

Physiological response study to adding different levels of Lemon grass *Cymbopogon citratus* leaves powder to the diet and its extract in drinking water of broiler chickens

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Abstract: This experiment was conducted at the poultry farm of the college of agriculture, university of Al-Qasim green for the period from 18/9/2019 to 23/10/2019. In experiment, 225 unsexed broiler chicks, which obtained from Al-Anwar hatchery, it the were randomly distributed to 15 pen, with 5 experimental treatments, 45 birds for each treatment. Each treatment included three replicates per 15 birds. The treatments of the experiment were as follows: First treatment: control group without any addition . The second treatment: a basal diet + 10 gm of lemon grass / kg feed, the third treatment: a basal diet + 20 gm of lemon grass / kg feed, The fourth treatment: adding 100 ml of the aqueous extract of the lemongrass / liter of drinking water, and the fifth treatment: adding 200 ml of the aqueous extract of the lemongrass liter of drinking water. The experiment included studying the following parameters : Total protein, Albumin ,Globulin, Glucose , ALT , AST, Cholesterol ,Triglycerides ,High-density lipoproteins (HDL), Low-density lipoproteins (LDL), and (MDA) of Malondialdehyde . This results of the experiment showed a significant improvement for the treatments by addition lemongrass leaves (third and fifth) in the concentration of total protein, Albumin and Globulin, and a significantly decreased for the treatments(T3, T4 and T5) in the concentration of Glucose compared to the first treatment (control) and the second treatment. as for the concentration of liver enzymes . The treatment of adding lemongrass leaves (T2, T3, T4 and T5) showed a significant decrease the level of cholesterol and triglycerides concentration level as well as low-density lipoproteins and the level of Malondialdehyde (MDA) and an increase in the level of high -density lipoproteins in the blood of birds compared to the first treatment control .

Keywords: Lemon grass, *Cymbopogon citratus*, Physiological response , broiler chickens.

1. INTRODUCTION

Medicinal plants contain many active compounds with different effects and its either present in the plant or in the form of metabolic products and these materials are divided into either a toxic and deadly type or beneficial and nutritious [Ali and Al-Shuhaib, 2021]. Herbs have been used in the treatment of health problems that appear in poultry, these were used Medicinal and aromatic plants and their extracts for their in improving health [Al-Awadi and Al- Nadawi, 2020]. Some plant extracts have a stimulating effect on the digestive system of

animals and poultry, as they improve the function of organs, especially the liver, and this leads to an increase in digestive enzymes that increase the benefit from eating food and meeting the need of the body [Nihad Abdul-Lateef Ali et al. 2021]. The feeds and natural additives are among the components that affect improving growth as well as food conversion, so plants and medicinal herbs have been used in recent years to feed animals [Hassan and Muhamad, 2007]. Plant extracts have been used to treat many diseases, especially animal respiratory diseases [Mudalal *etal*, 2020]. and from this plant it Lemon grass, whose scientific name is *Cymbopogon citratus*. It is considered one of the medicinal wide uses since ancient time and it is an aromatic herb perennial with long and smooth leaves. It lives in hot countries such as Egypt, Sudan, Saudi Arabia, India, Ceylon, and East Africa [Garcia *etal*, 2017]. Recent and ancient studies have shown that this plant has many medicinal benefits for its high content of volatile oil, which contains many compounds, especially the main compound Citral, which ranges between 65-90% and the compound myosin 10-25% and neighbors 1-4%, as this plant is used as a disinfectant and analgesic for headaches. And the treatment of rheumatism, as it is antihypertensive and is useful in treating ulcers and colitis as well as cold and flu diseases [Marrelli ,2021]. Inhibitor of the growth of microorganisms and fungi [Valková *etal*, 2022]. It has also been used industrially for food preservation and flavor addition [Marrelli ,2021]. What accompanied and will accompany this increase from the diseases of the modern era and the danger resulting from the side effects of the chemical drugs used, all these reasons were sufficient to go or advise people to go to nature in search of plants with a medical effect in treating diseases and that most of the diseases that we suffer from find the solution in nature more than in pharmacy, and that pharmacology is used in the broadest field of nature herbs for the composition of drugs and medicines [Gore , 1993]. based on the above of the foregoing and given the great importance of the leaves of the lemon grass plant, the aim of the present study was to know the nutritional value of the powder of the lemon grass plant their use and determination of the best proportions added to the diet or to drinking water that can be used in poultry diets and its impact some biochemical characteristics of blood serum.

2. MATERIALS AND METHODS

This experiment was conducted at the poultry farm of the college of agriculture, al-Qasim green university for the period from 18/9/2019 to 23/10/2019. this study aimed to investigate Physiological response study to adding different levels of Lemon grass *Cymbopogon citratus* leaves powder to the diet and its extract in drinking water of broiler chickens . In the experiment, 225 unsexed broiler chicks (Ross 308), which obtained from al-Anwar hatchery, randomly distributed on 15 pens, with 5 experimental treatments, 45 birds for each treatment. Each treatment included three replicates per 15 birds. The treatments of the experiment were as follows: First treatment: control group free from any addition (normal diet and water) or (basic feed and water). The second treatment: a basic feed added to 10 g of lemon grass / kg feed, the third treatment: a basic feed added with 20 g of lemon grass / kg feed, The fourth treatment: adding 100 ml of the aqueous extract of the lemongrass / liter of drink water, and the fifth treatment: adding 200 ml of the aqueous extract of the lemongrass / liter of drink water The experiment included the study of the following traits: : the Total protein, Albumin, Globulin, Glucose ,ALT, and AST. Cholesterol, Triglycerides, High-density lipoproteins (HDL), Low-density lipoproteins (LDL), and MDA of Malondialdehyde. As the rates of these traits were estimated for each week of the five-week experience. The Completely Randomized Design was used to study the effect of different treatments on studied traits the significant

differences between the averages were compare using Duncan's Multiple Range Testy [Duncan, 1955] and they SAS [SAS,2016] was used to analyze data.

Table 1 : Feed materials Included in the composition of the initial diet and final diet used in the experiment with the calculated chemical composition for both diets.

Feed material	starter diet (1-21) %	Final diet (22 -35 day) %
yellow corn	48.2	58.7
Local wheat	8	7.5
Soybean meal (44% protein)	28.5	20.5
Concentrated Protein*	10	10
Vegetable oil (sunflower)	4	2.5
Limestone	1	0.5
Food salt	0.3	0.3
Total	100%	
The Calculated Chemical Analysis		
Metabolized Energy (kcal/kg)	3079.85	3102.6
Crude protein (%)	21.56	18.87
Lysine (%)	1.04	0.85
Methionine + Cysteine (%)	0.455	0.42
fiber (%)	3.54	3.2
Calcium (%)	1.28	1.07
Phosphorus availability (%)	0.42	0.41

*Concentrated protein (Belgian origin), each kilogram contains: 2200 kcal/kg metabolized energy, 40% crude protein, 8% fat, 3.5% fiber, 25% ash, 8% calcium, 3.1 phosphorus availability, 1.2 % lysine, 1.2% Methionine, 1.8 % Methionine + 70 mg, 30 mg Vitamin B1 , 300 mg Vitamin E, 2500 U D3I, Cysteine A, 2% Chlorine, 10,000 IU 12 mg Folic Acid, 250 mg B 12 B 120 g. Pantothenic acid, 400 mg niacin, 50 mg vitamin B2, 5000 mg Choline chloride, 450 mg iron, 70 mg copper, 600 mg, C 600 mcg biotin, 1000 mg special vitamin, 750 manganese , 5 mg iodine, 1 g cobalt and antioxidant.

3. RESULTS

Table 2 the effect of adding different levels of lemon grass leaf powder to the diet and its extract to drinking water some biochemical characteristics of blood serum at the age of 35 days. The results of the analysis regarding the total protein concentration (g / 100 ml) Where the birds of the fifth treatment recorded the highest concentration of total protein, while the first treatment recorded the lowest concentration of total protein, as for the albumin concentration (g / 100 ml) and the globulin concentration (g / 100 ml), we note the continuation of the fifth treatment, and it recorded the highest concentration of albumin and globulin. With the first treatment, which recorded the lowest concentration of albumin and globulin, and the third treatment significantly Morally superior ($P \leq 0.05$) over the first treatment birds, as for the Glucose concentration (mg / 100 ml), the third, fourth and fifth treatments recorded the lowest concentration of glucose compared to the first and second treatment birds. Which recorded the highest concentration of glucose, as well as from the

same table, we note that there were no significant differences between the treatments of all experiment regarding liver enzymes (AST, ALT).

Table 2: The leaf powder to the diet and its extract to drinking water on some biochemical characteristics of blood serum of 35 days of broiler (arithmetic mean \pm standard error).

Treatments	Traits					
	Total protein g / 100 ml	Albumin g / 100 ml	Globulin g / 100 ml	Glucose Mg / 100 mL	ALT Units / liter	AST Unit / liter
T1	3.15 \pm 0.02 d	2.08 \pm 0.02 c	1.07 \pm 0.02 c	216.66 \pm 1.41 a	19.69 \pm 0.21	20.21 \pm 0.29
T2	3.43 \pm 0.11 dc	2.28 \pm 0.11 bc	1.15 \pm 0.06 c	213.32 \pm 1.47 a	19.72 \pm 0.40	20.64 \pm 0.74
T3	4.08 \pm 0.18 ab	2.51 \pm 0.06 ab	1.57 \pm 0.13 ab	201.32 \pm 1.46 b	19.96 \pm 0.43	20.28 \pm 0.60
T4	3.76 \pm 0.27 bc	2.40 \pm 0.19 abc	1.36 \pm 0.10 bc	193.05 \pm 1.45 c	19.55 \pm 0.32	26.65 \pm 6.26
T5	4.40 \pm 0.16 a	2.68 \pm 0.03 a	1.72 \pm 0.14 a	194.99 \pm 1.85 c	19.76 \pm 0.29	19.80 \pm 0.42
Significant level	*	*	*	*	NS	NS

- Averages with different letters within one column indicate significant differences ($p \leq 0.05$). NS: No significant.
- T1: control group free from any addition
- T2: a basic feed added to 10 g of lemon grass / kg feed.
- T3: a basic feed added with 20 g of lemon grass / kg feed.
- T4: adding 100 ml of the aqueous extract of the lemongrass / liter of drinking water.
- T5: adding 200 ml of the aqueous extract of the lemongrass / liter of drinking water.

Through the results of the study, it can be said that the addition leaves (third and fifth treatments) led to an increase in the concentration of total protein, albumin, and globulin protein, and this proves its role in acting as one of the most important antioxidants [Jorge A. Pino, *et al* .2018] which was reflected. This is on the health status of the herd and the reduction of stress resulting from oxidation of free radicals represented by increasing and albumin, as well as the role of lemongrass in increasing the release of immune globulins resulting from the increase in the number of lymphocytes white, which increased in the index of the ratio of lymphocytes to heterogeneous cells in the treatment of adding lemon grass. Lemons in our study, Table (2), also that gives an indication of, and that the improvement in the albumin concentration of the treatments of lemon grass in the blood serum of total protein, as an increase in the total protein concentration in serum, it indicates an increase in protein synthesis and a decrease in protein catabolism. As for the low level of Glucose in the blood serum of treatments birds (third, fourth and fifth) compared to the first treatment (control), it may be due to the presence of alkaloids in lemongrass leaves that stimulate beta cells in the pancreas as well as promote or stimulate greater secretion. Amount of insulin in response to

elevated blood glucose and increased glucose metabolism by glycolysis as well as increased entry of glucose into the plasma membrane .

Table 3 adding different levels leaf and its extract to drinking water in the form of fats in the blood serum of broilers at the age of 35 days, where the first treatment (control) recorded the highest concentration (mg / 100 ml), While the treatments of lemon grass leaves with bush or drinking water the second, third, fourth and fifth recorded the lowest concentration of cholesterol, we also note from the same table a significant superiority for the birds of the treatments (second, third, fourth and fifth) over the birds of the first treatment (control) in the characteristic of lipoproteins. High-density HDL, while the first treatment recorded the lowest concentration of HDL, while the first treatment recorded the highest concentration of low-density lipoproteins, LDL, and the highest concentration of MDA.

Table 3: leaf powder to the diet and its extract to drinking water in the lipid profile at 35 days of broiler (arithmetic mean \pm standard error).

Treatments	Traits				
	Cholesterol (mg / 100mL)	Triglycerides (mg / 100mL)	High-density lipoproteins HDL (mg / 100mL)	Low-density lipoproteins LDL (mg / 100mL)	MDA Micr / mol
T1	158.71 \pm 4.52 a	94.96 \pm 1.93 a	86.30 \pm 1.54 b	53.41 \pm 5.21 a	228.92 \pm 22.89 a
T2	143.67 \pm 1.03 b	89.14 \pm 0.85 b	95.77 \pm 1.22 a	30.07 \pm 2.11 b	167.35 \pm 11.16 b
T3	135.67 \pm 1.40 bc	80.33 \pm 1.58 c	97.88 \pm 1.15 a	21.71 \pm 1.49 b	186.53 \pm 3.60 b
T4	130.84 \pm 4.63 c	76.36 \pm 1.42 dc	96.52 \pm 1.81 a	19.04 \pm 3.57 b	168.45 \pm 10.45 b
T5	134.13 \pm 3.23 bc	74.83 \pm 1.50 d	98.53 \pm 1.09 a	20.63 \pm 2.59 b	149.65 \pm 7.19 b
Significant level	*	*	*	*	*

- Averages with different letters within one column indicate significant differences ($p \leq 0.05$).
- T1: control group free from any addition
- T2: a basic feed added to 10 g of lemon grass / kg feed.
- T3: a basic feed added with 20 g of lemon grass / kg feed.
- T4: adding 100 ml of the aqueous extract of the lemongrass / liter of drinking water.
- T5: adding 200 ml of the aqueous extract of the lemongrass / liter of drinking water.

The reason for the low concentration of cholesterol, triglycerides, and low-density lipoproteins, and high high-density lipoproteins, in treatments of lemon grass leaves, both with feed and drinking water, compared to the first treatment (control) may be due to the presence of flavonoids that work to lower the cholesterol concentration, which are antioxidants that worked to clear Free radicals and their elimination also reduce the level of free fatty acids in the plasma and thus reduce the level of triglycerides[Valková *et al*, 2022] and perhaps the reason for the decrease in the concentration of lipoproteins Low density indicates the presence of flavonoids in lemongrass leaf powder that inhibit the oxidation of

low-density lipoproteins produced by free radicals [Khushboo and Amit, 2020]. Malondialdehyde (MDA) is the product of lipid peroxidation that occurs spontaneously in body cells, and is one of the end products of peroxidation of polyunsaturated fatty acids in cells, a marker [Mas-Bargues, *et al* ,2021]. Malondialdehyde plays a major role in the occurrence of mutations as a result of its interaction with the deoxyribonucleic acid and then the occurrence of cancerous tumors, as they work to prevent the oxidation of cell membranes fats and suppress free radicals by cutting the chains of reactions, thus inhibiting the formation of lipid peroxidation, so the concentration of triglycerides and Malondialdehyde (MDA) will decrease in the serum Blood [Jorge A. Pino, *et al* .2018].

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