

Research article

Effect the dietary supplementation of Cariander (*Coriandrum sativum L.*) and Fennel (*Foeniculum vulgares*) seed powder and their mixture in productional and physiological performance of broiler

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Abstract

*This study was conducted in one of the commercial poultry farms for study the effect of dietary supplementation of coriander (*Coriandrum sativum L.*) and Fennel (*Foeniculum vulgares*) seed powder and their mixture in improvement the production and physiological performance of broiler. In this experiment we used 120 chick of Hubbard at one day old and distributed randomly to four treatments with three replicates for each treatment and was given two types of diets, The first is starter that have been feeding from the 1-22 day age old and finisher that have been feeding from 23-45 day age old. The control group included the chicks that feeding on the basal diet without any additive.T1 which included the group of chicks that feeding on the basal diet plus 5% of coriander seed powder, While T2 included the group of chicks that feeding on the basal diet plus 5% of fennel seed powder then T3which included the group of chicks that feeding on the basal diet plus the mixture of 2.5% of coriander seed powder and 2.5 % of fennel seed powder. The results showed the present of a significant effect ($p<0.05$) of adding coriander and fennel seed powder and their mixture in the broiler diet in the body weight, weight gain ,feed conversion ratio, feed intake ,carcass and internal organs weight compared with the control group as well as the results showed no significant difference ($p>0.05$) in dressing percentage, heart weight and serum protein concentration between different treatments ,while we saw a significant decrease ($P<0.05$) in concentration of glucose, cholesterol, triglycerides and uric acid in blood serum of treatments compared to the control group. In this study, we conclude that the dietary supplementation of coriander and fennel seed powder and their mixture lead to improve the production and physiological performance of broiler.*

Keyword: Coriander, Fennel, Broiler, Production, Physiological performance

Introduction

Dietary antibiotics have played important role in the animal production as growth and health promoters. The use of antibiotics as growth promoter in the poultry feed develops resistance for the pathogenic microorganism (1), and the use of antibiotics as growth promoter in the poultry diet has been banned in many countries, for public concern about

their residues in the poultry products and development of antibiotic-resistance bacteria (2). The nutritionist search for an alternative to antibiotic, aromatic Plants as coriander and fennel has become more important for their potential antimicrobial and stimulating effect on the poultry digestive system. As an aromatic plant, coriander (*Coriandrum*

sativum L.) is an annual species of the parsley family found in the eastern Mediterranean region and southern Europe and many other parts of world, it used as flavoring agent in bread and its oil for manufacturing of soap and perfumes and used as a medicine for thousands of years. (3). *Coriandrum sativum L.* used traditionally as anti-parasitic, anthelmintic, analgesic, antiseptic and antidiabetic properties, antioxidant, hypocholesterlemic (4). It has stimulating effect on the digestive system of bird by increasing digestive enzyme producing and improving utilization of digestive product in addition to improve liver function (5). *Coriandrum sativum L.* used as antimicrobial because it has volatile oils like carvone, geraniol, limonene, borneol, camphor, linalool having antimicrobial properties against food born pathogen such as *Salmonella spp.* Fennel (*Foeniculum vulgares*) was a plant has been used in the Mediterranean region as aromatic herbs, this plant having medical, properties (antispasmodic, carminative and diuretic), and have stimulating effect on growth of poultry and used as analgesic, antioxidant, antimicrobial, antifungal, endoparasitic (6). The objective of this study was to investigate the effect of coriander and fennel seed powder supplementation and their mixture as a diet additive on the production and physiological performance in broiler.

Materials and Methods

Ethical approval

The Animal Ethical Committee of Veterinary Medicine College, University of Al-Qadisiyah, Iraq, has approved the present study under permission No: 446

The study was carried out in one of commercial poultry farm .the birds were housed in floor pens. a total 120 of Hubbard were equally and randomly divided into four dietary treatments (30 birds for each treatment) with three replication (10 birds for each replicate) and the birds were given two types of diets, The first was starter that had

been feeding birds from the 1-22 day age and finisher that had been feeding birds from 23-45 day age old and estimated the chemical analysis of ration according to (7). The dietary treatments distributed as following:
C: include the birds feeding on the basal diet without any additive.

T1: include the birds feeding on the basal diet plus 5% of coriander seed powder.

T2: include the birds feeding on the basal diet plus 5% of fennel seed powder.

T3: include the birds feeding on the basal diet plus the mixture of (2.5% of coriander seed powder and 2.5% of fennel seed powder).

At 22 and 45 day age old of birds we measured the live weight of body, weight gain, feed intake and feed conversion ratio, at the end of experiment ten birds per each treatment were randomly chosen weighted and slaughtered ,the feather were removed and measured the carcass yield and internal organs were collected and measured the weight of heart, liver, gizzard and measured the relative to live body weight and estimated the dressing percentage as indicated by (8). Blood samples were collected from wing vein at 45 day of age from ten birds per each treatment group and put in tube free from anticoagulant, then put in centrifugation at 3000 cycle for 15 minutes, serum were analyzed for estimated the concentration of glucose according to (9), cholesterol according to (10), triglycerides according to (11) and total protein and uric acid according to (12) by using specific kits from Randox company and Biomerienx company and the essay was carried out according to manufactured protocols. The data were analyzed by one way analysis of variance (ANOVA) and Complete Randomize Design (CRD) to study the effect of treatments which contain coriander and fennel seed powder and test the significant of differences between means by Duncan's multiple range (13) and used statistical program SPSS (14) for analysis.

Table (1) dietary ingredient and chemical composition of the basal diet to starter and finisher

| Ingredient | Starter % | Finisher % |
|---------------------------------------|-----------|------------|
| maize | 47 | 50 |
| wheat | 10.5 | 8.5 |
| Soybean meal | 27 | 28 |
| Concentrated protein | 10 | 10 |
| Plants oil | 4 | 2.5 |
| Ground limston | 1 | 0.5 |
| salt | 0.5 | 0.5 |
| | 100% | 100% |
| Chemical analysis of nutrition | | |
| Energy ME(Kcal/Kg) | 3078 | 3105 |
| Crude protein | 22 | 19 |
| Lysine% | 1.2 | 1.1 |
| Methoinin+cystein | 0.8 | 0.7 |
| Crude fiber | 3.4 | 3.2 |
| Ca% | 1.3 | 1 |
| Phosphorus% | 0.4 | 0.4 |

Chemical analysis of nutrition estimated according to NRC 1994(7).

Results

The table (2) indicates to the effect of dietary supplementation of 5% coriander (*Coriandrum sativum L.*) seed powder and fennel (*Foeniculum vulgares*) seed powder and their mixture in the broiler diet in production performance at 22 day age, we saw the present significant increase ($p < 0.05$) in live body weight and weight gain in the treatment T1, T2, T3 which have birds consuming the diet containing 5% of either coriander and fennel seed powder and their mixture compared with control group that have birds receiving the basal diet without any additive. As well as we found a significant decrease ($p < 0.05$) in feed intake in the treatments T1, T2 and T3 compared with control group and the T3 recorded the lowest rate in feed intake then T2 and T1. The feed conversion ratio was improved in the treatments that consuming the coriander and fennel seed powder, that the T3 recorded the best rate then T1, T2 that have similar rate compared with control group. The Table (3) illustrated the effect of coriander and fennel seed powder and their mixture supplementation to the broiler diet in the production performance at 45 day age, as we observe a significant improvement ($p < 0.05$) in body weight and weight gain in T1, T2 and

T3 compared with control group and we saw that these treatments group were similar in the improvement and there is no significant difference between them. The table also indicated a significant decrease ($p < 0.05$) in feed intake and conversion ratio in the treatments of birds that received the basal diet with coriander and fennel seed powder and these treatments were significantly similar between them compared with control group. The table (4) showed to the effect of coriander and fennel seed powder and their mixture supplementation to the broiler diet in the weight of carcass, dressing percentage and relative weight of heart, liver and gizzard, where there is a significant increasing ($p < 0.05$) in carcass weight of treatment groups compared with control group, while there is no significant difference between the same treatment groups. We also note that there is no significant difference ($p > 0.05$) between the treatments and control group in dressing percentage and relative weight of heart, while there is a significant increase ($p < 0.05$) in relative weight of liver and gizzard in treatment groups compared with control group. The Table (5) indicates to the effect of dietary supplementation of 5% coriander seed powder and fennel seed

powder and their mixture in the broiler diet in the biochemical parameters, where we observed that the concentration of glucose was higher significantly ($p < 0.05$) in control group compared with the birds that receiving the diet contain the coriander and fennel seed powder (T1, T2, T3), while were no significant differences ($p > 0.05$) in glucose concentration between T1, T2, T3. Birds in

treatments T1, T2, and T3 had lower significant ($p < 0.05$) in cholesterol concentration and triglycerides concentration than control group and there is no significant difference between themselves. Blood uric acid was significantly lower ($p < 0.05$) in birds of treatments groups T1, T2, T3 than control group.

Table (2): effect of dietary supplementation of coriander and fennel in production performance at 22 day old

| treatments parameter | Control C | Treatment 1 T1 | Treatment 2 T2 | Treatment 3 T3 |
|-------------------------|----------------|-------------------|-------------------|-------------------|
| Body weight(g) | a 570±0.07 | b 597± 0.09 | b 600± 0.06 | b 590± 0.09 |
| Weight gain(g) | a 1300±1.5 | b 1455±1.62 | b 1470±1.64 | b 1466±1.50 |
| Feed intake(g) | a 2950±0.08 | b 2870±0.09 | b 2800±0.04 | C 2690±0.07 |
| Feed conversion ratio | a 2.26±0.12 | b 1.97± 0.08 | b 1.9±0.12 | C 1.78± 0.04 |

Numbers indicate to the means± standers error.

Different letter indicate to significant differences between treatments at ($p < 0.05$).

Table (3): effect of dietary supplementation of coriander and fennel in production performance at 45 day old

| treatments parameter | Control C | Treatment 1 T1 | Treatment 2 T2 | Treatment 3 T3 |
|-------------------------|------------------|-------------------|-------------------|-------------------|
| Body weight (g) | a 1970± 0.19 | b 2010±0.15 | b 2019± 0.2 | b 2015±0.25 |
| Weight gain (g) | a 1970± 0.35 | b 1970±0.25 | b 1987± 0.35 | B 1975± 0.3 |
| Feed intake(g) | a 4200± 0.22 | b 3848± 0.3 | b 3958± 0.19 | b 3850±0.33 |
| Feed conversion ratio | a 2.17± 0.017 | b 1.95± 0.02 | b 1.99± 0.17 | b 1.94± 0.04 |

Numbers indicate to the means± standers error. Different letter indicate to significant differences between treatments at ($p < 0.05$).

Table (4): effect of dietary supplementation of coriander and fennel in carcass weight and internal organs percentage

| treatments parameter | Control C | Treatment 1 T1 | Treatment 2 T2 | Treatment 3 T3 |
|-------------------------|------------------|-------------------|-------------------|-------------------|
| Carcass weight(g) | a 1460±0.05 | b 1516± 0.13 | b 1519±0.2 | b 1515±0.13 |
| Dressing percentage% | a 71.2%± 0.01 | a 72.8±0.04 | a 72.5±0.07 | a 71.9±0.03 |
| Heart % | a 0.4±0.02 | a 0.45±0.01 | a 0.48±0.01 | a 0.44±0.01 |
| Liver% | a 1.98±0.03 | b 2.2±0.02 | b 2.1±0.01 | b 2.2±0.01 |
| Gizzard % | a 1.89±0.03 | b 1.99±0.04 | b 2.3±0.02 | b 2.2±0.03 |

Numbers indicate to the means± standers error

Different letter indicate to significant differences between treatments at (p<0.05).

Table (5) effect of dietary supplementation of coriander and fennel in biochemical parameters

| treatments parameter | Control C | Treatment 1 T1 | Treatment 2 T2 | Treatment 3 T3 |
|-------------------------|------------------|-------------------|-------------------|-------------------|
| Glucose mg/dl | a 179.3±0.11 | b 169.84±0.09 | b 163.5±0.06 | b 165.7±0.06 |
| Cholesterol mg/dl | a 141.25±0.01 | b 125.72±0.03 | b 121.6±0.03 | b 129.5±0.05 |
| Total protein mg/dl | a 6.63±0.08 | a 5.86±0.09 | a 5.66±0.09 | a 6.00±0.08 |
| Triglycerides mg/dl | a 130.62±0.03 | b 110.3±0.02 | b 103.7±0.04 | b 107.2±0.02 |
| Uric acid mg/dl | a 4.2±0.01 | b 3.6±0.08 | b 3.88±0.03 | b 3.55±0.01 |

Numbers indicate to the means± standers error

Different letter indicate to significant differences between treatments at (p<0.05).

Discussion

Through the positive results which obtained from the dietary supplementation of coriander and fennel seed powder to broiler ration in production and physiological performance, the significant improved of body weight, weight gain, feed intake, carcass weight and organs weight could be due to the essential oil present in coriander and fennel seeds such as linalool and other monoterperoids like citronellol, geraniol. Limonene, α and β phellandrene, camphor, α and β pinene (15,16). These oils has appetizing properties in diet and stimulating effect on the digestive process and has inhibitory effect of pathogenic microorganism in digestive system(17) such as E.coli, pseudomonas aeruginosa, salmonella typhimurium, staphylococcus aureus, the positive improvement of dietary coriander and fennel seed powder supplementation on body weight, weight gain, feed intake ,feed conversion ratio and carcass weight may be due to increase efficiency of feed utilization and carcass composition (18). The improvement of dressing percentage and the relative weight of internal organs were agreement and similar to the result of (19, 20). This study showed a significant improvement in biochemical parameters, we observed a significant decrease in serum glucose concentration in treatments groups compared

with control group and this is due to the antihyperglycemic action of coriander and fennel seeds powder, which has been documented by (21), the inclusion of coriander and fennel oil resulted a significant decrease in glucose concentration. The antihyperglycemic action due to stimulation of insulin secretion and enhancement of glucose uptake and metabolism by muscles (22). Birds in T1,T2 and T3 had lower significant (p<0.05) in serum cholesterol and triglycerides compared with control group, these results showed that the coriander and fennel seed supplementation had a profound influence on the metabolism of lipids in poultry fed on cholesterol containing diet (23). The key enzyme of cholesterol biosynthesis in the liver is 3-hydroxy -3-methyl-glutaryl co enzyme reductase, the activity enzyme significantly increase in birds fed on coriander and fennel seeds, cholesterol concentration decreased in serum to be mediated when their increased rate of degradation to bile acid and neutral sterols then this study showed a significant hypolipidemic effect of coriander and fennel seeds. (24,25). Serum uric acid was significant lower (p<0.05) in birds of treatments T1,T2 and T3 compared to control group ,the serum uric acid and protein depend on both the quality and quantity of

protein supplied in the diet, this result agreement with (26).

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