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The Effect of Adding Different Levels of Thyme (Thymus vulgaris) and Camphor (Cinnamomum camphora) Powders on Certain Biochemical Blood Parameters in Broiler Chickens

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تأثير اضافة مستويات مختلفة من مسحوق الزعتر و الكافور على الصفات الكيموحيوية على دجاج اللحم

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Abstract:
This experiment was conducted on 45 birds of the ROSS strain, which were randomly assigned to three groups: a 0% control group (no additives), the second group received feed containing 0.2 g/kg of thyme powder, and the third group received feed containing 0.4 g/kg of camphor powder. The experiment continued until market age (45 days), during which blood samples were collected at slaughter.
The results showed no statistically significant differences ($P < 0.05$) between the addition of thyme and camphor and the average levels of glucose, total cholesterol, triglycerides, GPT, and GOT, as well as total protein, albumin, and globulin. However, a statistically significant difference ($P < 0.05$) was observed in blood urea levels in the control group compared to the group receiving 0.4% camphor. The 0.4% camphor group also showed a statistically significant increase ($P < 0.05$) in alkaline phosphatase (ALK) levels compared to the other groups.
These results indicate that the addition of thyme powder and camphor at concentrations of 0.2% and 0.4% may not have a significant effect on most of the major biochemical indicators in broiler chicken blood and liver function, except for ALK, which increased with the higher camphor concentration. The increase in ALK enzyme levels warrants further investigation to understand the nature of this effect and its physiological implications. Overall, the study highlights the need for further research to assess the full effects of medicinal plants such as thyme and camphor as natural feed additives in the poultry industry, taking into account the concentrations used and various indicators of health and productivity.

Keywords : Camphor, Thymus vulgaris, Ross,Broiler, Biochemical Blood parameters, glucose, triglycerides.

الملخص:
أُجريت هذه التجربة على 45 طائرًا من سلالةROSS ، والتي تم توزيعها عشوائيًا على ثلاث مجموعات: مجموعة تحكم 0% (بدون إضافات)، والمجموعة الثانية تلقت علفًا يحتوي على 0.2 جم/كجم من مسحوق الزعتر، والمجموعة الثالثة تلقت علفًا يحتوي على 0.4 جم/كجم من مسحوق الكافور. استمرت التجربة حتى بلوغ سن التسويق (45 يومًا)، وخلال هذه الفترة تم جمع عينات الدم عند الذبح.
أظهرت النتائج عدم وجود اختلافات ذات دلالة إحصائية ($P < 0.05$) بين إضافة الزعتر والكافور ومتوسط مستويات الجلوكوز والكوليسترول الكلي والدهون الثلاثية و GPTوGOT، بالإضافة إلى البروتين الكلي والألبومين والغلوبولين. ومع ذلك، لوحظ فرق ذو دلالة إحصائية ($P < 0.05$) في مستويات اليوريا في الدم في المجموعة الضابطة مقارنة بالمجموعة التي تلقت 0.4٪ من الكافور. كما أظهرت المجموعة التي تحتوي على 0.4٪ من الكافور زيادة ذات دلالة إحصائية ($P <$ 0.05)في مستويات الفوسفاتاز القلوي (ALK) مقارنة بالمجموعات الأخرى. تشير هذه النتائج إلى أن إضافة مسحوق الزعتر والكافور بتركيزات 0.2٪ و 0.4٪ قد لا يكون لها تأثير كبير على معظم المؤشرات البيوكيميائية الرئيسية في دم دجاج التسمين ووظائف الكبد، باستثناءALK ، الذي ازداد مع ارتفاع تركيز الكافور .

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تستدعي الزيادة في مستويات إنزيم ALK إجراء المزيد من الأبحاث لفهم طبيعة هذا التأثير وآثاره الفسيولوجية.
بشكل عام، تسلط الدراسة الضوء على الحاجة إلى مزيد من البحث لتقييم التأثيرات الكاملة للنباتات الطبية مثل الزعتر والكافور كمضافات علفية طبيعية في صناعة الدواجن، مع الأخذ في الاعتبار التركيزات المستخدمة والمؤشرات المختلفة للصحة والإنتاجية.

الكلمات المفتاحية: كافور ،زعتر ،روز ،صفات الدم ، جلكوز،دهون ثلاثية ، كيموحيوية

1. Introduction

The poultry sector is an integral part of the global food security system, as it contributes significantly to the supply of animal protein necessary to meet the growing nutritional needs of the world's population (FAO, 2013). Broiler chickens, in particular, are considered one of the most important types of poultry due to their short production cycle and efficiency in converting feed into meat, making them an economical and readily available source of protein. However, the broiler industry faces growing challenges, including increasing pressure to reduce the use of antibiotics as growth promoters due to concerns regarding antibiotic resistance and their impact on human health (O'Neill, 2016). This has prompted researchers and breeders to seek natural and safe alternatives to enhance production performance and maintain poultry health.

Herbs and medicinal plants have emerged as promising alternatives to antibiotics in poultry feed, due to their content of effective natural compounds with antimicrobial, antioxidant, and immunostimulatory properties (Huyghebaert et al., 2011). Among these plants, thyme and eucalyptus stand out as natural compounds with a long history of traditional and medicinal use, and preliminary studies have demonstrated their potential for use as feed additives in poultry.

Thyme (Thymus vulgaris) is an aromatic plant rich in essential oils, particularly thymol and carvacrol, which have been shown to be effective as antimicrobials and antioxidants (Burt, 2004). Numerous studies have indicated that adding thyme to poultry feed can improve production performance and reduce digestive problems (Cross et al., 2007). Camphor, extracted from the camphor tree (Cinnamomum camphora), contains the compound camphor, known for its antiseptic and antimicrobial properties.

Materials and Methods

Location

The study was conducted at a farm on the outskirts of the city of Sirte. The site—a room—was prepared prior to receiving the birds. The floor and walls were disinfected and cleaned with lime, and the room was ventilated. After cleaning was completed, the room was divided into 9 replicates, with each treatment divided into three wooden replicates. The dimensions of these replicates were 1 × 1 square meter, with each cage or replicate accommodating five birds. Wood shavings were used as bedding for these cages, laid 7 cm above the floor.

Plant Collection:

The plants were purchased and collected from a local herbal shop in the city, where they were processed using traditional, proper methods for collecting, drying, and preserving plants; we then ground and preserved them.

Test Birds.

The study was conducted on 45 two-week-old (14-day-old) birds of the ROSS strain, which were placed in the cages and provided with water and feed.

Feeding Management

The birds were fed the basal diet until slaughter age, with the following additions according to the treatments:

- The first treatment (control) contained no additives.
- Treatment 2: Basal diet supplemented with 0.2 g/kg of thyme powder.
- Treatment 3: Basal diet supplemented with 0.4 g/kg of eucalyptus powder.

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In addition, 10 mL of molasses diluted with 20 mL of water was added per kg of feed for all three treatments to ensure proper mixing and adhesion of the added powder to the feed according to the specified amounts.

Blood samples were collected to measure: - (Biochemical blood parameters)

Glucose, urea

Serum parameters were measured using ready-to-use kits by analyzing samples with a German-made Human Plus device

Liver function tests

GOT, GPT, Alk, total protein, globulin, albumin.

Serum was analyzed using ready-to-use kits via an assay performed on a German-made Human Plus device.

Blood lipid levels

Triglycerides, cholesterol.

Serum was analyzed using ready-to-use kits via an assay performed on a German-made Human Plus device.

Measuring Instruments

A Dayang Digital Computing scale was used during the experiment to weigh feed and birds weekly. An electronic balance was used to measure the camphor and thyme additives, and thermometers were used to measure the temperature inside the chamber.

Statistical Analysis:

A completely randomized design (CRD) was implemented in the experiment, and Bartlett's test and one-way ANOVA were used to analyze the data obtained through analysis of variance. The LSD test was used to compare means at a significance level of ≥ 0.05:

4. Results and Discussion

Table (1) shows some biochemical blood parameters of broiler chickens at 45 days of age

parameter		Operations	
	Control	**Treatment 0.4**	**Treatment 0.2**
Glucose	164	163	164
Blood urea	13.6^{b}	18^{a}	15^{ab}
Cholesterol	86	100	99.6
Triglycerides	269	297	281

The different letters within each row indicate statistically significant differences at the significance level ($P < 0.05$).

The results in Table 1, which presents some biochemical indicators in the blood of broiler chickens at 45 days of age, show that there were no significant ($P < 0.05$) effects of adding thyme and camphor powders on blood glucose levels. It is noted that glucose values are very similar between the control group and the two treatment groups to which thyme and camphor were added. This suggests that these plant-based additives, at the concentrations used in this experiment, did not significantly affect carbohydrate metabolism or blood glucose levels in the chickens.

The same applies to total cholesterol and triglycerides. Although there were slight numerical differences ($P < 0.05$) between the groups, these differences were not statistically significant. In other words, we cannot conclude that the addition of thyme or camphor led to a real change

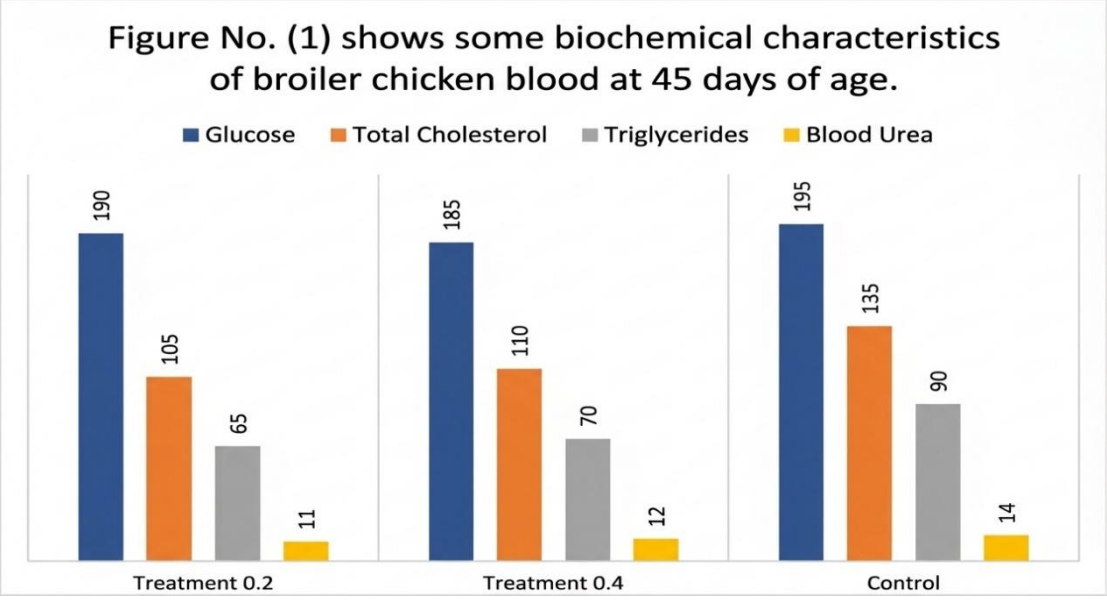
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in blood cholesterol or triglyceride levels compared to chickens that did not receive any supplements. This result may be somewhat surprising, especially since some previous studies have suggested that medicinal plants may affect blood lipid levels.

Regarding blood urea levels, we found a statistically significant difference ($P < 0.05$) between the treatment groups. The most important observation is that the control group (without additives) recorded a significantly lower level of blood urea compared to the camphor group at a concentration of 0.4%, while the thyme group at a concentration of 0.2% did not differ significantly ($P < 0.05$) between the groups. The most important observation is that the control group (without additives) recorded a significantly lower blood urea level compared to the camphor group at a concentration of 0.4%, whereas the thyme group at a concentration of 0.2% did not differ significantly ($P < 0.05$) from either of the other two groups. The researcher views this result as a possible indication of camphor's effect on protein metabolism in chickens. The increase in blood urea levels in the camphor group, although slight, may be due to increased protein breakdown or possibly an effect on the kidneys' ability to eliminate urea. However, it is important to emphasize that this change in urea was the only parameter that showed a statistically significant difference ($P < 0.05$) in this table, while the other parameters (glucose, cholesterol, triglycerides) remained essentially unchanged. (Lameen & Alhadad, 2026)

When comparing these results with previous studies, we find a mix of similarities and differences. For example, the study by Tayeb et al. (2019) noted the effect of medicinal plants on certain biochemical parameters but reported effects on cholesterol and glucose, whereas our current study found no significant effect on these two indicators. In contrast, the study by Falah and Mirzai (2016) reported a decrease in cholesterol and triglycerides with the use of thyme and turmeric, which contradicts our results, which showed no significant decrease in these indicators. On the other hand, a study by Zhou et al. (2014) found that thyme essential oil led to a decrease in serum urea, which differs from what we observed in our study, where we did not see a decrease in urea with thyme but rather a slight increase with camphor.

Previous studies have sometimes used essential oils or plant extracts at different concentrations, whereas we used the whole plant in powder form. Furthermore, the type of plant used (specifically thyme and eucalyptus), the chicken breed, and rearing conditions may vary from one study to another, and all these factors can influence the results. Even the nature of the chickens' basic feed can play a role in how medicinal plants interact with the birds' bodies and affect their biochemical indicators.



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Table (2) shows the results of liver function tests for broiler chickens at 45 days of age

parameter		Operations	
	Control	**Treatment 0.4**	**Treatment 0.2**
GPT	15	17	19.6
GOT	285.6	360.6	336.6
ALK	17.3^{b}	105^{a}	24.4^{ab}
Total protein	0.083	0.14	0.11
Albumin	1.03	1.4	1.3
Globulin	7.27	12.6	9.7

The different letters within each row indicate statistically significant differences at the significance level ($P < 0.05$).

Based on the results in Table 2, which focuses on liver function tests in 45-day-old broiler chickens, we observe that the addition of thyme and camphor powders had no statistically significant effect ($P < 0.05$) on the levels of most of the measured liver function markers. For the two important liver enzymes, GPT and GOT—which are considered markers of liver cell damage—we found no significant differences ($P < 0.05$) between the control group and the treatment groups that received thyme and camphor. This suggests, in principle, that the addition of these medicinal plants at the concentrations used in this study did not cause any damage to liver cells or an increase in the activity of these enzymes in the blood, compared to chickens that did not receive any supplements.

The same is true for the liver-produced protein markers: total protein, albumin, and globulin. Here, too, there were no statistically significant differences ($P < 0.05$) between the groups. This suggests that the liver's ability to synthesize proteins was not negatively affected by the addition of thyme and camphor—and may not have been significantly affected at all. This is an important finding, especially since some substances can affect liver functions related to protein production.

However, the only difference in this table is the alkaline phosphatase (ALK) enzyme. Here, we observe a highly significant difference between the treatment groups. Specifically, the treatment group (camphor at a concentration of 0.4%) recorded a significantly higher ALK level ($P < 0.05$) than both the control group and the treatment group (thyme at a concentration of 0.2%), which did not differ significantly ($P < 0.05$) from each other. In other words, it appears that the addition of camphor at a concentration of 0.4% led to a noticeable increase in ALK enzyme levels in the chickens' blood.

The researcher views this increase in ALK as an indicator worthy of further study. Alkaline phosphatase is found in many tissues, including the liver, bones, and intestines. In the liver, ALK is specifically associated with the bile ducts. Elevated ALK levels in the blood may indicate problems with the bile ducts, such as blockage or inflammation, or may be associated with certain bone diseases or even rapid bone growth in young chickens. In the context of this study, the elevated ALK levels in the camphor group may indicate an effect of camphor on liver functions related to the bile ducts, or perhaps another indirect effect.

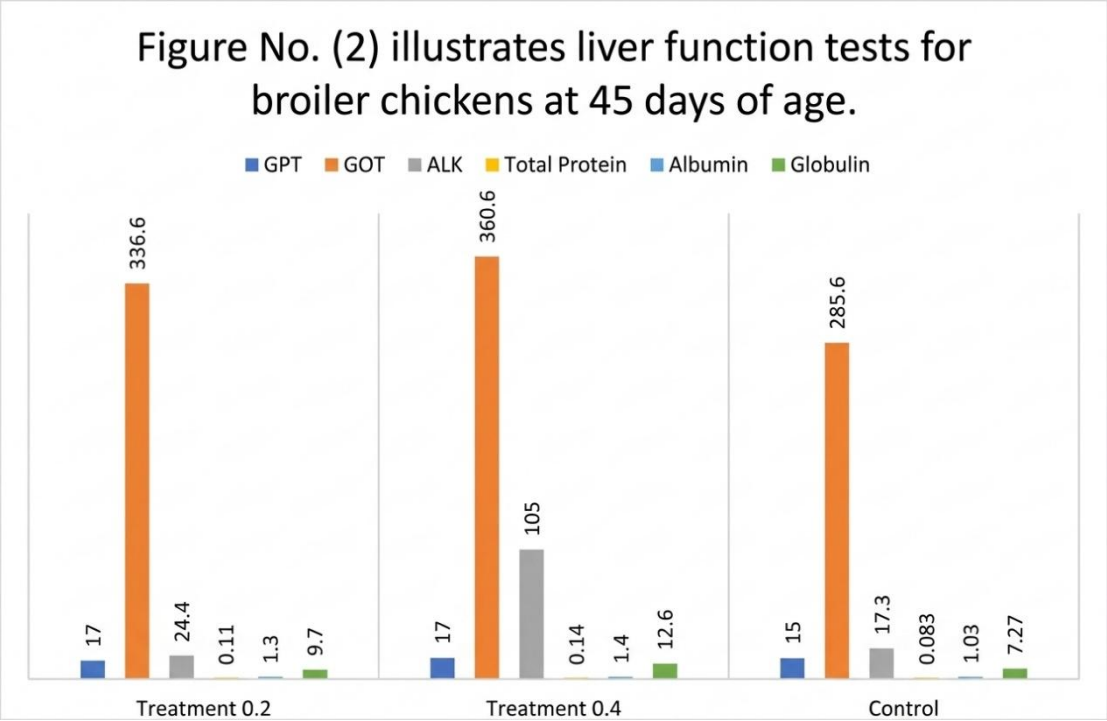
When comparing these results with previous studies, we find a relative lack of direct information on the specific effects of thyme and camphor on liver enzymes such as GPT, GOT, and ALK in broiler chickens. Most previous studies have focused more on production performance indicators, carcass traits, and certain other biochemical indicators such as cholesterol and glucose. However, some studies have generally pointed to the positive effects

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of medicinal plants on poultry health, which may include indirect improvements in liver function.

For example, Al-Khudari's (2013) study reported an improvement in liver enzyme activity (AST, ALT) when ginger, thyme, or a mixture of both was added, which appears to contradict our observation of no significant effect on GPT and GOT in our study. In contrast, a study by Zhou et al. (2014) found that thyme essential oil led to a significant decrease in alanine aminotransferase (ALT) activity, which also differs from our results, which showed no significant change in GPT (which is similar to ALT). This discrepancy once again underscores the importance of taking into account methodological differences between studies, such as the type of plant used (powder versus essential oil), concentrations, and experimental conditions.

In the researcher's opinion, the results in this table indicate that thyme and camphor powders, at the concentrations used, do not appear to have a negative effect on liver function in broiler chickens, based on GPT, GOT, total protein, albumin, and globulin levels. On the contrary, the absence of elevated GPT and GOT enzyme levels may indicate that these plants do not cause damage to liver cells. However, the observed increase in ALK enzyme levels in the camphor group at a concentration of 0.4% represents an area requiring further research.



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