Effect of utilization of black cumin (*Nigella sativa*) and parsley (*Petroselinum crispum*) in laying quail diets on egg yield, egg quality and hatchability

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SUMMARY

This study was carried out of determine the effect of utilization of black cumin *(Nigella sativa)* and dry parsley *(Petroselinum crispum)* in the diets on body weight, feed consumption, feed conversion ratio, egg production, egg quality (Haugh unit, eggshell thickness and, egg yolk cholesterol values) and hatchability in the laying quails.

The experiment lasted 8 weeks and was performed on 210 laying quails: 140 females and 70 males at age of 14 weeks. The quails were randomly allocated with 7 dietary treatments one as the negative control group without any feed additives (C); the others designed as 1.00 % black cumin (G1), 1.00 % parsley (G2), 1.50 % black cumin (G3), 1.50 % parsley (G4), 0.50 % black cumin + 0.50 % parsley (G5) and 0.75% black cumin + 0.75% parsley (G6) respectively.

There were not statistically difference in body weight, among the groups, except female body weight ($p<0.05$). While mean feed intakes values did not differ, feed conversion ratio (FCR) values were different among the groups ($p<0.05$). There were no differences in egg production (%) egg weight, egg quality parameters (except the yolk colour) and egg yolk cholesterol levels among the groups. Hatchability was found 88.0, 88.0, 68.0, 36.0, 68.0, 56.0, 88.0 %; for C, G1, G2, G3, G4, G5, G6 respectively ($p<0.05$).

In conclusion, the use of black cumin and dry parsley as together in the layer quail rations as feed additives have a synergetic effect on body weight gain, egg production and hatchability. Their usage in combination could be profitable to improvement of performance of laying quail as the natural way.

Keywords**:** black cumin, parsley, quail, egg, performance

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INTRODUCTION

In addition to the increase in population and the growing deficit of the nutrient requirements of healthy nutrition and livestock production and in order to enhance efficiency, it is of most importance to protect animal health. To address these goals various feed additives are introduced into the diets of animals in production units to enhance animal health as well as achieve more output from the animals.

Nigella is a small plant with a one-year life span which is specific to Asia. It contains 35-40 % oil, bitter substances, saponins, volatile fats, tannin, nigelon and thymochinon (Anonymous, 2009). Wagner et al. (1990) reported that *nigella* seeds contain 6.4% water, 4% ash, 32% fat, 20.2% crude protein, crude fiber 6.6% and 37.4% carbohydrates. Moreover its oil contains 1% myristic, palmitic 8.4%, 2.9% stearic, oleic 17.9%, 60.8% linoleic and a small amount of arachidonic acid and eikosadienoik acid. Guler et al. (2007) carried out black seed research in order to examine the effect of 1.00% black seed on the performance of broilers and concluded that it can be used as a growth stimulant. Aydin et al. (2006) carried out a study in which the impact of 3 different levels (%1,% 2,% 3) of nigella seeds added to the diet of laying hens during 49 days on egg performance, egg quality and feed conversion ratio was studied. They showed that the black seeds didn't affect BWG, egg production, feed consumption FCR Egg yolk index and white index in the laying hen. Akhtar et al. (2003) demonstrated that different levels of nigella seed supplementation to the diets of laying hens have significantly increased egg production, egg weight, egg shell thickness, Hough units ($p<0.05$), whereas the cholesterol content of the egg yolks was significantly decreased ($p<0.05$). Parsley (*Petroselinum Crispum*) has small and dark seeds with a volatile oil content of the fruits of a glycoside called apiin (Anonymous, 2009). Ragab et al. (2005) have demonstrated that it is possible to replace 16 % of yellow corn with aromatic plants (parsley, mint etc.) in quail diets.

This study was conducted for the purpose of determining the effect of utilising black cumin *(Nigella sativa)* and dry parsley *(Petroselinum crispum)* in the diets of laying quails and their impact on body weight, feed consumption, feed conversion ratio, egg production, egg quality and hatching results in the laying quails.

MATERIAL AND METHODS

In this study, a total of 140 female and 70 male quails (*Coturnix coturnix* japonica) 12-14 weeks aged were used. The ingredients of basal diet are shown in Table 1. The experimental groups were divided as control (basal diet; no supplementation) and six treatment groups [supplemented with 1.00 % black

cumin (G1), 1.00 % parsley (G2), 1.50 % black cumin (G3), 1.50 % parsley (G4), 0.50 % black cumin plus 0.50 % parsley (G5) and 0.75 % black cumin plus 0.75 % parsley (G6) respectively].Each group consisted of 30 animals (20 female and 10 male) with replicate sub-groups in each. The experiment was performed within 8 weeks.

Table 1. Composition of the basal diets, (%).

Feedstuffs	%
Wheat	30.00
Corn	34.70
Fishmeal	1.30
Soybean , 48%	17.50
Full fat soya	9.40
Dicalcium phosphate	1.07
DL – Methionine	0.13
Calcium Carbonate	5.30
Salt	0.25
Vitamin*	0.25
Mineral **	0.10
Calculated values	
Metabolisable energy, kcal/kg	2900
Crude protein , %	20

*Provided by per kg of diet: Vitamin A, 15 000.000 mg; vitamin D3, 3 000.000 mg; vitamin E, 30.000 mg.
**Provided by per kg of diet: 50.000 mg; Mn, 50.000 mg; Fe, 50.000 mg; Zn, 10.000 mg; Cu, 5 mg, 200 mg Co, 800 mg I, 500 g Se.

Feed and water were provided ad-libitum. Light was supplied for 16 hours/day throughout the experiment. Animals were weighed at the beginning and end of the trial. Egg production was recorded daily, feed consumption and egg weight were determined weekly. Egg quality traits [egg shell thickness (ST), Haugh units (HU), egg yolk colour (EYC) and egg yolk cholesterol] were measured on 20 eggs from each group on the 4^{th} and 8^{th} weeks of the experiment. Raush's (1958) method was used in determining the ST and HU of eggs. The values of EYC were measured by a colour of Hoffman Laroche scale (Vuillemier, 1969). Egg cholesterol level was determined according to the method modified by Uyanık et al. (2002). At the end of the study hatchability was determined using 25 eggs selected randomly from groups. Variance analyses among the groups were used for statistical comparisons. Duncan test was applied to determine group differences (SPSS, version 17, Chicago Ill).

RESULTS AND DISCUSSION

The performance data and body weight values are shown in Table 2. There were statistical differences between the groups in terms of body weight of the quails (except male quails) ($p<0.05$). These results were different from the findings for quails (Denli et al. (2004) laying hen (Aydın et al. (2006) and Hassan and Ragab (2007) regarding black cumin.

Table 2. Mean performance data

	Experimental groups							SEM	P
Items	C	G1 1% BC	G2 1% P	G3 1.5% BC	G4 1.5% P	G5 0.5% BC 0.5% P	G6 0.75% BC 0.75% P		
Female BW	239.7^{ab}	230.8^{bc}	224.2^{c}	240.3^{ab}	247.6^{a}	238.1^{ab}	242.4^{ab}	1.87	0.019*
Male BW	188.7	200.8	196.0	198.9	207.2	204.0	201.2	2.19	0.271
Feed intake	29.9^{b}	29.7^{b}	29.2^{b}	30.3^{ab}	31.2^{a}	29.7^{b}	31.2^{a}	0.14	0.000**
FCR	2.0^{b}	2.1^{ab}	2.1^{ab}	2.1^{ab}	2.2^{a}	2.2^{a}	2.2^{a}	0.005	0.012*
Egg yield	83.5	87.4	85.7	88.8	88.6	89.0	88.9	1.53	0.155
Egg weight	12.6^{ab}	12.6^{ab}	12.1^{c}	12.9^{a}	12.7^{ab}	12.3^{bc}	12.6^{ab}	0.003	0.000**
EST. mmx10^{-2}	21.0	21.4	21.8	21.6	21.6	21.7	21.8	0.14	0.671
EYC	11.9^{a}	9.4^{d}	11.0^{bc}	10.9^{c}	11.3^{abc}	11.5^{abc}	11.6^{ab}	0.12	0.000**
Egg cholesterol	92.9	82.7	94.4	84.6	98.5	99.0	110.0	4.00	0.603
Hough units	90.4	88.9	91.7	91.6	90.6	89.4	89.4	0.58	0.815
Hatchability	88.0^{a}	88.0^{a}	68.0^{ab}	36.0^{b}	68.0^{ab}	56.0^{ab}	88.0^{a}	4.88	0.015*

Means within a row sharing a common superscript are significantly different, *: P<0.05, **: P<0.01
BC: Black cumin, P: parsley, BW: Body weight, FCR; Feed conversion ratio, EST: Egg shell thickness, EYC: Egg yolk color

Feed consumption ($p<0.01$) and feed conversion ratio ($p<0.05$) values were statistically different among the groups. While feed consumption (FC) values were highest in groups 4 and 6, the level of group 2 was the lowest. It was reported that adding black cumin didn't affect laying quail and laying hen in terms of FC and FCR (Denli et al., 2004) and Aydin et al. 2006). These differences may be due to differences in feed, animal species and different factors applied to the trial period. Egg production weren't statistically different among the groups during the study. Our findings are similar to the results of Aydın et al. (2006) However, there are studies which report that the use of black seed also increases egg production (Aktar et al. 2003; Hassan and Ragab,2007). Moreover negative effects on egg production through the addition of black seed have also been reported (El Baghir et al. 2006). Mean egg weight values varied significantly between the groups ($p<0.01$). This result confirmed the results of Denli et al. (2004), El Bagir et al. (2006), Akhtar et al. (2003), although it differed from the results of Hassan et al. (2007).

While there were no differences among the groups in terms of egg shell thickness, Haugh units and egg cholesterol levels, there were significant

differences between the results of the groups regarding egg colour ($p<0.01$). Akhtar et al., (2003) reported that Nigella seed supplementation to the layer diets increased egg shell thickness and Haugh units, whereas they didn't alter in terms of egg yolk index, egg blood and meat stains. In addition to, results of Denli et al. (2004) Hassan et al. (2007), Aydın et al. (2006), El Bagir et al. (2006) differed from the results of our present study. Supplementation of 1.5 % of black cumin to quail diets decreased the hatching results ($p<0.05$). However, Nigella seeds alone and combined with parsley in the quail diets did not adverse effect. These results differ from the research findings which reveal an increased fertility rate in pigs with the use of thyme (Allan and Bilkei, 2005). Moreover, there was a study about thyme extract supplementation to the diets of layer breeders which reported higher values compared to the control group for hatchability, chick weight and fertility rates (Bozkurt, 2005). These differences could be due to the contribution, animal species, the trial period, and the different growth factors.

As a result, the addition of different proportions of black seed into laying quail diets didn't affect feed consumption and FCR while parsley affected negatively. Egg production was similar in all groups. On the other hand, 1.5% of black seeds decreased egg weight and hatchability. Moreover, Egg colour was influenced negatively by the black seeds addition. In the light of current knowledge, it would be appropriate to hold more trials regarding the value of Parsley (*Petroselinum crispum*) and nigella seeds (*NigellaSativa*) as feed.

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