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The effect of adding clove seed oil with or without zinc oxide to the diet of laying hens on egg quality characteristics.

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ABSTRACT

The experiment was conducted in the poultry field of the Department of Animal Production - College of Agriculture - University of Kirkuk, where 112 laying hens were used, which extended from 2/1/2024 until 15/4/2024, including the preliminary period, which lasted 14 days. The birds were divided into (7) Treatments / 4 replicates / 4 birds, according to the following treatments: T1: It was the comparison group and free of additives, T2: 0.06 ml of clove oil/kg of feed was added to it, T3: The third treatment was added to 0.08 ml of clove oil/kg of feed, T4: Add 0.1 ml clove oil/kg feed, T5: Add 0.06 ml clove oil/kg + 0.05 zinc oxide. T6: Add 0.08 ml clove oil/kg feed + 0.05 zinc oxide, T7: Add 0.1 ml clove oil/kg feed + 0.05 zinc oxide. The results obtained from the experiment were: In the qualitative characteristics of eggs, it is observed that there are no significant differences ($p \leq 0.05$) for most of the qualitative characteristics, including the thickness of the shell, the Yolk index, and the Albumin index. As for the percentage of weight of the yolk, a significant superiority of ($p \leq 0.05$) is observed for all addition treatments over the control treatment. As for the percentage of weight of the shell, it is noted that there are no significant differences ($p \leq 0.05$) in all periods except the fifth period, where it is noted that the addition treatments are superior to the control treatment. As for the weight, it is noted that the relative Albumin weight is significantly lower ($p \leq 0.05$) in all addition treatments compared to the control treatment.

***Keywords*:** clove oil, zinc oxide, egg quality characteristics, laying hens.

INTRODUCTION

In recent years, we have noticed an increase in interest in medicinal herbs and plants through their extensive use. They are used as a source in the production of medicines due to the active compounds they contain, or they are used in the production of medicinal materials such as drugs, or they are used for some medicines as chemical compounds [1]. As a result of the increase in the density of raising chickens, especially laying hens, the demand for eggs or meat has increased due to the high increase in population, and thus the need for animal proteins increases in general, especially egg protein, because its chemical composition is very suitable for human consumption [2]. Therefore, there has been research to reduce the use of drugs, antibiotics, and medications [3]. There has become a recent trend in current studies to use plant extracts for treatment because they have high effectiveness, in addition to being easy to obtain, and because they do not lead to environmental pollution, in addition to being safe [4]. Plants are important because of the nutrients they provide [5]. This natural addition has received great interest and acceptance by consumers because of its impact on improving animal products, whether the production of eggs or meat [6]. The poultry industry has contributed greatly as it is a good source in achieving food security [7]. Recently, research has been conducted to replace these antibiotics with natural feed additives in poultry feed [8]. Spices, herbs, medicinal plants and organic acids have been successfully used as growth stimulants in poultry feed [9,10]. Among these alternatives is clove oil, which is an essential oil extracted from clove plants, especially from their flowers, stems and leaves. The quality of clove oil is usually indicated by its eugenol and caryophyllene contents [11, 12]. Methyl eugenol (ME) may be released as a component of the leaves, stems, or roots when this part of the plant is damaged. Methyl eugenol is a component of many essential oils sold for use in aromatherapy. Clove essential oil acts as an effective growth stimulant in broiler chickens [13]. Which works mainly by reducing intestinal diseases [14]. In addition, it is an antiseptic, expectorant, and appetite stimulant [15]. It is an anti-inflammatory and antioxidant [16]. Medicinal plants are classified into antioxidants, immunomodulatory, digestive aids or growth enhancers [17]. Zinc (Zn) is also a pivotal micronutrient essential for normal animal function, including physical growth and muscle development [18], immunity [19], reproduction, egg production, and eggshell quality [20]. The World Health Organization reported [21]. Zinc deficiency ranks 11th among the 20 most important risk factors that contribute to disease worldwide and fifth among the 10 most important factors in developing countries. Hence, strategies to increase people's zinc intake could be crucial in many parts of the world. Zinc is a major additive in the feed industry, with both organic and inorganic forms being used. Inorganic zinc is relatively cheap; However, organic sources are more easily assimilated than inorganic sources, which would allow lower concentrations added to the feed [22]. According to the National Research Council, a supplemental dose of 35 mg of zinc per kilogram is recommended for laying hens [23]. Although

[24] reported that 20 mg/kg supplemental zinc was sufficient to maintain performance, good eggshell quality, and bone condition. This study aimed to determine the effect of adding clove oil with or without zinc oxide on the qualitative characteristics of the egg.

Materials and methods:

The experiment was conducted in the poultry field of the Department of Animal Production - College of Agriculture - University of Kirkuk, where 112 laying hens were used, which extended from 2/1/2024 until 15/4/2024, including the preliminary period, which lasted 14 days. The birds were divided into (7) Treatments for each treatment: 4 replicates/4 chickens according to the following treatments: T1: It was the comparison group and free of additives, T2: 0.06 ml clove oil/kg feed was added to it, T3: 0.08 ml clove oil/kg feed was added to it, 0.08 ml clove oil/kg feed was added to it. 1 ml clove oil/kg feed, T5: Add 0.06 ml clove oil/kg feed + 0.05 zinc oxide, T6: Add 0.08 ml of clove oil per kg of feed + 0.05 zinc oxide. T7: Add 0.1 ml of clove oil per kg of feed + 0.05 zinc oxide. Studied attributes. (percentage of yolk weight, yolk index, per cent of white weight, height of white, shell thickness, shell weight percentage, Hu unit).

Statistical analysis

Statistical analysis was conducted by applying a completely randomized design (CRD) to study the effect of the studied parameters on the various characteristics according to the SAS program [25]. According to the significant differences between the means according to [26] with multiple levels at a significance level (0.05), according to the following mathematical model: -

$Yij = \mu + Ti + eij$

Treatment

T1	T2	T3	T4	T5	T6	T7
23.14	23.09	23.09	23.09	23.08	23.08	23.08
40.7	40.69	40.69	40.67	40.67	40.65	40.65
20.5	20.5	20.48	20.48	20.48	20.48	20.46
3.50	3.50	3.50	3.50	3.50	3.50	3.50
1.83	1.83	1.83	1.83	1.83	1.83	1.83
9.63	9.63	9.63	9.63	9.63	9.63	9.63
0.10	0.10	0.10	0.10	0.10	0.10	0.10
0.20	0.20	0.20	0.20	0.20	0.20	0.20
	0.06	0.08	0.1	0.06	0.08	0.1
				0.05	0.05	0.05
0.20	0.20	0.20	0.20	0.20	0.20	0.20
0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	100	100	100	100	100	100
2908.14	2906.25	2906.25	2905.09	2904.78	2904.10	2903.62
16.47	16.46	16.46	16.45	16.45	16.44	16.43
4.09	4.09	4.09	4.09	4.09	4.09	4.09
0.44	0.44	0.44	0.44	0.44	0.44	0.44
0.94	0.94	0.94	0.94	0.94	0.94	0.94
0.32	0.32	0.32	0.32	0.32	0.32	0.32

Results

T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.71 ±23.10 c	0.74 ±22.82 d	0.41 ±24.01 b	0.58 ±24.96 c	0.75 ±25.10 c	0.51±25.26 b	0.71±23.10 c
T2	0.63 ±25.21 bc	0.74 ±25.58 bc	1.49±26.02 ab	1.18 ±26.13 bc	0.94 ±26.01 bc	1.01± 27.70 a	0.63±25.21 bc
T3	0.68 ±25.78 abc	0.64 ±25.24 c	0.84 ±25.50 ab	0.89 ±25.46 abc	0.95 ±27.06 abc	0.89 ±27.56 a	0.68±25.78 abc
T4	1.09 ±27.79 ab	1.00 ±27.91 ab	1.19 ±27.96 a	0.75 ±28.20 ab	0.60 ±28.18 ab	0.44±28.58 a	1.09±27.79 ab
T5	1.03 ±26.07 abc	0.92 ±26.83 abc	1.04 ±27.07 ab	1.49 ±27.71 abc	0.54 ±27.90 ab	0.30±28.53 a	1.03±26.07 abc
T6	1.20 ±28.65 a	0.70 ±28.66 a	0.82 ±28.73 a	0.47 ±28.53 a	0.41 ±29.06 a	0.32±28.49 a	1.20 ±28.65 a
T7	1.06 ±27.01 ab	0.72 ±27.36 abc	0.70 ±27.30 a	0.34 ±27.90 ab	0.19 ±28.18 ab	0.54±28.46 a	1.06±27.01 ab

Measuring the response resulting from adding clove seed oil with or without zinc oxide in the diet of laying hens on the yolk weight percentage: The results of the statistical analysis in Table (2) indicated that the yolk weight percentage in the first period was significantly higher than the sixth treatment ($P \leq 0.05$), as the highest percentage was recorded in The weight of the yolk was 28.65%, while the control treatment recorded the lowest percentage of the weight of the yolk, reaching 23.10%. It is also noted that the seventh treatment and the fourth treatment were significantly superior to the control treatment. In contrast, the rest of the treatments did not differ significantly ($P \geq 0.05$) from the control treatment. It is also noted that in the second period, all addition transactions outperformed the control transaction, with the sixth treatment continuing to record the highest percentages, which amounted to 28.66%, compared to the control transaction, which recorded the lowest percentage, 22.82%. As for the third period, it is observed that the fourth, sixth, and seventh treatments outperformed significantly ($P \leq 0.05$), with the sixth treatment continuing to record the highest percentages, which amounted to 28.73% compared to the control group, which recorded 24.01%. As long as the additional treatments remained, it was noted that they were mathematically superior to the control treatment. It is also noted from the results of the statistical analysis that the sixth treatment continues to have significant superiority ($P \leq 0.05$) over the control treatment, which is noted to have recorded the highest percentages of yolk weight, which amounted to (28.53 and 29.06%) in the two periods, the fourth and fifth periods, over the control treatment, which recorded the lowest percentages. It reached (24.96 and 25.10%) for the same periods. In the sixth period, it is noted that all addition treatments outperformed the control treatment, as it is noted that the fourth treatment recorded the highest percentages, which amounted to 28.58%, compared to the control group, which recorded the lowest percentage of yolk weight, which amounted to 25.26%.

Table (2) Measurement of the response resulting from adding clove seed oil with or without zinc oxide in the diet of laying hens on the percentage of yolk weight in grams (mean ± standard error).

* If different, the letters inside the columns indicate the presence of a significant difference ($P \leq 0.05$). (T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed

Table (3): Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens on the relative weight of the eggs in grams. (mean ± standard error).

Period T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.67±66.16 a	1.26±67.16 a	0.77±66.80 a	0.65 ±65.60	0.89±64.96 a	0.53±65.70 a	0.67±66.16 a
T2	0.83±64.16 ab	0.96±65.19 ab	2.06±64.80 ab	1.78±65.09	1.55±63.57 ab	0.95±63.66 ab	0.83±64.16 ab

T3	0.92±62.34 bc	1.22±64.61 abc	0.94±65. 49 a	1.46±65.41	1.00±61.32 bc	0.81±63.99 ab	0.92±62.34 bc
T4	1.64±61.72 bc	1.38±62.17 bc	1.53±62.82 ab	0.74±62.66	0.89±60.94 bc	0.61±62.57 b	1.64±61.72 bc
T5	0.75±63.56 abc	1.13±63.35 bc	0.08±63.25 ab	1.73±62.93	0.34±60.59 c	0.50±62.76 b	0.75 ±63.56 Abc
T6	1.77±60.24 c	0.97±61.16 c	0.79±61.36 b	0.69±61.96	0.52±59.95 c	0.85±62.47 b	1.77 ±60.24 c
T7	1.05±62.51 abc	0.89±63.33 bc	0.83±62.79 ab	0.45±63.57	0.71±59.61 c	0.89±62.91 b	1.05±62.51 abc

Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens on the weight percentage of egg albumin

The results of the statistical analysis in Table (3) indicate that the percentage of egg weight in the first period is significantly higher than the control treatment (P≤0.05), as the highest percentage of weight was recorded the percentage of egg weight was 66.16%. In contrast, the sixth treatment recorded the lowest percentage weight for the same period, which amounted to 60.24%. As for the second, fifth, and sixth treatments, they did not differ significantly (P≥0.05), with the control treatment only showing arithmetic differences. As for the second period of the experiment, it is noted that the control treatment continued to have a significant superiority (P≤0.05) by recording the highest percentage of egg weight, reaching 67.16%, with the sixth treatment recording the lowest percentage of egg weight, reaching 61.16%. In the third period, we noticed that the control and third treatments were significantly superior (P≤0.05), as they recorded the highest percentages of white weight (66.80 and 65.49%). As for the rest of the treatments, they did not differ significantly (P≥0.05) with the control treatment, except the sixth treatment, which differed significantly. P≤0.05) recording the lowest percentage of egg weight, which amounted to 61.36%. In the fourth period, there were no significant differences (P≥0.05) between the addition treatments and the control treatment. However, in the fifth period, we notice that the control treatment was significantly superior (P≤0.05) to all addition treatments except for the second treatment, and it did not differ significantly (P≥0.05)) with the control treatment, as the control treatment recorded the highest percentages, which amounted to 64.96%, and the seventh treatment recorded The lowest percentage of weight reached 59.61%. We also noticed in the sixth period that the control treatment continued to have its moral superiority by recording the highest percentage of white weight, 65.70%, over the fourth, fifth, sixth, and seventh experimental treatments, where the sixth treatment recorded the lowest percentage of white weight, 62.47%. As for the second and third treatments, there were no significant differences between them and the control treatment, only differences. Mathematical.

* If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed

Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens

The results obtained from the statistical analysis of Table (4) indicate that there are no significant differences (P≥0.05) between all addition treatments and the control treatment trait. for all periods.

Table (4) Measurement of the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens at laying height mm (mean ± standard error).

Period T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.18±9.50	0.26±9.58	0.27±9.02	0.32±7.96	0.09±9.09	0.19±6.87	0.18±9.50
T2	0.33±9.53	0.20±9.58	0.22±9.61	0.37±9.26	0.27±9.06	0.29±6.87	0.33±9.53
T3	0.14±9.39	0.38±9.97	0.36±9.16	0.61±8.50	0.47±9.24	0.21±6.55	0.14±9.39
T4	0.39±9.73	0.24±9.88	0.31±9.06	0.77±8.69	0.15±9.00	0.46±7.05	0.39±9.73
T5	0.23±9.86	0.30±9.25	0.29±8.95	0.29±9.35	0.24±9.57	0.15±7.06	0.23±9.86
T6	0.25±9.42	0.24±9.53	0.21±9.48	0.64±8.82	0.21±9.27	0.19±6.59	0.25±9.42
T7	0.51±9.35	0.18±9.27	0.24±9.73	0.61±8.79	0.25±8.88	0.11±7.30	0.51±9.35

* If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

(T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed.

Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens at high yolk index

The results obtained from the statistical analysis of Table (5) indicate that there are no significant differences (P≥0.05) between all addition treatments and the control treatment for the trait. Al Saffar guide for all periods

Table (5): Measurement of the response resulting from adding clove seed oil with or without zinc oxide in the diet of laying hens on the yolk index mm (mean ± standard error).

Period T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.00±0.47	0.01±0.47	0.02±0.46	0.00±0.47	0.00±0.50	0.00±0.47	0.00±0.47
T2	0.00±0.47	0.02±0.49	0.01±0.46	0.01±0.48	0.03±0.45	0.00±0.48	0.00±0.47
T3	0.00±0.46	0.01±0.01	0.01±0.49	0.00±0.49	0.01±0.50	0.03±0.45	0.00±0.46
T4	0.01±0.48	0.00±0.48	0.01±0.50	0.00±0.49	0.00±0.48	0.01±0.47	0.01±0.48
T5	0.04±0.51	0.00±0.50	0.01±0.49	0.00±0.49	0.04±0.52	0.01±0.49	0.04±0.51
T6	0.01±0.48	0.01±0.48	0.00±0.48	0.01±0.48	0.00±0.48	0.00±0.47	0.01±0.48
T7	0.02±0.49	0.00±0.49	0.00±0.50	0.01±0.49	0.01±0.47	0.00±0.44	0.02±0.49

* If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

(T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed

Measuring the response resulting from adding clove seed oil with or without zinc oxide in the diet of laying hens on the thickness of the shell

The results obtained from the statistical analysis of Table (6) indicate that there are no significant differences (P≥0.05) between all addition treatments and the control treatment for the thickness trait. Veneers for all periods.

Table (6): Measuring the response from adding clove seed oil with or without zinc oxide to the diet of laying hens on Veneer thickness mm (mean ± standard error).

Period T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.00±0.55	0.01±0.61	0.02± 0.45	0.02±0.44	0.03±0.41	0.02±0.41	0.00±0.55
T2	0.04±0.53	0.05±0.61	0.02±0.41	0.01±0.48	0.03±0.41	0.01±0.39	0.04±0.53
T3	0.03±0.57	0.03±0.58	0.03±0.43	0.03±0.47.	0.02±0.44	0.03±0.40	0.03±0.57
T4	0.04±0.55	0.01±0.56	0.02±0.43	0.02±0.51	0.02±0.43	0.02±0.43	0.04±0.55
T5	0.05±0.56	0.02±0.65	0.01± 0.45	0.03±0.46	0.03±0.43	0.01±0.42	0.05±0.56
T6	0.04± 0.55	0.02±0.61	0.03±0.45	0.02±0.44	0.02±0.49	0.02±0.41	0.04±0.55
T7	0.02±0.55	0.03±0.57	0.03±0.48	0.02±0.47	0.01±0.50	0.02±0.37	0.02±0.55

* If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

(T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed.

Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens on the percentage of shell weight

The results obtained from the statistical analysis of Table (7) indicate that there are no significant differences (P≥0.05) between all addition treatments and the control treatment for the trait. Peel weight percentage for the first, second, third, fourth, and sixth periods. In the fifth period, we notice a significant superiority (P≤0.05) for the seventh treatment, which recorded the highest percentage of peel weight, 12.20%, over the control treatment, which recorded the lowest percentage, 9.92%.

If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

(T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed.

Measuring the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens on the Hu unit

The results obtained from the statistical analysis of Table (8) indicate that there are no significant differences (P≥0.05) between all addition treatments and the control treatment for the fish trait. Veneers for all periods.

Table (8): Measurement of the response resulting from adding clove seed oil with or without zinc oxide to the diet of laying hens in the Hoff unit (mean ± standard error).

Period T	First period	Second period	Third period	Fourth period	Fifth period	Sixth period	General Average
T1	0.89±97.23	1.24±97.19	1.41±94.68	1.67±94.58	0.84±94.73	1.45±81.90	0.89±97.23
T2	1.88±96.12	1.30±95.37	1.06±96.49	0.90±96.33	1.59±93.04	1.68±79.96	1.88±96.12
T3	1.06±95.98	1.48±97.82	2.18±93.74	2.09±93.32	2.30±93.68	1.90±77.47	1.06±95.98
T4	1.93±97.28	1.02±97.83	2.30±93.71	1.84±93.46	0.88±92.73	3.06±80.81	1.93±97.28
T5	0.83±97.98	1.28±95.05	1.29±93.46	1.31±93.40	1.24±95.58	1.04±81.19	0.83±97.98
T6	0.90±96.13	1.22±96.34	0.94±96.03	1.01±95.54	1.04±94.31	1.36±77.83	0.90±96.13
T7	2.51±95.08	0.93±94.90	1.07±96.84	1.13±96.59	1.33±92.23	0.94±82.59	2.51±95.08

* If different, the letters inside the columns indicate the presence of a significant difference (P≤0.05).

(T1): (standard diet without additives), T2 Second treatment: Standard diet with 0.06 ml clove oil added/kg feed, T3 Third treatment: Standard diet with 0.08 ml clove oil added/kg feed, T4 Fourth Treatment: Standard diet added to 0.1 ml clove oil/kg feed, T5. Fifth treatment: Standard diet added 0.06 ml clove oil + 0.05 zinc oxide/kg feed, T6. Sixth treatment: Standard diet added 0.08 ml clove oil + 0.05 zinc oxide/ Kg of feed, T7, seventh treatment: Standard feed added to 0.1 ml clove oil + 0.05 zinc oxide/kg feed.

The studied egg quality characteristics were (shell thickness, shell weight percentage, yolk weight percentage, yolk index, H unit, white weight percentage, white height), where it is noted from the results of the statistical analysis that there are no significant differences in most of the egg quality attributes that were studied, except The yolk weight percentage and the white weight percentage, as well as the fifth period of the shell weight percentage only, as shown in Tables (2)(3)(4)(5)(6)(7)(8), respectively.

It was found that adding (0.1 ml/1 kg) and adding (0.06 ml/1 kg) of clove oil had a significant effect (P<0.05) on the albumin index, and (1.0 ml/1 kg) of clove oil had a significant effect (P< 0.05) on the H unit, and this differs from the findings of our current study, which indicated that there are no significant differences in the H unit, Table (8), and the study also showed that there is no significant difference (P>0.05) in the other criteria of egg quality, and this is consistent with the findings of our study. As for the percentage of yolk weight, we notice that all the addition treatments are superior to the control treatment, as our study does not agree with what the researcher mentioned [27].

Previous studies on the work of hormones, including estrogen, indicated its stimulating work in the formation of yolk, in addition to its work in the formation of the hepatic lipoprotein (Apo B) [28]. After their formation in the liver (the precursors of the yolk), the process of packaging takes place inside the particles of low-density lipoproteins (VLDL) to be transported, and vitellogenin, i.e. the precursors of the proteins in the yolk, is released into the blood until it reaches the egg [29].

The estrogen hormone, at the beginning of ovulation, completely converts the hepatic lipoproteins that were produced from the VLD into very low-density lipoproteins (VLDL), which target the yolk, and the process of transporting triglycerides and total cholesterol that were synthesized through the liver cells in the form of VLDL, which is considered the substance that can Access and yolk formation within developing eggs [28] .The specific characteristics of the egg (shell thickness, shell weight, yolk weight percentage, white weight percentage, in units)

we're not significantly affected compared to the comparison group, and this is consistent with the findings of our current study.

As for the yolk weight percentage, we notice that all the addition treatments are superior to the control treatment. In addition to the percentage of white weight, we noticed a decrease in the percentage of white weight in all additional treatments compared to the control treatment, and this does not agree with what the researcher mentioned [30].

It was found that zinc additions had a significant effect on the albumin index. Still, no significant effect was observed between the treatment groups with regard to shape index, yolk index, yolk percentage, albumin, shell weight, and Hu unit between the addition treatments and the comparison treatment [31].

This is consistent with our study regarding Except for the weight of the yolk, we note that all the addition treatments outperformed the control treatment. Adding organic or nano-zinc led to a significant increase in the average weight of the yolk, which is consistent with our study. And a non-significant increase ($P \geq 0.05$) in the average peel weight. This is consistent with our study, but we notice a significant increase in the fifth period in the peel weight in Table (7), while lowering the level of nano-zinc (30 ppm) reduced it significantly ($P<0.05$). of the average albumin weight. At the same time, nanozinc led to a significant decrease in the average albumin index. Forms of zinc with a concentration of 30 or 60 ppm/kg feed can be used as a safe alternative source of inorganic zinc in the diets of laying hens without any harmful effect on their production performance [32].

A significant improvement ($P<0.01$) was found in the unit, shell thickness, and egg shell ratio with increasing levels of zinc oxide nanoparticles. Adding zinc oxide nanoparticles to chicken diets led to improved digestibility of nutrients, cholesterol, and liver and kidney functions, and they can be used as additives. Effective for feed [33]. Zinc is a trace element that improves broiler growth performance and meat quality. Furthermore, zinc can benefit animals in several ways, such as carbohydrate metabolism, productive performance, as well as acting as a cofactor in more than 300 metalloenzymes [34].

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صفات نوعية البيض.

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الخلاصة

اجريت التجربة في حقل الطيور الداجنة التابع لقسم الانتاج الحيواني _ كلية الزراعة _ جامعة كركوك حيث استخدمت 112 طير دجاج بياض من نوع ***Lohmann Brown*** والتي امتدت من ***2 / 1 / 2024*** ولغاية ***15 / 4 / 2024*** من ضمنها الفترة التمهيدية والتي استمرت 14 يوماً، قسمت الطيور الى (***7***) معاملات لكل معاملة (***4***) مكررات ولكل مكرر (***4***) طيور حيث كانت المعاملات كالتالي: ***T1*** المعاملة الاولى : كانت معاملة سيطرة بدون اي اضافة، المعاملة الثانية ***T2***: اضيف لها ***0.06*** مل زيت القرنفل/ كيلو غرام علف، ***T3*** المعاملة الثالثة اضيف لها ***0.08*** مل زيت القرنفل/ كيلو غرام علف، ***T4*** المعاملة الرابعة اضيف لها***0.1*** مل زيت القرنفل/ كيلو غرام علف، ***T5*** المعاملة الخامسة اضيف لها ***0.06*** مل زيت القرنفل/ كيلو غرام علف + ***0.05*** اوكسيد الزنك، ***T6*** المعاملة السادسة: اضيف لها ***0.08*** مل زيت القرنفل/ كيلو غرام علف + ***0.05*** اوكسيد الزنك، ***T7*** المعاملة السابعة : اضيف لها ***0.1*** مل زيت القرنفل / كيلو غرام علف + ***0.05*** اوكسيد الزنك. وكانت النتائج التي تم الحصول عليها من التجربة : اذ يلاحظ في الصفات النوعية للبيض عدم وجود فروق معنوية ***P≥ 0.05*** لغالبية الصفات النوعية منها سمك القشرة ، دليل الصفار، وحده هو، ارتفاع البياض اما نسبة وزن الصفار فيلاحظ تفوق معنوي ***P≤ 0.05*** لجميع معاملات الاضافة على معاملة السيطرة، اما نسبة وزن القشرة فيلاحظ عدم وجود فروق معنوية ***P≥ 0.05*** في جميع الفترات ما عدا الفترة الخامسة اذ يلاحظ تفوق معاملات الاضافة على معاملة السيطرة اما نسبة وزن البياض يلاحظ انخفاض وزن البياض النسبي معنوياً ***P≤ 0.05*** في جميع معاملات الاضافة مقارنة مع معاملة السيطرة.

الكلمات المفتاحية : زيت القرنفل ، اوكسيد الزنك، الصفات النوعية للبيضة ، الدجاج البياض .