Effect of Anti-Riboflavin factor in the residues of the tomato paste industry on the Physiological and Biochemical traits of broilers

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Summary

The aim of this study was to investigate the effect of anti-riboflavin factor in dried tomato seed meal on some physiological and biochemical traits of broiler. This study was conducted at the poultry farm of the Veterinary Medicine College at Baghdad University. A total of (150 broiler chicks) were used in this study for 56 days. The chicks were randomly distributed into five treated groups, 30 chicks for each period. Chicks at the age of 3 days were fed *Ad libitum* during the whole period and dried tomato seed meal was added to the diets of birds at the concentration of 0, 2.5, 5, 7.5 and 10% respectively. The results revealed that dietary supplementation with different levels of dried tomato seed meal resulted in a significant ($P \leq 0.05$) improvement regarding physiological and health traits. Also, adding 10.0% of dried tomato seed meal was the best among the other dietary supplementation levels of tomato seed meal. No signs of riboflavin deficiency appeared on broiler chicks.

Keywords: Anti-Riboflavin factor, Residues, Tomato paste industry, Broilers.

Introduction

Raiboflavin (B2) is a water-soluble vitamin that plays a very important role in the growth of poultry and is associated with protein. This vitamin plays a role in the growth of chicken embryos, modern broiler eggs and subsequent growth (1-3). Vitamin riboflavin is a thermally stable vitamin in normal cases. There are some compounds that contribute to inhibition of absorption and fracture, which is reflected in the deterioration of growth and show symptoms and symptoms of visual impairment and problems in the nervous system and problems of standing and balance and deterioration of skin condition and the emergence of the condition of the finger twisted legs and paralysis sometimes (4 and 5).

Many studies have indicated that eating tomatoes and their products or their dehydrated residues contributes to the improvement of the health and productivity of tomato and their products or their residues from important natural compounds antioxidants such as red lycopene, carotenoids, water-soluble vitamins and many other compounds (6-8). Also (9) found that the percentage of tomato wastes (seeds and cuticles) had high protein content. Other researchers (10) pointed to the possibility of using the graft of the tomato at rates ranging between 8-15% without affecting the productive performance of the white chicken or the quality of the eggs produced while the egg yolk color improved significantly. The possibility of using 12% of the waste of dried tomatoes in the reader whiteness and did not have a negative impact in the production of eggs or productive efficiency (11). Authers (12) describe that adding the seeds of dried tomatoes to the chick larvae by 15% without any significant deterioration in the body weight and the weight increase and feed consumption until the age of 21 days of continuous feeding of the fact that the tomato is rich in high quality protein. While (13) reported that the dried tomato extract can be a successful and economically viable alternative to the percentage of wheat in white chicken diets and has an important role in improving the color of egg yolks produced. Also (14) found that the percentage of dried tomato and added to white chicken lovers contributed to the improvement of final body weight, feed consumption, food conversion efficiency and egg weight, but it did not affect the percentage of egg production.

A number of local studies indicated that the addition of lycopene to female gazelle diets resulted in a significant improvement in the biochemical characteristics of the blood serum in local female geese, which included the concentration of glucose, protein, cholesterol

and triglycerides (15). In addition, (16) reported that the addition of lycopene extracted from the tomato in the white chicken diets showed a significant decrease ($P<0.05$) in the level of the liver enzymes Aminotransferase (AST) and Alanine Aminotransferase (ALT) and the concentration of monaldehyde (MDA) Alkaline phosphatase (ALP) in serum compared to control treatment. The researcher (17) showed the possibility adding the seeds of dried tomatoes to the chick larvae by 15% without any significant deterioration in the body weight and healthy status of chicks. In spite of (18) reported that the seeds of tomatoes contain an anti-vitamin riboflavin compound. This research aims to study the effect of the addition of different levels of the waste of the tomato seed meal industry to improve some physiological and biochemical traits of broiler.

Materials and Methods

This research was carried out in the poultry field of the Public Health Branch at the Faculty of Veterinary Medicine/ Baghdad University to study the effect of adding different levels of the residues of the dried tomato seed meal industry to the diet in the physiological blood components and some health indicators for the meat broiler. The chicks were randomly distributed into five treatments, with 30 chicks per treatment. Birds were fed free feeding on the stock throughout the breeding period as in (Table 1 and 2). The chicks were vaccinated by Newcastle (Lasota) at the ages of 7, 17 and 27 days and by Gambaro vaccine at the age of 10 days.

Table, 1: Diets used and their components.

Treatment Ingredient	T1	T2	T3	T4	T5
Residues of dried tomato seed meal industry	٠,٠	٢,٥	٥,٠	٧,٥	١٠,٠
Yellow corn	٦٠,٠	٥٩,٠	٥٨,٠	٥٧,٠	٥٥,٠
Soybean Meal 44%	٣٨,٧	٣٧,٢	٣٥,٧	٣٤,٢	٣٣,٧
Lime Stone	٠,٧	٠,٧	٠,٧	٠,٧	٠,٧
salt	٠,٣	٠,٣	٠,٣	٠,٣	٠,٣
premix	٠,٣	٠,٣	٠,٣	٠,٣	٠,٣
Total	١٠٠	١٠٠	١٠٠	١٠٠	١٠٠
protein	٢٢,٦	٢٢,٥	٢٢,٤	٢٢,٣	٢٢,١
Total energy	٢٩٣٠	٢٩٢٠	٢٩٠٠	٢٨٩٣	٢٨٩٠

Treatment 1: 0.0% Residues of dried tomato seed meal (control).
Treatment 2: 2.5% Residues of dried tomato seed meal industry.
Treatment 3: 5.0% Residues of dried tomato seed meal industry
Treatment 4: 7.5% Residues of dried tomato seed meal industry.
Treatment 5: 10.0% Residues of the dried tomato seed meal industry.

Table, 2: Chemical composition of the dried tomato seed meal industry.

Chemical Analysis	Percentage %
Protein	٢٤,٣
Ash	٣,١
Lipids	١٩,٢
Fiber	٣٣,٣
Charbohydrate	٢٠,١
Total	١٠٠

When the chicks reached the age of 56 day, blood samples were collected from the jugular vein (1 ml syringe) of nine chicks from each treatment. Blood was collected by test tubes containing anti coagulant for the assessing the Red blood cells count (RBC), Hemoglobin concentration and PCV were estimated according to (19). The concentration of total serum protein according to the instructions was attached to the prepared kit produced by Biomaghreb, according to the method indicated by (20). The procedure follows the accompanying leaflet with the standard kit attached by the French company REACTIFS BIOLABO according to the manner indicated by (21). The concentration of uric acid in the serum was measured according to instructions attached to the prepared kit produced by Biomaghreb. The models were read along 510 nm wavelengths using the spectrometer based on (22).

Aminotransferase (AST) and Alanine Aminotransferase (ALT): The efficacy of these two enzymes in the serum was measured using kit prepared by Randox Laboratories (LTD) imported from the local market. This kit was adopted on the Calorimetric method. The test was based on RANDOX instructions for the kit and the samples were then read on the spectral scale along a 546 nm wavelength.

Alkaline Phosphatase (ALP): This test was conducted using steps described in the attached leaflet for the equipment supplied by the French company BioMerieux, which was based on the chromatic method to estimate the activity of this enzyme. Spectrophotometers and wavelengths of 510 nanometers.

The statistical program (23) used for analysis of data to study the effect of various treatments in Safat studied according to the complete random design (CRD). The differences between the averages were compared with the Duncan Multilevel Test (24).

Results and Discussion

Table (3) showed a significant effect (P<0.05) to add the residues of tomato seed meal in PCV, Hb, and RBC in birds at 28 days. Values were increased with the increase concentration of dried tomato seed meal, and with the age of 56 days, the addition of the residues of the dried tomato seed meal diet showed to the treatment were significantly increased (P<0.05) in PCV, Hb and RBC. The addition of 10% (the fifth treatment) was the best.

Table, 3: The effect of the addition residues of the tomato paste industry of some blood parameters of the broiler at the age of 28 days and 56 days.

Treatment	At the age of 28 days			At the age of 56 days		
	PCV (%)	Hb (gm%)	RBC (mm)6	PCV%	Hb (gm%)	RBC (mm)6
T1	b 31.26±0.022	b 6.08±0.021	b 33.29±0.05	c 36.44±0.04	c 7.71±0.02	c 36.93±0.03
T2	ab 31.52±0.033	b 6.12±0.024	ab 33.61±0.06	bc 36.61±0.05	bc 7.90±0.02	b 37.33±0.04
T3	a 31.87±0.028	ab 6.51±0.022	ab 33.60±0.06	b 36.88±0.03	b 8.16±0.02	ab 37.50±0.04
T4	a 31.98±0.026	a 6.87±0.019	a 34.12±0.03	a 37.51±0.04	a 8.52±0.02	a 37.67±0.04
T5	a 32.14±0.027	a 6.97±0.021	a 34.33±0.03	a 37.58±0.03	a 8.61±0.02	a 37.68±0.04

Means with different letters in the same column significantly different (P <0.05)

Values increased at the age of 56 days than 28 days but the addition of 10% (the fifth treatment) was the best and with the age of 56 days. Table (4) shows that the added of residues of tomato seed meal paste industry contributed significantly (P<0.05) to increase the protein concentration at the age of 28 days, also the fifth treatment significantly (P<0.05) increased the values and contributed to the rest of the process of adding the wastes of the dried tomato seed meal industry. At the same time, the addition of residues of tomato seed meal paste industry contributed significantly (P<0.05) to decrease the cholesterol and uric acid in the serum. The treatment with 10% (fifth treatment) of residue of the tomato paste industry was the best among other treatments and control. The effect of the addition of the dried tomato seed meal residues to the treatments improved the chemical characteristics of the broiler blood under study.

Table, 4: The effect of the addition residues of the tomato paste industry on some blood parameters of the broiler at the age of 28 days and 56 days.

Treatment	At the age of 28 days			At the age of 56 days		
	Protein (gm/L)	Cholesterol (mg/100ml)	Uric acid (mg/Dl)	Protein (gm/L)	Cholesterol (mg/100ml)	Uric acid (mg/Dl)
T1	c 4.12±0.01	a 176.33±0.04	a 3.41±0.001	b 5.10±0.06	a 193.33±0.88	a 4.06±0.031
T2	bc 4.22±0.02	b 162.00±0.05	ab 3.38±0.030	a 5.27±0.05	ab 191.0±0.58	a 4.07±0.033
T3	b 4.54±0.01	b 163.00±0.04	bc 3.30±0.030	a 5.30±0.03	bc 188.67±0.88	a 4.00±0.01
T4	a 4.68±0.01	c 155.00±0.03	c 3.25±0.001	a 5.37±0.034	c 187.0±1.00	a 4.00±0.01
T5	a 4.87±0.02	c 152.00±0.04	c 3.23±0.001	a 5.37±0.034	c 187.0±1.00	a 4.00±0.01

Means with different letters in the same column significantly different (P <0.05).

The adding of the dried residues tomato seed meal industry significantly (P<0.05) lead to increase the activity of liver function enzymes such as AST, ALT and ALP enzymes in the chorionic serum compared to the control group at the age of 28 days and 56 days (Table, 5).

Table, 5: The effect of the addition residues of the tomato paste industry in some blood enzymes to the broiler at the age of 28 days and 56 days.

Treatment	At the age of 28 days			At the age of 56 days		
	GOT(IU)	GPT(IU)	ALP(IU/L)	GOT(IU)	GPT(IU)	ALP(IU/L)
T1	c 82.3±1.18	b 9.5±0.02	c 25.43±0.03	b 101.96±1.12	c 11.81±0.30	c 34.47±0.24
T2	bc 89.6±1.18	ab 9.8±0.02	b 26.21±0.02	ab 103.51±1.15	c 11.87±0.33	b 34.99±0.25
T3	b 94.1±1.16	a 10.4±0.02	b 26.29.003	a 103.82±1.20	b 12.53±0.34	ab 35.13±0.31
T4	ab 95. 7±0.20	a 10.7±0.02	ab 26.84±0.03	a 104.70±1.18	a 13.37±0.58	a 35.79±0.30
T5	a 103.3±1.18	a 10.8±0.02	a 26.95±0.03	a 104.78±1.20	a 13.43±0.58	a 35.84±0.29

Means with different letters in the same column significantly different (P<0.05).

Despite the fact that the researcher (18) that the seeds of tomatoes contain a compound against the anti-vitamin riboflavin and that the addition of proportions of them caused the emergence of shortage of riboflavin in poultry, a numerous of studies indicated that there is a positive effect of the residue of tomato and the content of lycopene (25-26). Lycopene is an effective antioxidant that promotes protection against oxidative damage of living cells, as blood cells in the body. This positive role in poultry as it reduces oxidative stress. Others (27) confirmed a positive effect of adding different levels of lycopene to the diet in increasing growth and improving the efficiency of food conversion in birds. The reason for the increased concentration of protein in the serum fed to a diet supplemented by tomato seed is the high lycopene potential as an antioxidant that protects the protein from oxidation and reduces the risk of free radicals (28). In addition, tomatoes and lycopene work to increase the concentration of insulin-like growth factor (IGF-I) as it stimulates the liver to increase its production. IGF-I increases protein production in cells (29).

The role of lycopene in improving chicken production performance, increasing protein concentration in the blood and increasing growth (30). The reduction of cholesterol in the blood of the birds may be due to treated with the residues of the dried tomato seed meal industry. The high concentration of fiber in the residues of the dried tomato seed meal industry (more than 33%), since fiber has a significant role in reducing cholesterol concentration in blood, Lycopene in the residues of the dried tomato seed meal industry, where lycopene has a deleterious effect on the enzymes responsible for the manufacture of cholesterol (31). Lycopene acts to inhibit the enzyme hydroxy methyl glutarylase reductase (HMG), the primary enzyme for the production of cholesterol in the liver (32). It was noted that the residue of the fruits of tomato and lycopene have the ability to reduce the concentration of fat in the serum by inhibiting the process of manufacturing fat in the liver and this is confirmed by (33), found that lycopene works to inhibit the process of manufacturing cholesterol and triglycerides, which significantly reduced in the blood. While (34) showed a decrease in the concentration of triglycerides and an increase in antibody concentration in the treatment of lycopene compared with the control treatment. It was explained that the anti-oxidant lycopene reduced fat levels and enhanced immunity.

The activity of the enzymes, including AST and ALT, is an indicator of liver efficiency and activity in the conversion of protein compounds to glucose, this is a good indicator of the health status of the adult and 28 and 56 days old (35). The ALP enzyme contributes to the formation of bones and any increase in the ALP enzyme reflects the increase of this enzyme in the skeletal, kidney and intestines. Several studies also indicated a significant positive correlation between the concentration of the basal phosphatase in the serum with the concentration of calcium and phosphorus in the serum and bone production, the ALP is an enzyme that is associated with the production status of bone (36).

The absence of any signs of riboflavin deficiency in the addition of dried tomato seed meal residues at rates of 2.5, 5.0, 7.5 and 10.0% negates the hypothesis of an anti-

riboflavin factor in tomato seeds (18). The study recommends the possibility of using high rates of dried tomato seed meal production of up to 10% without any health problems as well as improving the productive performance of poultry. In Conclousion, the addition of the residues of the dried tomato seed meal to the diet showed a significant increase ($P<0.05$) in PCV, Hb and RBC. The protein concentration at the age of 28 days contributed significantly ($P<0.05$) to increased when broilers fed on dried tomato seed meal. At the same time, the addition of residues of tomato seed meal paste industry contributed significantly ($P<0.05$) to decrease the cholesterol and uric acid in the serum, Also the adding of the dried residues tomato seed meal industry significantly ($P<0.05$) lead to increased the activity of AST, ALT and ALP enzymes.

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تأثير العامل المضاد للرايبوفلافين في مخلفات صناعة معجون الطماطة في الصفات الفسلجية والكيموحيوية لفروج اللحم

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الخلاصة

أجري هذا البحث في حقل الطيور الداجنة التابع لفرع الصحة العامة في كلية الطب البيطري/ جامعة بغداد لإثبات عدم وجود عامل مضاد لفيتامين الرايبوفلافين (B2) في الدواجن عند اعطاء مخلفات صناعة معجون الطماطة بحالتها الطبيعية. فقد دُرس تأثير إضافة مستويات مختلفة من مخلفات معجون الطماطة المجففة إلى العليقة. استخدم في التجربة 150 فرخ من سلالة هابروفوكس ووزعت الأفراخ عشوائياً على خمس معاملات وبواقع (30) فرخ لكل معاملة. غذيت الأفراخ تغذية حرة واضيفت مخلفات معجون الطماطة المجففة إلى العليقة بخمسة تراكيز هي ٠,٠ و ٢,٥ و ٥,٠ و٧,٥ و ١٠,٠% من العلف على التوالي طيلة مدة التجربة. أشارت النتائج إلى أن إضافة نسب من مخلفات معجون الطماطة المجففة إلى علائق أفراخ اللحم ادت إلى تحسن معنوي ($P\leq0.05$) في معظم مكونات الدم الفسلجية والمؤشرات الصحية مقارنة بمعاملة السيطرة وكانت معاملة إضافة ١٠,٠ % من الكسبة هي الافضل من بين معاملات مخلفات معجون الطماطة المجففة ولم تظهر أي اعراض لنقص فيتامين B2 على الأفراخ.

الكلمات المفتاحية: العامل المضاد للرايبوفلافين، مخلفات، صناعة معجون الطماطة، فروج اللحم