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Article

Effect of adding different levels of dill seeds to the diet on productive traits and some carcass traits of broiler chickens

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Abstract
This study was conducted in the poultry field of the Department of Animal Production / College of Agricultural Engineering Sciences / University of Baghdad Abu Ghraib for the period from 10/15/2021 to 11/25/2021 to show the effect of adding different levels of dill seeds to the diet on productive and carcass traits For broiler meat. In this study, 200 unsexed broiler chicks of breed (308 Ross) were used, one day age, with a starting weight of (42) g. The chicks were randomly distributed to 5 treatments, and each treatment included 4 replicates, 10 birds for each replicate. The birds were fed three diets: the starter diet, the growth diet and the final diet. The experiment treatments were T1, T2, T3, T4 and T5, adding dill seeds at average (0, 0.3, 0.6, 0.9, 1.2%), respectively. The experiment results indicated a significantly excelled($P < 0.05$) for treatment T5. Compared with the T1 treatment, it did not differ significantly from the rest of the treatments; adding dill seeds T2, T3 and T4 in body weight, weight gain and feed consumed for broilers at 42 days, an improvement was observed in the food conversion ratio of treatment T5 compared to the rest of the treatments in the first week, and in the fourth week, the results indicated a significant improvement ($0.01>P$) in the feed conversion ratio of the addition treatments T2, T3, T4 and T5 compared to treatment T1. It was found that there was a significant ($P < 0.05$) excel in the carcass weight of the T5 treatment compared to the T4 treatment. It did not differ significantly with the T1, T2 and T3 treatments, and a significant ($P < 0.05$) in the relative weight of the gizzard for the T4 treatment compared to the T1 treatment and the liver relative weight for the two treatments. T4 and T5 as compared to T1. Also, a significant excel ($P<0.05$) was observed in the relative weight of the thigh for treatment T1 and T4 compared to T5. When calculating the relative weight of the neck, it was noted that treatment T1 compared to treatment T5. When calculating the relative weight of the back, treatment T4 excelled on the rest of the treatments. We conclude from this study that adding 1.2% of dill seeds to the diet improved the productive traits of broilers.

Keywords: dill seeds, broilers, productive performance, carcasses.

Introduction

The European Union has banned industrial antibiotics in poultry and animal feed as growth stimulants since 2006 because of their negative impact on human health due to the accumulation of chemical residues in animal products [1]. This prompted researchers to find natural alternatives to achieve good production and reduce the

poultry industry's problems by using herbs and medicinal plants in bird diets [2] Medicinal plants and herbs have been used in food and treating many diseases. They are among the oldest plants known to man due to the presence of active substances in them [3]. They have been used for centuries by humans as food and medicinal additives. Herbs and spices are the origins of medicinal natural products used in the past as feed additives for farm animals [4]. In the past few years, medicinal plants and their extracts have been used in poultry feed to improve their production performance, health and quality of their products [5] One of the most essential additives recently highlighted its effectiveness is dill seeds. The scientific name of Dill is Anethum graveolens, and its common name worldwide is Dill. The Anethum plant belongs to the celery family Apiaceae and is widely cultivated. It is a short-lived herb containing more than 250 species of green crops. Many varieties in the world differ in their quantitative and qualitative content of active compounds, and there is one local variety in Iraq that contains the main compounds such as carbohydrates, proteins and fats [6]. Dill seeds are flat brown, oval, more aromatic than leaves and have a mild citrus flavor [7]. Dill seed is widely used as a medicinal plant for digestive disorders [8].
Moreover, bacteria [9] The active compounds in dill seeds are carvone, responsible for the smell of dill seeds, limonene, alpha phellandrine and beta-cyamine, flavonoids, coumarins, steroids, and phenolic acids [11]. In addition, dill seeds play a significant role as a growth stimulator when added to poultry feed. As a result of the lack of research, this study aimed at the effect of adding different levels of dill seeds to the broiler diet on the productive traits represented by body weight rate, food conversion factor, and feed consumption rate.

Materials and Methods

This study was conducted in the poultry field of the Department of Animal Production/College of Agricultural Engineering Sciences/University of Baghdad from 10/15/2021 to 11/25/2021 for six weeks: 42 days. In this study, 200 unsexed (Ross308) broiler chicks prepared from the hatchery of Al-Thanks Al-Ahlia Company for the production of broilers in the Abu Ghraib district at the age of one day were used. Chicks were randomly distributed to 5 treatments, and each treatment included 4 replicates, 10 birds for each replicate, with an average starting weight of 41.64 g. All chicks were fed a free diet (ad-libitum), on a starter diet from 1-10 days of age, then gradually replaced with a growth diet from 11-24 days of age, and then replaced with a final diet of 25-42 days of age (Table (1), The experimental treatments were divided as follows: The first treatment (T1): - a control treatment without addition, and the second treatment (T2): - adding dill seeds to diet at an average of 0.3% and the third treatment ((T3): Adding dill seeds to diet at a average of 0.6%, and the fourth treatment (T4): - adding dill seeds to the bush at a rate of 0.9%. The fifth treatment (T5) - adding dill seeds to the diet at an average of 1.2%. The dill seeds were prepared. From local markets, the chemical analysis of dill seeds was conducted in the Department of Environment and Water / Ministry of Science and Technology Laboratory, as shown in Table 2). The productive traits were studied, which included body weight, weight gain, feed consumption and weekly feed conversion ratio. At the end of the experiment, four birds (2 males and 2 females) were taken, weighed, and slaughtered to remove the internal viscera. The weight of the carcass, the weight of the internal edible organs (liver, heart and gizzard) and the relative weight of belly fat were estimated according to the equation mentioned [11]. The data of the experiment were analyzed according to the Complete Randomize Design (CRD) to analyze the effect of different treatments on the studied traits, and the significant differences between the means were compared with Duncan's test (1955) and the SAS (2012) program was used in the statistical analysis.

Feed material	starter diet (1-10)day	Growth diet (24-11)days	final diet (25-42)days
yellow corn	43.8	44.6	46.5
wheat	14	15.4	16
soybean meal 48%	32.7	29.1	26
Protein Concentrate (1)	5	5	5
sunflower oil	2.2	3.5	4.4
limestone	1.1	1.5	1.3
Dicalcium Phosphate DCP	0.7	0.4	0.3
salt	0.3	0.3	0.3
Vitamins & Minerals Blend (2)	0.2	0.2	0.2
total	100	100	100
Computed chemical analysis			
Crude protein (%)	23.03	21.53	20.27
Represented energy (kilo calories/kg of feed)	3005.83	3105.47	3193.20
Lysine (%)	1.3	1.22	1.13
Methionine + Cysteine (%)	0.88	0.84	0.80
Calcium(%)	0.86	0.93	0.82
Available phosphorous (%)	0.52	0.46	0.44

Table1. Percentages of the ingredients of the diets used in the experiment and their chemical composition.

The chemical analysis of the diets was calculated according to the NRC (1994) (1) Brocon-5 Special W Protein Concentrate. Each kg contains: 40% crude protein, 5% fat, 2.2% fiber, 24.52% ash, 3.53% calcium, 5.35% phosphorous, 3.85% lysine, 3.7% methionine, 4.12% methionine + cysteine, 0.43% tryptophan, 2.57 % Arginine, 2.4% Sodium, 2107 Kcal/Kg Represented Energy, 200,000 IU Vitamin A, 60,000 IU Vitamin D3, 600 mg Vitamin E, 50% Vitamin K3, 60 mg Vitamin B1, 140 mg Vitamin B2, 80 mg Vitamin B6, 700 mcg Vitamin B12,800 mg Niacin, 20 mg Folic Acid, 1 mg Iron, 200 mg Copper, 1.6 mg Manganese, 1.2 mg Zinc, 20 mg Iodine, 5 mg Selenium.

(2) A mixture of vitamins and minerals, each kg of which contains: 500 IU Vitamin A, 600 IU D3, 10 mg E, 2 mg K3, 2 mg B1, 2 mg B2, 2 mg B6, 5 micrograms B12, 10 mg C Folic acid, 15 mg, niacin, 500 mcg.

chemical analysis	%Percentage
Protein	14.2
ash	7.1
Fats	13.9
Humidity	5.9
raw fiber	20.9
carbohydrates	38.0
limonene	18.22
carphone	40.05
Beta-Ciamin	12.0

Table 2. Chemical analysis of dill seeds used in the experiment.

Results

Table (3) shows that there are no significant differences between the treatments for the average live body weight in the first and second week of the experiment, Significant differences were found between the treatments ($P < 0.05$) in the third, fourth, fifth and sixth weeks of the experiment, as the fifth treatment (T5) excelled on the control treatment and did not differ significantly with treatments T2, T3 and T4.

	Age in weeks					
treatments	first week	second week	third week	fourth week	fifth week	sixth week
T1	149.30±7.91	429.51 ±16.63	770.725± 40.08 b	1250.60±54.86 b	1891.43 ±102.05 b	2569.60 ±109.96 b
T2	156.22±4.04	437.50 ± 13.99	801.40 ±31.27 ab	1329.05±49.83 ab	1996.55 ±53.52 ab	2739.55 ±95.68 ab
T3	152.25±4.89	432.07±10.99	805.02 ±5.25 ab	1364.95±6.92 ab	2082.70 ±9.52 ab	2825.85±27.31 ab
T4	147.30±1.64	428.22 ±10.49	798.87 ±3.68 ab	1348.40±22.77 ab	2060.98 ±37.08 ab	2825.83 ±68.39 ab
T5	148.62±4.27	461.05±1.89	854.85 ±16.69 a	1413.75±41.63 a	2121.90 ±57.11 a	2865.08±80.00 a
significant level	N.S	N.S	*	*	*	*

Table3. Effect of adding different levels of dill seeds to broiler diet Ross 308 on average live body weight (gm/bird) (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level ($P < 0.05$).**
N.S There are no significant differences between the average of the treatments.

Table (4) shows no significant differences between treatments in the average weight gain in the experiment's first, third, fifth and sixth weeks. In contrast, significant differences were found between treatments ($P<0.05$) in the second and fourth weeks, as it was noticed in the second week of the experiment that The fifth transaction (T5) on the rest of the treatments, In the fourth week of the experiment, we notice that the treatments T3, T4 and T5 significantly excelled on the control treatment T1. At the same time, they did not differ significantly from the treatment T2. When calculating the cumulative weight gain, it is noted from the table that the fifth treatment (T5) was superior to the control treatment T1. At the same time, it did not differ significantly from the treatments T2, T3 and T4.

	Age in weeks						
treatments	first week	second week	third week	fourth week	fifth week	sixth week	cumulative weight gain
T1	108.50 ± 7.77	279.85 ±12.14 b	341.57± 24.40	479.87 ± 15.78 b	640.82 ± 49.03	678.17± 8.30	2528.80± 109.51 b
T2	115.00± 4.18	281.27± 9.95 b	363.90± 18.30	527.65 ± 19.61 ab	667.50 ± 26.81	743.00± 45.93	2698.33± 95.51 ab
T3	110.95± 4.67	279.82± 6.35 b	372.95± 8.46	559.92± 6.60 a	717.75 ± 9.21	743.15± 19.02	2784.55± 26.75 ab

T4	104.82± 1.66	280.92± 9.37 b	370.65± 8.70	549.52± 21.58 a	712.57± 14.97	764.85± 36.88	2783.35± 68.73 ab
T5	107.10± 4.68	312.42± 2.77 a	393.80± 15.53	558.90± 28.94 a	708.15 ± 19.38	743.17± 27.65	2823.55± 80.21 a
significant level	N.S	*	N.S	*	N.S	N.S	*

Table 4. The effect of adding different levels of dill seeds to the diets of 308 Ross broilers on the average weekly weight gain (gm/bird) (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level (P < 0.05).**
N.S There are no significant differences between the average of the treatments.

The statistical analysis results (Table 5) indicate no significant differences between treatments in the rate of feed consumption at the first, second, third and fourth weeks of the experiment. In contrast, significant differences were found between treatments (P < 0.05) at the fifth and sixth weeks. In the fifth week of the experiment, the fourth treatment (T4) significantly excelled on treatments T1, T2, T3 and T5, where it recorded 1108.43 g/fowl. At the same time, it did not differ significantly with treatment T5. The fifth treatment (T5) significantly excelled in treatments T1 and T2, and it was noticed that the third treatment (T3) excelled in treatments T1 and T2. In the sixth week of the experiment, it was noted that the fifth treatment (T5) excelled on the control treatment, T1, while it did not differ significantly from T2, T3 and T4 treatments. When calculating the cumulative feed consumption, it is noted from the table that the fifth treatment, T5, also excelled in the control treatment, while it did not differ significantly from the treatments T2, T3 and T4.

	Age in weeks						
treatments	first week	second week	third week	fourth week	fifth week	sixth week	Cumulative feed consumption
T1	133.20 ± 9.03	327.97± 15.78	494.82± 33.13	693.62± 27.68	997.02± 42.77 c	1162.80± 39.19 b	3809.45± 150.70 b
T2	140.37 ± 3.23	333.42± 12.20	512.42± 12.39	726.72± 26.08	1009.70± 26.24 bc	1248.70± 40.39 ab	3971.35± 106.61 ab
T3	139.02± 4.24	335.95± 4.74	516.40 ± 6.16	755.12± 8.17	1083.15± 15.77 abc	1276.78± 34.83 ab	4106.43± 41.54 ab
T4	135.97± 1.25	325.72± 3.06	509.57± 10.33	752.37± 29.78	1108.43± 22.49 a	1267.93± 35.09 ab	4100.00± 87.50 ab
T5	129.27 ± 3.64	340.35± 6.65	540.65 ± 6.21	764.52± 30.81	1095.45± 30.97 ab	1289.08± 35.71 a	4159.33± 105.68 a
significant level	N.S	N.S	N.S	N. S	*	*	*

Table 5. Effect of adding different levels of dill seeds to the diets of 308 Ross broilers on the average weekly consumed feed (gm/bird) (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level (P < 0.05).**
N.S There are no significant differences between the average of the treatments.

Table 6) shows no significant differences between treatments when calculating the food conversion factor in the experiment's second, third, fifth, sixth, and cumulative weeks. In contrast, significant differences were found between treatments (P

< 0.05) in the first and fourth weeks of the experiment. In the first week of the experiment, a significant improvement was observed for the fifth treatment (T5) compared to the rest. In contrast, in the fourth week, a significant improvement was observed in the food conversion ratio of treatments T2, T3, T4 and T5 compared with the control treatment.

Age in weeks							
treatments	first week	second week	third week	fourth week	fifth week	sixth week	Cumulative feed conversion ratio
T1	1.23±0.00 ab	1.17 ± 0.05	1.45 ± 0.02	1.44± 0.02 a	1.57 ± 0.08	1.71 ± 0.04	1.43 ± 0.01
T2	1.22 ± 0.02 ab	1.18± 0.00	1.41 ± 0.05	1.37± 0.00 b	1.51 ± 0.04	1.69 ± 0.05	1.40 ± 0.01
T3	1.25 ± 0.03 ab	1.20 ± 0.01	1.38 ± 0.01	1.34 ± 0.01 b	1.50± 0.00	1.72 ± 0.01	1.40 ± 0.00
T4	1.30 ± 0.02 a	1.16 ± 0.04	1.38± 0.05	1.37 ± 0.01 b	1.55± 0.01	1.66 ± 0.06	1.40 ± 0.01
T5	1.20 ± 0.02 b	1.08 ± 0.02	1.37± 0.03	1.37 ± 0.01 b	1.54 ± 0.02	1.73 ± 0.02	1.38 ± 0.01
significant level	*	N.S	N.S	**	N.S	N.S	N.S

Table 6. The effect of adding different levels of dill seeds to the diets of 308 Ross broilers on the weekly feed conversion ratio (gm of feed/gm of weight gain) (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level (P < 0.05).**
N.S There are no significant differences between the average of the treatments.

It is noted in Table 7 that there are no significant differences between the treatments (P < 0.05) in the average live body weight and the percentage of dressing. However, when calculating the average carcass weight, it is noted from the table that there are significant differences between the treatments (P < 0.05) as the fifth treatment (T5) excelled on Treatment T4. At the same time, it did not differ significantly with treatments T1, T2 and T3.

treatments	dressing percentage	carcass weight	live body weight
T1	75.30 ±0.62	2048.75 ±18.75 ab	2721.25 ±35.43
T2	75.05 ±0.50	2143.75 ±39.71 ab	2857.00 ±62.15
T3	74.70 ±0.69	2093.75 ±37.85 ab	2803.50 ±60.01
T4	73.05 ±0.20	1988.00 ±65.62 b	2721.25 ±91.93

T5	80.37 ±6.13	2287.25 ±171.57 a	2847.50 ±50.68
significant level	N.S	*	N.S

Table 7. Effect of adding different levels of dill seeds to 308 Ross broiler diets on live body weight, carcass weight and dressing percentage (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level (P < 0.05).**
N.S There are no significant differences between the average of the treatments.

The data in Table 8 indicate no significant differences between treatments in the relative weight of the heart and belly fat. At the same time, there were significant differences between treatments (P < 0.05) in the relative weight of gizzard and liver. The fourth treatment (T4) was significantly superior to the control treatment, T1, while it did not differ significantly from treatments T2, T3, and T5. When calculating the relative weight of the liver, it is noted from the table that the two treatments, T4 and T5, significantly excelled on the control treatment, T1. In comparison, it did not differ significantly with the two treatments, T2 and T3.

	Relative weight(%)			
treatments	belly fat	liver	gizzard	heart
T1	0.76 ±0.23	1.39 ±0.45 b	0.76 ±0.41 b	0.28 ±0.15
T2	0.96 ±0.04	2.13±0.06 ab	1.20 ±0.04 ab	0.49 ±0.02
T3	0.94 ±0.17	1.89±0.06 ab	1.14±0.23 ab	1.30 ±0.73
T4	0.85 ±0.13	2.44 ±0.29 a	1.60±0.16 a	0.60 ±0.07
T5	0.90 ±0.07	2.27 ±0.08 a	1.22 ±0.08 ab	0.53 ±0.02
significant level	N.S	*	*	N.S

Table 8. Effect of adding different levels of dill seeds to 308 Ross broiler diets on the relative weight of edible entrails and belly fat (mean ± standard error).
T1: control treatment without addition, T2: add dill seeds at an average of 0.3%, T3: add dill seeds at the rate of 0.6%, T4: add dill seeds at an average of 0.9%, T5: add dill seeds at an average of 1.2%.
*** The averages bearing different letters for the same column indicate significant differences between the mean of the treatments at the level (P < 0.05).**
N.S There are no significant differences between the average of the treatments.

Discussion

The improvement in the productive performance of broilers is due to the fact that dill seeds contain many active compounds carvone and limonene, which are highly effective against fungi [12], which act on the basis of being an antimicrobial against bacterial diseases that cause poultry. Hence, it limits bacterial growth Inside the intestine [13]. Studies have confirmed that the active compounds carvone and limonene of dill seeds improve the environment of the gastrointestinal tract by eliminating harmful microorganisms, which leads to improved bird health. It reflects improved appetite, feed conversion factor, increased live body weight and feed consumption [13]. In addition, dill seeds contain flavonoids that have similar structure and action to steroid hormones [14] Steroid hormones are anabolic hormones that have an essential role in promoting the growth of the body and increasing the process of manufacturing structural proteins in the muscles of the body and working to increase the metabolic rate and reduce the process of its breakdown [15] [16]

confirmed that the use of dill seeds in poultry diets led to a significant increase in weight gain as a result of increased absorption of nutrients and increased secretion of bile acids. The reason may be due to essential oils that have beneficial effects on the activity of the digestive system by stimulating the secretion of digestive enzymes and eliminating harmful factors such as harmful microorganisms in the digestive system [17]. Also, the nutrients found in dill seeds, such as volatile oils, amino acids, minerals and vitamins [18], have a significant role in providing all birds' nutritional needs.

Conclusions

We conclude from this study a significant improvement in the productive traits of the treatments of adding dill seeds, especially when adding dill seeds by 1.2%.

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