaves give a sweet smell when it is used in sweets or desserts. Sirito (2009) explained that the nutrition of a *Pandanus amarylifolius Roxb* contains protein (1.90%), carbohydrate (4.70%), fiber (5.20%), calcium (27.00%), phosphorus (124.00%). Besides, there is beta-carotene in *Pandanus amarylifolius Roxb*. It is the initial substance to vitamin A which plays an important role in maintaining health and boosting the immune system. It also acts as an antioxidant. The researchers, therefore, have the idea of using *pandanus amarylifolius Roxb*. powder to replace the color source in eggs quail.

Materials and Methods

1. Sampling Animal

Sixty female quails at 30 days are fed and divided quails into 4 treatment groups, each group with three replications each replication with 5 head.

2. Experimental Housing

The quails were in a 4-layer cage in open housing with a single gable. Each tier was divided into four replications. There were feed troughs, automatic water containers, quail cage mats and lighting in each tier.

3. Experimental Feed

Quails were fed with at least protein 22%. Feed is divided into 4 formulas, as following:

Treatment 1: feeding with layer quail feed (control group)

Treatment 2: feeding with control diet supplemented with 2%

Treatment 3: feeding with control diet supplemented with 4%

Treatment 4: feeding with control diet supplemented with 6%

by supplementing *Pandanus amarylifolius Roxb* powder and using a horizontal mixer.

4. Methods

From Raised layer quails aged 30 days, are fed and divided quails into 4 treatment groups, each group with three replications each replication with 5 head.randomly pick an egg from replication 5 each, total 36 eggs in week 7-10 to measure intensity of eggs, yolk height, yolk diameter, and thickness of eggshell throughout the experimental period, 45 days. The quails were fed with four formulas two times a day, at 8.00 a.m. and 4.00 p.m. The quails were fully fed with food and water.

5. Data collection

Record feed intake, growth rate per day, weight gain, egg productivity rate, egg weight, eggshell weight, yolk height, yolk diameter, albumen height, albumen diameter, yolk weight, albumen weight, shell thickness, and measure egg color by measuring brightness value (L*), redness value (a*), yellowness value (b*). Then, calculate collected data to find average value by using Microsoft Excel, and analyze statistical differences of each value by analysis of variance: Anova). In addition, if the influence of treatment was found, drawing the comparison of differences of average value will be conducted by Duncan's New Multiple Range Test: DMRT using a program (SAS).

- Formulas for Calculation

$$\text{Feed intake} = \frac{\text{Weight of Given feed} - \text{Weight of remaining Feed}}{\text{The number of quails}}$$

$$\text{Feed Conversion Ratio} = \frac{\text{Feed Intake}}{\text{Weight Gain}}$$

$$\text{Average Daily Gain} = \frac{\text{Final Weight} - \text{Initial Weight}}{\text{The Number of Experimental}}$$

$$\text{Body Weight Gain} = \text{Final Weight} - \text{Initial Weight}$$

$$\text{Feed Conversion Ratio Egg} = \frac{\text{Feed Intake}}{\text{The Number of Egg} \times \text{Average Weight of Egg}}$$

$$\text{Hen-day production} = \frac{\text{Total Eggs to Day}}{\text{Total Quails to Day}} \times 100$$

$$\text{Feed dozen egg} = \frac{\text{Feed Intake} \times 12}{\text{Total eggs}}$$

- Internal and external egg inspection

1. Measure yolk height by using vernier caliper measuring from the bottom to the top.
2. Measure yolk diameter by using vernier caliper measuring yolk diameter.
3. Measure shell thickness by using vernier caliper measuring shell thickness at the center of the egg.

Results and Discussion

From experiment in week 6-10, the quails fed *Pandanus amarylifolius Roxb.* supplementation at different level show that initial weights (149.53, 151.40, 151.33 and 148.73 g), final weights (177.13, 174.33, 173.93 and 173.40 g), weight gain (27.60, 22.93, 22.60 and 24.66 g) feed intake (168.74, 155.00, 163.68 and 169.61 g/treatment), growth rate per day (3.03, 2.00, 1.20 and 2.06 percent respectively) and feed conversion to eggs (11.35, 9.44, 7.60 and 7.09 g/head respectively) is not different in statistic ($p>0.05$). feed conversion ratio, it shows that (9.40, 16.53, 27.28 and 11.79 respectively) are statistically different ($p<0.05$). For feed conversion ratio, it shows that *Pandanus amarylifolius Roxb.* powder Supplementation on productivity of Japanese quails at level, 2, 4 and 6 percent has a higher FCR than control group (9.40 g) significantly statistically ($p<0.05$). This is due to a result of short period of experiment and the young quails in the experiment which require a high diet, but rate of conversion ratio and rate of egg conversion are not fully ready. This conforms to the experiment of *Pandanus amarylifolius Roxb*. powder supplementation in quails' feed taken by Sanguanphan et.al. (2005). The result showed that it does not enhance the efficiency of productivity ($p>0.05$).

Table 1 Effects of *Pandanus amarylifolius Roxb* Supplementation on quails egg quality at different levels

Egg Productivity	***Pandanus amarylifolius Roxb*** powder levels				P-value	SEM
	0	2	4	6		
Initial Weight (g)	149.53	151.40	151.33	148.73	0.66	1.17
Final Weight (g)	177.13	174.33	173.93	173.40	0.67	1.5
Weight Gain (g)	27.60	22.93	22.60	24.66	0.49	1.61
Feed intake (g/treatment)	168.74	155.00	163.68	169.61	0.19	4.47
Growth Rate per Day	3.03	2.00	1.20	2.06	0.49	0.07
Feed Conversion Ratio (g)	9.40^{b}	16.53^{a}	27.28^{a}	11.79^{a}	0.03	0.63
Feed Conversion to eggs (g/head)	11.35	9.44	7.60	7.09	0.17	0.22

Annotation: (T1) feeding with control diet with supplemented 0%, (T2) feeding with control diet with supplemented 2%, (T3) feeding with control diet with supplemented 4%, (T4) feeding with control diet with supplemented 6%

For productivity and egg color of Japanese quails, it shows that percentage of egg productivity (9.03, 8.35, 10.58 and 9.3 percent respectively), rate of feed conversion to a dozen of eggs (347.52, 390.08, 411.61 and 478.73 g respectively), shell thickness (1.72, 1.70, 1.69 and 1.70 mm respectively), yolk height (2.22, 2.24, 2.27 and 2.17 mm) and yolk diameter (1.11, 1.12, 1.13 and 1.14 mm) are not statistically different ($p>0.05$). For the rate of feed conversion to a dozen of eggs, it shows that *Pandanus amarylifolius Roxb*. powder Supplementation on productivity of Japanese quails at level 2 4 and 6 percent (390.08, 411.61 and 478.73 g respectively) gives a higher rate of feed conversion to a dozen eggs than the control group (347.52 g) significantly statistically ($p<0.05$). For the value of egg color of Japanese quails, it shows that brightness value (L*) of quails fed *Pandanus amarylifolius Roxb.* powder Supplementation at level 2 4 and 6 percent (53.76, 52.35, 52.93 and 52.13 respectively) are not statistically different ($p<0.05$). Besides, for redness value (a*) (9.38, 9.24 and 10.37 respectively) and yellowness (b*) (51.41, 52.30 and 53.16 respectively) is likely to be higher than the control group (7.79 and 41.39 respectively) significantly statistically ($p<0.05$). This conforms to the experiment taken by Niyomdecha (2012). The experiment was taken on supplementing pandanus powder into bird feed, and the result showed that *Pandanus amarylifolius Roxb* enhanced the intensity of egg color. Besides, Kit (2002) reported that supplementing *Pandanus amarylifolius Roxb* into quail feed at 6% enhances intensity of yolk because, probably, there are components of pigments, such chlorophyll, anthocyanin, beta-carotene which are substance that improve animal's health, and it helps quails to eat more feed, gain more benefits from feed, so the pigment in yolk increases.

Table 2 Effects of *Pandanus amarylifolius Roxb* Supplementation on quails egg quality at different levels.

Egg Quality	*Pandanus amarylifolius Roxb* powder levels				P-value	SEM
	0	2	4	6		
Percentage of Egg Productivity (day)	9.03	8.35	10.58	9.3	0.56	1.09
Feed Conversion to a Dozen of Eggs(g)	347.52[b]	390.08[a]	411.61[a]	478.73[a]	0.058	0.06
Shell Thickness (mm)	1.72	1.7	1.69	1.7	0.75	0.01
Brightness Value (L*)	53.76	52.35	52.93	52.13	0.44	2.19
Redness Value (a*)	7.79[b]	9.38[a]	9.24[a]	10.37[a]	0.04	1.52
Yellowness Value (b*)	41.39[b]	51.41[a]	52.30[a]	53.16[a]	0.007	3.71
Yolk Height (mm)	2.22	2.24	2.27	2.17	0.77	0.13
Yolk Diameter (mm)	1.11	1.12	1.13	1.14	0.76	0.06

Annotation: (T1) feeding with control diet with supplemented 0%, (T2) feeding with control diet with supplemented 2%, (T3) feeding with control diet with supplemented 4%, (T4) feeding with control diet with supplemented 6%. a,b: means within same column with different superscripts are significantly statistical different ($p<0.05$)

Conclusion

The study shows that *Pandanus amarylifolius Roxb*. powder Supplementation on productivity of Japanese quails at level 2 4 and 6 percent tends to improve growth, amount of feed intake, growth rate per day, feed conversion to eggs, shell thickness, yolk diameter, color value of Japanese quail eggs, higher than control group.

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