

## Effect of Adding Lycopene to the Ration on Some Blood Serum Biochemical Traits of Broiler Ross 308

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### Abstract

This study was conducted at Poultry Farm of Animal Resources Dept., College of Agriculture, University of AL-Qasim Green to investigate the effect of adding Lycopene to the ration on some blood serum biochemical traits of broiler Ross 308. Use the 90 broiler chicks Ross 308 day-old were randomly assigned to three treatments (by 3 replicates per treatment 10 chicks per replicate), and treatments were as follows: control group without adding lycopene to the diet, add lycopene by 250 mg / kg feed (first treatment) and add lycopene by 500 mg / kg feed (second treatment). The experiment included a study of the following characteristics: concentrations of glucose, protein, cholesterol and triglycerides.

The results indicated that the addition of lycopene by 250 and 500 mg / kg feed to broiler diet led to a significant improvement in blood serum biochemical traits of broiler.

**Keywords:** lycopene, blood serum biochemical traits, broiler

### Introduction

The tomato is one of the basic human health fruits where tomatoes contain vitamin A, and vitamin C, potassium, folate and beta-carotene and carotenoids, which the most important of lycopene and beta-carotene and lutein and proved that the lycopene found in tomatoes of the most powerful antioxidants which protect against chronic diseases (Agarwal and Rao, 2000) confirmed. Many studies that whenever tomato products consumption average, the lower the proportion of cancer and heart disease incidence and this is due to the lycopene found in tomatoes (Wu et al., 2004) and is lycopene one of the most important carotenoids and pigments responsible for the red color in mature tomato (*Lycopersicon esculentum*) and products tomato (Shi and Maguer, 2000), which is a natural red dye made by some plants and microorganisms during the process of photosynthesis to protect it from the optical activity (Rao and Rao, 2004) is found in vegetables and some types of fruit with red dye (such as pineapple, orange, tomato, grapefruit, strawberries and sweet peppers) and is the main source of this in the human diet tomato, only been identified six forms of carotenoids found in food and in the blood and body tissues and these carotenoids are:  $\alpha$ - and  $\beta$ -carotene, lycopene,  $\beta$ -cryptoxanthin, lutein, zeaxanthin (Borel et al., 2007). The antioxidants important fodder as additives and to its role in improving the qualities of productivity and physiological poultry and strengthen the immune status and improve the quality of the eggs as well as the impact of anti-oxidation (Sahin et al, 2006 a) and lycopene is a powerful antioxidant which provides protection against the body's cells damaged by free radicals and this importance be helpful to poultry as free radicals formed in the body of the chicken at higher temperatures and in cases of stress and when rapid growth and higher production and metabolism.

Most studies have focused on the role of lycopene in the promotion of public health for humans and its role effectively a natural antioxidant in addition to his role in the protection of humans from heart disease and various cancers. There were no studies on this article in the field of poultry, but in a limited way so it was the aim of this study was to determine the effect of lycopene in addition to diet broiler on some blood biochemical characteristics.

### Materials and methods

This study was carried out at the poultry farm of Animal Resource college of Agriculture, University of AL-Qasim Green from 14/3/2015 to 18/4/2015. Use the 90 chick broiler chickens Ross and an average weight of 43 g. Been raising chicks in cages ground dimensions (2 × 2) m, and chicks were distributed randomly on three treatments (by 3 replicates per treatment 10 chicks per replicate), It has been providing feed for the birds freely and fed the birds on a ration (Table 1). Treatments were as follows: control group without adding lycopene to the ration, add lycopene by 250 mg / kg feed (first treatment) and add lycopene by 500 mg / kg feed (second treatment). The experiment included a study of the following characteristics: Glucose concentration, protein, cholesterol and triglycerides as was the blood collection in weeks 3 and 5 of 6 birds of each transaction (2 birds from each repeater) wildly as the collection of blood from a vein brachial where the use of pipeline container on the mind clotting Potassium EDTA to prevent blood clotting and was placed in the centrifuge at the speed of 3000 r / min for 15 minutes and for the purpose of blood plasma separation was keeping plasma frozen at a temperature of -20 ° m to until the laboratory tests, which included the concentration of glucose, protein, cholesterol and triglycerides, where were measured the concentration of glucose in the blood plasma and through the use of (several) measurement solutions ready (Kit) from the production of English Randox company

where his focus has been estimated using the optical method mentioned by Asatoor and King (1954). Were measured total protein concentration in the blood plasma through the use of several (Kit) supplied by the company (Randox) English has this count was based on the way payourat ((Biuret method to estimate the total protein was conduct the examination on the basis of the steps referred to by the company processed in the directory supplied with the kit was then read samples using Spectrophotometer and a wavelength of 546 nanometers and based on Henry and others (1974). The estimate cholesterol concentration in the blood plasma through the use of several has been screening in accordance with the annex to the guide with the kit where this test result cholesterol interaction with ferric chloride and concentrated sulfuric acid is produced for this interaction color pink (pink) can be measured optically using Spectrophotometer according to Franey and Elias (1968). was estimated concentration triglycerides where used the kit standard ready-made and produced by Linear chemicals company Spanish, by the way in which referred to (Toro and Ackermann, 1975) .

Data were subjected to an ANOVA using the General Linear Models (GLM) procedures of SAS (2010). Significant treatment means were separated by using the multiple range test of Duncan (Duncan, 1955) .

**Table 1. Composition of experimental ration.**

Ingredients (%)	Starter	Grower
	1 – 21 days of age	22 – 35 days of age
Yellow corn	59	35
Wheat	-	32.5
Soybean meal	30	20
Protein centaverage <sup>(1)</sup>	10	10
Sunflower oil	-	1.5
Limestone	0.7	0.7
Salt	0.3	0.3
Total	100	100
<b>Calculated chemical structure <sup>(2)</sup> (%)</b>		
Crude protein	23.12	20.42
ME, Kcal / Kg feed	2936	3068
Lysine	1.30	1.07
Methionine	0.53	0.48
Calcium	0.92	0.91
Available phosphorus	0.55	0.46

<sup>(1)</sup> Protein centaverage used was Golden which imported from Jordan. However, this centaverage provided per Kg: 49% crude protein; 2900 ME K cal / Kg; 15% crude fat; 20% Ash; 5.6% calcium; 3.1% available phosphorus; 3.4% lysine; 2.4% methionine; and 3.2% methionine + cystine.

<sup>(2)</sup> Chemical structure was calculated according to the analysis of diet material found in NRC (1994).

## Results and discussion

table (2) obtain significant increase ( $p < 0.05$ ) in the concentrations of glucose in the blood plasma of the control group with the highest concentration of glucose reached 202.83 and 215.87 mg / 100 ml in two weeks, the third and fifth, respectively, while the second treatment recorded the lowest concentration of glucose 3 and 5 weeks as compared to control and the first and amounted to 145.81 and 152.93 mg / 100 ml, respectively, followed by the first treatment recorded 179.32 and 182.46 mg / 100 ml, respectively, and return the ability of high-lycopene to reduce the concentration of glucose in blood to its effective role in protecting the pancreas, especially beta responsible for insulin secretion from free radical damage and improve their work, leading to ensure the availability of insulin in blood and maintaining the level of glucose without altitude above normal rates, to the continued entry of sugar into the cells, which is the mainstay of the energy cells, on the one hand and on the other hand has lycopene ability High focus on reducing fat and cholesterol, which maintains the insulin receptors in cell membranes as it was found that the high concentrations of fat and cholesterol works to close these receptors, leading to an imbalance in glucose metabolism (Barbara et al., 2009). Also stressed Shain and others (2006 a) that there is an effective role for lycopene in productive performance and Physiologic in poultry, high ability to reduce the concentrations of glucose and cholesterol in blood. As physiological study indicated the existence of a positive relationship between the rich lycopene food intake and protection from pancreatic disease as lycopene, which protects the pancreas cells from free radicals and improve their work (Sridevi, 2008), also contributes to lycopene in maintaining liver cells and increase its efficiency, (Rao and Shen, 2002) .

Table (2) Effect of adding lycopene to the ration in the concentration of glucose mg / 100 ml

Age (week)		Treatments
5	3	control group
a 8.36±215.87	a 6.34±202.83	
b 4.92±182.46	b 7.63±179.32	first treatment
c 7.67±152.93	c 8.90±145.81	second treatment
*	*	Level of significance

\* : P<0.05

It is seen from the table (3) that the addition of different concentrations of lycopene may have led to increased concentrations of total protein in blood plasma as compared to control, outperforming the first treatment and the second control group and teams significantly (p 0. 05) in the third week, reaching 3.64 and 3.53 gm / 100 ml, respectively. While the control group recorded a 2.31 g / 100 ml. The fifth week we note the continued superiority and the second first treatment was significantly (0.05> P ) to the control group where highest concentration of total protein and stood at 4.61 and 4.88 g / 100 ml, while the control group registered the highest concentration of total protein and amounted to 3.24 g / 100 ml. Many studies have indicated that there is a positive impact of lycopene in productive performance and the quality of meat and eggs in poultry (Botsoglou et al., 2004) as the lycopene is an antioxidant effectively enhances the protection against oxidative damage living cells and this role is positive in poultry as it reduces the oxidative stress it is clear that the high-speed growth and high feed conversion efficiency lead to oxidative stress for the birds, and that lycopene plays an important role in strengthening the antioxidant defense system in the body. Sevcikova and others have said (2008), the positive effect of adding different levels of lycopene in the diet to increase growth and improve the efficiency of feed conversion in birds. The reason to increase the protein concentration may be in the blood serum of broiler chickens on a bush lycopene is added to the high susceptibility of the antioxidant lycopene protects the protein from oxidative stress and reduce the risk of free radicals (Rao and Shen, 2002). Also, lycopene is working to raise the growth I Insulin-like concentration factor Insulin like growth factor stimulates the liver where to increase its production and works (IGF-I) to increase protein production in cells (Alina et al., 2007) . Englmaierova et al., (2011) on the role of lycopene in improving the productive performance of chickens and increase the concentration of protein in the blood and increase growth. This result agreed with Barbara et al., (2009) as he found that there is a significant role for lycopene in maintaining the level of protein in the blood as well as the ability of high lycopene in increasing concentrations of steroid hormones that stimulate and increase the rate of growth may be another reason to raise the protein concentration in the blood serum .

Table (3) Effect of adding lycopene to the ration in the concentration of Total protein mg / 100 ml

Age (week)		Treatments
5	3	control group
b 0.05 ± 3.24	b 0.06 ± 2.31	
a 0.07 ± 4.61	a 0.04 ± 3.64	first treatment
a 0.08 ± 4.88	a 0.03 ± 3.53	second treatment
*	*	Level of significance

\* : P<0.05

The table indicates (4) that the addition of lycopene to the diet resulted in a significant decrease (0.05> P) to the concentration of cholesterol where second treatment recorded the lowest concentration of cholesterol and lead moral (0.05> P) for treatments to control the first and reached 112.05 mg / 100 ml, followed by the first transaction recorded 131.13 mg / 100 ml and a difference of moral for the control group, which recorded the highest concentration of cholesterol and reached 165.21 mg / 100 ml and when the third week of the experiment, when the fifth week, the second treatment continued to register the lowest rate of cholesterol in the blood serum as recorded 117.10 mg / 100 ml, followed by the first transaction recorded 138.23 mg / 100 ml while the highest concentration of cholesterol control and reached 171.06 mg / 100 ml. The decrease in cholesterol in the blood serum lycopene transactions may be due to the role of lycopene in inhibiting cholesterol manufacturing, which led to a reduction in serum concentration as the influence of lycopene inhibitor of enzymes responsible for cholesterol manufacturing (Amany et al., 2009). As the lycopene works on the inhibition of enzyme Hydroxy

methyl glutaryl COA reductase, a key enzyme for the manufacture of cholesterol the liver (Laker, 1996). Also, lycopene works to strengthen the work of the enzyme alpha-7 Hidroxaz responsible for converting cholesterol into bile salts, leading to lower cholesterol level (Murray et al., 2003). High capacity of lycopene in reducing the cholesterol concentration in the blood may be returning to the role of lycopene in increasing the concentration of steroid hormones such as testosterone, progesterone and estrogen (Blum et al., 2006). Where the cholesterol is mainly manufacture these hormones and increase output (Sturkie, 2000), leading to a decline in its concentration in the blood serum. He said Sahin et al., (2006 b) to get a significant increase in egg production coupled with get significant decrease of cholesterol in the blood plasma of birds Japanese quail after that fed on diet supplemented with lycopene. Where the production of eggs require additional amounts of cholesterol to manufacture vitamin D3 for the purpose of calcium to precipitate provision shell limestone (Squires, 2003), where is cholesterol advances born Dihydroxycholecalciferol's, which is of great significance in the process of organizing calcium transport from the intestines to the uterus to precipitate the crust limestone Since the measure cholesterol concentration accompanied with egg production phase of the present experiment and including that of lycopene a positive impact in increase egg production and this was confirmed by Sahin et al., (2006 a) as it was found that there is a highly significant effect of the lycopene in increasing the production of eggs and yolks to the specifications quail so it became clear knowledge of the role of lycopene in reducing the cholesterol concentration .

Table (4) Effect of adding lycopene to the ration in the concentration of cholesterol in mg / 100 ml

Age (week)		Treatments
5	3	
a 2.41 ±171.06	a 2.31 ±165.21	control group
b 1.30 ±138.23	b 3.53 ±131.13	first treatment
c 2.65 ±117.10	c 1.27 ±112.05	second treatment
*	*	Level of significance

\* : P<0.05

Can be seen from the table (5) the existence of a significant decrease in the concentration of triglycerides in the blood serum, as it demonstrates that there is a moral superiority ( $0.05 > P$ ) for the control range of the lycopene transactions (first and second) when the third and fifth weeks of the experiment. Where the first treatment and the second lowest recorded level of concentration triglycerides, reaching 194.32 and 145.21 mg / 100 ml in the third week in a row, while the control group the highest recorded concentration of cholesterol and lead moral ( $0.05 > P$ ), amounting to 246.28 mg / 100 ml, and increased control group significantly ( $0.05 > P$ ) at a concentration of triglycerides in the fifth week compared treatment first, second and reached 256.38 mg / 100 ml, while the first treatment recorded and the second the following values of 203.21 and 178.54 mg / 100 ml, respectively, may be the reason in the ability of lycopene to reduce the concentration of triglycerides in serum is its ability in inhibiting triglyceride manufacturing process in the liver and this was confirmed by Agarwal and Rao (2000) found that as lycopene works on the inhibition of cholesterol and triglycerides manufacturing process, which led to a significant reduction in blood. As well as between Agarwal and Rao (2000) for a decrease in triglycerides and high concentration in the concentration of antibodies for transactions lycopene as compared to control and explained that the act of lycopene antioxidant led to the reduction of the level of fat and strengthen immunity. He studied Ševčíková et al (2008) Effect of different levels of lycopene to the bush on the amount of feed intake and the percentage of mortality weight body the final quarter of chicken meat and fats, blood where they were feeding chicks on three concentrations of 50.1002 million mg lycopene / kg feed where there are not severely affected significant transactions lycopene in the recipe feed consumption as compared to control, while I rate mortality be moral to transactions three lycopene compared with the control group, lycopene transactions also outperformed the body's final live weight compared with the control group has transactions made lycopene lower the proportion of fat in a piece of the chest, as well as less the rate of cholesterol and triglycerides in the blood serum and explained that lycopene reduces the formation of the triglycerides cholesterol or impede production.

Table (5) Effect of adding lycopene to the ration in the concentration of triglycerides mg / 100 ml

Age (week)		Treatments
5	3	control group
a 2.35 ± 256.38	a 1.24 ± 246.28	
b 1.54 ± 203.21	b 0.11 ± 194.32	first treatment
b 0.49 ± 178.54	b 2.63 ± 145.21	second treatment
*	*	Level of significance

\* : P<0.05

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