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PRODUCTIVE, PHYSIOLOGICAL AND IMMUNOLOGICAL EFFECTS OF USING SOME NATURAL FEED ADDITIVES IN JAPANESE QUAIL DIETS

By

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Abstract: *A total number of four hundred one day-old unsexed Japanese quail were used to evaluate some herbal feed additives(black seed and fenugreek) as growth promoters for quails .Birds were divided into four equal groups. The treatments were control (0 additive), 2% black seed, 2% fenugreek and 1% black seed + 1% fenugreek.*

Birds were exposed to 24-17 hour light daily during growing and production periods, respectively. Feed and water were given ad-libitum. The experiment lasted for 12 weeks of age. During the experimental period some productive, physiological and immunological parameters were taken.

Results indicated that using black seed and fenugreek improved body weight during 0-6 weeks of age and all treatments improved body weight and body gain during 0-12 weeks of age. Black seed and fenugreek alone decreased the feed consumption for all experimental period. Using 2% black seed and 2% fenugreek increased in egg number, egg weight and egg mass and all treatments improved the fertility and hatchability percentages and egg quality compared to control group.

Adding black seed and fenugreek increased serum LH, FSH, T3 and T4 hormones, serum glucose, cholesterol, LDL, HDL, total lipids and triglycerides were decreased in the treatments compared with control group at the end of experimental period. Also all treatments increased in AST, total protein, albumin and globulin, while no significant differences were observed between treatments and control group in serum ALT. However, yolk and liver cholesterol, LDL, HDL and total lipids were decreased by using all treatments compared to control group.

Using 2% black seed improved the RBC's, WBC's, HB and PCV. Primary and secondary responses to sheep red blood cells (SRBC,s) were

higher in black seed group than fenugreek, black seed + fenugreek and the control group.

Also using black seed and fenugreek have increased relative weights of spleen, bursa and thymus, and improved the carcass, dressing percentages, while the abdominal fat % was decreased.

It can be concluded that using black seed and fenugreek in quail diets improving the productive, some physiological and immunological performance for Japanese quail and produce healthily animal product for human consumption.

INTRODUCTION

Intensive production systems represents considerable stress on poultry, that adversely affecting the costs of production. The use of dietary natural additives such as black seed (Nigella sativa) and fenugreek has gained momentum because of their beneficial effects on growth rate and feed efficiency, their prevention of intestinal infections and inhibits colon carcinogenesis by modulating the activities of beta – glucurondase and mucinase (El-Ghamry., 2004 and Devasena and Menon., 2003).

There is a general agreement that feeding Nigella sativa or fenugreek (natural biological growth promoters) prohibit many diseases has improved health and increase performance and immunity without problems.

Previous studies (Nofal et al., 2006, Tollba et al., 2005 and El-Ghamry et al 2004) provide evaluation of black seed and fenugreek, as feed ingredient to reduce serum, egg and liver cholesterol, total lipids concentration and may produce eggs with low cholesterol and total lipids content Also EL-kaiaty et al., (2002) studied the effects of using Nigella sativa and fenugreek as feed additives in laying hen diets on both productive and physiological traits and evaluate the possibility of using these additives to obtain egg with low cholesterol content and high primary and secondary immuno response. Using black seed tend to improve the productive performance by increasing both serum T3and T4 hormones (AbdEL-Latif et al., 2002),has increased immunity and inhibiting non – enzymatic by increasing some blood hematological parameters (AbouEL-Soud., 2000) for Japanese quail.

The present study was conducted to evaluate some herbal feed additives as growth promoters (black seed and fenugreek) in diets and their effects on productive, physiological, immunological performance and carcass characteristics for Japanese quail.

MATERIALS AND METHODS

This study was carried out at the quail Research Farm, Nuclear Research Center, Atomic Energy Authority, Egypt. Four hundred of one day-old unsexed Japanese quail chicks was maintained in heated of one-battery cages in light and temperature controlled room, constant light was daily permitted 24 hours during the growing period, however along the laying period, layers were subjected to photoperiod for 17 hours constant light per day .Water and feed were available during all times. The birds were divided into 4 groups (100 birds each) according to herbal feed additives source addition, i.e. control (without additives), 2%Black seed, 2%Fenugreek and combination of 1%Black seed +1%Fenugreek. Each group contained 5 replicates of 20 birds.

Diets:

The basal control diets for starter, grower and production Japanese quail diets as recommended by the National Research Council (NRC, 1994).Four dietary treatments were obtained by adding the tested natural growth promoters to the control diet, being (Black seed, Fenugreek and Black seed + Fenugreek). Each one of duchy growth promoter was added to the control diet at level of 2% (20 k gm/ ton) and the level of combination was 1%+1% (10 k gm + 10k gm/ ton). The composition of the control diets is shown in Table (1).

Productive traits:

1- Body weight, body gain and feed intake were recorded weekly (to the nearest 1 g) for each replicate.

2- Egg production traits: Starter of egg production at 7 week egg number and egg weight (to nearest 0.1 g) for each replicate were recorded daily and calculated egg mass.

3- During the egg production periods(6-12 weeks)of age had been involved quails which comprises two females and one male fore each one in each cage for all replicate and 50 eggs were taken for each group were taken egg fertility and hatchability percentages were calculated .

4- At the end of the experimental period 20 eggs were taken from each group to investigate egg quality traits.

Physiological traits:

A- Serum contents:

Blood samples were collected at the end of the experimental period during slaughter 10 birds were taken in each group to evaluate the blood chemical constituents. Both blood and egg samples were taken from the same replicate. For each sample, 2ml blood was collected by brachial vein puncture in tubes. The blood was centrifuge at 4000 RPM for 15 minutes, clear serum was separated, and then stored at -20ºc until the analysis.

Serum LH and FSH hormones were determined using methods described by Sharp et al., (1987), concentration of LH, FSH, triiodothyronine (T3) and thyroxin (T4) hormones were determined by the double antibody radioimmunoassay with commercial purchased from antibodies incorporated(P.O. Box 442, Davis, California 95616).The radioactivity was measured by gamma Counter as described by Peebles and Marks (1991).

Serum LH, FSH, T3 and T4 hormones were measured using gamma counter, glucose, cholesterol, LDL, HDL, total lipids, triglycerides, AST, ALT, total protein, albumin were determined using chemical analysis by commercial kits at Animal Production Research Institute, Ministry of Agriculture, Giza.

B- Yolk cholesterol and lipids contents:

After measuring the egg quality, yolk samples for each treatment were separated from the broken eggs, calculated and extracted to determine cholesterol, LDL, HDL and total lipids according to Floch et al ., (1957).

C- Liver cholesterol and lipids contents:

Liver samples were prepared to determine the cholesterol, LDL, HDL and total lipids. Liver was rapidly dissected out chilled in ice cold. One gram of liver was put in glass containing 0.1 ml phosphate buffer solution (PH 7.4) and was homogenized with on electric motor. The homogenate solution was centrifuged at 2000 RPM for 5 minutes. Clear homogenate solution was separated, stored at-20ºc until the time of analysis. Cholesterol, LDL, HDL and total lipids were determined using kits according to Zollner and Kirsch, (1962).

Immunological traits:

A-Blood hematological and biochemical parameters:

Blood samples were collected from 10 birds/ treatment as mentioned above. Samples were analyzed for some hematological parameters (RBC's and WBC's counts, HB and PCV).

Serum samples were subjected to biochemical analysis using the specific kits produced by Boehringer and Merck Companing.

B-Immune Responses (Antibody production):

To study the effect of some feed additives on immune response, ten birds/ treatment at 7 and 11 weeks of age were injected intravenously with one ml of suspension SRBC (Sheep Red Blood Cell's) 0.07 ml packed SRBC mixed with 0. 93 ml physiological saline 0.9 %NaCl and compared with birds that injected with one ml saline (0.68% NaCl)seven days following the antigen challenge, blood samples were collected.

Serum was frozen until the measurements of primary and secondary responses according to Vanderzijpp et al, (1983) and Bachman and Mashaly (1986).

C- Relative lymphoid organs weight and slaughter data:

To study the effect of some feed additives on the internal organs, ten birds/ treatment were randomly chosen at the end of experimental period, weighted, slaughtered and eviscerated. The lymphoid glands (spleen, bursa and thymus were weighted) and calculate the relative weight of the organ = weight of organ /body weight × 100

Statistical Analysis:

All results were analyzed by using the general liner models (GLM) adapted to microcomputer of statistical system (SAS) software package (1998).

RESULTS AND DISCUSSION

Productive traits:

A-Body weight and body gain:

Results presented in Table (2) showed that using 2% black seed and 2% fenugreek improved body weight and body gain at 0-6 weeks and 0-12 week compared with control and using 1% black seed +1%fenugreek groups. It means that using 2% black seed or 2% fenugreek alone as feed additive in quail improved body weight and body weight gain .

This result agrees with those reported by AbdEL-Latif et al (2002) and AbouEL-Soud (2000) who showed that the quail's birds fed dietary black seed recorded the highest ($P \leq 0.05$) values of body weight and body weight gain.Similer results were obtained with layers (Nofal et al 2006, EL-Kaiaty et al 2002) and broiler chicks (Azouz 2001) .

On the other hand, Tollba et al (2005) found that adding 2% black seed to Gimmizah and Bandarah local strains diets have no significant differences in body weight gain compared with control group. Moreover, El-Ghamry et al (2004) showed that adding of fenugreek to turkey diet reduced significantly ($P \leq 0.01$) live body weight and body weight gain compared with the basal control diet at the end of experimental period 11 weeks of age.

The improvement of the body weight may be due to the antimicrobial effect of the black seeds (Hanafy and Hatem 1991 and Soltan 1999) and the high amount of unsaturated fatty acids in the black seeds which are very essential to the poultry and this may explain the significant effects of dietary herbal feed additives in improving metabolic process (AbdEL - Malak et al., 1995).

B- Feed consumption:

It is clear from Table (3) that the feed consumption significantly decreased by using both of 2% black seed and 2% fenugreek compared with control group and group fed 1% black seed + 1%fenugreek, respectively during 1-6 weeks of age and 1-12 weeks of age for Japanese quail.

The results was agreement with those of Soltan (1999) who found that the addition of 1% Nigella sativa seeds to the diet of quail improved feed conversion ratio, Zeweil (1996) in quail, EL-Kaiaty et al (2002) in layer and Osman and EL-Barody (1999) in broilers, El-Ghamry et al (2004) who found that adding 0.5 and 1% fenugreek to turkey diets were significantly lower feed intake than the birds of the control and other groups. This may explain the significant effects of dietary herbal feed additives in improving metabolic process (AbdEL-Malak et al., 1995).

On the other hand AbdEL-Latif et al (2002) and AbouEL-Soud (2000) showed that the quail's birds fed dietary black seed recorded the highest ($P \leq 0.05$) values of feed intake and feed conversion. Also Tollba et al (2005) showed that adding 2% black seed to local strains diet increased feed consumption and feed conversion compared with control group, Azouz (2001) showed that broilers fed on fenugreek seeds (1, 1.5 or2%), gave no significant differences in feed intake and feed conversion.

C- Egg production (egg number, egg weight and egg mass):

Table (4) shows that at 7-12 weeks of age for Japanese quail adding 2% black seed and 2% fenugreek were highest in egg production compared with group fed combination of 1% black seed +1%fenugreek or the control groups.

Table (4) indicated that the all egg number and egg weight were increased in groups fed 2% fenugreek and 2% black seed compared with group fed1% black seed +1%fenugreek and control group, respectively, the groups fed 2% fenugreek and 2% black seed and combination of 1% black seed +1%fenugreek were improved the egg mass numerical 17.01, 16.26 and 5.69 g, respectively compared with control group.

These results agree with Soltan (1999) who found that the addition of 1% Nigella sativa seeds to the diet of quail improved egg production percentage, egg mass , and Khodary et al (1996) showed that feeding of balady chickens on diet containing 1% of freshly crushed nigella seeds for 65 successive days resulted in significant increase of egg production .On the other hand found that Nofal et al (2006), Tollba et al (2005) and EL-Kaiaty et al (2002) who found that using black seed and fenugreek in local and commercial layers diets there no marked change in both egg number and egg production rate , no significant effects on production efficiency, egg production rate and egg mass compared with control group.

D- Hatchability and fertility eggs:

Results in Table (5) showed that using 2% black seed, 2% fenugreek and1% black seed +1%fenugreek improved and increased fertility and hatchability percentages, respectively compared with control group in all periods from 9-12 weeks.

These results agree with Soltan (1999) who found that the addition of 1% Nigella sativa seeds to the diet of quail improved fertility and hatchability percentages of fertile eggs, also Tollba et al (2005) and Khodary et al (1996) who found that feeding local strains on diets containing 2%black seed and 1% crushed nigella sativa seeds were improved fertility, hatchability and hatched chick weight percentage numerical compared to un supplemented control group during the experimental period.

E- Egg quality:

Results in Table (6) declared that using 2% black seed and 2% fenugreek for Japanese quail were improved ($P \leq 0.05$) shape index, shell thickness and yolk color compared with control group, while no significant

different between the treatments and control group in egg weight, shell weight %, yolk weight %, albumin weight %and yolk index at the end of experimental period.

These results disagree with Soltan (1999) in quail fed 1% Nigella sativa seeds to the diet, Tollba et al (2005)in local strains were observed that adding 2% black seed was not affected in egg quality and egg components while Nofal et al (2006) found that egg weight , yolk weight, yolk percentage and yolk index were significantly($P \leq 0.001$) increased , with respect to Haugh units score, albumin percentage and shell thickness were significantly ($P \leq 0.001$) decreased when local strains fed 0.75-1.5 % crushed nigella sativa seed in diet .

Physiological traits:

A-Serum contents:

Results in Table (7) declared that supplemented quail diet with2% black seed and 2% fenugreek increased the serum LH and FSH hormones compared with other traits and control group.

Results presented in Table (7) showed that using 2% black seed during treatment period was increased T3 andT4 hormones and the same results detected when quail were fed control diet, while it was observed that adding 1% black seed +1%fenugreek gave the highest level of serum T3and lowest level of serum T4hormone, also the group fed 2%fenugreek gave the low level of serum T3 hormone as compared with other groups.

The same results agree with AbdEL-Latif et al (2002) who reported that adding black seed to the control diet increased ($P \leq 0.05$) both T3 and T4 plasma concentration at market age of Japanese quail, Tollba et al (2005) found that adding 2% black seed to local strains diet increased plasma T3 hormone compared with control group during winter and summer seasons.

The improvement in the performance due enhancement in thyroid activity may be related to the increasing in Leukocytes population mainly as affected, especially by thyroid hormone (Bachman and Mashaly, 1986).

The same results when quail fed 1%black seed +1% fenugreek this may result from decreased capacity of thyroid gland to synthesis size T4due to an increase in peripheral conversion of T4 to T3 with an inability of the thyroid gland to produce sufficient T4to maintain normal levels.

Our data obtained in Table (7) showed that using 2% black seed, 2% fenugreek and1% black seed +1%fenugreek decreased the serum glucose compared with control group.

This is agrees with that reported by Tollba et al (2005)and EL-Kaiaty et al (2002) using2% black seed and2% fenugreek in layer diets reduced serum glucose. Also El-Ghamry et al (2004) showed that adding of fenugreek was significantly ($P \leq 0.05$) lower of plasma glucose than control group for ducks, Talpur et al (2005) and Puri et al (2002) who showed that mechanism of action of an orally active hypoglycemic principle isolated from some medicinal plants (black seed and fenugreek for examples) may be mediated through stimulating Insulin synthesis and / or secretion from the beta pancreatic cells of Langerhans.Also Devasena and Menon (2003) found that fenugreek seeds in the diet inhibit colon carcinogenesis by modulating the activities of beta- glucuronidase and mucinase.

Our data obtained in Table (7) showed that adding2% black seed, 2% fenugreek and1% black seed +1%fenugreek for quail diets were decreased the serum cholesterol ,LDL ,HDL ,total lipids and triglycerides compared with control group at the end of experimental period.

The results agrees with that reported by Sedaros (2000) who found that adding nigella sativa seeds to Japanese quail diet was decrease serum cholesterol and total lipids. Also Nofal et al (2006), Tollba et al (2005)and L-Kaiaty et al (2002)who showed that using crushed nigella sativa seeds, 2%black seed and 2%black seed, 2% fenugreek in layer diets decreased plasma and serum cholesterol , LDL, HDL , total lipids and triglycerides compared with control group .The same results found by El-Ghamry et al (2004) who using fenugreek for ducks, and Azouz (2001) who found that there was a significant decrease in total lipids and cholesterol by increasing the level of fenugreek seeds for broilers.

They suggested that feeding black seed and fenugreek at low levels for short duration has anon-toxic effect on liver and kidneys as confirmed by an improvement of enzymatic activates that decreased cholesterol and triglycerides (EL-Kaiaty et al., 2002).

Results in Table (7) showed that when quail fed either 2% black seed or 2% fenugreek during treatment period were increased serum AST compared with using1%black seed +1% fenugreek and control group, but addition of 2% black seed, 2% fenugreek and 1%black seed +1% fenugreek for quail diets did not change significantly ($P \leq 0.05$) in the serum ALT compared with control group at the end of experimental period. The results are in agreement with those reported by Nakhla et al (1991) who found that AST activity was elevated by fenugreek seed saponins diets fed to broiler chicks. On the other hand Tollba et al (2005) found that adding 2% black seed to local strains diet not effected on plasma AST and ALT compared

with control group, El-Ghamry et al (2004) showed that adding fenugreek for ducks diet gave no deleterious effects on kidney and liver function (as measured by AST and ALT activity) and no significant differences in ALT between the birds fed control and fenugreek seed diets.

It can be observed from Table (7) that serum total protein, albumin and globulin were increased by supplemented 1%black seed +1% fenugreek and 2% black seed compared with control group and supplemented 2% fenugreek.

This results agrees with that reported by AbdEL-Latif et al (2002) who showed that adding 1000gm / ton black seed to quail diet enhanced ($P \leq 0.05$) plasma total protein, albumin and improved plasma globulin at 6 weeks of age, EL-Kaiaty et al (2002) found that adding 2% fenugreek for layer diet decreased total protein, albumin and globulin compared with control group, Also Tollba et al (2005) and AbouEL-Soud (2000)showed that adding black seed for local strains was increased total protein, albumin and immunoglobulin .

This result disagree with that reported by El-Ghamry et al (2004) who adding 0.5, 1 and 1.5 %fenugreek to ducks was significantly ($P \leq 0.05$) increase plasma total protein, albumin and globulin.

And this conclusion agrees with the findings of Nagwa and Fathy (1997), and Khodary et al., (1996), confirms the previous reports about the immuno stimulant effect of Nigella sativa and its high content of essential amino acids (Khalifah, 1995) and this may explain the significant effects of dietary herbal feed additives (%black seed +1% fenugreek) in improving metabolic process.

B-Yolk contents:

Results in Table (8) declared that supplemented diet with either 2% black seed, 2% fenugreek or1% black seed +1%fenugreek were significantly ($P \leq 0.05$) decrease the yolk cholesterol , LDL, HDL and total lipids compared with control group .This is agree with that reported by Nofal et al (2006), Tollba et al (2005)and EL-Kaiaty et al (2002)who observed that adding black seed or fenugreek for local strains and commercial layer decreased significantly the yolk cholesterol and total lipids and may produce eggs with low cholesterol and total lipids content .

C-Liver contents:

Results in Table (9) indicated that adding of 2% black seed, 2% fenugreek and1% black seed +1%fenugreek were decreased the liver cholesterol, LDL, HDL and total lipids compared with control group for

Japanese quail. This is agrees with reported by Tollba et al (2005) and EL-Kaiaty et al (2002) in local strains and commercial layer and Azouz (2001) in broilers who observed that adding (2% black seed), using (2% black seed and 2% fenugreek) and adding(1and 2% fenugreek) were decreased cholesterol, LDL, HDL and total lipids in liver .

Immunological traits:

A-Blood hematological:

Results in Table (10) indicated that adding of 2% black seed, 2% fenugreek and1% black seed +1%fenugreek did not significantly differences ($P \leq 0.05$)in the RBC's count as compared with the control group, while the WBC's, HB and PCV counts were increased when adding 2% black seed compared with other groups.

This results agrees with that reported by AbouEL-Soud(2000) who found that were was a significant increase in WBC's count of group fed diet containing 2% whole crushed nigella sativa seeds for Japanese quail.

The increase in WBC's may be due to an increase in the membrane protection from autoxidation, because there are numerous reports on the significant role of black seed in increasing immunity and inhibiting non-enzymatic peroxidation (Houghton et al 1995). The results are in agreement with findings of Khodary et al., (1996) who reported that nigella sativa seed extract prevent the decrease in HB level and WBC's count, Also Taha (1997) who revealed that no significant differences were observed in HB, PCV, RBC's and WBC's count in growing rabbits fed diet containing 1, 3, 6 and 9% nigella sativa in diets.

B-Immune response (Antibody production):

Humoral immunity (Ab's production) against sheep red blood cells (SRBC's) was tested at 8 and 12 weeks during treatments. Geometric means of Ab's production determined and shown in Table (11) at primary and secondary response, using 2% black seed gave the highest value; also, all treatments were higher than control group. These effects due to both effective substances Nigllone (in black seed) and Mucilage (in fenugreek). Also the secondary response was higher when compared with the primary one. The same results were obtained by EL-Kaiaty et al (2002). Increasing secondary response values may be due to the same results with primary response. The finding was in complete agreement with that of Lamont and Smyth, (1984), Vanderzijp et al., (1983). Trout et al (1988) indicated that on the early step in the initiation of humoral immunity (Ab's production); there

is an increase in serum hormones (especially, corticosterone, T3 and T4). Also, physiological status may play an important role in immune response.

These results were in complete agreement with that of Bachman and Mashaly (1986). Also the increase in WBC's may be due to an increase in the membrane protection from autoxidation, because there are numerous reports on the significant role of black seed in increasing immunity and inhibiting non-enzymatic peroxidation (Houghton et al 1995).

C-Lymphoid organs relative weights:

Results in Table (12) observed that both of spleen, bursa and thymus relative weights were increased by using 2% black seed, 2% fenugreek and1% black seed +1%fenugreek compared with control group at the end of experimental period. This is agrees with that reported by EL-Kaiaty et al (2002) and Osman and EL-Barody (1999) who reported that supplementation of black seed or fenugreek had significant effect on lymphoid organs and immune response.

Slaughter traits:

Results in Table (13) revealed that significant difference was detected among dietary treatments in relative weights of carcass, dressing, blood, feathers, heart, intestine, liver, proventrics, gizzard, ovary, oviduct, oviduct length, testis and abdominal fat. The highest ($P \leq 0.05$) values of carcass, dressing, heart, proventrics, gizzard, ovary, testis and oviduct length were noticed when quail fed 2% black seed compared with other dietary treatments and control group, also fed 2% fenugreek gave the highest ($P \leq 0.05$) values of feathers, liver and the lowest ($P \leq 0.05$) values of abdominal fat, but revealed that no significant difference was detected among dietary treatments and control group in the relative weight of intestine. Moreover our results are consistent with those obtained by El-Ghamry et al (2004) who showed that fed 1.5 % fenugreek for turkey diet had a significantly ($P \leq 0.05$) lower gizzard percentage than that of the unsupplemented,a significantly higher liver and heart percentage, and a significantly lower dressing percentage than fed control diets, AbouEL-Soud (2000) found that relative weight of liver and small intestine were insignificantly effect by nigella sativa treatments at 21and 28 day of age and liver relative weight was highest for quail fed on 1% nigella sativa oil and 2% of whole crushed nigella sativa seeds at 35 day of age, Also, Soltan (1999) stated that non significant differences were obtained in liver and heart percentage to the live body weight between various quail groups receiving different levels of nigella sativa, Taha (1997)showed that no significant effect in internal organ weight in rabbits fed nigella sativa seed at 1%and cake at 3,6 and 9%.

It can be concluded that 2% black seed and 2% fenugreek followed by 1% black seed +1%fenugreek that the best feed additives that increased egg production, fertility and hatchability and decreased serum cholesterol, yolk cholesterol and liver cholesterol, and using 2% black seed, 2% fenugreek and its combinations 1% black seed +1%fenugreek showed that best results in immunity and using black seed and fenugreek in quail diets improving that productive, some physiological and immunological performance for Japanese quail and production healthily product for human , the effective substance of black seed was Niglone and fenugreek as Musilage.

Table (1): Composition and calculated analysis of diets:

Ingredient (%)	**Starter**	**Grower**	**production (Layer)**
Period of age	**0 – 3 weeks**	**4 - 6 weeks**	**7 - 12 weeks**
Yellow corn	63.0	68.0	65.0
Soybean meal (44% CP)	30	26.5	23.3
Wheat bran	3.0	1.7	1.9
Di-calcium phosphate	1.8	1.3	1.5
Limestone	1.5	1.8	7.6
NaCl	0.3	0.3	0.3
Vitaminerals mixture*	0.3	0.3	0.3
DL-Methionine	0.1	0.1	0.1
Total	100	100	100
Calculated analysis:			
Metabolizable energy K cal/kg	2806	3003	2700
Crude protein, %	23	21	18
C/P ratio	122	143	150
Calcium, %	1.0	0.9	3.3
Available phosphorus, %	0.45	0.4	0.4
Lysine, %	0.95	0.7	0.73
Methionine, %	0.38	0.3	0.32
Methionine and cystine, %	0.70	0.54	0.62

* Each2.5 kg of vitamins and minerals mixture contains:
12000.000 IU vitamin A acetate; 2000.000 IU vitamin D_3; 10.000 mg vitamin E acetate; 2000 mg vitamin K_3; 100 mg vitamin B_1; 4000 mg vitamin B_2; 1500 mg vitamin B_6; 10 mg vitamin B12, 10.000 mg pantothenic acid; 20.000 mg Nicotinic acid; 1000 mg Folic acid; 50 mg Biotin; 500.000 mg chorine; 10.000 mg Copper; 1000 mg Iodine; 300.00 mg Iron; 55.000 mg Manganese; 55.000 mg Zinc, and 100 mg Selenium.

Table (2): Effect of some natural feed additives on body weight and body gain (g):

Age (week)	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
0	*7.83 ± 0.35	7.69± 0.35	7.80 ± 0.35	7.75 ± 0.35
1	25.18 ± 0.71 b	26.71 ± 0.71 a b	26.40 ± 0.71 a b	27.51 ± 0.71 a
2	48.15± 1.48 b	50.51 ± 1.48 a b	51.00 ± 1.48 a	51.19 ± 1.48 a
3	86.18 ± 2.65 b	91.15 ± 2.65 a	90.16 ± 2.65 a b	89.00 ± 2.65 a b
4	115.55 ± 4.21 c	122.19 ± 4.21 a	120.07 ± 4.21 b	121.08 ± 4.21 b
5	136.33 ± 5.55 d	145.66 ± 5.55 a	142.22 ± 5.55 b	139.82 ± 5.55 c
6	154.67 ± 5.75 c	162.49 ± 5.75 b	164.81± 5.75 a	152.44 ± 5.75 d
0 - 6	**162.50 ± 6.11 c**	**170.18 ± 6.11 b**	**172.61± 6.11 a**	**160.19 ± 6.11 d**
7	176.61 ± 6.50 c	180.92 ± 6.50 b	183.17 ± 6.50 a	178.00 ± 6.50 c
8	182.15 ± 6.75 d	189.55 ± 6.75 b	191.19 ± 6.75 a	184.15 ± 6.7 5 c
9	196.16 ± 7.15 b	199.00 ± 7.15 a b	201.25 ± 7.15 a	195.92 ± 7.15 b
10	202.15 ± 8.02 c	208.19± 8.02 b	212.18 ± 8.02 a	207.71 ± 8.02 b
11	208.52 ± 8.50 c	220.00 ± 8.50 a b	223.33 ± 8.50 a	217.06 ± 8.50 b
12	221.80 ± 8.11 c	232.20 ± 8.11 b	235.25 ± 8.11 a	234.80 ± 8.11 a
0 - 12	**213.97± 8.30 b**	**224.51 ± 8.30 ab**	**227.45± 8.30 a**	**227.05 ± 8.30 a**

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (3): Effect of some natural feed additives on feed intake (g/ bird/ day):

Age (week)	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
1	*3.15± 0.17	2.83 ± 0.17	2.95 ± 0.17	3.06 ± 0.17
2	5.26± 0.41^{a}	4.38 ± 0.41^{b}	4.79 ± 0.41^{ab}	5.11 ± 0.41^{a}
3	11.22 ± 1.22^{a}	10.03 ± 1.22^{b}	10.57 ± 1.22$^{a b}$	11.31 ± 1.22^{a}
4	17.05 ± 2.15^{a}	15.19 ± 2.15^{b}	15.52 ± 2.15^{b}	16.84 ± 2.15^{ab}
5	21.44 ± 2.71^{a}	19.34 ± 2.71^{b}	18.92 ± 2.71^{c}	20.89 ± 2.71^{ab}
6	25.72 ±3.31^{a}	23.28 ± 3.31^{b}	24.61± 3.31^{ab}	25.83 ± 3.31^{a}
1 - 6	**83.84 ±6.71^{a}**	**77.36 ± 6.71^{c}**	**77.36± 6.71^{b}**	**83.04 ± 6.71^{ab}**
7	29.81 ± 4.22^{a}	26.40 ± 4.22^{b}	27.00 ± 4.22^{b}	30.11 ± 4.22^{a}
8	32.15 ± 4.18^{a}	30.19 ± 4.18^{b}	30.65 ± 4.18^{ab}	32.00 ± 4.18^{a}
9	37.07 ± 4.44^{a}	34.51± 4.44^{b}	33.92 ± 4.44^{c}	36.85 ± 4.44^{a}
10	41.22 ± 4.70^{a}	38.75± 4.70^{b}	38.21 ± 4.70^{c}	41.60 ± 4.70^{a}
11	46.17 ± 4.81^{a}	43.00 ± 4.81^{b}	43.57 ± 4.81^{b}	47.02± 4.81^{a}
12	52.35 ± 5.03^{a}	49.18 ± 5.03^{b}	50.07 ± 5.03^{ab}	51.86 ± 5.03^{a}
1 - 12	**322.61 ±9.55^{a}**	**297.08 ± 9.55^{b}**	**300.78± 9.55^{ab}**	**322.48 ± 9.55^{a}**

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (4): Effect of some natural feed additives on egg production:

Age (week)	Parameters	Treatments			
		Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
7	Egg number (egg)	*3.15 ± 0. 09 b	4. 02± 0. 09 ab	4. 36 ± 0. 09 a	3.17 ± 0. 09 b
8		3. 66 ± 0. 50 b	4.11 ± 0. 50 a b	4. 40 ± 0. 50 a	3. 85 ± 0. 50 b
9		4. 12 ± 0. 48 b	4. 65 ±0. 48 ab	4.71 ± 0. 48 a	4. 30 ± 0. 48 a b
10		4. 51 ± 0.46 c	5. 02 ± 0.46 a b	5. 41 ± 0.46 a	4.75 ± 0. 46 b
11		4. 04 ± 0. 52 b	5. 65 ± 0. 52 a	5. 80 ±0. 52 a	4. 92 ±0. 52 a b
12		5.16 ± 0. 42 b	6. 20 ± 0. 42 a	6.18 ± 0. 42 a	5.22 ± 0. 42 b
7 - 12		24.64 ± 4.11 d	29.65 ± 4.11 b	30.86 ±4.11 a	26.21 ± 4.11 c
Mean all		**4.11 ± 0. 55 b**	**4. 94 ± 0. 55 a**	**5.14 ± 0. 55 a**	**4. 37 ± 0. 55 ab**
7	Egg weight (g)	**10. 90 ± 1. 20 b	12. 07 ± 1. 20 a	11. 90 ± 1. 20 a	11. 34 ±1. 20 a b
8		10. 60 ± 1. 66 b	12. 08 ± 1. 66 a	11.10 ±1. 66 a b	11. 02± 1. 66 a b
9		11. 21± 1.70 c	12.72 ± 1.70 a	12. 69 ± 1.70 a	12.13 ± 1.70 b
10		11. 98± 1. 65 b	13. 30 ± 1. 65 a	13.07 ± 1. 65 a	12. 24 ± 1. 65 b
11		12. 62 ± 1. 39 b	13. 89 ± 1.39 a	13. 52 ±1.39 a b	13. 28 ±1.39 a b
12		13.12 ± 1.46 b	14. 03 ± 1.46 a	13. 67 ±1. 46 a b	13. 82 ±1. 46 a b
7 - 12		70.43 ± 5.07 d	78.09 ± 5.07 a	75.95 ±5.07 b	73.83 ±5.07 c
Mean all		**11.74 ± 1.80 c**	**13.02 ± 1.80 a**	**12.66 ±1. 80 a b**	**12.31 ±1. 80 b**
7	Egg mass (g)	***34. 34 ± 3. 22 b	48. 52 ± 3. 22 a	51.88 ±3. 22 a	35.95 ± 3. 22 b
8		38.79 ± 5.15 b	49. 65 ± 5.15 a	48. 84 ± 5.15 a	42. 43 ±5.15 a b
9		46.18 ± 7.22 c	59.15 ±7.22 a	59.77 ± 7.22 a	52.16 ± 7.22 b
10		54. 03 ± 5. 91 c	66.77± 5. 91 ab	70.71 ± 5. 91 a	58.14 ± 5. 91 b
11		50. 98 ± 3.18 c	78. 48 ± 3.18 a	78.42 ± 3.18 a	65. 34 ± 3.18 b
12		67.70 ± 3. 98 d	86. 99 ± 3. 98 a	84. 48 ± 3. 98 b	72.14 ± 3. 98 c
7 - 12		292.02 ± 7.75 c	389.56 ± 7.75 a	394.10 ± 7.75 a	326.16 ± 7.75 b
Mean all		**48.67 ± 4.22 c**	**64.93 ± 4.22 a**	**65.68 ± 4.22 a**	**54.36 ± 4.22 b**

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).
***** Means of egg number =total egg number every week / 7 days (egg)
****** Means of egg weight = total egg weight every week / 7 days (g)
******* Means of egg mass (g) every day during week =egg number x egg weight

Table (5): Effect of some natural feed additives on fertility and hatchability Percentages:

Fertility %				
Age (week)	**Treatments**			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
9	*86. 50 ± 6. 21^{b}	92. 50± 6. 21^{a}	86. 67 ± 6. 21^{b}	94. 40 ± 6. 21^{a}
10	90. 00 ± 7.19^{c}	95. 00 ± 7.19^{a}	95. 00 ± 7. 19^{a}	92. 68 ± 7. 19^{b}
11	84.13 ± 7. 35^{c}	97. 54 ± 7. 35^{a}	92. 05 ± 7. 35^{b}	91. 43 ± 7. 35^{b}
12	90. 57 ± 6. 88^{c}	97. 83 ± 6. 88^{a}	91.18 ± 6. 88^{b}	98. 04 ± 6. 88^{a}
Mean all	**87. 80 ± 7. 00^{c}**	**95.72 ± 7. 00^{a}**	**91. 23 ± 7. 00^{b}**	**94. 14 ± 7. 00^{ab}**
Hatchability%				
9	55. 55 ± 4.15^{c}	72. 00 ± 4.15^{a}	60. 00 ± 4.15^{b}	61.11 ± 4.15^{b}
10	60. 00 ± 4. 46^{c}	77. 50 ± 4.46^{a}	72. 50 ± 4.46^{b}	75. 61 ± 4.46$^{a\,b}$
11	66. 07 ± 5.18^{c}	77. 04 ± 5.18^{ab}	82. 56 ± 5.18^{a}	74. 29 ± 5.18^{b}
12	66. 64 ± 5. 49^{c}	84. 81 ± 5.49^{b}	87. 17 ± 5.49^{ab}	89. 40 ± 5.49^{a}
Mean all	**62. 06 ± 3.16^{c}**	**77. 84± 3.16^{a}**	**75. 69 ± 3.16^{b}**	**75.10 ± 3.16^{b}**

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (6): Effect of some natural feed additives on egg quality:

Parameters	**Treatments**			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Egg weight(gm)	*13. 42 ± 2. 14	14.13± 2. 14	13. 87 ± 2. 14	13. 62 ± 2. 14
Shape index	75. 51 ± 5. 66^{b}	79. 24 ± 5. 66^{a}	77. 14 ± 5. 66^{ab}	75. 35 ± 5. 66^{b}
Shell thickness (cm/mm)	27. 60 ±1. 42^{b}	29. 85 ± 1. 42^{a}	29. 71 ± 1. 42^{a}	27.74± 1. 42^{b}
Shell weight %	12.76 ±1. 61	13. 02 ± 1. 61	12. 87 ± 1. 61	12. 66 ± 1. 61
Yolk weight %	27. 81 ± 3. 35	28. 41± 3. 35	28. 39 ± 3. 35	28. 22 ± 3. 35
Albumin weight %	59. 43 ±4. 22	58. 57± 4. 22	58. 74 ± 4. 22	59. 12 ± 4. 22
Yolk index	40. 52 ± 3. 76	39. 81 ± 3. 76	40. 59 ± 3. 76	40. 93 ± 3. 76
Albumin index	14. 98 ±1. 51^{a}	13. 68 ± 1. 51^{b}	14. 36 ± 1. 51^{ab}	14. 29± 1. 51^{ab}
Haugh unit	75. 60 ± 5.77^{a}	71. 50 ± 5.77^{b}	74. 25 ± 5.77^{a}	71.75 ± 5.77^{b}
Yolk color	6. 40 ± 0. 42^{b}	7. 50± 0. 42^{ab}	8. 30 ± 0. 42^{a}	7. 20 ± 0. 42^{a}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (7): Effect of some natural feed additives on some serum blood parameters:

Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
LH(ml IU /ml)	*1.56 ± 0. 21^{b}	2.00 ± 0. 21^{a}	2.08 ± 0.21^{a}	1.62 ± 0.21^{b}
FSH(ml IU /ml)	1.11 ± 0.13^{b}	1.79 ± 0.13^{a}	1.67 ± 0.13^{a}	1.12 ± 0.13^{b}
T3(ng /ml)	0.367 ± 0. 032^{a}	0.365 ± 0.032^{a}	0.234 ± 0. 032^{b}	0.281± 0. 032^{ab}
T4(ng /ml)	1.245 ± 0.072^{a}	1.218 ± 0. 072^{a}	1.168 ± 0. 072^{ab}	0.964 ± 0. 072^{b}
Glucose (mg /100ml)	145. 66 ±12.13^{a}	129. 18 ± 12.13^{c}	122. 46 ± 12.13^{d}	137.17 ± 12.13^{b}
Cholesterol (mg / 100ml)	173.11 ± 4. 91^{a}	132. 80 ± 4. 91^{c}	144. 86 ± 4. 91^{b}	157.18 ± 4. 91^{ab}
LDL(mg /100ml)	112. 52 ± 3. 25^{a}	86. 32 ± 3. 25^{c}	95. 16 ± 3. 25^{b}	104.65 ± 3. 25^{ab}
HDL(mg /100ml)	60. 59 ± 2. 09^{a}	46. 48 ± 2. 09^{b}	49. 70 ± 2. 09^{b}	52. 53 ± 2. 09$^{a b}$
Total lipids (mg /100ml)	248. 30 ± 6. 80^{a}	192. 58 ± 6. 80^{d}	205. 39 ± 6. 80^{c}	219. 55 ± 6. 80^{b}
Triglycerides (mg /100ml)	127. 59 ± 5. 03^{a}	92. 41± 5. 03^{b}	110. 49 ± 5. 03^{ab}	115. 06 ± 5. 03^{ab}
AST (U /100ml)	12. 06 ± 1. 42^{b}	14. 55 ± 1. 42^{a}	14. 40 ± 1. 42^{a}	13. 25 ± 1. 42^{ab}
ALT(U /100ml)	4. 33 ± 0. 63	4. 50 ± 0. 63	4. 25 ± 0. 63	3. 96 ± 0. 63
Total protein (mg /100ml)	2. 98 ± 0. 56^{b}	4. 00 ± 0. 56^{a}	3. 37 ± 0. 56^{ab}	4. 14± 0. 56^{a}
Albumin (mg /100ml)	1.71 ± 0. 34^{b}	2. 11 ± 0. 34^{ab}	1. 82 ± 0. 34^{b}	2. 31 ± 0. 34^{a}
Globulin (mg /100ml)	1. 27 ± 0. 17^{b}	1. 89± 0. 17^{a}	1. 55 ± 0. 17^{ab}	1. 83 ± 0. 17^{a}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (8): Effect of some natural feed additives on some yolk parameters:

Yolk Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Cholesterol (mg / g yolk)	*14. 66 ± 1. 63^{a}	10. 80 ± 1. 63^{c}	11. 72 ± 1. 63^{b}	12. 56 ± 1. 63^{b}
LDL (mg / g yolk)	9. 32 ± 1. 02^{a}	6. 54 ± 1. 02^{c}	6. 80 ± 1. 02^{c}	7. 77 ± 1. 02^{b}
HDL (mg / g yolk)	5. 34 ± 0. 85^{a}	4. 26± 0. 85^{b}	4. 92 ± 0. 85^{ab}	4. 79 ± 0. 85^{ab}
Total lipids (mg / g yolk)	226. 11 ± 10. 22^{a}	183. 15 ± 10. 22^{d}	194. 55 ± 10. 22^{c}	213. 71 ± 10. 22^{b}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (9): Effect of some natural feed additives in diet on some liver parameters:

Liver Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Cholesterol (mg / g liver)	*131. 70 ± 3. 70^{a}	95. 17 ± 3. 70^{d}	103. 57 ± 3. 70^{c}	111. 75± 3. 70^{b}
LDL (mg / g liver)	83. 22 ± 3. 11^{a}	57. 87 ± 3. 11^{d}	62. 81 ± 3. 11^{c}	70. 36 ± 3.11^{b}
HDL (mg / g liver)	48. 48 ± 2. 22^{a}	37. 30 ± 2. 22^{c}	40. 76 ± 2. 22^{b}	41. 39 ± 2. 22^{b}
Total lipids (mg / g liver)	192. 18 ± 5. 75^{a}	159. 66 ± 5. 75^{c}	162. 55 ± 5. 75^{c}	186. 71 ± 5. 75^{b}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (10): Effect of some natural feed additives on hematological parameters:

Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
RBC (10^{6} cell)	*3. 91 ± 0. 34	4. 28 ± 0. 34	4. 01 ± 0. 34	4.12 ± 0. 34
WBC(10^{3} cell)	21.66 ± 2.11^{c}	35.04 ± 2.11^{a}	29.90 ± 2.11^{b}	20.50 ± 2.11^{c}
HB(g/dl)	11. 90 ± 1. 32^{b}	13. 65 ± 1. 32^{a}	12.48 ± 1. 32^{ab}	11. 80 ± 1. 32^{b}
PCV (%)	44.75 ± 3.66^{b}	47. 91 ± 3.66^{a}	45. 32 ± 3.66^{b}	45. 93 ± 3.66^{b}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (11): Primary and secondary response of antibody production SRBC's In Japanese quail:

Age (week)	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Primary response at 8 weeks	*41. 00±5.77^{c}	50. 00± 5.77^{a}	48. 30± 5.77^{a}	45. 33± 5.77^{b}
secondary response at 12 weeks	185.16±10. 08^{c}	251. 00± 10. 08^{a}	228. 01 ± 10. 08^{ab}	204. 19 ± 10. 08^{b}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (12): Effect of some natural feed additives on some immuno internal organs relative weights:

Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Spleen	*0. 055± 0. 014 ^{c}	0. 274± 0. 014 ^{a}	0. 078 ± 0. 014 ^{b}	0. 097± 0. 014 ^{b}
Bursa	0. 051± 0. 032 ^{c}	0. 097± 0. 032 ^{a}	0. 082 ± 0. 032 ^{b}	0. 057 ± 0. 051 ^{c}
Thymus	0. 032 ± 0. 011 ^{c}	0. 091 ± 0. 011 ^{a}	0. 075 ± 0. 011 ^{b}	0. 082 ± 0. 011 ^{b}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

Table (13): Effect of some natural feed additives on some internal organs Relative weights:

Parameters	Treatments			
	Control	**2% Black seed**	**2% Fenugreek**	**1% Black seed +1% Fenugreek**
Body weight (g)	*191. 50 ±16. 07 ^{b}	219. 02± 16. 07 ^{a}	211. 23 ± 16. 07 ^{ab}	212. 43 ± 16. 07 ^{ab}
% Carcass	68. 07 ± 4. 55 ^{ab}	69. 84 ± 4. 55 ^{a}	67. 96 ± 4. 55 ^{b}	68. 87 ± 4. 55 ^{ab}
%Dressing	64. 36 ± 7. 35 ^{b}	66. 88 ± 7. 35 ^{a}	65. 50 ± 7. 35 ^{ab}	64. 70± 7. 35 ^{b}
%Blood	4. 24 ± 0. 78 ^{a}	3. 11 ± 0. 78 ^{b}	3. 04 ± 0. 78 ^{b}	3. 09± 0. 78 ^{b}
%Feathers	3. 62 ±0. 65 ^{b}	2. 90± 0. 65 ^{c}	5. 32± 0. 65 ^{a}	2. 95± 0. 65 ^{c}
%Heart	0. 64 ±0. 10 ^{b}	0. 71± 0. 10 ^{a}	0. 66 ± 0. 10 ^{ab}	0. 64 ± 0. 10 ^{b}
% Intestine	4. 61 ±0. 76	4. 00 ±0. 76	4. 18 ± 0. 76	4. 62 ± 0. 76
%Liver	2. 91 ±0. 21 ^{a}	2. 53 ± 0. 21 ^{b}	2. 83± 0. 21 ^{a}	2. 57± 0. 21 ^{b}
%Proventriculus	0. 226 ±0. 066 ^{b}	0. 355 ± 0. 066 ^{a}	0. 285± 0. 066 ^{ab}	0. 298 ± 0. 066 ^{ab}
%Gizzard	2. 31 ± 0. 59 ^{b}	3. 05± 0. 59 ^{a}	2. 80 ± 0. 59 ^{ab}	2. 72 ± 0. 59 ^{ab}
%Ovary	6. 46±1. 28 ^{b}	9. 59± 1. 28 ^{a}	9. 09 ± 1. 28 ^{a}	9. 34 ± 1. 28 ^{a}
%Oviduct	2. 72 ±0. 45 ^{b}	3. 46 ±0. 45 ^{a}	2. 61 ± 0. 45 ^{b}	3. 11 ± 0. 45 ^{ab}
Oviduct length	15. 50 ±1. 76 ^{b}	17. 15 ± 1. 76 ^{a}	15. 10 ± 1. 76 ^{b}	17. 05± 1. 76 ^{a}
%Testis	2. 94 ±0. 62 ^{b}	5. 33 ± 0. 62 ^{a}	3. 06 ± 0. 62 ^{b}	4. 80 ± 0. 62 ^{ab}
%Abdominal fat	2. 05 ± 0. 29 ^{a}	1. 05 ± 0. 29 ^{c}	1. 35 ± 0. 29 ^{b}	1. 67 ± 0. 29 ^{ab}

*Means in the same row per each item having different letters are significantly different ($P \leq 0.05$).

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الملخص العربى

التأثيرات الانتاجية والفسيولوجية والمناعية لأستخدام بعض الأضافات الغذائية الطبيعية فى علائق السمان اليابانى

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أجريت هذة التجربة فى محطة بحوث السمان بالهيئة العامة للطاقة الذرية- بأنشاص- محافظة الشرقية لدراسة تاثير أضافة بعض الاضافات الغذائية الطبيعية مثل حبة البركة والحلبة وخليط منهما الى علائق السمان اليابانى على بعض الصفات الانتاجية والفسيولوجية والمناعية .

أستخدم فى هذة التجربة عدد 400 طائر من السمان اليابانى عمر يوم من كلا الجنسين وتم تقسيمهما الى 4 مجاميع بكل مجموعة 100 طائر وقسمت كل مجموعة الى 5 مكررات بكل مكرر 20 طائر وكانت المعاملات على النحو التالى :

- المعاملة الاولى عليقة كنترول بدون اى اضافة .
- المعاملة الثانية عليقة كنترول وتم اضافة 2% حبة بركة مجروشة
- المعاملة الثالثة عليقة كنترول وتم اضافة 2% حلبة مجروشة
- المعاملة الرابعة عليقة كنترول وتم اضافة 1% حبة بركة مجروشة+ 1% حلبة مجروشة

استمرت التجربة لعمر 12 أسبوع وأثناء التجربة تم أخذ وزن الجسم واستهلاك العلف اسبوعيا وبداية من الاسبوع السابع تم اخذ انتاج البيض (عدد ووزن وكتلة) وتم اخذ 4 دفعات تفريخ على اعمار 9 ،10، 12,11 اسبوع من الانتاج وفى نهاية التجربة تم اخذ 20 بيضة من كل معاملة لتقدير صفات جودة البيض ، كما درست بعض الصفات الفسيولوجية باخذ 10 سمانات ذكور واناث من كل معاملة فى نهاية التجربة وذبحت واخذ عينات الدم اثناء الذبح لتقدير صفات الدم الهيماتولوجية مثل عدد كرات الدم الحمراء والبيضاء والهيموجلوبين والمكونات الخلوية وتم تقدير بعض الهرمونات مثل LH, FSH , T3 ,T4 والجلوكوز والكوليستيرول و HDL, LDLو الدهون الكلية والجلسريدات الثلاثية وانزيمات AST, ALT والبروتين الكلى والالبيومين والجلوبيولين فى سيرم الدم . وايضا تم اخذ 10 عينات من صفار البيض والكبد اثناء الذبح لتقدير كلا من الكوليستيرول و HDL, LDL و الدهون الكلية بهما .

وعند اعمار 8 ، 12 اسبوع تم حقن خلايا كرات الدم الحمراء للغنم لدراسة الاستجابة المناعية الاولية والثانوية و تم اخذ اوزان الاعضاء المناعية مثل الطحال والبرسا والغدة الثيموسية كما تم اخذ اوزان التصافى والتشافى ووزن بعض الاعضاء الداخلية .

وكانت اهم النتائج المتحصل عليها:

-اضافة كلا من حبة البركة أوالحلبة منفردة الى العليقة القياسية ادى لتحسين وزن الجسم وزيادة وزن الجسم المكتسب مع تقليل استهلاك العليقة طول فترة التجربة ، وكذلك تم زيادة عدد

ووزن وكتلة البيض الناتج مع تحسين نسب الفقس والتفريخ وتحسين بعض صفات جودة البيض الناتج بالمقارنة بالمعاملة الكنترول بدون اضافات غذائية .

-كان لاضافة حبة البركة أوالحلبة منفردة بنسبة 2% او مخلوطة بنسبة 1% لكلا منهما تاثير واضح على زيادة هرمونات T4, T3 , LH, FSH ، وكذلك زيادة مستوى انزيم AST مما انعكس على زيادة الوزن والانتاج طول فترة التجربة .

-ادى اضافة كلا من حبة البركة أوالحلبة منفردة بنسبة 2% او مخلوطة بنسبة 1% لكلا منهما الى العليقة القياسية الى تقليل كلا من الكوليستيرول و LDL ,HDL و الدهون الكلية والجلسريدات الثلاثية بسيرم الدم والبيض والكبد وانتاج بيض منخفض فى هذة المكونات مع قلة مستوى الجلوكوز بالدم و كذلك زاد مستوى كلا من البروتين الكلى والالبيومين والجلوبيولين بالدم مما انعكس على تحسين الاداء الانتاجى للسمان .

-زاد عدد كرات الدم الحمراء والبيضاء والهيموجلوبين والمكونات الخلوية و زادت كلا من الاستجابة المناعية الاولية والثانوية عند الحقن بخلايا كرات الدم الحمراء للغنم وايضا زادت اوزان الاعضاء المناعية مثل الطحال والبرسا والغدة الثيموسية و اوزان التصافى والتشافى ووزن بعض الاعضاء الداخلية فى السمان الذى تغذى على علائق تحتوى على كلامن 2% حبة بركة مجروشة ،2 % حلبة مجروشة وعند اضافة 1% حبة بركة مجروشة+ 1% حلبة مجروشة بالمقارنة بالسمان الذى تغذى على العليقة الكنترول التى لم يضاف لها اى اضافات .

توصى هذة الدراسة باستخدام الاضافات الغذائية الطبيعية مثل حبة البركة أوالحلبة أوخليطهما بنسب 2% ، 2% ، 1% على التوالى الى علائق السمان اليابانى لتحسين الاداء الانتاجى والفسيولوجى والمناعى والذى يمكن أن ينعكس على زيادة وزن الجسم والانتاج وقلة استهلاك العليقة وتحسين نسب الخصوبة و الفقس وانتاج بيض منخفض الكولستيرول والدهون الضارة بصحة الانسان مع تحسين الحالة المناعية والصحية للسمان اليابانى بالاضافة لانتاج بيض ولحم آمن صحيا .