



# IMPACT OF ADDING DIFFERENT LEVELS OF (*THYMUS VULGARIS*) POWDER IN GROWTH DIETS ON SOME PHYSIOLOGICAL AND BLOOD BIOCHEMICAL TRAITS, OF TURKEY HYBRIDS

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## Abstract

This experiment was conducted in the field of poultry at the Department of Animal Production, College of Agriculture, Kirkuk University, to study the effect of using different proportions of thyme leaf powder (*Thymus vulgaris*) in the diets on some physiological characteristics, and some chemical blood parameter of the Turkey hybrid. A total 60 birds of Turkey at the age of 21 day, randomly assigned to 5 dietary treatment and each 4 replicates (3 birds per replicate) and the treatments were as follows (0, 0.5, 1, 1.5 and 2g thyme leaf powder/kg diet). The results showed that the containment of the diet on thyme leaf powder led to an increase in the concentration of total protein (TP) in the serum with a decrease in the concentration of each glucose (GLUG), very-low-density lipoproteins (VLDL) and triglycerides (TG) significantly in the fourth treatment (1.5 g/kg feed) compared to other treatments, the fifth group birds (2 g/Kg feed) a significant decrease in the concentration of cholesterol (CHOL) and low-density lipoproteins (LDL) in the serum, and significant increase in the concentration of high-density lipoproteins (HDL) in nutritional treatment added to thyme leaf powder (1, 1.5, 2 g/kg feed) compared to the first treatment (control) and the addition of thyme leaf powder (0.5, 1 and 2 g/kg feed) led to a significant increase in the concentration of glutathione and a significant decrease in the concentration of malonaldehyde in the blood serum compared to the treatment of control.

**Key words:** *Thymus vulgaris*, Growth Diets, Turkey Hybrids

## Introduction

Poultry meat is classified as a high-quality protein source and is preferred by consumers because it contains high sources of protein as well as its low concentration of calories and contains the essential amino acids for human health and growth (Panda, 1995). Poultry production is of great importance because of its high capacity to convert food that is not suitable for human consumption into food items of high nutritional value and suitable for human consumption (Yasin and Abdul Abbas, 2010) and poultry products are cheap compared to the meat of other livestock, because of their rapid growth and high efficiency of feed conversion (Ibrahim, 2000), and because research on poultry in Iraq limited to broiler, layer hens, and quail, there are few poultry birds researched on them such as turkeys, ducks, geese and current research has been conducted on turkey because it is a type of chicken that provides large quantities of

meat with a high protein content, vitamins and minerals of man and characterized by low meat content of cholesterol (Case and others, 2010).

Recently, most of the research in the livestock sector has focused on poultry nutrition, especially on the issue of improving feed mixtures used in nutrition, because the cost of feeding in poultry constitutes about two-thirds of the cost of total production (al-Kassar, 2010), as well as the awareness of health consumers and the desire of people to use natural substances planted because the diet is associated with many diseases all of this has prevented the use of feed additives with industrial sources such as antibiotics, Antioxidants and hormones as catalysts for growth in animal relationships in many European countries and America as a result of the damage they cause to human health due to the accumulation of residues of these substances in animal products and the trend of the use of natural plants instead of antibiotics (Castanon, 2007). One of these plants is the thyme plant, which belongs to the

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oral species Labiatae, an herbal plant that spreads in the Mediterranean region and a portion of thyme circulating in the local markets returns to the wild species and is spread in the western regions of Iraq (Hadithi, 1999) and is concentrated in the active substance of thyme in the leaves (Mossa, 1987).

Ozaki and others (2007) noted that the addition of thyme crushed by 70 mg/kg feed led to significant improvement in some of the productive and physiological qualities of broiler, Ali and others (2007) also noted that the addition of 0.25% of the thyme leaf to the layers chicken is an increase in egg numbers, food conversion and a decrease in body weight compared to the treatment of control, explaining that the content of thyme leaves for essential oils containing active substances against microbes, fungi and oxidase, which has led to improved digestion of nutrients. He also noted that the reason for improving growth and dietary conversion when adding thyme leaves to the diet is to improve thyroid gland activity and the reaction of hormones in metabolism and metabolism of elements Radwan (2003). Because of a few studies showing the effect of thyme leaf powder on the productive and physiological performance of turkey, the current research was designed to determine the effect of adding different levels of thyme powder in some of the physiological and productive qualities of turkeys.

### Materials and methods

This experiment was conducted in the field of poultry birds of the Department of Animal Production, College of Agriculture, Kirkuk University for the period from 29/10/2019 until 12/1/2020 for a period of (10 weeks) and aimed to study the effect of use different proportions of thyme leaf powder (*Thymus vulgaris*) in the diets on some physiological characteristics, and some chemical blood parameter of the Turkey.

### Experimental Design

In the experiment, 60 birds of unsexed 21-day-old turkeys were used from a special field in Koi Sanjaq district (Sulaimaniyah governorate). The chicks were reared on a deep litter system with feed and water supplied ad-libitum in a field divided by metal wire barriers in the form of cages (pens) area (2×1.5 m) and distributed the chicks randomly to 5 treatments by (12) chicks per treatment and divided the chicks of each treatment randomly by 4 replicate (3 chicks per replicate) and the duration of the breeding (10 weeks), preceded by a preliminary period of accustoming the birds to the relation of the experiment and for a period of (10 days) and did not collect the data and the nutritional transactions were as follows.

1st treatment control: the basic diet (starter and growth) does not contain thyme powder.

2nd treatment: a basic diet (starter and growth) added to 0.5 g/kg of thyme leaf powder.

3rd treatment: a basic diet (starter and growth) added to 1g/kg of thyme leaf powder.

4th treatment: A basic diet (starter and growth) added to 1.5g/kg of thyme leaf powder.

5th treatment: A basic diet (starter and growth) added to 2g/kg of thyme leaf powder.

### Nutrition

Table 1 shows the diet used in the experiment, as the amount of thyme leaf powder added to the diet was mixed by a horizontal mixer (made and designed to mix small quantities below 100 kilograms) to ensure the homogeneity of the distribution of thyme powder, and calculated the values of the relation according to reports (NRC, 1994).

**\*\*Calculated analysis was based on National Research Center (NRC) (1994).**

The chicks were weighed on the first day of the start of the experiment to take the primary weights at the age of 21 days by using the electronic balance capacity of 40 kg DISPLAY type and error rate  $\pm 1$  gram, and after distributing them randomly on the treatments, for the purpose of studying the characteristics of the blood, blood samples were collected at the end of the trial period (10 weeks), as blood was collected from 20 birds, four birds

**Table 1:** Composition and determined analysis of starter and grower diets.

Ingredients %	Starter	Grower
Crashed wheat	51	59.73
Soybean Meal(48% protein)	37.7	31
Premix (40% Protein)*	5	2.5
Oil	4.15	4.32
Limestone	1.8	2
Salt	0.25	0.25
Blended Vitamin	0.1	0.2
Total	100	100
Calculated Analysis**		
ME (Kcal/kg)	2964.65	3037.105
Crude Protein%	26.726	23.6449
Calcium%	0.964	0.9
Available Phosphorus %	0.2325	0.11625
Methionine%	0.52584	0.410133
Lysine%	1.39533	1.151151

\*Wafi Protein Center (Holland origin) and contains 40% crude protein, 2,150 Kcal/kg, 5% crude fat, 3.85% lysine, 3.70% methionine, 4.10% methionine + cysteine, 5.60% calcium and 2.60% phosphorus.

from each treatment randomly. Collect blood during bird slaughter and put in two types of tubes the first container on the anticoagulant EDTA (Ethylene Diamine Tetra Acetic Acid) to prevent blood clotting which are whole blood models to study a physical characters such as number of RBC and WBC and PVC and some other characters, the second does not contain EDTA were measured to study alchemical characters of blood such as triglyceride, total cholesterol and plasma lipoproteins and high density lipoprotein and low density lipoprotein and some other characters.

## Results and Discussion

Effect of treatments on (RBC) was not significant in the trial period ( $P>0.05$ ) as shown in table 2 the first (control), second and fifth treatments was significantly different ( $P<0.05$ ) compared to the fourth treatments. Furthermore, effect of different treatments of birds fed on thyme leaf powder on (WBC) in the trial period was not significant ( $P>0.05$ ) compared to the first treatment (control). as shown in the rate of (pcv) in the blood was significantly different ( $P>0.05$ ) in the second and fifth treatment compared to the fourth treatment. As shown in the results of hemoglobin was not significant difference between the second, third and fifth treatments compared to the control treatments, but they recorded a significant difference ( $P<0.05$ ) with the fourth transaction. These results like to results of (Al-Jugifi *et al.*, 2015) When using thyme leaf powder (0.2, 0.4, 0.6, 0.8) in the broiler, they noted that there was not significant difference of the treatment 0.2% in both the number of RBC, HB and PCV compared to the control treatment. In a study

(Bhaisare and Thyagaraja, 2014) When adding 0.5% thyme seed powder in the turkey's fed, noted a decrease in the level of hemoglobin Hb for both sexes (male and female) in the blood serum throughout the trial period, compared to the control treatment, where it recorded (10.27, 11.40) g/dl and (10.87, 11.60) g/dl, respectively.

Shown in table 3 the results of the addition of thyme leaf powder in some of the chemical characteristics of blood, where all the study treatment fed on thyme powder recorded a significant decrease in the rate of glucose in the serum ( $P<0.05$ ) compared to the first treatment (control), Furthermore a significant increase ( $P<0.05$ ) in the total protein (TP) concentration in the serum, which increased significantly when the thyme leaf powder was added in the fifth treatment (2g thyme powder/kg feed) compared to the control treatment, We also note that there has been a significant decrease in the concentration of cholesterol in the fifth treatment added thyme powder by (2 g/kg feed) compared to the first, second, third and fourth treatment, While we noted a variation in the concentration of Triglycerides (TG) in the serum, where all the treatments fed on thyme leaf powder record a significant decrease compared to the control treatment, as shown the results in table 3 there is significant increase in the third, fourth and fifth treatment, which contains (1, 1.5, 2) thyme leaf powder in the concentration of high-density lipoproteins (HDL) compared to the first treatment (control) and the second, as recorded a significant increase in the second treatment added by (0.5 g/kg of thyme powder) in the concentration of low-density proteins (LDL) compared to the third, fourth and fifth treatment, While the concentration of very low-density

**Table 2:** The effect of adding different levels of thyme leaf powder on some of the cellular characteristics of blood in turkeys.

Treatment	RBC	WBC	PCV	Hb
T1	2.40±0.12 a	96.53±0.29 a	35.53±1.31 ab	13.33±0.27 a
T2	2.38±0.06 a	94.46±1.71 a	39.23±0.79 a	13.90±0.30 a
T3	2.16±0.10 ab	95.33±1.58 a	36.13±1.46 ab	12.96±0.53 a
T4	1.96±0.008 b	99.23±3.38 a	33.03±1.24 b	11.83±0.12 b
T5	2.28±0.06 a	96.53±0.26 a	37.76±0.83 a	12.86±0.08 a

a, b, c - means within column bearing different superscripts differ significantly ( $P<0.05$ ) - Significant ( $P<0.05$ )

lipoproteins (VLDL) there is a significant increase in the treatment of control free from the addition of thyme powder compared to other treatments.

These results are like with the findings of (El-Ghousein and Al-Beitawi, 2009), when using thyme leaf powder in broiler feed and in a ratio of 0.5, 1, 1.5, 2% where it recorded a significant decrease ( $P<0.05$ ) in the cholesterol level in the blood serum in all added treatments of thyme

**Table 3:** Effect of adding different levels of thyme leaf powder on some biochemical characteristics of blood in turkey.

Treatment	GLUG	TP	CHOL	TG	HDL	LDL	VLDL
T1	374.76±0.39 a	54.72±0.54 c	117.22±0.40 a	80.33±0.88 a	42.66±1.35 b	60.66±0.26 ab	14.00±0.30 a
T2	339.55±0.29 d	57.31±0.74 b	116.66±0.66 a	60.33±2.18 b	35.88±0.58 c	64.53±0.48 a	10.80±0.15 dc
T3	350.66±1.33 c	57.92±0.54 b	117.88±1.41 a	55.00±1.15 c	48.66±0.88 a	58.40±2.50 bc	11.60±0.35 c
T4	335.00±1.00 e	53.62±0.57 c	117.88±0.67 a	37.77±0.96 d	48.77±0.77 a	55.46±0.70 c	9.90±0.37 d
T5	372.11±0.58 b	61.00±0.58 a	107.33±0.66 b	61.66±0.88 b	47.88±0.67 a	48.53±0.75 d	12.80±0.34 b

a, b, c - means within column bearing different superscripts differ significantly ( $P<0.05$ ) - Significant ( $P<0.05$ ).

powder compared to control, and in the total protein concentration, significant differences in the added treatment were 0.5, 1, 1.5 and 2% of thyme powder compared to the control treatment and as agree with the results (Rahimi *et al.*, 2011) who used thyme extract 1% in drinking water for broiler, shown a decrease in LDL concentration and a rise in HDL concentration of blood serum in the added treatment of 1% of thyme extract compared to the control group, it also agrees with the results (Abdulkarimi and others, 2011) when using thyme extract 0.2% in drinking water for broiler where he noted a significant decrease ( $P < 0.05$ ) in the concentration of total cholesterol and low-density lipoproteins in the serum compared to the treatment of control, we also note the results are like with (Bhaisare and Thyagaraja, 2014) when the thyme seed powder was added by 0.5% in the turkey's he recorded a significantly in the concentration of protein in the blood serum throughout his study. We also recorded a significant decrease in the level of triglycerides in the serum at 8 weeks of the age of the bird in both sexes (male and female) compared with the treatment of the control, While disagrees ( Mansoub and Myandab, 2011), to the concentration of glucose in the serum, with a significantly in the treatments 1, 1.5 and 2% compared to the treatment of control, also, was recorded no significant difference in the concentration of cholesterol in the serum in the added treatments of the thyme powder in the fed of the broiler compared to the treatment of control. As we note that there is a significant decrease in the serum glucose concentration in the serum when adding thyme leaf powder, the reason may be that the thyme contains many compounds, including carvacrol, which constitutes a high percentage of the total phenolic compounds of thyme and among the sugar-reducing compounds by stimulating the pancreas to secrete a hormone Insulin, which increases the introduction of glucose into the cells and thus causes a decrease in its level of blood (Day, 1995). We also notice a significant difference in the rate of protein concentration in the blood serum when adding thyme leaf powder because it contains flavonoids and phenolic compounds, including Thymol and Carvacrol, which is responsible for its activity as an antioxidant (Schwarz *et al.*, 1996), that works to reduce the catabolism and breakdown of protein and convert it into glucose by inhibiting it or reducing the secretion of the hormone corticosterone responsible for the synthesis of glucose from non-carbohydrate sources, including proteins through a process called gluconeogenesis (Siegel, 1985), we also note the presence of a significant decrease in the rate of cholesterol concentration and the rate of triglycerides in the blood serum as the reason is due to

**Table 4:** The effect of adding different levels of thyme leaf powder on the antioxidant status of turkeys.

Treatment	GLU	MDA
T1	335.00 ± 1.73 b	0.82 ± 0.008 a
T2	286.33 ± 0.88 d	0.72 ± 0.006 d
T3	323.33 ± 1.20 b	0.74 ± 0.003 c
T4	299.00 ± 2.00 c	0.80 ± 0.006 b
T5	348.66 ± 1.45 a	0.80 ± 0.003 b

a, b, c - means within column bearing different superscripts differ significantly ( $P < 0.05$ ) - Significant ( $P < 0.05$ )

their influence on the effective components of thyme that led to an increase in thyroid gland activity and its secretion of thyroxine hormone, which affects the metabolism of fats and activates the liver lipase enzyme and its effectiveness that led because they are low in blood (Hashemipour *et al.*, 2013).

The effect of adding thyme leaf powder shown in table 4 for antioxidants in turkey, where the fifth treatment is added (2) g/kg significantly compared to all nutritional treatments in the concentration of glutathione (GSH) in the blood ( $P < 0.05$ ), there was also a significantly in all additive treatments powder of thyme leaves for the concentration of malalonyhyde (MDA) in the blood, was recorded in the treatment T2 added by 0.5 g/kg ( $P < 0.05$ ) compared to the first treatment (control), third, fourth and fifth, we also notice a significant in the third treatment by 1 g/kg compared with the control, fourth and fifth treatments and the T4 and T5 treatment recorded a significant ( $P < 0.05$ ) compared to the T1.

While we notice that it disagrees with the results of (Saleh *et al.*, 2017) when using thyme powder 2 g/kg in the turkey diets, which led to an increase in the activity of MDA in serum compared to the control treatment, and when thyme leaf powder containing (Carvacrol and Thymol) was added in different levels in the broiler meat diet, it led to a significant increase in the Superoxide dismutase and Glutathione peroxidase and a significant decrease in the concentration of MDA in the blood serum (Hashemipour *et al.*, 2013). Phenolic compounds are present in thyme and are responsible for its activity as an antioxidant (Bölükbaşı *et al.*, 2006), where the flavonoids and phenolic compounds contained in the thyme plant are very effective in their effect as anti-oxidants, as they protect and saved the cells of the body from various stress factors and from free radicals, through which the process inhibitor of fat oxidation in cell membranes (Kahkonen *et al.*, 1999).

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