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ORIGINAL ARTICLE

The Effects of Vitamin E-Se Supplemented on some of Serum Biochemical Parameters in the Laying Japanese quail

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ABSTRACT
The purpose of this study was to determine the effects of different doses of vitamin E-Se (Vit. E-Se) supplemented into the diet on some of serum biochemical parameters in Japanese quail. 135 quails layer were randomly divided into three groups and three replicate for each group (one control and two experimental groups). Experimental groups (E-se$_1$ and E-se$_2$) were fed with a diet supplemented with E-se$_1$ (80 mg/kg vitamin E + 0.2 ppm Se) and E-se$_2$ (160 mg/kg vitamin E + 0.4 ppm Se) respectively. The serum biochemical parameters, of all the test subjects were measured in the end experiment (sixty day of the study). Result showed difference between groups in plasma glucose (GLO), uric acid (UA) and albumin (AL) were not significant. But the addition of different levels of vitamin E-selenium in quail diet led to increased cholesterol, triglycerides (TG), total protein (TP) high density lipoprotein (HDL) ($p<0.05$). The present study was designed to investigate the effects of vitamin E-Se added in laying Japanese quail diets on some of serum biochemical parameters from 60 days of age.
Keywords: *Vitamin E-selenium, Blood parameters, laying Japanese quail.*

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INTRODUCTION

Quail with good properties such as rapid growth, early maturity, high egg production, a short incubation period and low susceptibility to common diseases in poultry short distance to the generation, less space for short with an acceptable commercial poultry birds are known. Vitamin E (a-tocopherol) is a biological antioxidant, soluble in fat [1], which prevents oxidation of long-chain polyunsaturated fatty acids (PUFA) of cell membranes [2, 3]. Vit.E has been reported an excellent biological functions as natural antioxidant prevents the oxidation of unsaturated lipid materials within cells, thus protecting the cell membrane oxidative damage [4].

Selenium is an essential micronutrient for healthy growth of the body and the poultry. The inorganic form of selenium supplements in the form of sodium selenite used in poultry diets. All of the selenocysteine, selenium-enriched yeast (SY), selenomethionine (SM) and is used as a source of selenium. Vitamin E and selenium appear to participate in the same biochemical relationships and food. Selenium is essential for proper function of the antioxidant enzyme glutathione peroxidase, which protects the cell by destroying free radicals [5]. The Se requirement of poultry in physiological conditions is thought to be quite low, varying from 0.06 ppm (laying hen) up to 0.2 ppm (turkey, quail, duck; NRC, 1994). Sahin et al. [7] reported that higher dietary vitamin E resulted in a decrease in serum cholesterol concentrations of Japanese quails. Use of organic selenium in the environment through fecal excretion of selenium is low, indicating that the deposition of selenium in tissues and eggs. Payne and Southern [8], the amount of selenium available to absorb by the tissues of poultry in the diet depends on the form and concentration of the element. Reported that dietary of organic selenium supplementation resulted in increased concentrations of vitamin E in breeder hens eggs [9]. Combs and Combs [10] reported that supplemented organic Se to broiler breeders and layers diets was actively absorbed and can be directly incorporated into protein. Kim and Mahan [11] indicated that selenium is biochemically similar to sulphur, Se replaces the sulphur molecule in the normal biosynthetic pathways of the yeast cell and is absorbed actively across the intestine by the same amino acid carrier. Adding Se to poultry diets can provide the poultry industry with a simple method for improving lipid oxidation of poultry meat [12]. Swain et al. [13] suggested that deficiencies of vitamin E or Se, or both, impair immune function in young chicks. The organic selenium compounds in Sel-Plex™ allow contributing to a selenium reserve to be available for prevention of lipid peroxidation (through Glutathione Peroxidase GSH-Px) during stress conditions [14].

The purpose of this study is evaluating effects of different doses of vitamin E-Se (Vit. E-Se) supplemented into the diet on some of serum biochemical parameters in Japanese quail.

MATERIAL AND METHODS

This experiment was conducted to study the effect of different levels of vitamin E(VE) and selenium as seleno-yeast(SY) addition in Japanese quail laying diets. 135 quail layer were randomly divided into three groups (one control and two experimental groups). Quail were fed with 18.89 % crude protein and 2914 kcal ME/kg up to 60 days of life (Tabal 1). The experimental diets were based on corn and soybean meal planning group and 4% in the diet of vegetable oils were used. The experimental groups were fed on one of the following diets:

1) control
2) control + vitamin E-selenium (combination of 80 mg/kg Vitamin E + 0.2 ppm organic selenium)
3) control + vitamin E-selenium (combination of 160 mg/kg Vitamin E + 0.4 ppm organic selenium)

At the end of the experiment, blood samples were collected tubes from the brachial vein (4 quail/group). All data were performed by ANOVA procedures appropriated for a randomized complete block design by the GLM procedures of SAS [15] and significance was defined at ($P < 0.05$).

RESULTS AND DISCUSSION

Glucose

As shown in Table 2, the effect of Vit.E-Se supplementation on serum glucose concentration (GLu) of quail in different experimental groups was not different significant. Higher glucose concentration in quails which received Vit.E-Se_2 in diet to compared to Vit.E-Se_1 and control group. The overall quail serum biochemical results were in agreement with the results of Sahin et al. [7] and Speranda et al. [16], which showed that dietary vitamin E levels did not affect the glucose in quail's serum. However, Swain et al. [13] suggested that combined dietary supplementary levels of vitamin E (150 IU/kg) and Se (0.1 mg/kg) may be required for better health and overall growth performance. Observed that when the level of dietary Vit. E-Se increased from 80 mg/kg vitamin E + 0.2 ppm Se to 160 mg/kg vitamin E + 0.4 ppm Se, the GLu content of blood plasma of quail increased from 273.67 to 300.33 mg/dl.

Cholesterol

The effect of Vit.E-Se supplementation on cholesterol of quail in different experimental groups for serum cholesterol concentration was significant ($p<0.05$). This finding suggested that dietary supplementation with Vit.E-Se influenced serum cholesterol concentration. In addition, the Vit.E-S_1 group was the most effective on serum cholesterol concentration compared to Vit.E-Se_2 and control group. Similar findings have been observed by Arsalan et al. [17], Vakili and Bahram [18] and El-Mallah *et al*. (19), they reported that addition of Vit.E and/ or organic Sel-Plex to diets were effective ($P<0.05$). However, Sahin *et al*. [7], Hidiroglou et al. [20] and Ramezani *et al*. [21], found that not a significant. Like vitamin E in serum cholesterol is transported by lipoproteins. Possible mechanisms include the effect of vitamin E on the relationship between vitamin E and cholesterol distribution of plasma lipoproteins and cholesterol in the activity of cholesterol 7 - alpha - hydroxylase [22].

Triglycerides

In the present study, triglycerides were significantly affected by experimental groups ($p< 0.05$). In addition, the Vit.E-S_1 groups were the effective on serum TG concentration compared to Vit.E-Se_2 and control group. This observation supported the findings of Arsalan *et al*. (17), who showed that combined dietary supplementary levels of vitamin E (100, 200 and 300 mg/kg) affect the triglycerides of chicks. However, Speransa et al. (16), Zaghari and Mohiti Asli (23), El-Mallah et al.[19], showed that addition of Vit.E and/ or Se to diets did no significant differences in the TG.

Uric acid

The increase in UA in the quail the control group as compared to the VitE-Se1 and Vit.E-Se2 these groups were showed. The overall Uric acid results were in agreement with the results of Sahin et al. [7]. Speranda et al. [16] who reported that dietary vitamin E or Se levels did not affect the plasma Uric acid of chicks. Elevated serum level of uric acid predicts the development of obesity and hypertension. With this increased the possibility that uric acid may have a strong pathogenic role in metabolic syndrome .

Albumin

Quails fed diet contaminated with Vit.E-Se had significantly higher on serum albumin concentration in 60 day of experiment compared to the control group (Table 2). This result is in agreement with their obtained by Marcela et al [25]. Observed that when the level of dietary Vit.E-Se increased from 80 mg/kg vitamin E + 0.2 ppm Se to 160 mg/kg vitamin E + 0.4 ppm Se, the ALB content of blood serum of quail decreased from 2.13 to 2.03 g/dl.

Total protein

The serum total protein (TP) concentration was significantly higher in quails fed of Vit.E-Se as compared to control group ($p< 0.05$). Kucuk et al. [26] and Al-Azraqi [27], Reported that supplementation of diet with antioxidants to prevent oxidative stress, protein and total protein concentration in the blood were increases, In conclusion, dietary supplementation of Vit.E-Se led to increases the concentrations of TP in serum blood quails. Similar findings have been observed by, Arslan *et al*. (17), El-Mallah *et al*. [19], Maysa et al. [28], they showed that addition of Vit.E and/ or organic Sel-Plex to diets improves serum TP concentration compared to control group. However, Speranda *et al.* [16], reported that supplementation of a diet with Se had no significant positive effect on TP.

High density lipoprotein

Even the positive effects of Vit.E-Se on HDL appeared when used in combination in the study. The Vit.E-Se supplementation to diets enriched did significant positive effect on HDL ($p<0.05$). Vakili and Bahram [18], showed that supplementation of a diet with VitE-Se significantly increased HDL serum blood of quail. But, Speranda et al. [16], reported that supplementation of a diet with Se had no significant positive effect on HDL.

Table 1. Composition and calculated analysis of basal diet.

Ingredients	Unit	weight
Corn	%	42.13
Wheat	%	15
Soybean meal	%	31
oil	%	4
Limestone	%	5.30
Dicalcium phosphate	%	1.74
Mineral premix	%	0.25
Vitamin premix	%	0.25
Salt	%	0.2
DL-Methionine	%	0.08
L Lysine	%	0.05
Total	100	
ME	kcal/kg	2914
Crude protein	%	18.89
Calcium	%	2.47
Available phosphorus	%	0.35
Lysine	%	1.15
Methionine	%	0.46
Methionine + cysteine	%	0.74
Linoleic acid	%	1.43
Tryptophan	%	0.25
Threonine	%	0.77

Table 2. Effects of different doses of vitamin E-Se (Vit. E-Se) supplemented into the diet on some of serum biochemical parameters in Japanese quail

Treatments	Glucose mg/dl	Cholesterol mg/dl	Triglyceride mg/dl	Uric acid g/dl	Albumin g/dl	T. protein g/dl	HDL mg/dl
control	295.33	207.33^{b}	1559.33^{b}	5.80	1.90	4.73^{b}	46.66^{b}
E-se (80 mg/kg vitamin E +0.2 ppm Se)	273.67	267^{a}	1700.67^{a}	4.87	2.13	5.56^{a}	56.67^{a}
E-se (160mg/kg vitamin E +0.4 ppm Se)	300.33	257.67^{a}	1401^{b}	5	2.03	5.27^{a}	58^{a}
P value	0.53	0.001	0.001	0/23	0.27	0.01	0.006
SEM	16.85	2.99	49.03	0.37	0.09	0.13	1.69

$^{a–c}$ Values in the same row not sharing a common superscript differ significantly ($P< 0.05$).

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