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STUDYING THE EFFECT OF ADDING DIFFERENT CONCENTRATIONS OF THE MINT OIL TO THE RATION OF BROILER CHICKS ON SOME BLOOD BIOCHEMICAL TRAITS

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Abstract

This study was conducted at Poultry farm of Animal Resources Department, College of Agriculture, University of AL-Qasim Green to study the effect of adding different concentrations of the Mint oil to the ration of broiler chicks on some blood biochemical traits. The 144 broiler chicks (Ross 308) with one day old were used, as it was randomly divided into four treatments, with 36 chicks per treatment, each treatment consists of three replicates (12 chicks per replicate). Experiment treatments were as follows: The first treatment (control) without adding Mint oil to the ration, add Mint oil at a concentration of 600 $mg.kg^{-1}$ $feed^{-1}$ (the second treatment), add Mint oil at a concentration of 800 $mg.kg^{-1}$ $feed^{-1}$ (the third treatment) and add Mint oil at a concentration of 1000 $mg.kg^{-1}$ $feed^{-1}$ (The fourth treatment). The study included investigating of the following traits: Total Protein concentration, Albumin, Globulin, Cholesterol and Triglycerides. The results indicated that the addition of Mint oil at a concentration of (600, 800, 1000 $mg.kg^{-1}$ $feed^{-1}$) to ration of broiler chicks led to a significant improvement in blood biochemical traits of broiler chicks.

Key words : Mint oil, broiler chicks, blood biochemical traits.

Introduction

In recent years, the poultry industry in the world has seen significant development and expansion, both in the production of meat or eggs, as the volume of production increased compared to other animal products, As well as the size of increase in meat production were higher than in eggs production (Windhorst, 2006). This development and expansion of the poultry industry has been accompanied by a trend in the use of multiple factors for the purpose of increasing productivity, such as organic acids, enzymes and medicinal herbs as food additives, including the use of antibiotics as a growth catalysts, and for the protection and treatment of poultry birds from pathogenic microbial infections, which increased with increase the intensive breeding (Eid *et al*., 2010; Swiatkiewicz *et al*., 2015). Although, the positive role of antibiotics in the development of the poultry industry, but they did not without from the collateral damage on animal health, as well as human after consumption of its products (Dibner and Richards, 2005) and rapid growth of modern breeds and genetic improvement, to breeds of broiler chicks in order to reach fast-growing herds, with highly food conversion efficiency, at the same time has led to reduce the immunity of these birds, and make them more susceptible to infection by diseases and high rates of loss in them, so It was observed that the two traits of growth speed and immunity were negatively genetically correlated (Deif *et al*., 2007; Eid *et al*., 2010). Among the new food additives is the use of mint plant *Mentha spicata* L., which is a medicinal plant that dates back to the Lamiaceae family and is known all over the world and is characterized by its good quality of oil and it is medically preferably. Its various medical benefits were mentioned in many works of the first Muslim doctors'. And for the mint oil has many vital functions. It is an analgesic, antiseptic, treatment for a poor digestion (Miller, 1998), a vasodilator for blood vessels (Duke *et al*., 2002) and it has a strong anti-fungal and anti-oxidant effect (Moussawi, 2012). It has a role in lowering glucose in the serum (Nobakht and Shahryar, 2010), lowering the total fat level and raising the level of high density lipoproteins in the serum (Barbalho *et al*., 2009). Mint contains a lot of effective compounds, it contains volatile oils by 0.8-2.5% (PDR, 1998), Crvone compound by 55% (British Pharmacopoeia, 1993), the flavonoids, including thymine,

contain the derivatives of caffeic acid, compounds of the esters and terpenes, and mainly on a Limonene compound, and Mono-turbines occupy the main components in the volatile oil for all mint cultivar (Foster, 1990). The nutritional value of the mint plant represent by its good content of minerals such as Fe, Cu, Mg, Na, K and vitamins A and C (Nair, 2001; Cappello, 2007). Based on the above, the study aimed to show the effect of adding different concentrations of mint oil to feed on some blood biochemical traits of broiler chicks.

Materials and Methods

This study was conducted in the poultry field of the Department of Animal Resources at the college of Agriculture/AL-Qasim Green University for the period from 14/3/2016 to 18/4/2016. The 114 broiler chicks (Ross 308) were used With an average weight of 43 g/chick. The chicks were breeded in land cages their dimensions is 2×2 m. The chicks were distributed randomized of 4 different treatments, each treatments consisting of 3 replicates, where each replicate containing 12 chick. The feed was provided in a free manner to the birds, where provided two ration, the initiator ration of age 1-21 days and the growth ration of age 22-35 days as shown in table 1. The mint oil was added to the ration starting from first day and as follows: first treatment (control) without adding mint oil to ration, add mint oil with a concentration of 600 mg/kg feed (second treatment), add mint oil with a concentration of 800 mg/kg feed (third treatment) and add mint oil with a concentration of 1000 mg/kg feed (fourth treatment). The experiment included studying the following traits: Total Protein concentration, Albumin, Globulin, Cholesterol and Triglycerides. The studied traits were estimated in the fifth week of the experiment. Where the blood was collected from 6 birds of each treatment (2 birds of each replicator), Blood was collected randomly from the brachial vein Where tubes were used that did not contain anticoagulant to the separation of the serum where it was placed in the centrifuge at a speed of 3000 cycles / min for 15 minutes for the purpose of separating blood plasma, it was kept in the refrigerator at -20ºC until the laboratory tests, which included the concentration of Total Protein concentration, Albumin, Globulin, Cholesterol and Triglycerides. The total protein concentration in blood plasma was measured using (kit) tool equipped by Randox. This tool was based on the Biuret method for the determination of the total protein. The test was performed according to the steps indicated by the company in the attached index with tool. The samples were then read using a spectrophotometer and a wavelength of 546 nm based on Henry *et al*. (1974). The albumin amount in the serum was estimated using the kit tool from Syrian company (Syrbio), a chromatic method. The albumin in the sample results in the presence of green bromocresol, a chromatic change from greenish-yellow to green at pH of (4.2). This color remains constant for a period of 60 seconds, During this period, the light absorption of the sample is measured at a wavelength of 628 nm using the optical spectrometer, The Globulin level in serum was estimated by method of Bishop *et al*. (2000) by the following equation :

Globulin (g/100 serum) = Total Protein – Albumin

The concentration of cholesterol in blood plasma was estimated by tool use. The test was performed according to the attached index to the kit. This test was performed as a result of the interaction of cholesterol with ferric chloride and concentrated sulfuric acid. This reaction results in a pink color that can be measured using a light spectrometer according to Franey and Elias (1968). The concentration of Triglycerides was estimated using the standard prepared and produced by Spanish company (Linear Chemicals) and according to the method indicated by Toro and Ackermann, 1975). The Completely Randomized Design was used to study the effect of different treatments in the studied traits, significant differences between the averages were compared with the use of the Dunkin Multidimensional Test (Duncan, 1955) and the Statistical Analysis Program (SAS) (SAS Institute, 2010) was used for data analysis.

Results and Discussion

Table 2 indicates significant differences ($p < 0.05$) between the fourth treatment and the other experiment treatments in the total protein level in the birds' blood. The highest serum concentration was recorded for the fourth treatment of (4.03 g/100 ml serum) compared with the rest of the experiment, which recorded the lowest level in the serum reached (3.26, 3.38, 3.53 g/100 ml serum) for the first, second and third treatments, respectively.

The results of the table also showed significant differences in Albumin concentration level in serum of the birds between experiment treatments and control treatment. The first treatment recorded the lowest level reached (1.62 g/100 ml serum) compared to the third and fourth parameters that recorded the highest level of albumin in serum of the birds of (1.75 and 2.04 g / 100 ml serum) respectively followed by the second treatment which recorded (1.67 g/100 ml serum) without significant difference from the rest of the treatments.

The results of the study are showed that the addition

Table 1 : The ratio of feed materials in the formation of the initiator ration and the growth ration used in the experiment with the calculated chemical composition of both rations.

Feed materials	The initiator ration (1-21 day) %	The growth ration (22-35 day) %
Yellow corn	48.2	58.7
Local wheat	8	7.5
Soybeans (44% protein)	28.5	20.5
Proteins Center*	10	10
Vegetable oil	4	2.5
limestone	1	0.5
Food salt	0.3	0.3
Total summation	100%	100%
	The calculated chemical analysis**	
Representative energy (kCal / kg)	3079	3102.6
Crude protein (%)	22.06	19.37
Lysine (%)	1.21	1.03
Methionine + Cicin (%)	0.82	0.75
Raw fiber (%)	3.54	3.2
Calcium (%)	1.2	0.95
Phosphorus Ready (%)	0.44	0.42

*A Belgian protein center established, containing one kilogram of: 2200 Kilocalories of energy represented 40% crude protein, 8% fat, 3.5% fiber, 25% ash, 8% calcium, 3.1 phosphorus ready, 1.2% lysine, 1.2% methionine, 1.8% methionine + 70 mg, D 2500 IU 3, A Systeine, 2% chlorine, 10.000 IU, 12 mg folic acid,12 mg B 250, B 120 mg Bantokinic acid, 400 mg Niacin, 50 mg 6, B vitamin 2 5000 mg Colloid, Iron amalgam, 70 mg copper, 600 mg, C 600 microgram biotin, 1000 mg special vitamin, 750 manganese, 5 mg iodine, 1 g cobalt, 1 mg selenium, antioxidants

**According to the chemical composition according to the analysis of feed materials inNRC (1994).

Table 2 : Effect of adding different concentrations mint oil to the ration in Total Protein, Albumin and Globulin of broiler chicks (arithmetic mean ± standard error).

Treatments	Total Protein (g/100ml)	Albumin (g/100ml)	Globulin (g/100ml)
T1	3.26 ± 0.08 b	1.62± 0.02 b	1.64 ± 0.05 b
T2	3.38 ± 0.06 b	1.67 ± 0.02 ab	1.71 ± 0.03 ab
T3	3.53 ± 0.05 b	1.75±0.01 a	1.78± 0.08 ab
T4	4.03 ± 0.03 a	2.04 ± 0.04 a	1.99 ± 0.07 a
Significance level	*	*	*

T1, T2, T3, T4: feed add to it a mint oil with a level of 0, 600, 800 and 1000 mg/ kg feed, respectively.

* The different letters in each column indicate significant differences between the mean of the coefficients at ($p < 0.05$).

of mint oil has played an important role in reducing the exposure of birds to any type of stress by increase the metabolic rate of food and increase the body's vital reactions and thus build muscle tissue, which results in maintaining a high rate of total protein and albumin in the serum for the third and fourth treatments birds compared to the first treatment as the peppermint oil has a wide content of nutrients such as iron, calcium, sodium and potassium as well as vitamins A, C and Riboflavin and amino acids, especially Tryptophan, which is one of a reflection of good health (Sivropoulon *et al*., 1995). As for the level of Globulin, the fourth treatment recorded the highest level of serum (1.99 g/100 ml serum), with a significant difference ($p < 0.05$) compared to the first treatment, which recorded a minimum level of (1.64 g/ 100 ml serum), either The second and third treatments were no significant differences between them and between the first and fourth treatments. This is due to the biological properties of active oils in mint, flavonoids and carotene, as well as vitamin C, which play an important role as antioxidants and improve the immune system of the bird (Lavinia *et al*., 2009), which may play a role in raising the level of serum immunoglobulin in the serum and this reflects the susceptibility of birds to enhance cellular immunity and increase body immunity. The results of table 3 showed significant differences in

Table 3 : Effect of adding different concentrations mint oil to the ration in Cholesterol and Triglycerides of broiler chicks (arithmetic mean ± standard error).

Treatments	Cholesterol (g/100ml)	Triglycerides (g/100ml)
T1	159.33 ± 17.80 a	64.29± 3.91 a
T2	110.55 ±4.83 b	50.57 ± 2.38 b
T3	93.33 ± 4.69 b	45.85 ± 1.96 bc
T4	115.00 ± 13.65 b	35.57 ± 6.18 c
Significance level	*	*

T1, T2, T3, T4: feed add to it a mint oil with a level of 0, 600, 800 and 1000 mg/kg feed, respectively.
* The different letters in each column indicate significant differences between the mean of the coefficients at ($p < 0.05$).

the level of fat image in the serum of the birds of the treatments and the first treatment (control). It was noted that the lowest level of serum cholesterol was recorded for the second, third, and fourth treatments (110.55, 93.33, 115.00 mg/100 ml serum) respectively compared to the first treatment (control), which recorded the highest level of cholesterol in the serum, reaching (159.33 mg/100 ml serum). The same table 3 also showed significant differences ($p < 0.05$) between the experiment treatments at the level of triglycerides. The second, third and fourth treatments recorded the lowest values of this traits (50.57, 45.85 and 35.57 mg/100 ml serum) compared to the first treatment (control), which recorded the highest values of this trait of (64.29 mg/100 ml serum).

The reason for the ability of peppermint oil to reduce the level of cholesterol and triglycerides in the serum to the presence of active substances, phenolic compounds, which play a large role in the suppression of free radicals and remove and reduce the fatty acids in plasma of blood, Flavonoids play an important role in the reduction of cholesterol esters and has the role In preventing oxidative decomposition of fat (Ka *et al*., 2005), the Choudhury *et al*. (2006) indicated the presence of phenolic acids, flavonoids and terpenes, which gain plant antioxidant activity play an important role in lowering serum lipid level. In addition, plant containment of carveol, an active substance similar to that found in thyme, inhibits the absorption of grease in the intestines (Ocak *et al*., 2008). In addition, the good content of vitamins, especially vitamin A and C, and the ability to promote the role of the plant as an antioxidant in the cell and reduce the oxidative voltage activates the body cells, as the Siegal and Gould (1983) noted to that the ability of vitamin C to inhibit the secretion of corticosterone from the cortex of the adrenal gland as reflected on the activity of the thyroid gland and then lead to a reduction in the level of cholesterol.

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