



Short communication

**Effect of dietary inclusion of alfalfa (*Medicago sativa*) and black cumin (*Nigella sativa*) on performance and some blood metabolites of Japanese quail**

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**Abstract**

This study was conducted to investigate the effect of dietary inclusion of alfalfa (*Medicago sativa*) and black cumin (*Nigella sativa*) powder on performance and serum composition of Japanese quails. One week old three hundreds Japanese quails were divided into 4 groups (of three replicates each) in a randomized design. G1 is the control group that did not receive any herbal planet, G2 group was fed the control diet + 2% of Alfalfa powder, G3 group was fed the control diet + 2% of *Nigella Sativa* powder and G4 group was fed the control diet + 2% of the mixture of both herbal plants. The results showed that using these medicinal plant in their diet had significant effects on daily body weight gain of the quails ( $P<0.05$ ). The serum total cholesterol and triglycerides concentration were significantly reduced in G2 compared to the control groups ( $P<0.05$ ). The study concluded that that inclusion of Alfalfa and *Nigella sativa* either alone or in combination can improve the performance and blood metabolites of Japanese quails.

**Keywords:** Japanese quail, Carcass, Alfalfa, *Nigella sativa*, Blood Cholesterol

**Introduction**

There is a need to find more efficient alternatives or combinations of different alternatives for maintaining health and improving performance of poultry and livestock. Phytogetic compounds are the groups of feed additives that have been reported to have potential for growth of livestock species by enhancing feed intake, activating digestive enzymes and stimulating immune function (Williams and Losa, 2001; Lee et al., 2003; Hernandez et al., 2004). Limited researches have been conducted on aromatic plants and their components on poultry performance (Bassett, 2000; Hertrampf, 2001; Tucker, 2002). Use of natural products such as medicinal plants could be widely accepted as feed additive to improve feed efficiency and productive performance (Aboul-fotouh et al., 1999; Kong et al., 2006). Approximately 80% of domestic animals have been fed synthetic compounds for the purpose of medication and growth promotion (Lee et al., 2001). Recently, the concerns about possible antibiotic

residues and antibiotic resistance have raised great concern in the use of antibiotics in the animal feed.

This study was conducted in order to evaluate the effect of alfalfa (*Medicago sativa*) and black cumin (*Nigella Sativa*) on performance, carcass quality and blood biochemical parameters of Japanese quails.

**Materials and Methods**

The experimental diet is shown in Table 1. A total of 300 chickens were divided into 4 groups of 3 replicates (25 chickens each). G1, the control diet group, did not receive any herbal planet in their diet. The G2 group received a diet containing 2% Alfalfa (*Medicago sativa*) powder, G3 group was fed a diet of 2% black cumin (*Nigella Sativa*) powder and G4 group was fed a diet of 2% mixture of both herbal plants. Throughout the experiment, birds had free access to feed and water. Chick's weight and feed consumption were calculated daily and feed conversion ratio (FCR) was then estimated from feed intake and weight gain of the birds.

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**Table 1: Ingredients and chemical analyses composition of diets**

Ingredients (g/kg)	
Corn	48.8
Soybean oil	2.2
Soybean meal	40
Fish meal	6
Dicalcium phosphate	1.6
Vitamin premix*	0.25
Mineral premix**	0.25
Methionine	0.25
chemical composition (g/kg DM)	
Dry matter	92.2
Crude protein	23.9
Fat	3.46
Fibre	4.13
Ash	6.7
Calcium	1.22
Phosphorus	0.41
ME by calculation (MJ/kg DM)	12.21

\*Vitamin premix (per kg diet): Vitamin A- 1.000 IU; vitamin D<sub>3</sub>- 1.000 IU; vitamin E- 42 mg; vitamin K<sub>3</sub>- 4 mg; vitamin B<sub>1</sub>- 3.6 mg; vitamin B<sub>2</sub>- 7 g; vitamin B<sub>6</sub>- 8 mg; vitamin B<sub>12</sub>- 0.02 mg; niasin- 24 mg; folic acid- 12 mg; biotin- 0.05 mg; pantothenic acid- 12 mg; cholin chloride- 150 mg; vitamin C- 60 mg

\*\*Mineral premix (mg/kg diet): Fe- 72; Zn - 72; Cu- 6; I - 1.2; Co- 0.24; Se- 0.18; Mn- 96

At the ends of 6 weeks, five quails per replicate were randomly chosen, slaughtered and carcass percent to live weight and percent of carcass parts to carcass weight were calculated. Blood samples were obtained from brachial vein and centrifuged at 1500 rpm to separate serum for biochemical analysis.

### Statistical Analysis

The data was tested for the significance of the effect of diet treatment by one-way analysis of variance

with the help of the statistical package, SAS (Statistical Analyses Software).

## Results and Discussion

The effects of alfalfa and black cumin powder on feeding and body performance are shown in Table 2. The highest amount of daily gain was observed in the group 4. This improvement of body weight gain may be due to the active materials found in the herbal plants which increased the efficiency of utilization of feed, resulting in enhanced growth. Previous reports suggest that herbs, spices and various plant extracts have appetite and digestion stimulating effects, in addition, to their antimicrobial activity against pathogenic bacteria (Cabuk et al., 2003; Demir et al., 2008). Mansoub (2010) suggested that herbal plants have stimulatory effects on pancreatic secretions such as digestive enzymes which help to digest and absorb more amino acids from the digestive tract and thereby improve carcass traits (Mansoub, 2010). The antimicrobial effect of herbs decreases remarkably the intestine microbial populations and prevents the lysis of amino acids which is used in proteinic tissues and increases the body gain (Lee et al., 2001).

The effects of experimental plants on blood biochemical parameters are presented in Table 4. Serum total cholesterol and triglycerides concentration were significantly reduced in G2 compared to the control group (P<0.05). The main reason of cholesterol and triglyceride reduction in blood of G2 chicks may be due to substances like carvacrol and thymol present in herbs (Akiba and Matsumoto, 1982).

**Table 2: Performance of Japanese quail fed the examined herbal plants**

Parameters	G1	G2	G3	G4	SEM
Feed intake (g/day)	12.12	12.97	12.82	13.10	1.02
Average daily gain (g/day)	3.98 <sup>b</sup>	4.21 <sup>ab</sup>	4.09 <sup>ab</sup>	4.29 <sup>a</sup>	0.14
Feed conversion ratio (g feed intake/g body gain)	3.20	3.17	3.32	3.47	0.10

G1: control; G2: 2% Alfalfa; G3: 2% *Nigella Sativa*; G4: 2% Alfalfa and *Nigella Sativa*

<sup>a,b</sup>Means in the same row with different subscripts differ significantly (P<0.05); SEM: Standard error of means

**Table3: Carcass quality of Japanese quails fed the examined herbal plants**

Characters (%)	G1	G2	G3	G4	SEM
Carcass	78.23	78.64	78.52	79.07	3.23
Spleen	2.30	2.23	2.42	2.89	4.92
Liver	2.24	2.87	2.94	2.85	0.09
Gizzard	7.32	7.61	7.41	7.95	0.11

G1: control; G2: 2% Alfalfa; G3: 2% Black cumin; G4: 2% Alfalfa and Black cumin

**Table 4: Some blood metabolites of Japanese quails fed the examined herbal plants**

Blood Parameter	G1	G2	G3	G4	SEM
Glucose (mmol/L)	121.12	122.40	124.38	123.64	0.89
Cholesterol (mg/dl)	117.46 <sup>a</sup>	108.06 <sup>b</sup>	114.80 <sup>a</sup>	110.32 <sup>ab</sup>	4.92
Triglyceride (mmol/L)	118.36 <sup>a</sup>	109.61 <sup>b</sup>	113.09 <sup>ab</sup>	112.45 <sup>ab</sup>	2.32

G1: control; G2: 2% Alfalfa; G3: 2% Black cumin; G4: 2% Alfalfa and Black cumin; <sup>a,b</sup>Means in the same row with different subscripts differ significantly (P<0.05)

These substances have positive effect on cholesterol and triglyceride and decrease their concentration in blood (Zargari, 2001). The results of the present study indicate that 2% level of Alfalfa (*Medicago sativa*) and black cumin (*Nigella sativa*), either alone or in combination can improve the performance and blood metabolites of Japanese quails.

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