Effect of Supplementation of Organic Selenium and Vitamin E in Commercial Diets on Quails Reproduction

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Abstract

Quail can be used as potential commodity to meet the needs of protein, therefore is required to increase quail reproduction. This study was aimed to get an optimum level of supplementation of organic selenium (Se) and vitamin E in two commercial diets in obtaining accelerate in age of quail first laying, improving egg production, fertility and hatchability. The treatments were supplementation of combination organic selenium (S1= 0.5 ppm and S2= 1 ppm) and vitamin E (E1= 50 ppm and E2 = 100 ppm) in different commercial diets (P and G). four hundred and twenty female and mail quails (ratio 1: 1) aged 3 weeks old were divided into 10 treatment groups with 3 replicates. Each replicate consisted of 14 quails. Two groups as control consisted of two kinds of commercial diets (P and G) without supplementation of organic selenium and vitamin E. The eight remaining groups were the groups given the combination of organic selenium and vitamin E at different level in P and G diets. The design of the experimental was completely Randomize Factorial Design. The result of this study indicated that the level of combination 0.5 ppm selenium and 100 ppm vitamin E in the two commercial diets significantly ($p<0.05$) improved the egg production as compare to the control groups. The supplementation of combination 1 ppm Se and 100 ppm vitamin E in two commercial diets significantly ($p<0.05$) improved fertility, hatchability and accelerate of age of quail first laying. From this study we can concluded that supplementation combination organic selenium and vitamin E improved quail reproduction. It showed by higher egg production, increased in fertility and hatchability and also acceleration in age of quail first laying.

Key words: quail, selenium organic, vitamin E

Introduction

Increasing quail population can be achieved by increasing quail reproduction that included accelerate egg of first laying, fertility and hatchability. Quality of feed nutrient is factor that affecting quail reproduction. Selenium (Se) and vitamin E are required for quail reproduction because Selenium has plays role in quail fertility and embryonic development. There are two main sources of selenium in the diet: organic selenium, which is an integral part of many feed, and inorganic selenium selenite or selenate. The differences between these two forms of selenium that organic form providing more Selenium reserve in the body and more efficient in transfer to the egg (Surai, 2003). Furthermore organic selenium is potential to protect developing avian embryo from peroxidation that causes mortality of embryo, so that Se increases the hatchability of fertile eggs.

Meanwhile vitamin E protect cells and tissue from oxidative damage induce by free radical. Vitamin E plays a role in Se metabolism, vitamin E and Se act synergistically and they act as primary antioxidant to protect membrane from damage. Using vitamin E together with Se makes avaibility of Se more efficient. However, low concentration of Se in soil cause low Se content in the quail feed. Therefore, it is needed to supplement Se and vitamin E in quail feed to improve selenium content in the diets that support quail reproduction, but the effects of either Se alone or its combination with Vitamin E on quail reproduction was not available in the literatures. The objective of this study was to evaluate the effect of supplementation organic Se and vitamin E on age of egg first laying, fertility and hatchability of quail.

Material and Methods

Four hundred and twenty quail male and female quail (ratio 1:1), 3 week of age were divided into 10 treatments with 3 replicates, and each replicate consisted of 14 quail placed into battray cage (42 x 60 x 20 cm). The treatments were ten groups given the combination of two level organic Se and two level vitamin E (dL-α- tocopheryl acetat) in two kinds of commercial diets (P and G diets). Ten treatments diet were: P_1 (P diets without supplementation), P_2 (0.5 ppm organic Se + 50 ppm vitamin E), P_3 (0.5 ppm organic Se + 100 ppm vitamin E), P_4 (1 ppm organic Se + 50 ppm vitamin E), P_5 (1 ppm organic Se + 100 ppm vitamin E), G_1 (G diets without supplementation), G_2 (0.5 ppm organic Se + 50 ppm vitamin E), G_3 (0.5 organic Se + 100 vitamin E), G_4 (1 ppm organic Se + 50 ppm vitamin E), G_5 (1 ppm organic Se + 100 ppm vitamin E). The commercial diets (P and G diets) used as basal diets for starter and layer period. Fertile eggs from 18 week's quails were collected and incubated using standard conditions (37.5 ^{o}C and 60% relative humidity). Quail day egg production was measured, fertility was observed on days

12 incubation. and hatchability was measured on days 16-17 of incubation. The design of the exprimental was Factorial Completely Randomize Design (Steel and Torrie, 1995). Nutrient composition of control diets presented in Table 1.

Table 1 Nutrient Composition of Control Diets

Nutrient*	Diets			
	Starter		Layer	
	(P)	(G)	(P)	(G)
Protein (%)	21.50	22.00	20.00	20.00
Fat (%)	6.09	6.00	4.78	4.25
Crude fiber (%)	2.82	3.50	4.34	4.50
Ash (%)	5.34	6.45	10.69	11.00
Calcium (%)	0.89	0.90	3.24	3.25
Phosphorus (%)	0.70	0.70	0.72	0.70
Vitamin E (ppm)	50.00	50.00	43.50	43.00
Selenium (ppm)	0.21	0.35	0.46	0.40

Analysed at Integrated Chemical Laboratory, Bogor Agricultural University (2006)

Result and Discussion

Age of Quail First Laying and Egg Production

The effect of supplementation of organic selenium and vitamin E on age of quail first laying, fertility and hatchability is presented in Table 1.

Table 1. Supplementation organic Se and vitamin E on age of quail first laying, fertility and hatchability of quail

Treatments	Age of Quail (days)	Fertility (%)	Hatchability (%)
P1 (P diets, control)	48.67±0.58^{a}	88.32±0.61^{c}	81.45±1.32^{c}
P2 (0.5 ppm Se + 50 ppm vit E)	46.67±1.15^{ab}	87.05±3.21^{c}	84.45±3.11^{c}
P3 (0.5 ppm Se + 100 ppm vit E)	45.33±1.53^{b}	93.03±1.35^{b}	90.55±1.15^{b}
P4 (1 ppm Se + 50 ppm vit E)	43.67±1.53^{bc}	93.82±2.53^{b}	89.05±4.70^{b}
P5 (1 ppm Se + 100 ppm vit E)	44.67±1.53^{b}	97.01±2.53^{a}	93.47±3.37^{a}
G1 (G diets, control)	49.67±1.53^{a}	88.18±0.48^{c}	85.44±1.14^{c}
G2 (0.5 ppm Se + 50 ppmvit E)	45.33±1.15^{b}	86.60±3.01^{c}	85.11±3.45^{c}
G3 (0.5 ppm Se + 100 ppm vit E)	44.00±1.00^{bc}	94.72±0.95^{b}	92.36±0.91^{a}
G4 (1 ppm Se + 50 ppm vit E)	41.33±1.53^{c}	94.34±2.78^{b}	90.07±3.77^{b}
G5 (1 ppm Se + 100 ppm vit E)	44.33±3.21^{bc}	97.56±2.42^{a}	92.34±1.09^{a}

Different superscript in the same line means significantly different (P<0.05)

Table 1 shows that age average of quail first laying about 41.33-49.67 days. Supplementation of organic Se and vitamin E significantly (P<0.05) accelerated age of quail first laying. The earliest age of quail first laying was reached at days 41.44 by supplementation of organic selenium 1 ppm + vitamin E 50 ppm. But there were no significant difference in age of quail first laying affected by different kinds of commercial diets. Furthermore, increasing supplementation organic Se level or vitamin E level in the diets did not influence age of quail first laying. Interaction supplementation of organic Se dan vitamin E significantly (P<0.05) affected age of quail first laying. Supplementation of higher level organic Se with lower level of vitamin E (1 ppm organic Se + 50 ppm vitamin E) significantly (P<0.05) accelerated of age of quail first laying. In other hand, increasing of supplementation organic Se with higher of vitamin E level (1 ppm Se + 100 ppm Vit E) did not influence age of quail first laying. Overall supplementation of organic Se and vitamin E significantly (P<0.05) accelerated age of quail first laying compared to the control diets.

Fertilitility and Hatchability

Table 1. shows that percentage of fertility obtained in this study ranged from 86.60-97.56%. The Fertility of treatments diets significantly (P<0.05) difference with that of the control. Increasing of organic Se or vitamin E level in the diets significantly (P<0.05) increased fertility. The highest Fertility 97.56% was resulted by G diet with supplementation of 1 ppm organic Se + 100 ppm vitamin E and there was no significant different in fertility due to feeding P diet with the same level of supplementation organic Se and vitamin E. Supplementation of combination Organic Se and vitamin E significantly (p<0.05) resulted of higher fertility than the controls. Fertility of supplementation 0.5 ppm organic Se + 100 ppm vitamin E did not significantly difference with fertility of supplementation 1 ppm Se + 50 ppm vitamin E but significantly (p<0.05) higher compared with fertility of lower level of supplementation organic se 0.5 ppm + 50 ppm vitamin E and with that of the control diets. In contrast there were no significantly different fertility of Supplementation combination of 0.5 ppm organic Se + 50 ppm vitamin E with fertility of controls.

Percentage of hatchability obtained in this study ranged 81.45-93.48%. Supplementation combination organic Se and vitamin E significantly (P<0.05) affecting hatchability. Increasing of organic Se level significantly (P<0.05) increased hatchability, likewise increasing of vitamin E level significantly increased hatchability. Supplementation combination of organic Se and vitamin E significantly (P<0.05) affected the hatchability of quail that supplementation of organic Se and vitamin E significantly increased hatchability compared with the control diets. The highest hatchability 93.48% resulted from treatment P diets with supplementation of organic Se 1 ppm + vitamin E 100 ppm.

Supplementation organic Se and vitamin E in diets increasing hatchability because there were increasing of organic selenium and vitamin E content in eggs, so

that the nutritional content of antioxidants in eggs sufficient for embryonic development. This relates to the process of embryogenesis, in which Se and vitamin E protects the developing embryo from tissue damage caused by free radicals and improve the durability of his life until they hatch. Surai *et al* (2006), an important benefit of Se associated with its ability to protect the birds from the peroxidation of embryonic development during embryogenesis. Increase in selenium in the tissue responsible for the increase in the antioxidant defense against oxidative stress, increased levels of selenium potentially improve the expression of various selenoprotein are beneficial to the hatchery. Improving the status of selenium in eggs would result in increased hatchability. The use of Se into the quail diets was potential source of selenium for embryonic development (Surai *et al*, 2006). The most effective effort to increase concentration of selenium of egg is increasing the use of Selenium into the parents feed. Supplementation of organic Se 0.5 mg/kg significantly increased the concentration of Se of components of the egg, Se of albumen increased by 8.8 times, in which the Se control 41.8ηg Se/g increased to 368.2 8 ηg/g, the yolk Se concentrations increased two fold from the control Se, i.e. from 459.6 ηg/g to 865.2 ηg/g after supplemented (Surai *et al*, 2006). Renema (2004) also obtain improvement in hatchability as a result of replacement of sodium selenite with organic Se.

Conclusions

Supplementation of organic selenium 1 ppm and vitamin E 100 ppm resulted in the highest number of fertility and hatchability of quail

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