

Effect of adding *Cinnamomum camphora* on some productive and biochemical traits of Awassi ram lambs

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Abstract

This study aimed to find out the effect of feeding *Cinnamomum camphora* on some productive and biochemical traits. Ten ram lambs aged 3.0- 4.0 months, with body weight 18-22.0 Kg. Awassi ram lambs were randomly and equally distributed into two groups, 1st (c) group was daily fed on a concentrate pellets diet (2%) of body weight and kept as control group. 2nd group (T) was daily fed on the same concentrate pellets diet and level containing 25 mg/kg of *cinnamomum camphora*, both groups are grazing for 3-4 hours a day. The results revealed that body weight was progressively increased in all groups, but the treated groups showed significantly ($p < 0.05$) better values than the control group. PCV percentage, hemoglobin concentration and WBCs count numerically increased with time progress in all groups. While Serum glucose levels reduced with time progress in all groups, but the treated groups showed significantly ($P < 0.05$) lower values than the control group in late experimental periods. With time progress, serum cholesterol and triglyceride percentages were decreased in the treated group contrasted with the control group. The total protein concentration and albumin concentration increased significantly ($P < 0.05$) from the 4th period to the end of the study while the globulin concentration were increased significantly ($P < 0.05$) compared with the treated group in the 5th and 6th period of the experiment. It was concluded that adding *Cinnamomum camphora* in the feed had positive effect on body weight and some of the traits in this experiment.

Keywords: *cinnamomum camphora*, cholesterol, weight gain, sheep.
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تأثير اضافة (*Cinnamomum camphora*) على بعض الصفات الإنتاجية والكيميائية

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الخلاصة

هدفت هذه الدراسة لمعرفة تأثير تغذية أوراق الكافور (*Cinnamomum camphora*) على بعض الصفات الإنتاجية والبايوكيميائية لحملان الأغنام العواسية. استخدم عشرة حملان تتراوح أعمارهم بين 3 - 4 أشهر، بوزن يتراوح بين 18-22 كغم وزعت عشوائياً وبشكل متساو على مجموعتين، تم تغذية المجموعة الأولى (مجموعة السيطرة C) على العلف المركز بنسبة (2%) من وزن الجسم. أما المجموعة الثانية (مجموعة المعاملة T) فقد تم تغذيتها يومياً على نفس العلف المركز (2%) مع إضافة (25) ملغم/كغم من أوراق الكافور، مع الرعي لمدة 3-4 ساعات يومياً. أظهرت النتائج زيادة معنوية في وزن الجسم في كلا المجموعتين، لكن مجموعة المعاملة (T) أظهرت قيم معنوية ($P < 0.05$) أفضل من مجموعة السيطرة (C). بينما ازداد تركيز الهيموجلوبين وحجم الخلايا المرصوصة وكريات الدم البيض مع تقدم الوقت في كلا المجموعتين من دون اختلافات معنوية. في حين انخفضت مستويات الجلوكوز في الدم مع تقدم الوقت في كلا المجموعتين، ولكن مجموعة المعاملة (T) أظهرت وبشكل ملحوظ ($P < 0.05$) قيم أقل من مجموعة السيطرة في فترات التجربة المتأخرة. ومع تقدم وقت التجربة، فقد انخفضت نسبة الكوليسترول في الدم ونسبة الدهون الثلاثية في مجموعة المعاملة بالمقارنة مع مجموعة السيطرة.

في حين ازداد تركيز البروتين الكلي وتركيز الألبومين معنويًا ($P < 0.05$) من الفترة الرابعة إلى نهاية الدراسة، وازداد تركيز الكلوبيولين معنويًا ($P < 0.05$) مقارنة مع المجموعة المعاملة في الفترة الخامسة والسادسة من التجربة. خلصت الدراسة إلى أن إضافة (*Cinnamomum camphora*) في العلف كان له تأثير إيجابي على وزن الجسم وبعض الصفات الأخرى في هذه التجربة. الكلمات المفتاحية: الكافور، كولتسيرول، وزن الجسم، أغنام.

Introduction

Camphor is a ketone took from *Cinnamomum camphora*, or made synthetically. Camphor is originate from the Arabic word of 'Kafur', which means chalk (1). It has been used for periods as aphrodisiac, contraceptive, abortifacient, cold remedy, antiseptic and suppressor of lactation (2). Also it has been widely used as a fragrance in cosmetics, flavor food additive, scenting agent in a variety of home products, active element in some old drugs, and intermediate in the synthesis of aroma chemicals (3). Recently, investigations showed that camphor containing complexes have uterotrophic (4), antitussive (5), anticonvulsant (6), nicotinic receptor blocking (7), anti-implantation (8), antiestrogenic and estrogenic activities (9), and reduced serum triglyceride and thyroid hormone (10). Camphor has been used both as an aphrodisiac and ant aphrodisiac. In small doses, camphor is used as an aphrodisiac to stimulate the reproductive organs, causing substantial heat in the urethra and nocturnal secretions. However, in large doses, it is used as an antiaphrodisiac to reduce urino-genital irritation. Moreover, it has been suggested to decrease libido and sexual performance (11).

Materials and Methods

This experiment was carried out at the Animal farm, College of Veterinary Medicine, University of Baghdad from the first of March 2017 to the end of May 2017. Ten healthy ram lambs were bought at age of about 3.0-4.0 months, with average body weight (18-22 Kg), animal where kept in cages. All animals where fed on the concentrate diet and green grass and tap water were offered of preliminary period for 2 weeks. Animals were divided randomly and equally into two groups contain (5 rams each) body weight was considered. First group daily fed on concentrate diet of pellet (2%) of body weight and kept as control group. The second group daily fed on the same concentrate diet with (25 mg/ kg) of *cinnamomum camphora*. The quantity of concentrated diet offered for individually group were biweekly adjusted according to the body weight changes in order to ensure that the intake would be about 2% of live body weight.

- The samples and parameters comprised in this study:-

1. Body weights of all animals were taken biweekly interval to determine the changes in body weight.
2. Blood samples were taken biweekly to study some blood characteristics include:-
 - a- Blood Hemoglobin, PCV and WBCS
 - b- Serum cholesterol, triglycerides and glucose concentration.
 - c- Total protein, albumin and globulin concentration.

- **Parameters and measurements comprised in this study:** Blood samples were taken from jugular vein by using disposable sterilized syringes. The region was sterilized. Three ml of blood samples were taken and split into two parts, first part, one ml of blood samples was kept in specific tubes containing anticoagulants EDTA to estimate hemoglobin, PCV and WBCs count according to (12). The second part of blood samples (2 ml) was left in sterilized gel tube free of anticoagulant substances, was kept in the refrigerator at a slant position until analysis. Blood glucose determined according to (13) while cholesterol concentration was measured by (14) method. Triglycerides concentrations were measured according to (15)

method. On other hand total protein and albumin were estimated by method mentioned by (16), globulin concentration was estimated by (17). Data were analyzed using Statistical analysis was performed using the SPSS computer software by (18) Two sample t-test between percent's with a 5% significance level was used.

Results and Discussion

- **Body weight:** Body weight increased in all groups with time and age progress, with significant ($P < 0.05$) differences in their weight means of ram lambs in the treated group from the 3rd period of the study up to the completion of the experiment (Table 1)

Table (1) Effect of *cinnamomum camphora* on body weight of ram lambs (Kg). (Means \pm SE).

Groups Period	C	T
1	22.75 \pm 0.47	22.00 \pm 0.42
2	24.00 \pm 1.00	23.00 \pm 0.70
3	24.25 \pm 0.25	24.75 \pm 0.47
4	25.50 \pm 0.28 b	29.25 \pm 0.62 a
5	26.75 \pm 0.47 b	30.25 \pm 0.75 a
6	28.75 \pm 0.47 b	32.50 \pm 0.64 a

Different lowercase letters refer to significant differences among periods at ($P < 0.05$).

The increase in the body weight of all animals during the experimental period indicated that those animals were at growth stage. (19) mentioned that sex hormones have an effect on growth and development of the animals, the testosterone hormone stimulates bone and muscle tissues anabolism. This development in the body weight could be related to endocrine secretion before puberty. The increase in the growth hormone with other sex hormones could be a factor to accelerate the protein and bone tissues syntheses in the body at early stages of age progress. These results were agreed with (1) who found that the sexual desire and animal performance enhanced when camphor was added at 50 mg/kg. The effects of camphor may due to modulation of the sympathetic nervous system, or its impact on serum testosterone levels. The significant ($P < 0.05$) increase of the treated group related to the effect of camphor as when ingested camphor has carminative properties (20).

- **Blood hemoglobin (Hb) and Packed cell volume (PCV):** Table (2) showed that the level of Hb of different ram groups slightly and gradually increased with time and age progress, but all the groups showed non significantly difference in the periods of experiment study.

Table (2) Effect of *cinnamomum camphora* on blood hemoglobin (Hb) concentration (g/ dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	9.22 \pm 0.68	10.42 \pm 0.73
2	11.35 \pm 0.41	11.52 \pm 0.36
3	11.82 \pm 0.32	11.77 \pm 0.43
4	11.62 \pm 0.34	12.00 \pm 0.21
5	11.95 \pm 0.61	12.72 \pm 0.41
6	11.75 \pm 0.19	12.17 \pm 0.37

The packed cell volume percentage were take the same trend of the Hb that there were non-significant increase of the PVC percentage along the studied periods (Table 3) but there were slight increase in the percentage.

Table (3) Effect of *cinnamomum camphora* on blood packed cell volume (PCV)% of ram lambs. (Means \pm SE).

Groups period	C	T
1	36.25 \pm 0.62	36.00 \pm 1.22
2	36.50 \pm 0.86	37.75 \pm 0.85
3	37.00 \pm 1.73	37.25 \pm 1.10
4	35.75 \pm 1.43	36.50 \pm 0.64
5	37.75 \pm 0.85	38.50 \pm 0.95
6	38.00 \pm 0.81	38.25 \pm 0.62

The slightly and gradually increased in blood components Hb and PCV for all groups could be approved that those animals were in good management and feeding regimes, but there was an improvement in the late stage of studied period for T and C groups. This might be due to improve in the absorption of nutrients in the intestine and an increase in feed intake because of an increase in the appetite, which reflects the metabolic activity of the animals (20). This study were agreed with other study on some species in the Lauraceae family, shows that a number of extracts have significant antioxidant, anti-inflammation and antitumor activities, revealed that Lauraceae tree species and other camphor including plants could have essential nutraceutical and pharmaceutical applications (21).

- **Total white blood cell counts (WBCs):** Results showed that the number of WBCs gradually increased in all groups with time Table (4), however, the treated group showed none significantly higher value than control group during the period of the experimental. The results revealed that there were little effect of digestion camphor on the white blood cells counts and there are few studies proving the possibility of camphor in the treatment of disease have been carry out, but those undertaken included improvement of immune function (22, 23).

Table (4) Effect of *cinnamomum camphora* on white blood cells of ram lambs. (Means \pm SE).

Groups period	C	T
1	8225 \pm 85.39	8150 \pm 28.86
2	8050 \pm 28.86	8325 \pm 47.87
3	8175 \pm 85.39	8200 \pm 40.82
4	8425 \pm 47.87	8175 \pm 62.91
5	8375 \pm 75.00	8300 \pm 91.28
6	8275 \pm 75.00	8550 \pm 64.54

- **Cholesterol concentration:** The results showed that there were significant ($P < 0.05$) reduction in the treated group compared with the control group from the second period of the study up to the end. The reduction of the cholesterol concentration might be related to the camphor oil contains many compounds such as camphor, safrol, eugenol, terpeniol, cineol and ligans (24). The reduction in the cholesterol concentration might due to the effect of terpeniol (25) Thus the antihyperlipidemic effect of the *D. kotschyi* is partially due to the existence of limonene and terpineol in its essential oil but the correct mechanism of action remains to be elucidated(26).

Table (5) Effect of *cinnamomum camphora* on blood cholesterol concentration (g/dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	78.70 \pm 1.77	78.89 \pm 1.60
2	83.95 \pm 1.94 a	74.00 \pm 1.21 b
3	86.80 \pm 0.53 a	75.37 \pm 0.64 b
4	84.49 \pm 1.75 a	76.70 \pm 1.36 b
5	89.20 \pm 0.73 a	72.72 \pm 0.61 b
6	89.77 \pm 0.96 a	73.50 \pm 0.55 b

Different lowercase letters refer to significant differences among periods at ($P < 0.05$).

- **Triglyceride concentration:** The Table (6) appeared that the treated group with *cinnamum camphora* significant ($P < 0.05$) reduction in the triglyceride concentration compared with the control group from the 3rd period of the study to the end of the experiment. The reduction in the triglyceride concentration in the treated group might due to the effect of the camphor competent of safrol and these result were agreed with (27) who found that oral administration of safrole for 30 days at doses 100 and 200 mg/kg affects the level of blood glucose, glycosylated hemoglobin,

total cholesterol (TC) and triglycerides (TG) which cause their reduction in normal induced diabetic rats at significantly improve the diabetic condition in Streptozotocin-induced diabetic rats.

Table (6) Effect of *cinnamomum camphora* on blood triglyceride concentration (g/dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	60.07 \pm 0.80	59.60 \pm 0.83
2	60.80 \pm 0.68	58.80 \pm 0.66
3	63.01 \pm 0.80 a	56.19 \pm 0.82 b
4	65.91 \pm 0.79 a	53.21 \pm 0.88 b
5	66.61 \pm 0.53 a	52.88 \pm 0.64 b
6	63.75 \pm 0.63 a	60.93 \pm 0.68 b

Different lowercase letters refer to significant differences among periods at (P<0.05).

- **Glucose concentration:** Glucose concentration showed that significant (P<0.05) decrease of the treated group contrast with the control group from the 5th period of the study (Table 7). The reduction in the glucose concentration may due to the effect of *cinnamomum camphora* component safrole. These results were agreed with (28) who found that at a concentration of 2 mg/ml of spraying medium, safrole, reduce the absorption of glucose with no effect on the butyric acid. These results could be demonstrate by differences in intestinal water absorption induced by methoxybenzene compounds, or by alterations in the digestive mucosa seen in histological studies.

Table (7) Effect of *cinnamomum camphora* on blood glucose concentration (g/dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	84.69 \pm 0.67	86.45 \pm 0.63
2	80.26 \pm 0.55	81.20 \pm 0.75
3	74.44 \pm 0.39	71.25 \pm 0.85
4	70.88 \pm 0.44	70.75 \pm 0.47
5	73.66 \pm 0.77 a	63.75 \pm 0.75 b
6	71.30 \pm 0.76 a	62.25 \pm 0.47 b

Different lowercase letters refer to significant differences among periods at (P<0.05).

- **Total protein, albumin and globulin concentration:** The treated group with *cinnamomum camphora* showed significant increase (P<0.05) compared with the untreated group from the 3rd period to the end of the study (Table, 8). These results may due to the impact of *cinnamomum camphora* and its content of terpineol that showed antioxidant activity and these results were agreed with (29) who showed the antioxidant effects of α -terpineol on hypertensive rats were evaluated Camphor derived oxidant substances that have been traced in umbilical cord, blood, and fetal tissues.

Table (8) Effect of *cinnamomum camphora* on blood total protein concentration (g/dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	5.39 \pm 0.25	5.56 \pm 0.63
2	5.97 \pm 0.24	5.80 \pm 0.57
3	6.52 \pm 0.21	7.42 \pm 0.17
4	6.55 \pm 0.15 b	7.47 \pm 0.16 a
5	6.53 \pm 0.12 b	7.92 \pm 0.04 a
6	6.55 \pm 0.08 b	8.07 \pm 0.07 a

Different lowercase letters refer to significant differences among periods at (P<0.05).

The albumin concentration showed significant (P<0.05) higher concentration in the treated group with *cinnamomum camphora* compared with the untreated group from the 4th period of the study to the end of the experiment (Table 9)

Table (9) Effect of *cinnamomum camphora* on blood albumin concentration (g/ dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	3.21 \pm 0.20	3.15 \pm 0.13
2	3.22 \pm 0.17	3.37 \pm 0.13
3	3.10 \pm 0.20	3.47 \pm 0.08
4	2.97 \pm 0.13 b	3.55 \pm 0.13 a
5	2.75 \pm 0.05 b	3.40 \pm 0.10 a
6	2.87 \pm 0.07 b	3.62 \pm 0.12 a

Different lowercase letters refer to significant differences among periods at (P<0.05).

Table (10) showed that the treated group were significantly (P<0.05) higher globulin concentration compared with the control group in the 5th and 6th period of the study. The increase in the globulin concentration may due to the effect of the adding camphor to the ram feed the results were in the same trend with (22) few studies establishing the potential of camphor in the treatment of diseases have been conducted, but those undertaken included improvement of immune function.

Table (10) Effect of *cinnamomum camphora* on blood globulin concentration (g/ dl) of ram lambs. (Means \pm SE).

Groups period	C	T
1	1.40 \pm 0.08	1.75 \pm 0.28
2	2.50 \pm 0.15	2.90 \pm 0.30
3	2.80 \pm 0.17	3.12 \pm 0.08
4	2.70 \pm 0.04	3.25 \pm 0.17
5	2.75 \pm 0.11 b	3.57 \pm 0.14 a
6	2.67 \pm 0.13 b	3.85 \pm 0.27 a

The different lowercase letters refer to significant differences among periods at (P<0.05).

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