

Effects of feeding different levels of *ocimum basilicum* seeds on performance and immune traits of broiler

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Abstract

This study was conducted to evaluate the effect of *Ocimum Basilicum* seeds supplementation of a commercial broiler diet on the performance and immune response. Three dietary treatments(100 birds/treatment) with two replicates (50 birds/ replicate) one day old straight run Ross 308 . T1 (as control group) birds fed basal diet without any additives. While, T2 and T3 fed diet supplemented daily with 0.3 and 0.6% basil seeds respectively to the end of the experiment (42 days) to investigate the broiler performance and antibody titer against Newcastle disease virus (NDV) and infectious bronchitis (IB).

Results showed that the two levels of *Ocimum Basilicum* seeds supplementation (0.3 and 0.6%) had a beneficial effect on the antibody titer against (NDV) and (IB) and the high level (0.6%) was more significant against (NDV) while the low level (0.3%) was more significant against (IB). The high levels of antibodies titers were considered as the indicative of antiviral activity of *O. Basilicum* seeds. in addition, The results revealed significant ($p<0.05$) improvement of feed conversion ratio and high liver weight and spleen index in treatment groups compared with control group. In conclusion, *Ocimum Basilicum* seeds supplementation in commercial broiler diets was beneficial to broiler performance and immune function.

Key words: *Ocimum Basilicum*, basil, broiler, antibody titer.

تأثير تغذية مستويات مختلفة من بذور الريحان في الأداء الانتاجي والصفات المناعية للدجاج اللاحم.

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المستخلص

أجريت هذه الدراسة لتقييم تأثير اضافة بذور الريحان في العليقة على الأداء الانتاجي والاستجابة المناعية للدجاج اللاحم. ثلاثة معاملات غذائية (100 طائر / معاملة) مع اثنين من المكررات لكل معاملة (50 طائر / مكرر) من فروج اللحم (Ross 308) بعمر يوم واحد ، غذيت الافراخ في المجموعة الاولى عليقة أساسية بدون أي إضافات (واعتبرت مجموعة سيطرة) في حين غذيت المعاملة الثانية والثالثة العليقة الاساسية مضافا اليها 0.3 و 0.6% بذور الريحان على التوالي حتى نهاية التجربة (42 يوما) لدراسة الأداء الانتاجي للدجاج اللاحم ومستويات الأجسام المضادة ضد فيروسات مرض (ND) والتهاب الشعب الهوائية المعدي (IB). أظهرت النتائج أن كلا التركيزين من بذور الريحان (0.3 و 0.6%) كان لها تأثير مفيد على مستويات الأجسام المضادة ضد (NDV) و (IBV) والتركيز (0.6%) كان أكثر تأثيرا ضد (NDV) في حين أن كان التركيز (0.3%) أكثر أهمية ضد (IBV) و (NDV) و (IBV) واعتبرت المستويات العالية من الأجسام المضادة كمؤشر على نشاط بذور الريحان المضاد للفيروسات. بالإضافة إلى ذلك، أظهرت النتائج تحسنا معنويا ($p < 0.05$) في نسبة التحويل الغذائي وارتفاع وزن الكبد والطحال في المجاميع المعاملة مقارنة مع مجموعة السيطرة. نستنتج من ذلك، بان استخدام بذور الريحان كمكملات في علائق الدجاج اللاحم يحسن من لأداء الانتاجي والوظيفة المناعية. الكلمات المفتاحية : الريحان، الدجاج اللاحم، الأجسام المضادة.

Introduction

Recent studies have been directed for food organization by using herbs and medical plants as a therapeutic for many diseases, and a base to avoid the side effects of drugs and hormones and to provide an alternative sources or supportive to the chemical medicine (22). Medical plants are wide spread nowadays, due to their good effects for treatment of different diseases because of their active ingredients (32). Basil oil showed biological activity. Linalool, which is the dominant compound of the oil derived from Basil varieties (9), have antiviral, anti-inflammatory, antifungal, antibacterial, and relaxant properties (20). Basil volatile oil (Eugenol) one of the phenolic compound shows antioxidant (15) and activity as antimicrobial (33).

over a hundred conditions were reportedly treated by *Ocimum basilicum* then it has over 50 medicinal activities. Hence, *Ocimum basilicum* is antiseptic, antibacterial, a nervine and a febrifuge (Herb Society of America, 2004). The herbal natural feed additives such as basil may be used as alternatives to an antibiotic growth promoter without any adverse effects on broiler production (30). Also, many studies have been conducted on the effects of essential oils or combinations on the performance of poultry, but with varying and conflicting results. While some reports (2, 6, 5) have confirmed that essential oils improved animal performance. Besides that, essential oils reduce numbers of pathogenic bacteria, promote immune status, exert antioxidant properties, stimulate blood circulation and increase of digestive secretions (14). In order to improve the animals' health, performance, and the quality of products, the aromatic plants and their extracts have been used as feed additives in animals' diets. The aromatic plants had the wide range of growth promoters, antioxidant, anticoccidial, antimicrobial properties and feed additives (8,36). Growth performance was improved and reduce the gut micro-organisms for finishing broilers when added Leaf extracts of *Ocimum* in diets of broiler(24).

Ocimum basilicum is an important crop worldwide grown for its fresh and dry herb, and the essential oil which is used as a food additive and in cosmetics (28). The basil essential oil could be replace the antibiotics, which have been banned to use as growth promoter in animal feeds (30).

Materials & Methods

Three hundred day-old straight run broilers chicks (Ross- 308) were bought from a commercial hatchery and divided randomly and equally into three treated groups of 100 birds, each treated group was subdivided into 2 replicates of 50 birds per replicate. The first group (T1) was fed daily on diet without basil seeds additive as a control group. Second group (T2) were fed daily on diet with added 0.3% basil seeds and the third group (T3) were fed on diet with 0.6% basil seeds. Birds were management according to (Aviagen, 2009) guide for management and nutrition requirement(21.5% protein and 3020 (kcal/kg)energy). Feed and water were provided *ad libitum*. One type of diets was used over the period of experiment (42 days)

Measured of body weights and FCR :

The chicks were weighted individually on days 14, 21, 28, 35, and 42 for each pen. by using digital balance then calculated average body weights and FCR for each treatment. Feed intake per pen was calculated by week and used to calculate the feed to gain ratio.

The weights of carcass, spleen, liver, bursa of Fabricius and Intestinal length were recorded at the end of experimental period.

At eight days of age, the birds of all groups were injected intramuscularly with 0.1 ml of killed Newcastle disease (ND) and (IB) vaccines. Blood samples were collected at 35 days of age. Ten chickens of each group were bled randomly and antibody titer against Newcastle and IB vaccine virus was determined by Enzyme-linked immunosorbent assay (ELISA) systems. All the blood samples obtained from wing vein and serums were separated, identified and frozen at -20° C until the tests were performed.

A commercial indirect ELISA kit was used to test the samples, according to the manufacturer's instructions.

Statistical analysis:

Statistical analysis was applied by using Statistical program SPSS and Analysis of Variance (ANOVA) and used Least significant difference (L.S.D) for detect the significant differences between means of treatments (34). The significant difference statements were based on the possibility (P<0.05).

Results And Discussion

Performance traits:

Mean live body weights of the bird in the different treatments are presented in Table (1). During the first period (0-4weeks old) control group showed significant (P<0.05) higher mean live body weight between treatments . While during the period (4-6) weeks of age, T2 (0.3% basil) recorded a significant (P<0.05) increase in live body weight as compared with control group. This significant increase through the 4-6 weeks and the whole experimental period may be due to the health properties of this product including antioxidant (35,19), antimicrobial (13), stimulating endogenous digestive enzymes (19) and increasing digestibility (23,16). body weight was similar among all treatments at last week of study which agreed with the finding of (24), who found no difference in the performance of broilers when basil extract was supplemented in diets. Additionally, the different level of basil had were nonsignificant effect in carcass weight and carcass yield at the final day of age (12).

Table (1): Effect of different levels of basil seeds on weekly body weight (gm) of broiler (mean ± SE).

Treatments Age	Control	0.3% basil seeds	0.6% basil seeds
14 days	345.00 ± 6.84 B	321.15± 7.95 B	372.27 ± 11.25 A
21 days	689.64 ±15.97 A	639.58±15.96 B	642.50±16.63 B
28 days	1218.45±20.16	1160.00±25.95	1156.00± 35.40
35 days	1817.78±33.09 B	1931.67±63.25 A	1786.86±49.60 B
42 days	2192.22 ± 50.40	2271.88 ± 82.97	2217.14 ± 46.21

Different letters denote significant differences (P ≤ 0.05) among groups mean in one period.

Several workers have also reported similar improvement in body weight (1,27,26) they reported that addition of basil leaf and seed to the diet had a beneficial effect on feed intake, body weight gain and feed conversion ratio. Furthermore, (29) showed improved productive performance in birds fed diets contained (3 g/kg) basil or parsley seeds compared with control groups.

weekly weight gain Table (2) showed significant (P<0.05) higher means in T3 (0.6% basil) as compared with T1 (control group) and T2 (0.3% basil). This significant increase could be attributed to activity of basil essential oil in lowers colonies of E. coli and increases the colonies of Lactobacillus; a process that may improve intestinal

microflora and enhance the performance immune system indirectly through elimination of pathogens (30).

Table (2): Effect of different levels of basil seeds on weekly weight gain (gm) of broiler (mean ± SE).

Treatments Age	Control	0.3% basil seeds	0.6% basil seeds
14 days	161.00±0.58B	153.00±1.73B	184.00± 2.31A
21 days	344.00±2.31A	318.00±2.88B	270.00±1.15C
28days	529.67±3.38	521.00±2.89	514.33±2.40
35 days	599.00±1.15B	771.00±3.46A	630.00±1.73A
42 days	375.33±3.84B	340.00±1.16B	431.00±3.46A

Different letters denote significant differences ($P \leq 0.05$) among groups mean in one period.

Present results are in agreement with the finding of (7) in the importance effect of active sub-stances in the medicinal and aromatic plants as an active substances and digestive stimulators, also its effect as antimicrobials, especially the intestinal microbes that located in the digestive system.

Table 3 refers to the effect of different levels of basil seeds on totally feed intake of broiler. The different level of basil seeds had significant ($P \leq 0.05$) effect on weekly feed consumption. The results of (3) revealed that no significant effect ($P > 0.05$) on feed intake in the dietary treatment.

Table (3): Effect of different levels of basil seeds on feed consumption (gm) of broiler (mean ± SE).

Treatments Age	Control	0.3% basil seeds	0.6% basil seeds
14 days	250.00± 1.15 C	265.33± 3.53 B	309.00± 2.89 A
21 days	610.00± 1.15 A	572.00± 1.15 B	522.00± 1.15 C
28days	945.00± 1.73 A	815.00± 1.73 B	800.33± 2.40 C
35 days	1160.00±5.77A	1054.00±2.31B	1034.00±2.31C
42 days	990.00± 1.15 B	872.17± 1.17 C	995.00± 2.89 A

Different letters denote significant differences ($P \leq 0.05$) among groups mean in one period.

The results (Table 4) revealed that significant ($P < 0.05$) differences were observed in feed conversion ratio between treated and control group during all periods of study. the control group showed significant ($P \leq 0.05$) high value FCR as compared with other treatments. Furthermore, The birds of T2 which fed diets contained (0.3%) basil seeds showed the best value in feed conversion ratio as compared with T3 which fed diets contained (0.6%) basil seeds and control group. they recorded (2.78 ± 0.046 , 2.35 ± 0.029 and 2.81 ± 0.038) at 42 days age for control, T2 and T3 respectively. These results were supported with the findings of (31) who showed an improvement

in feed conversion ratio and they referred to that the dietary fat spare protein and amino acids from energy yielding processes and direct them towards the growth of the animals.

Table (4): Effect of different levels of basil seeds on Feed Conversion Ratio (gm feed intake/gm weight) of broiler (mean ± SE).

Treatments Age	Control	0.3% basil seeds	0.6% basil seeds
14 days	1.55 ± 0.029 B	1.72 ± 0.016 A	1.70 ± 0.024 A
21 days	2.25 ± 0.362 A	1.81 ± 0.006 B	1.86 ± 0.035 B
28 days	1.63 ± 0.017 A	1.52 ± 0.016 B	1.45 ± 0.029 C
35 days	2.02 ± 0.083 A	1.71 ± 0.028 B	1.80 ± 0.016 B
42 days	2.78 ± 0.046 A	2.35 ± 0.029 B	2.81 ± 0.038 A

Different letters denote significant differences ($P \leq 0.05$) among groups mean in one period.

These results in agreement with (10) who found an improvement in FCR with feeding herbal products as feed additives that may be attributed to improve the digestibility of dietary protein in the small intestine. These results agree with (29), who reported that the chicks fed diets with basil seeds had significantly heaviest body weights than other without basil seeds.

Averages of serum haemagglutinin antibody (Ab) titers against ND and IB viruses of broiler at 6 weeks of age are listed in Table (5). The results of the present study are in contrast to (11) who stated that, feeding experimental diets inclusive either Rosemary, Marjoram or Basil improved the immune status as reflected by ELISA titer compared with that of the control.

Table (5): Effect of different levels of basil seeds on antibody titers (unit/ml) against ND and IB viruses of broiler (mean ± SE).

Treatments Ab titers	Control	0.3% basil seeds	0.6% basil seeds
ND titers	1129.91±125.14 C	2164.07±372.53 B	3448.64±288.17 A
IBD titers	6339.00±1744.68 B	11262.79±1164.47A	10137.15±1013.41 A

Different letters denote significant differences ($P \leq 0.05$) among groups mean horizontally .

The results of our study are very supporting the use of basil seeds as feed additive to enhance immunity of birds against viruses like ND and IB. Moreover, in the present study both concentrations of basil seeds lead to increase in Ab titers significantly (table 5). Thus the dose of 0.3 and 0.6% concentration of basil seeds can be used to get protection against ND virus. The role of basil seeds as immunomodulatory has been thoroughly studied and established (4,21) along with activity as antibacterial against bacterial pathogens of animals (18,17) thus it can be a multiple activity in poultry feed.

The effects of *Ocimum* seeds dietary inclusion on some organs weights (Intestinal length ,liver, spleen, and bursa) of broiler chicks in different groups at the end of experimental period are summarized in table 6.

Our results showed that Liver weight and Spleen index at the dose of 0.3 and 0.6% of *Ocimum* seeds was significantly higher than control. While Analysis of variance of the data revealed that no effect on Intestinal length and Bursa index when compared with the control.

Table (6): Effect of different levels of basil seeds on organs weight (gm)of broiler (mean ± SE).

Treatments parameters	Control	0.3% basil seeds	0.6% basil seeds
Intestinal length	10.393± 0.389	10.648± 0.560	10.051± 0.118
Liver weight	2.258±0.085B	2.680± 0.106A	2.861± 0.174A
Bursa index	0.039±0.006	0.035± 0.005	0.039± 0.006
Spleen index	0.109±0.003B	0.151±0.038A	0.146± 0.016A

Different letters denote significant differences ($P \leq 0.05$) among groups mean horizontally .

Liver weight increased significantly ($P \leq 0.05$) with increased in the quantity of basil seeds offered to the broilers (Table 6). The increase in Livers weights of the birds served basil seeds may be attributed to extra works of additional basil seeds metabolism executed by the livers. Similar result was made by (25) who reported increase in percentage of live weight for liver when he used basil supplement in diet of growing Pullets.

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