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EFFECT OF REPLACEMENT OF SOYBEAN MEAL PROTEIN BY NIGELLA SATIVA MEAL PROTEIN ON PERFORMANCE OF GROWING JAPANESE QUIAL

By

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Abstract: *An experiment was conducted with Japanese quail to investigate the effect of replacement part of soybean meal protein (SBMP) by different levels of Nigella sativa meal protein (NSMP) (4.0, 8.0, 16.0 and 32.0%) on the growth performance, some blood plasma parameters, chemical carcass composition and carcass characteristics. A total number of 300 unsexed Japanese quail chicks at 7 days of age were randomly distributed into five experimental groups each in three replicates containing 20 birds each. The treatments were control group (0.0 NSMP), 4.0, 8.0, 16.0 and 32.0% NSMP. Birds were placed in electrically heated battery till the end of growing experimental period. Diets were formulated to be isocaloric and isonitrogenous provide 24.0% CP and 2900.0 ME Kcal/Kg of the diet. Both diet and water were given ad libitum. Lighting program was adjusted to met 24 hours of light daily. The experiment lasted 5weeks from the start. The obtained results indicated that the highest values of body weight, body weight gain, feed consumption and protein intake were observed for groups fed 4.0 or 8.0 % NSMP at the end of experiment, followed by groups fed 16.0, 32.0% and control group. While, insignificant differences were observed among dietary experimental groups for feed conversion ratio. Substitution soybean meal protein by different levels of NSMP protein caused decreases ($P \leq 0.05$) of protein efficiency ratio as compared with control group. Insignificant differences were detected for mortality rate. Carcass chemical compositions were not significantly affected due to feeding different levels of NSMP, with except of ash percentage where, it decreased by the increases NSMP % in the diet. All measured blood plasma parameters significantly ($P \leq 0.05$) decreases as NSMP% increased in the diet, except total plasma globulin, where, insignificant differences were detected. Also, insignificant differences were observed for all most carcass*

traits, with exception of blood, liver, heart and intestine weight where, significant differences were observed among treatments. The results showed that NSMP protein can be used in quail diets up to 8.0 % of soybean meal protein during growing period without any adverse effect on performance.

INTRODUCTION

Many studies used Nigella sativa as a feed additives in ration of poultry as a growth promoters, since it contain a different active substances, which enhance the growth rate. Results obtained varied greatly according to the form of Nigella sativa derivative, the level applied, the species of birds used and /or the age of birds. Natural feed additives of plants origin are generally believed to be safe, healthier, less subject to hazards and not accompanied by problems than synthetic feed additives. The use of dietary additives such as Nigella sativa, garlic and fenugreek is gaining momentum because of their beneficial effects on growth rate and food efficiency and their prevention of intestinal infection ***(Mohan et al., 1996).*** Nigella sativa seeds are considered to be a good source of crude protein, crude fat, ether extract and some minerals such as calcium, phosphorus, potassium, manganese and sodium ***(Abdel-Aal and Attia, 1993).*** In earlier studies reported by ***Nassar (1997)*** indicated that adding Nigella sativa in diets of balady chicken resulted increase of growth performance. ***Abou-El-Soud (2000)*** indicated that Japanese quail chicks fed 2.0 % of whole crushed Nigella sativa seeds had the highest live body weight at 21 and 42 days of age, and those fed 1.0% of Nigella sativa oil had the highest live body weight at 35 days of age. He added that final weight, total gain, daily gain, total feed intake and feed conversion ratio were the highest for quail received diets supplemented with 2.0% whole crushed Nigella sativa. However, ***Abdel-Mageed (2002)*** showed that substitution of soybean meal by Nigella sativa meal at 30.0% in diets of broiler resulted in a significant increase of body weight, body gain, feed intake, while feed conversion ratio, protein efficiency ratio and energy efficiency ratio were not affected.

There are general agreements that feeding Nigella sativa as natural growth promoters improve health and increase performance of birds without problems. ***Tollba and Hassan (2003)*** found that broiler fed 1.0 % of black cumin seeds resulted in an increases of body weight, gain, feed conversion ratio, total plasma protein as well as albumin and globulin. Furthermore, ***Abdo (2004)*** indicated that Nigella sativa seeds meal can be used in boiler diets up to 25.0% of soybean protein (or10.7 % of the starter diet and 9.47% of the finisher diet) without any adverse effect on broiler performance. In recent study reported by ***Hassan et al. (2007)*** showed that body weight

improved in Japanese quail when fed diet supplemented with 2.0% black seeds. While lipids and triglycerides were decreased.

This study aimed to investigate the effect of substitution soybean meal protein by different levels of Nigella sativa meal (4.0, 8.0, 16.0 and 32.0 %) on growth performance of Japanese quail during the growing period extended from 7 to 42 days of age. Also, this study performed to known the effect of feeding Nigella sativa meal on body chemical composition, blood parameters and carcass traits.

MATERIALS AND METHODS

This study was carried out at the Poultry Experimental Station, Faculty of Agriculture, Al-Azhar University, Naser City Cairo, Egypt, in order to investigate the effect of using different levels of Nigell sativa meal (NSMP) (4.0; 8.0; 16.0 and 32.0%) as a replacement of soybean meal protein on growth performance, blood plasma parameters, carcass chemical composition and carcass characteristics. The hatched chicks were fed on basal diets from one day old to 7 days of age according to requirements published in ***NRC (1994).*** At the end of 7 day of age three hundred of unsexed Japanese quail chicks (18.0 to 19.63g) were randomly distributed into five experimental groups each in three replicates containing 20 birds each. Chicks were placed in electrically heated battery till the end of growing experimental period. Both temperature and humidity degrees were reading every day to adjust the environmental condition and the lighting program was adjusted to met 24 hours of light daily. Diets were formulated to be isocaloric and isonitrogenous, 24.0% CP and 2900.0 ME Kcal/Kg of diets according the requirement published in ***NRC (1994)***. Birds were fed on 5 experimental diets group control diets (0.0); 4.0%; 8.0%; 16.0 and 32.0 % of NSMP as a replacement of soybean meal protein. Proximate chemical analysis of Nigella sativa meal as compared with soybean meal is shown in Table (1). Also, Formulation and diet composition was given in Table (2). Both diet and water was offered *ad libitum.* Chicks were individually weighed at zero time (at the end of 7^{th} day of age) intervals to nearest gram to avoid the differences at start of experiment. The weight of chicks repeated every week through the experimental growing period. Individual live body weight was totaled and divided by the number of chicks in every group and their replicate to obtain average live body weight. Other parameters were also recorded during the experiment i.e., body weight gain, feed consumption, feed conversion ratio, protein intake, protein efficiency ratio (g gain / g protein intake), and mortality rate. Also, at the end of experimental period 10.0 samples of blood were taken from 10 birds for each group and centrifuged at 3000 rpm for 15 minutes. Plasma was stored

in vials at -20C° until analysis. All tests were analyzed by using the commercial kits (were purchased from Diamond Company's tanpio Laboratory, Pasteur lab. Diagnostic and Biodiaquastic Company (Egypt).

Also, carcass and diets composition were analyzed according to standard methods of the ***Association Of Official Analysis Chemists (A.O.A.C., 1994).*** At the end of experiment 6 birds were randomly taken from each group to measure carcass characteristics. All obtained data were analyzed by using statistical analysis system software ***(SPSS 1995, FOR WINDOWS),*** the used model was Yij= u +Ti+ eij

Where Y= the observed value = population means, T= the effect of nutritional treatment, e = the standard error. One way analysis of variance and ***Duncan's Multiple Range (1955)*** test were used to compare means among the parameters of the different nutritional group. The differences were significant at 0.05 levels.

RESULTS AND DISCUSSIONS

Body weight (BW) and body weight gain (BWG).

Average body weight and body weight gain values of Japanese quail for experimental groups fed control diet; 4.0; 8.0; 16.0 and 32.0 % NSMP are presented in Table (3). At the start of the experiment (7^{th} day of age) averages of initial weight had ranged between 18.0 to19.63 g with insignificant differences among treatment groups indicating the random distribution of individuals among the treatment groups at the experimental start. At the 21^{st} days of age groups of quail chicks fed 4.0; 8.0 and 32.0 % NSMP were significantly ($P \leq 0.05$) higher in their body weight when compared with control or group fed 16 % NSMP. However, at the end of experimental period (42.0 days of age), the analysis of variance of BW revealed that groups fed 4.0 and 8.0 % NSMP had significantly ($P \leq 0.05$) higher BW compared to control or other dietary treatments (16.0 or 32.0% NSMP) which, indicated that incorporation of NSMP at a level of 4 to 8 % increases body weight and increases levels of NSMP about 8% was undesirable. Concerning body weight gain the results indicated that from 7 to 21 days of age BWG were significantly ($P \leq 0.05$) higher for groups fed 4.0; 8.0 and 32.0 % NSMP as compared with those fed 16.0 % NSMP or control group. While, at 21 to 42 days of age the analysis of variance showed that group of quail fed 4.0% NSMP showed the highest values of BWG, followed in a significant decreasing order by groups fed 8.0; 16.0 % NSMP and control group, while group fed 32.0 % NSMP recorded the lowest value of BWG.

During the whole experimental period extended from 7-42 days of age the obtained results showed that group fed 4.0 and 8.0 % NSMP exhibited the highest ($P \leq 0.05$) values of BWG, followed groups fed 16.0; 32.0 % NSMP and control group, with insignificant differences were observed among them. The previous results indicated that, addition of either 4.0 or 8.0% NSMP in quail diets significantly improved both body weight and body weight gain, compared to the other treatments containing higher levels of NSMP or control group. The increase growth of quail due to feeding NSMP attributed to some active compounds present in essential oil of NSMP such as P.cymene and thymoquinone **(EL-Alfy et al., 1975)**. These results are in agreement with **Nadia (2003)** who showed that black seeds contain 0.3-0.6 % essential oil which has 60-78 % nigelone this compound have been shown to possess antimicrobial and antifungal activities that cause depression in growth rate **(Mahmoud et al 1992; Fardous et al., 1992 and Ibrahim, 1999)**. Furthermore, **Abou El-Soud (2000)** indicated that both body weight and gain significantly increased of quail at 21 and 42 days of age when fed on diets containing 2.0% of whole crushed Nigella sativa seeds. Also, **Nadia (2003)** showed that adding Nigella sativa seeds at a level of 2.0 or 3.0 % improved body weight and gain of broiler chickens. **Hassan et al., (2007)** showed that body weight improved in Japanese quail when fed diet supplemented with 2.0% black seeds.

Feed consumption (FC) and feed conversion ratio (FCR).

Feed consumption and feed conversion ratio of Japanese quail during the whole experimental period (7-42 days of age) are given in Table (3).The results of FC indicated that the addition of NSMP at a level of 4.0 or 8.0 % significantly ($P \leq 0.05$) increased FC as compared with other dietary treatments (16.0 or 32.0%) or control group. The increase feed consumption of quail fed 4.0 or 8.0 % NSMP due to improve the quail appetite. But the increase level up to 16 % resulted decrease of feed consumption. Regarding with feed conversion ratio the average ranged between 2.93 to 3.24 g feed/g gains. The obtained results showed that insignificant differences were observed for FCR among dietary experimental groups. These results are in agreement with those obtained by **Nadia (2003)** who showed that the addition of 1.0,2.0 or 3.0 % of black seed either during the finishing period (29-49 days of age) or the total period (7-49 days of age) of growth, improved the broiler appetite significantly where the chicks consumed more feed than control group. Also, **Soltan (1999)** found that the addition of 1% Nigella sativa seeds to diet of quail improved feed conversion ratio. While these results disagreement with those obtained by **Abdel-Azeem et**

al.,(1999) and Hassan (2000) who indicated that improvement in feed conversion ratio was observed for chicks when received diets supplemented with 2.0 % Nigella sativa seeds.

Protein intake (PI) and protein efficiency ratio (PER).

Results of protein intake and protein efficiency ratio are given in Table (3).The analysis of variance indicated that both groups fed 4.0 and 8.0 % NSMP recorded higher ($P \leq 0.05$) values of PI followed in a significant decreasing order by groups fed 16.0 and 32.0% NSMP, while control group recorded the lowest value of PI. Regarding protein efficiency ratio the values had ranged between 1.29 to 1.41 g gain/g protein intake. Converse trend was observed, since the control groups recorded the highest PER as compared with other dietary treatments with insignificant differences were observed among NSMP levels. These results are in agreement with those obtained with **Osman (2002)** indicated that protein intake increased of chickens when fed on diet containing Nigella sativa meal.

Mortality rate (MR).

The results presented in Table (3) indicated that MR was not significantly affected by feeding dietary different levels of NSMP during the whole periods of experiment. The MR has ranged between 1.56 to 2.0% through the experimental period (7-42 days of age). It can be observed that the mortality rates observed in all groups were within the permissible levels and all mortalities were observed mainly due to the effect of quail handling during the experiment. **Zeweil (1996)** found that Japanese quail fed diet containing 38.0 or 48.0 % of Nigella sativa meal resulted increase of livability percentage when compared with control group or other dietary treatments. Also, **Tollba and Hassan (2003)** reported that the broiler chicks fed 1% grounds of black cumin resulted decreased mortality rate at 35,42 and 49 days of age.

Chemical carcass composition.

Results of chemical carcass composition of Japanese quail fed dietary different substitution levels of NSMP are illustrated in Table (4).The analysis of variance showed that insignificant differences were observed among dietary experimental groups including control group for all carcass chemical composition, with exception of ash percent, where both control and 4.0 % NSMP groups have higher ($P \leq 0.05$) levels of ash percent followed in a significant decreasing order by groups fed 8.0; 16.0 and 32.0 %. These results are in accordance with the results obtained by **Zeweil (1996)** who indicated that protein percentage of quail meat not affected when fed on diets containing 9.0% Nigella sativa meal. While, **Ghazalah**

and Faten (1996) found that carcass protein increased, while fat decreased of Muscovie ducks when fed diets supplemented with black seeds oil.

Blood plasma parameters.

The effect of dietary treatments on some blood plasma parameters are illustrated in Table (5). Data revealed that both total plasma protein and albumin values were significantly ($P \leq 0.05$) higher for group fed 4.0% NSMP followed in a significant decreasing order by groups fed other dietary treatments including control group, with insignificant differences were observed among 8.0; 16.0; 32.0% NSMP or control group. In respect of **Abdo (2004)** indicated that total plasma protein decreased of broiler chickens when fed diets supplemented with 25.0 and 50 % of Nigella sativa seeds as substitution of Soybean meal protein. In converse trend, insignificant differences were observed for total plasma globulin among dietary experimental groups. The results of A/G ratio indicated that the group fed 4 and 16.0 % NSMP showed the highest values of A/G ratio followed in a significant decreasing order by groups fed 8.0 %; 32.0% NSMP and control group where, group fed 32.0% NSMP recorded the lowest value of A/G ratio. Concerning the data of total plasma lipids and cholesterol the analysis of variance indicated that both parameters were significantly ($P \leq 0.05$) decreased when levels of NSMP increased in the diet of quail. The decreases of both parameters were more pronounced in groups fed higher levels of NSMP, attributed to the active substances present in NSM named Nigellone which mainly responsible for such depression in 3-hydroxy,3-methyle CoA reductase (HMG-CoA) (**Hassan, 2000).** Also,**Khodary et al., (1996)** indicated that the decrease of cholesterol due to higher content of unsaturated fatty acid present in black seeds which may stimulate the cholesterol excretion into the intestine and the oxidation of cholesterol to bile acids. These results are confirmed with those obtained by **Tollba and Hassan (2003)** who indicated that both total plasma lipids and cholesterol decreased of broiler chickens when fed on diets containing Black seeds at a level of 1.0%.Also, **El-Kaiaty et al., (2002)** indicated that serum total lipids and cholesterol decreased of layer chickens when fed on diets containing 1.0% black seeds +1.0% fenugreek seeds.

Carcass characteristics.

Results of carcass characteristics of growing Japanese quail at the end of experimental period are given in Table (6).The data indicated that insignificant differences were observed among dietary experimental groups including control group for most carcass characteristics measured, with exception of blood, liver, heart and intestine weight, where significant

differences were observed among these parameters. These results are confirmed with those obtained by **Taha(1997)** showed insignificant effect in internal organs weight of rabbits fed Nigella sativa seeds at 1.0%.Also, **Soltan(1999)** reported that insignificant differences were obtained in liver and heart percentages to the live body weight among various quail groups receiving diet containing different levels of Nigella sativa seeds. **Abou-El-Soud (2000)** found that relative weight of liver and small intestine were insignificantly affected by Nigella sativa treatment at 21 and 28 days of age and liver relative weight was highest for quail fed on 1.0% Nigella sativa oil and 2.0 % of whole crushed Nigella sativa seeds at 35 days of age. Moreover, **Abaza (2001)** indicated that insignificant differences were observed among groups of broiler fed diets containing black seeds for blood, heart, liver, spleen, and carcass and gizzard weight. Also, **Hassan et al., (2007)** showed that the highest values ($P \leq 0.05$) were observed for carcass, heart, gizzard, feathers percentage, while small intestine was not significantly affected for Japanese quail fed diet supplemented with 2.0 % black seeds.

Recommendation

Based on the obtained results in the present study it can be recommend that incorporation of NSMP to replace SBMP protein safety at levels of 4.0 or 8.0% in Japanese quail diets without any adverse effect on growth performance.

Table (1): Proximate chemical composition of Nigella sativa meal as compared with soybean meal.

Items (%)	*NSM**	*SBM***
Moisture.	4.60	2.00
Crude protein.	31.30	44.00
Ether extract.	11.89	0.80
Crude fiber.	12.00	7.00
Ash.	6.83	6.82
NFE.***	33.38	30.38
ME (Kcal/Kg).*****	3604	2230
Ca.	0.27	0.29
Available phosphorus.	0.29	0.27
Methionine.	0.60	0.62
Lysine.	1.05	2.69

* Aanalyzed at Central Lab. For food and feed (CLFF), Agriculture, Res. Center Egypt.
**According to NRC, 1994.
***NFE=Nitrogen free extract
****Calculated according to Carpenter and Clegg equation (1956):
ME Kcal/Kg= 35.3x CP% + 79.5 X EE % + 40.6 X NFE % +199.

Table (2): Formulation and chemical diet composition.

Ingredients	*Control group*	*NSMP levels (%)*			
		4.0	*8.0*	*16.0*	*32.0*
Ground yellow corn (8.5%).	55.10	55.980	55.711	24.200	48.400
Soybean meal (44.0%)	32.00	30.72	29.44	26.88	21.76
Nigella sativa meal (31.30%).	0.00	1.80	3.599	7.197	14.395
Broilers concentrate (52.0%).*	10.00	10.00	10.00	10.00	10.00
Gluten.	0.500	0.250	0.150	0.090	0.200
Wheat bran.	0.650	0.050	0.170	0.941	4.369
Sand.	0.068	0.0436	0.032	0.021	0.0326
Sunflower oil.	1.150	0.600	0.330	0.00	0.020
Sodium chloride (Nacl).	0.200	0.200	0.200	0.200	0.2788
Pre-mix**.	0.300	0.300	0.300	0.300	0.300
DL-Methionine.	0.032	0.0424	0.034	0.031	0.106
L-Lysine.	0.00	0.014	0.034	0.140	0.1386
Total	100.00	100.00	100.00	100.00	100.00
Calculated diet composition:					
Crude protein%.	24.53	24.32	24.39	24.25	24.34
Metabolizable energy (Kcal/Kg).	2945.2	2945.53	2945.01	2947.55	2948.82
Calcium%.	0.92	0.9346	0.8737	0.9383	0.946
Available phosphorus%.	0.45	0.4559	0.456	0.4626	0.477
Lysine%.	1.30	1.30	1.30	1.30	1.30
Methionine%.	0.50	0.50	0.50	0.50	0.50
Methionine+ Cystine%.	0.97	1.00	0.978	0.968	0.996
Analyzed: CP%	24.60	24.09	24.0	23.98	24.04

*Broiler concentrate contains: CP 52%,CF 1.6%, Ca 8.29%, Available phosphorus 3.12%,Methionine 1.4%, Methionine +Cystine 2.4%,Lysine 2.3%, Sodium 1.76%, and ME 2575 Kcal/Kg .

**The pre-mix (Vit& Min) was added at a rate of 3kg per ton of diet and supplied that following (as mg or I.U. per kg of diet): Vit A 12000 I.U., Vit D3 2000 I.U., Vit E 40 mg, Vit. K 34 mg, Vit. B 1 3 mg, Vit. B2 6 mg, Vit. B6 4 mg, Vit. B12 0.03 mg, Niacin 30 mg, Biotin 0.08 mg, Pantothenic acid 12 mg , Folic acid 1.5 mg, Choline chloride 700 mg, Mn 80 mg , Cu 10 mg. , Se. 0.2 mg, Fe 40 mg, Zn 70 mg and Co 0.25mg.

Table (3): Effect of different levels of Nigella sativa meal protein (NSMP) on performance of growing Japanese quail at 7- 42 days of age (Means ± SE).

Parameters	*Control diet*	*NSMP levels (%)*			
		4.0	*8.0*	*16.0*	*32.0*
Body weight,g.					
7days(zero time)	18.15±0.50[a]	18.00±0.49[a]	19.45±0.57[a]	18.75±0.65[a]	19.63±0.86[a]
21days	66.28±2.09[b]	76.05±2.04[a]	76.80±1.98[a]	67.22±2.13[b]	74.65±2.93[a]
42days	169.89±4.38[b]	187.44±4.34[a]	182.65±4.24[a]	171.45±5.53[b]	171.00±4.05[b]
Body weight gain,g.					
7-21days	48.13±0.57[b]	58.05±0.32[a]	57.35±0.61[a]	48.47±0.33[b]	55.02±0.24[a]
21-42days	103.61±1.62[b]	111.39±2.01[a]	105.85±1.61[b]	104.23±1.79[b]	96.35±1.63[c]
7-42days	151.74±2.61[b]	169.44±3.45[a]	163.20±2.21[a]	152.70±2.11[b]	151.37±1.99[b]
Feed consumption(7-42 days)	445.70±6.75[c]	525.18±6.14[a]	517.35±6.09[a]	485.34±7.01[b]	491.01±7.17[b]
Feed conversion ratio.	2.93±1.20[a]	3.09±1.90[a]	3.17±1.45[a]	3.17±1.45[a]	3.24±1.80[a]
Protein intake.	106.88±1.84[c]	126.04±1.91[a]	124.16±2.67[a]	116.26±2.91[b]	117.84±3.21[b]
Protein efficiency ratio.	1.41±0.59[a]	1.34±0.41[b]	1.31±0.62[b]	1.31±0.46[b]	1.29±0.86[b]
Mortality rate,%	2.0±0.08[a]	1.56±0.04[a]	2.0±0.06[a]	2.0±0.07[a]	2.0±0.04[a]

a,b,c...Means in the same row have the different superscript are significantly different ($P \leq 0.05$).

Table (4): Chemical carcass composition of Japanese quail fed different levels of Nigella sativa meal protein (NSMP) at 42 days of age. (Means ±SE).

Parameters	*Control diets*	*NSMP levels (%)*			
		4.0	*8.0*	*16.0*	*32.0*
Moisture,%	65.29±2.92	64.34±2.38	65.0±2.65	67.01±3.69	63.63±2.17
Crude protein,%	63.51±3.56	63.84±2.31	65.41±3.39	64.39±3.59	65.77±3.17
Ether extract,%	31.78±2.05	31.62±2.76	30.68±2.59	31.58±3.61	30.63±2.67
Ash,%	4.69±0.23[a]	4.45 ±0.25[a]	3.83±0.20[b]	3.89±0.45[b]	3.53±0.23[c]

a,b,c...Means in the same row have the different superscript are significantly different ($P \leq 0.05$).

Table (5): Blood chemical analysis of Japanese quail fed different levels of Nigella sativa meal protein (NSMP) (Means ±SE).

Parameters	*Control diets*	*NSMP levels (%)*			
		4.0	*8.0*	*16.0*	*32.0*
Total plasma protein(mg/100ml	3.70±0.21b[b]	4.39±0.17[a]	3.87±0.37[b]	3.97±0.25[b]	3.16±0.18[b]
Total plasma albumin(mg/100ml	1.42±0.13[b]	2.06±0.12[a]	1.70±0.10[b]	1.91±0. 8[b]	1.01±0. 9[b]
Total plasma globulin(mg/100ml)	2.28±0.35[a]	2.33±0.33[a]	2.17±0.39[a]	2.06±0.54[a]	2.15±0.61[a]
A/G ratio	0.62±0.30[b]	0.88±0.36[a]	0.78±0.0.34[b]	0.92±0.59[a]	0.47±0.44[c]
Total plasma lipids (g/100ml)	2.64±0.19[a]	2.42±0.17[b]	2.03±0.17[c]	2.01±0.20[c]	1.92±0.28[d]
Total plasma cholesterol (mg/100ml).	192.42±7.4[a]	181.16±6.2[b]	180.0±8.1[b]	179.95±6.5[b]	158.60±5.8[c]

a,b,c...Means in the same row have the different superscript are significantly different ($P \leq 0.05$).

Table (6): Carcass characteristics of Japanese quail fed different levels of Nigella sativa meal protein (NSMP) at 42 days of age (Means ±SE).

Parameters	*Control diets*	*NSMP levels (%)*			
		4.0	*8.0*	*16.0*	*32.0*
Live body weight,g	177.37±3.25[a]	174.29±3.73[a]	168.04±3.27[a]	180.28±3.71[a]	174.10±2.64[a]
Blood weight,g	6.46±0.36[b]	8.06±0.37[a]	6.21±0.32[b]	5.97±0.38[b]	6.66±0.27[b]
Feather weight,g	8.98±0.79[a]	10.97±0.69[a]	8.97±0.37[a]	10.22±0.44[a]	10.18±0.38[a]
Liver weight,g	4.34±0.27[b]	4.33±0.35[b]	4.19±0.33[b]	4.01±0.25[b]	5.42±0.41[a]
Gizzard weight,g	2.98±0.19[a]	3.40±0.18[a]	2.92±0.22[a]	2.85±0.25[a]	2.78±0.23[a]
Heart weight,g	1.48±0.10[ab]	1.57±0.15[a]	1.44±0.16[ab]	1.29±0.17[b]	1.38±0.12[ab]
Spleen weight,g	0.12±0.09[a]	0.12±0.09[a]	0.11±0.07[a]	0.12±0.08[a]	0.12±0.09[a]
Head weighs ,g	7.34±0.53[a]	7.38±0.88[a]	6.67±0.73[a]	6.47±0.64[a]	7.19±0.65[a]
Wing weight,g	3.56±0.38[a]	3.88±0.43[a]	3.65±0.29[a]	3.58±0.52[a]	3.99±0.55[a]
Legs weight,g	3.08±0.25[a]	3.18±0.19[a]	3.23±0.19[a]	2.97±0.18[a]	3.71±0.11[a]
Intestine weight, g	12.30±0.85[b]	13.69±0.77[ab]	12.62±0.81[b]	11.71±0.93[b]	16.16±0.81[a]
Carcass weight,g.	108.75±2.40[a]	115.10±2.80[a]	110.62±3.80[a]	107.11±3.38[a]	112.93±2.56[a]
Intestinal length ,Cm.	73.02±3.94[a]	75.0±4.01[a]	75.0±3.46[a]	69.58±4.46[a]	75.42±3.31[a]

a,b,c...Means in the same row have the different superscript are significantly different ($P \leq 0.05$).

REEARANCES

Abaza, L.M.K.A. (2001). *The use of some medical plants as feed additive in broiler diets. Ph.D. Thesis, poultry Nutrition Department, Faculty of Agriculture, Alexandria University.*

Abdel-Aal, E.S.M. and Attia, R.S. (1993). *Characterization of black cumin (Nigella sativa) seeds. L Chemical composition and Lipids. Alex. Sci. Exch. 14(4): 467-482.*

Abdel-Azeem,F.;.El-Hommasany, Y.M and Ali,N. G.M. *(1999). Effect of dietary black seeds supplementation on productive performance and some physiological parameters of growing rabbits. Egyp.Poul.Sci., 19(4):779-795.*

Abel-Mageed,M.A.(2002). *A study of substitution soybean meal by Nigella sativa meal on the performance of broiler chicks. Ph D. Thesis Faculty of Agriculture,(Poultry Nutrition) Cairo, University, Fayoum.*

Abdo, Z. M.A. (2004). *Effect of phytase supplementation on the utilization of Nigella sativa seed meal in broiler diets. Egypt. Poul. Sci. 24(1): 143-162. 9.*

Abou-El-Soud,S. B.(2000).*Studies on some biological and immunological aspects in Japanese quail fed diet containing some Nigella sativa seeds preparations. Egyp.Poul. Sci.,20(IV):757-776.*

A.O.A.C., (1994). *Association Of Official Analytical Chemists, "Official Methods of Analysis 15thEd.Published by the A.O.A.C. Washington, DC., U. S. A.*

Carpenter, K.J. and Clegg, KM. (1956). *The metabolizable energy of poultry feedstuffs in relation to their chemical composition. J. Sci. Food Agr., 7,45-51.*

Duncan,D.B.(1955).*Multiple range and multiple F test.Biometrics,11:1-42.*

El-Alfy,T.S.;.El-Fatatry, H.M and Toama, M.A (1975). *Isolation and structure assignment of an antimicrobial principle from the volatile oil of Nigella sativa L.seeds.Pharmazia, 30(2)109-111*

El-Kaiaty,A.M.; Soliman, A.Z.M. and.Hassan, M.S.H (2002).*Combined effects of Garlic, fenugreek and black seed on some productive and physiological response of laying hens. Egypt.Poul. Sci. 22:(I):147-174*

Fardous,A.J.; Islam, S.N; Ahsan, M ; Hassan, C.M and Ahmed, Z.U (1992). *In vitro antibacterial activity of the volatile oil of Nigella sativa sedds against multiple drug –resistant isolates of Shigella spp.and isolates of vibro cholerae and E.Coli.Phytotherapy Reasearch,6(3):137-140.*

Ghazalah,A.A. and Faten,A.A.I (1996). *The possibility of using some edible and aromatic oils in the nutrition of Muscovi ducks. Egypt. Poul.Sci.,16(11)305-328.*

Hassan, M.S.H. (2000). *Physiological studies on egg cholesterol and immunity in layers, Ph.D. Thesis Animal production Department, Faculty of Agriculture, Cairo University.*

Hassan,M.S.H; AboTaleb A.M.; Wakwak.M.M and Yousef, B.A (2007). *Productive, physiological and immunological effect of using some natural feed additives in Japanese quail .Egypt.Poul.Sci.,27(II):557-581.*

Ibrahim,A.M.E.(1999). *Chemical biological and microbial studies on Nigella sativa seeds. Ph D. Thesis, food Science and Technology Department, Faculty of Agriculture, Cairo, University.*

Khodary, R. M.; EL- Azzawy, M.H. and Hamdy, I.R. (1996). *Effect of Nigella Sativa on Egg production, hatchability percentage and some biochemical values in laying hens with reference to fertility in cockerels. 7th Sci. Conf.,Fac. Vet. Med. Assuit Univ. 17-19 Nov. Ass. Egypt.91-106.*

Mahmoud,I.; Alkofahi, A. and Abd El-Aziz, A. (1992). *Mutagenic and Toxic activities of several species and some Jordanian medicinal plants. International J.Phaermac,30(2):81-85.*

Mohan,B; Kadirvel,R.;Natrajan, A.; and Bhaskaran, M. (1996). *Effect of probiotics supplementation on growth, nitrogen utilization and serum cholesterol in broilers. Br.Poul. Sci., 37:395-401.*

Nadia,L.R.(2003).*Effect of using some medicinal plants on performance and immunity of broiler chickens. Ph D., Thesis Faculty of Agriculture Animal Production Department, Cairo University.*

Nassar, H.M (1997).*Pharmacological and toxicological studies on Nigella Sativa. Ph D. Thesis (Pharmacology) Fac.Vet.Med.Alx. University.*

N.R.C., (1994). *Nutrient requirements of poultry 9th ed, National Academy of Science, National Research Council. Washington, D.C., U.S.A..*

Osman,M. (2002). *Beneficial effects of black seed oil inclusion in broiler diet on performance and carcass characteristics. Egypt. Poul .Sci. 22(111): 839-853.*

Soltan,M.A.(1999). *Effect of diet containing Nigella Sativa (black seeds) on /or ox bile on growth and productive performance of Japanese quail.J.Vet.Sci.,15,3:655-669.*

SPSS 9.0 (1995) *for windows, Inc right reserved, December21.*

Taha,E.E.A.T.(1997). *Physiological studies on mammals effects of Nigella sativa (seeds and Cake) on the performance of New Zealand white rabbits.M.Sc. Thesis, Faculty of Agriculture, Alx. University.*

Tollba,A.A.H. and Hassan, M.S.H. (2003) . *Using some natural additives to improve physiological and productive performance of broiler chicks under high temperature conditions 2- black cumin (Nigella Sativa) or garlic (Allium sativum) . Egypt. Poul. Sci. 23 (II) : (327-340).*

Tollba. A.A. H; AdbEL-Galyl. M.A. and Abdel-Samad. M.H.(2005). *The effect of using some herbal additives on physiological and productive performance of tow Egyptian chicken strains during winter and summer seasons. Egypt. Poul. Sci., 25:107-123*

Zeweil, H.S. (1996). *Evaluation of substituting Nigella seeds oil meal for soybean meal on the performance of growing and laying Japans quail. Egypt. Poul. Sci., 16(11): 451-477.*

الملخص العربى

تاثير استبدال بروتين كسب فول الصويا ببروتين كسب حبة البركة على الاداء الانتاجى فى السمان الياباني

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اجريت هذة التجربة بكلية الزراعة جامعة الازهر قسم الانتاج الحيوانى بهدف دراسة تاثير احلال جزء من بروتين كسب فول الصويا باربعة مستويات مختلفة من بروتين كسب حبة البركة(٤،٨،١٦،٣٢ %) على الاداء الانتاجى، ومكونات الدم،التحليل الكيميائيى للجسم،وصفات الذبيحة.تم استخدام عدد ٣٠٠ سمانة غير مجنسة عمر سبعة ايام. وزعت الى خمسة مجاميع تجريبية متساوية كل مجموعة احتوت على ثلاث مكررات بحيث يحتوى كل مكرر على ٢٠ طائر.وكانت المجاميع التجريبية كالتالى:مجموعة الكنترول،٤،٨،١٦،٣٢% بروتين كسب حبة البركة.تم تحضين كل الطيور فى بطاريات كهربائية من بداية التجربة وحتى نهايتها.وكانت كل العلائق متساوية فى البروتين (٢٤%) والطاقة(كيلو كالورى٢٩٠٠ طاقة ممثلة /كجم).واستمرت التجربة خمسة اسابيع.واشارت النتائج المتحصل عليها الى ان المعاملات المغذاة على مستويات ٤ او ٨ % بروتين كسب حبة البركة كانت اعلى معنويا فى وزن الجسم بالمقارنة بامجموعة الكنترول او باقى المستويات الاخرى وذلك خلال المرحلة الكلية من التجربة(٧-٤٢ يوم).ايضا بالنسبة لوزن الجسم المكتسب فان المعاملة المغذاة على مستوى٤، ٨% بروتين كسب حبة البركة كانت اعلى امعنويا بالمقارنة بباقى المجموعات(١٦،٣٢%) والماملة الكنترول حيث لم تشاهد اختلافات معنوية بينهم..ايضا اظهرت النتائج ان الغذاء المستهلك زاد معنويا فى المعاملات المغذاة على ٨ ، ٤ % بروتين كسب حبة البركة بالمقارنة بباقى المجموعات بما فيهم المجموعة الكنترول.لم تشاهد اختلافات معنوية فى كفاءة تحويل الغذاء بين المعاملات او مجموعة الكنترول.اظهرت النتائج ايضا ان هناك نقص معنوى فى كفاءة استخدام البروتين بالمقارنة بمجموعة الكنترول .ايضا لم تشاهد هناك اختلافات معنوية بين المعاملات فى نسبة الوفيات المسجلة.

بالنسبة لتحليل الجسم اظهرت النتائج انة لا توجد اختلافات معنوية بين المعاملات التجريبية او مجموعة الكنترول فى كل الصفات المقدرة فيما عدا نسبة الرماد حيث انخفضت معنويا بزيادة نسبة الاحلال. لوحظ ان هناك اختلافات معنوية فى كل مقاييس الدم المقدرة فيما عدا الجلوبيولين حيث لم تلاحظ هناك اختلافات معنوية بين المعاملات. لم تشاهد اختلافات معنوية فى كل صفات الذبيحة المقاسة فيما عدا وزن الدم،والكبد،والقلب ووزن الامعاء حيث لوحظ ان هناك اختلافات معنوية بين المعاملات.ويمكن من خلال هذة الدراسة التوصية باحلال بروتين كسب حبة البركة محل بروتين كسب فول الصويا فى علائق السمان الياباني بشرط الا تزيد نسبة الاضافة عن٤ -٨ % بدون اى تاثير معاكس على الاداء الانتاجى.