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Comparison the Effect of Adding Local *Anemone coronaria* L. Flower Powder and Vitamin C in the diet on the Productive Performance of Laying Hens Exposed to Heat Stress in Summer

Mohammed Fadhil Abed Al-Khayyat [1] **Ammar Qahtan Shanoon [2]**

[1] *Ministry of Environment, Baghdad, IRAQ.*

[2] *Department of Animal production, College of Agriculture, University of Kirkuk, Kirkuk, IRAQ.*

*Corresponding Author: mfkyatt@gmail.com.

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ABSTRACT

The effect of adding powdered local *Anemone coronaria* L. flowers and vitamin C on the productive performance of laying hens raised in the summer and exposed to heat stress was studied. The experiment was completed using 120 Lohmann Brown birds at 30 weeks old, during July, August, and September, for a period of 84 days, which included a 14-day preparatory period. The experiment period was divided into (5) productive periods, where the birds were randomly distributed into (6) treatments with (5) replicates, and for each replicate (4) birds, where the treatment was T1: a control Diet-free of any additives, T2: a control diet with vitamin C added. At a rate of 250 mg/kg of feed, T3: a control diet to which *Anemone coronaria* L. flower powder is added. At a rate of 2 g/kg of feed, T4: a control diet to which *Anemone coronaria* L. flower powder is added, at a rate of 4 g/kg of feed, T5: a control diet with the addition of *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed and Vitamin C at a rate of 250 mg/kg feed, T6: a control diet with the addition of *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed and Vitamin C at a rate of 250 mg/ kg of feed. The results of the field experiment showed that there were significant differences in the general average of productive periods at the level ($P \leq 0.05$) in all the studied traits. Treatment T6 recorded the highest percentage of egg production. The highest average egg weight was in treatments T5 and T3, respectively, and the highest average egg mass was in treatment T6. The highest rate of feed consumption was in treatment T2, and the best food conversion factor was in treatments T5 and T6, respectively. The control treatment T1 witnessed the highest mortality rate with a decrease in the average live weight of birds. It is noted from the results of the experiment that the additions of *Anemone coronaria* L. flower powder and vitamin C led to a reduction in the effects of heat stress on birds when exposed to high temperatures in summer. Thus the positive effect was clear in improving the productive performance and health of the birds.

***Keywords*:** *Anemone coronaria* L., Vitamin C, productive performance, Laying hens, Heat stress.

INTRODUCTION

The poultry industry contributes significantly as a suitable source for achieving global food security, as it can transform a wide range of agricultural by-products into high-energy, protein-rich meat and eggs and other essential nutrients for humans while improving economic conditions [1]. Climate change and high temperatures pose a serious threat to animal production and are among the seasonal problems faced by breeders in Iraq, where poultry are exposed to heat stress, which negatively affects productive performance, health, and high mortality rates [2,3]. Heat stress leads to weight loss, decreased egg production, and even the death of birds, and its impact on poultry breeding and production is global and brings huge financial losses [4]. High temperatures in Iraq in the summer are one of the most seasonal problems that affect poultry production, as many breeders stop production in addition to the losses they suffer [2].

Nutritional supplements are the most feasible approach to overcome the effects of heat stress and improve productive performance, as many additives are used, such as vitamins, minerals, and herbs [5]. The *Anemone coronaria* L. plant is considered one of the medicinal plants of great importance because its various parts contain one or several active substances with biological effects in treating diseases, whether in their natural form or when extracted [6,7]. The extract of *Anemone coronaria* L. flowers also improves production performance, is antioxidant, analgesic, and antipyretic, and enhances the health of birds exposed to stress, thus reducing the rate of economic losses resulting from weight loss or deaths due to heat stress [8,9].

Therefore, this study, which is considered the first of its kind in Iraq and the world, aims to use the powdered flowers of the local *Anemone coronaria* L. plant as a safe feed additive and to know its effect on the productive traits of poultry birds exposed to heat stress while reducing the economic losses facing breeders in the summer and improving production performance by

relying on Available natural sources, comparing them to vitamin C, and studying the changes occurring in production characteristics.

Materials and methods

The experiment was conducted in the summer for (84) days, divided into five productive periods (14) days/period in order to measure the characteristics studied for the experiment. It was preceded by a (14) day preparatory period. The experiment was completed using (120) Lohmann Brown birds at the age of (30) weeks. They were placed in aluminum cages consisting of four floors vertically. They were placed in cages consisting of four floors vertically. The cages contained automatic plastic feeders and nipples. Table (1) shows the components of the feed and the chemical analysis. Based on NRC 1994 [10]. A lighting system of (16) hours of light and (8) hours of darkness was used, according to the recommendations of the breeding manual. The treatments were as follows: Treatment T1: a control diet free of any additives, T2: a control diet with vitamin C added. At a rate of 250 mg/kg of feed, T3: a control diet to which *Anemone coronaria* L. flower powder is added. At a rate of 2 g/kg of feed, T4: a control diet to which *Anemone coronaria* L. flower powder is added, at a rate of 4 g/kg of feed, T5: a control diet with the addition of *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed and Vitamin C at a rate of 250 mg/kg feed, T6: a control diet with the addition of *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed and Vitamin C at a rate of 250 mg/ kg of feed.

Feed ingredients	Percentage of feed ingredients
Wheat	16.32
Corn	40.5
Oil	1
Barley	4
Soybean meal 48%	25.7
Laymix-2.5	2.5
Lysine	0.01
Methionine	0.07
Limestone	9
T. Salt	0.2
Choline chloride	0.25
DCP	0.45
Total	%100
Amount	chemical composition
Energy Kcal/kg	2708
Protein %	18.37
Lysine %	1
Methionine	0.47
Methionine & Cysteine %	0.69
Ca %	4.38
p %	0.6
ME/CP Ratio	167.03

Statistical analysis

A completely randomized design (CRD) was used to study the effect of parameters on the studied traits using the statistical program (SAS), and the significant differences between the means were tested using the Duncan multilevel test [11], according to the following mathematical model: $Yij = \mu + Ti + eij$

Results

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the average live body weight: The results are shown in Table (2). There are significant differences ($P \leq 0.05$) in the average live body weight of the birds at the end of the experiment compared to their weights at the beginning of the experiment, where the treatment was recorded. T4 had the highest weight gain rate, which amounted to (96.3) g, followed by treatment T6 (83.68) g, treatment T3 (38) g, treatment T5 (25.36) g, then treatment T2 recorded (21.81) g, with increase rates of 5.82%, 5.05%, 2.29%. 1.53% and 1.32%, respectively, compared to treatment T1, which witnessed an average weight decrease of (-51.35) g, meaning -3.1% from the weight of the birds at the beginning of the experiment.

Table (2) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the live body weight gain (g) of laying hens exposed to heat stress in summer (mean ± standard error)

Treatment	Weight gain rate/g	Percentage of weight gain %
T1	-51.35 ± 25.71 c	-3.10 ± 1.55 c

T2	21.81 ± 20.20 b	1.32 ± 1.22 b
T3	38.00 ± 26.76 ab	2.29 ± 1.62 ab
T4	96.30 ± 23.61 a	5.82 ± 1.43 a
T5	25.36 ± 21.26 ab	1.53 ± 1.28 ab
T6	83.68 ± 17.53 ab	5.05 ± 1.06 ab

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the percentage of egg production (H.D.%): The results in Table (3) show that there are no significant differences in the percentage of egg production between the treatments in the first, second, third, and fourth production periods, and there are significant differences (P≤0.05) in the fifth productive period, where all treatments, without significant differences between them, outperformed the control treatment, as treatment T3 recorded (94.29%), treatment T6 (93.57%), treatments T5 and T2 (92.5%), and treatment T4 (89.94%) compared to treatment T1 (82.38%), which is the lowest recorded level. The general rate of production periods also witnessed significant differences, as treatment T6 recorded the highest production rate of (92.29%), followed by treatment T4 (89.64%), treatment T5 (88.64%), treatment T3 (88.61%), treatment T1 (87.88%) and treatment T2. (86.34%).

Table (3) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the percentage of egg production (H.D.%) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Egg production at different productive period					Average of egg production
	1	2	3	4	5	
T1	85.44±2.73 a	93.93±3.33 a	90.12±2.89 a	87.54±4.32 a	82.38±2.88 b	87.88±1.56 b
T2	80.71±3.45 a	86.07±1.18 a	86.07±2.85 a	86.34±4.01 a	92.50±1.91 a	86.34±1.40 b
T3	81.58±2.82 a	86.37±4.03 a	87.86±3.31 a	92.98±2.35 a	94.29±2.07 a	88.61±1.54 ab
T4	86.07±2.49 a	91.43±2.42 a	90.00±2.80 a	91.07±3.29 a	89.64±3.93 a	89.64±1.30 ab
T5	83.57±2.49 a	89.64±1.43 a	89.64±2.07 a	87.86±4.28 a	92.50±1.73 a	88.64±1.22 ab
T6	86.79±1.45 a	91.07±1.26 a	94.64±1.26 a	95.36±2.50 a	93.57±1.34 a	92.29±0.92 a

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the average egg weight: The results in Table (4) show that there are no significant differences in the average egg weight between the treatments in the first, second, fourth, and fifth production periods, and there are significant differences (P≤0.05). In the third productive period, treatment T5 recorded the highest average egg weight of (60.2) g, followed by treatment T3 (59.5) g, treatment T6 (59.19) g,

treatment T4 (58.82) g, treatment T1 (58.23) g, and then treatment T2 (57.45) g. The general rate of production periods also witnessed significant differences, as the highest weight rate was recorded in treatment T5 (60.09) g and treatment T3 (59.84) g, followed by treatment T6 (59.63) g and treatment T4 (59.13) g, then treatment T1 (58.44) g and treatment T2. (58.25) g

Table (4) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the average egg weight (g) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Egg weight at different Productive periods					Average of egg weight
	1	2	3	4	5	
T1	57.66±0.86 a	57.72±1.19 a	58.23±1.21 ab	59.28±0.94 a	59.33±0.68 a	58.44±0.43 b
T2	57.07±0.64 a	56.13±0.83 a	57.45±0.80 b	59.67±1.12 a	60.94±1.35 a	58.25±0.54 b
T3	59.04±1.36 a	58.30±0.66 a	59.50±0.80 ab	61.06±1.10 a	61.30±0.68 a	59.84±0.46 a
T4	58.35±0.80 a	58.76±1.02 a	58.82±0.79 ab	59.72±0.95 a	60.03±0.93 a	59.13±0.39 ab
T5	59.50±0.81 a	58.43±0.48 a	60.20±0.70 a	60.38±1.07 a	61.95±0.46 a	60.09±0.38 a
T6	56.70±0.58 a	57.64±0.69 a	59.19±0.50 ab	61.27±0.71 a	62.00±0.73 a	59.36±0.49 ab

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the average egg mass: The results in Table 5 show that there are no significant differences in the average egg weight in the first and fourth productive periods, and there are significant differences (P≤0.05) in the second productive period. The third and fifth: in the second production period, treatment T1 recorded the highest rate of (54.26) g, and in the third production period, treatment T6 recorded the highest rate of (56.01) g. In the fifth production period, all treatments outperformed the control treatment T1, which recorded the lowest level of (48.8) g. The general rate of production periods also witnessed significant differences, as the highest rate was recorded in treatment T6 (54.83) g, followed by treatment T5 (53.28) g, treatment T3 (53.07) g, treatment T4 (53.04) g, then treatment T1 (51.34) g and treatment T2 (50.34) g.

Table (5) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the average egg mass (g/ bird/ day) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Egg mass at different Productive periods					Average of egg mass
	1	2	3	4	5	
T1	49.26±1.77 a	54.26±2.50 a	52.48±2.02 ab	51.90±2.72 a	48.80±1.21 b	51.34±0.96 b
T2	46.02±1.74 a	48.30±0.73 b	49.49±2.06 b	51.57±2.82 a	56.33±1.34 a	50.34±1.05 b
T3	48.08±1.37 a	50.31±2.19 ab	52.30±2.28 ab	56.81±2.06 a	57.82±1.62 a	53.07±1.10 ab
T4	50.27±1.87 a	53.79±2.19 ab	53.00±2.20 ab	54.36±2.01 a	53.78±2.39 a	53.04±0.92 ab
T5	49.75±1.82 a	52.38±1.03 ab	53.92±0.98 ab	53.06±2.75 a	57.29±0.84 a	53.28±0.84 ab
T6	49.19±0.74 a	52.48±0.71 ab	56.01±0.80 a	58.41±1.60 a	58.05±1.46 a	54.83±0.85 a

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the rate of feed consumption: The results are shown in Table (6). There are significant differences (P≤0.05) in all production periods. In the first production period, treatment T2 (98.58) g was significantly superior. In the second period, treatment T2 (99.05) g was superior to treatment T1 (98.41) g. In the third production period, treatment T2 (99.69) g was significantly superior. In the fourth and fifth production periods, all The coefficients were significantly compared to the control treatment T1, which recorded the lowest consumption rate of (93.58) g and (95.09) g/ feed/day, respectively. The general rate of production periods also witnessed significant differences, as the highest rate was recorded for treatment T2 (99.08) g, followed by treatment T6 (97.33) g, then treatment T4 (96.85) g, treatment T1 (96.43) g, then treatment T3 (95.05) g, and then treatment T5 (93.22) g.

Table (6) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the rate of feed consumption (g feed/ day) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Feed consumption at different Productive periods					Average of feed consumption
	1	2	3	4	5	
T1	96.13±1.19 ab	98.41±0.51 a	98.65±0.70 ab	93.85±1.10 b	95.09±1.08 b	96.43±0.54 bc
T2	98.58±0.69 a	99.05±0.59 a	99.69±0.31 a	98.53±0.60 a	99.53±0.47 a	99.08±0.24 a
T3	90.04±1.42 c	92.87±1.43 b	96.28±1.12 b	98.57±0.74 a	97.47±1.26 a	95.05±0.81 c
T4	94.78±0.86 b	94.08±0.69 b	97.66±0.13 ab	98.66±0.41 a	99.08±0.39 a	96.85±0.47 bc
T5	90.82±0.48 c	86.76±2.05 c	92.70±1.96 c	96.79±0.82 a	99.03±0.37 a	93.22±1.04 d
T6	95.64±0.39 b	95.69±0.66 ab	98.17±0.41 ab	97.71±0.40 a	99.45±0.18 a	97.33±0.35 ab

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the feed conversion factor: The results in Table (7) show that there are no significant differences in the fourth production period. However, there are significant differences (P≤0.05) in the rest of the periods. In the first, second, and third production periods, treatment T2 was significantly superior to the rest of the transactions, recording (1.96, 1.83, and 1.89), respectively, and in the fifth production period, treatment T1 was significantly superior to the rest of the transactions, recording (1.95). The general rate of production periods also witnessed significant differences, as the highest food conversion factor was recorded in treatment T2 (1.99), then treatment T1 (1.89), followed by treatment T4 (1.84) and treatment T3 (1.81), and the lowest food conversion factor was for treatment T6 (1.78) and treatment T5. (1.76).

Table (7) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the feed conversion factor (g feed/g eggs) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Feed conversion factor at different Productive periods	Average of

	1	2	3	4	5	FCR
T1	1.96±0.07 ab	1.83±0.08 b	1.89±0.07 ab	1.83±0.12 a	1.95±0.06 a	1.89±0.04± ab
T2	2.16±0.09 a	2.05±0.02 a	2.03±0.08 a	1.94±0.12 a	1.77±0.05 b	1.99±0.04± a
T3	1.88±0.06 b	1.86±0.08 b	1.86±0.09 ab	1.75±0.08 a	1.69±0.07 b	1.81±0.03± bc
T4	1.90±0.08 b	1.76±0.08 b	1.86±0.08 ab	1.83±0.07 a	1.86±0.08 ab	1.84±0.03± bc
T5	1.84±0.07 b	1.66±0.05 b	1.72±0.06 b	1.85±0.10 a	1.73±0.03 b	1.76±0.03± c
T6	1.95±0.03 ab	1.83±0.03 b	1.75±0.03 b	1.68±0.04 a	1.72±0.04 b	1.78±0.02± c

* Different letters within column indicate the presence of significant differences (P≤0.05) between the treatments.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

The effect of adding the local *Anemone coronaria* L. flower powder and vitamin C on the mortality rate: The results in Table 8 show the number of bird deaths in each treatment and the productive period during which the death occurred. We note that the highest number of birds dying was for treatment T1, where 4 birds out of 20 birds were distributed as follows: 3 birds in the first productive period and one bird in the fifth and final productive period, meaning a percentage of 20% of the birds lost in treatment T1, followed by treatment T3. The number of perishing birds was 2 out of 20, distributed as follows: one bird in the first productive period and one bird in the second productive period, meaning a mortality rate of 10% of the total birds in treatment T3. As for the rest of the treatments, their birds did not witness any death throughout the experimental period of 70 days.

able (8) Comparison of the effect of adding local *Anemone coronaria* L. flower powder and vitamin C in the diet on the mortality (%) of laying hens exposed to heat stress in summer (mean ± standard error)

Treat.	Mortality % at different Productive periods					Total number of mortality	Percentage of mortality
	1	2	3	4	5		
T1	3	0	0	0	1	4	20 %
T2	0	0	0	0	0	0	0 %
T3	1	1	0	0	0	2	10 %
T4	0	0	0	0	0	0	0 %
T5	0	0	0	0	0	0	0 %
T6	0	0	0	0	0	0	0 %

* The numbers inside the columns represent the number of birds that died during production periods.

** The duration of one production period is two weeks.

*** Treatments: T1: control without any addition, T2: add vitamin C at a rate of 250 mg/kg feed, T3: add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed, T4: add *Anemone coronaria* L. flower powder at a rate of 4 g/kg Feed, T5: Add *Anemone coronaria* L. flower powder at a rate of 2 g/kg feed + Vitamin C at a rate of 250 mg/kg feed, T6: Add *Anemone coronaria* L. flower powder at a rate of 4 g/kg feed + Vitamin C at a rate of 250 mg/kg feed.

Discussion

The positive effect of adding *Anemone coronaria* L. flower powder and vitamin C was clear on the productive traits studied in the experiment, represented by (egg production rate, egg weight rate, egg mass rate, feed consumption rate, feed conversion factor, and mortality rate). The results regarding the average live weight of the birds at the end of the experiment compared to their weights at the beginning of the experiment show that the only treatment that caused the birds to lose their average weight was the T1 treatment. This may be due to the powder of *Anemone coronaria* L. flowers containing active substances such as saponins and essential oils, which can be considered new factors. Important in enhancing growth performance, the effect could be related to its improved effect on intestinal growth and increased protease activity, which leads to increased protein digestion and absorption of nutrients [12]. It also promotes growth and improves immunity [13].

The studied productive characteristics related to eggs, such as the egg production percentage, which achieved its highest significant level in treatment T6, amounting to (92.29%) and the average egg weight, which recorded its highest significant level in treatment T5 and T3, which amounted to (60.09 and 59.84) g, respectively, which are the two treatments that were provided an addition rate of *Anemone coronaria* L. flower powder, amounting to (2) g/kg feed, with the addition of vitamin C (treatment T5) or without the addition of vitamin C (treatment T3). The egg mass rate, which achieved its highest significant levels in treatment T6, amounting to (54.83) g/bird/day. This significant improvement of the above-mentioned characteristics is due to the active substances in the powder of the flowers of the *Anemone coronaria* L. plant. The role of flavonoids is similar to that of steroid hormones [14]. These hormones work (as do flavonoids) to increase the basal metabolic rate because they are structural hormones, including estrogen, which plays an important role in promoting the growth of the oviduct and the formation of proteins necessary for the formation of the egg [15]. In turn, flavonoids stimulate the secretion of the thyroid gland and thus increase the secretion of the hormone thyroxine, which affects protein metabolism and works to increase the flow of amino acids to the ovarian cells and increase their concentration within the ovarian cells, thus working on the manufacture of proteins [16]. The results of the study also reinforce the findings of [17] that flavonoids have an important role in enhancing the secretion of the hormone progesterone by the granulosa cells before the ovulation process. They also enhance the proliferation and differentiation of the granulosa cells and improve the secretion hormones and the development of ovarian follicles. Therefore, adding it to feed is considered beneficial in enhancing the rate of Laying eggs. In other studies, the active ingredient represented by essential vegetable oils added as food supplements has been shown to significantly improve the performance of laying hens, egg production, ovary formation, and the sensory quality of eggs [18,19]. The improved performance recorded in the percentage of egg production and weight and mass of eggs in treatments containing natural antioxidants (medicinal plants) or artificial ones in this study compared to other treatments is consistent with the results of the study reached by [20].

The rate of feed consumption showed a significant difference. Treatment T5 recorded the lowest feed consumption of (93.22) g/feed per day. However, in contrast, the best feed conversion coefficient was recorded in treatments T5 and T6 (1.76 and 1.78) g of feed/g of eggs, respectively. This may be due to antioxidants, represented by the active substances found in the powder of *Anemone coronaria* L. flowers, and vitamin C alike. In line with several studies that reported an increase in egg production by up to (7%), better feed conversion by (15%) and an increase in intestinal villi by (24%) in laying hens supplemented with essential fats [21,22,23]. Essential fats areare considered one of the active compounds in the flower powder used and have an antioxidant effect, enhancing immunity, egg production, and ovary formation [18], [19,24]. This may explain the low level of feed consumption for the bird to make the most of it.

This is consistent with the findings of [25] regarding the effect of using the *Gynura Procumbens* plant. The feed conversion factor for laying hens, but does not agree with the feed consumption rate.

The study also showed that there were no deaths in most of the treatments, except for the treatment T1, in which the losses reached 20%, and treatment T3, in which the losses reached 10%. This may be due to the effective role of the food additives as antioxidants, anti-inflammatory, anti-virus, and immune boosters [26,27]. The results of this study, which showed that the additives used improve the health of birds by reducing physical damage and mortality due to heat stress are consistent with [28], which showed that antioxidant supplements reduce the oxidative stress response in laying hens, thus supporting the hypothesis that supplemental antioxidants work. It improves chicken health by reducing the physical and physiological damage associated with heat stress.

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مقارنة تأثير إضافة مسحوق ازهار نبات Anemone coronaria L. المحلية وفيتامين C في العليقة على الأداء الإنتاجي للدجاج البياض المعرض للإجهاد الحراري صيفاً

محمد فاضل عبد الخياط [1] **عمار قحطان شعنون [2]**

[1] وزارة البيئة، بغداد، العراق.
[2] قسم الإنتاج الحيواني، كلية الزراعة، جامعة كركوك، كركوك، العراق.

الخلاصة

تم دراسة تأثير إضافة مسحوق ازهار نبات ***Anemone coronaria L.*** المحلية وفيتامين ***C*** على الأداء الانتاجي للدجاج البياض المربى في فصل الصيف والمعرض الى الاجهاد الحراري، وانجزت التجربة باستخدام (120) طائر من نوع ***Lohmann Brown*** بعمر (30) أسبوع وخلال أشهر تموز واب وأيلول ولمدة (84) يوماً حقلياً تضمنت 14 يوماً كفترة تمهيدية، قسمت التجربة الى (5) فترات إنتاجية، حيث وزعت الطيور عشوائياً الى (6) معاملات وبواقع (5) مكررات ولكل مكرر (4) طيور، اذ كانت المعاملة ***T1***: عليقة مقارنة خالية من أي إضافة، ***T2***: عليقة مقارنة مضاف اليها فيتامين ***C*** بنسبة 250 ملغم/ كغم علف، ***T3***: عليقة مقارنة مضاف اليها مسحوق ازهار نبات ***Anemone coronaria L.*** بنسبه 2 غم/ كغم علف، ***T4***: عليقة مقارنة مضاف اليها مسحوق ازهار نبات ***Anemone coronaria L.*** بنسبه 4 غم/ كغم علف، ***T5***: عليقة مقارنة مضاف اليها مسحوق ازهار نبات ***Anemone coronaria L.*** بنسبه 2 غم/ كغم علف وفيتامين ***C*** بنسبة 250 ملغم/ كغم علف، ***T6***: عليقة مقارنة مضاف اليها مسحوق ازهار نبات ***Anemone coronaria L.*** بنسبه 4 غم/ كغم علف وفيتامين ***C*** بنسبة 250 ملغم/ كغم علف. اثبتت نتائج التجربة الحقلية الى وجود فروقات معنوية في المعدل العام للفترات الانتاجية عند مستوى ***(P≤0.05)*** في جميع الصفات المدروسة، فقد سجلت المعاملة ***T6*** اعلى نسبة انتاج بيض، واعلى معدل وزن بيض في المعاملتين ***T5*** و***T3*** على التوالي، واعلى معدل كتلة بيض في المعاملة ***T6***، واعلى معدل استهلاك علف في المعاملة ***T2***، وأفضل معامل تحويل غذائي في المعاملة الخامسة والسادسة على التوالي، شهدت معاملة السيطرة اعلى نسبة هلاكات مع نقص في معدل الوزن الحي للطيور. حيث يلاحظ من نتائج التجربة ان اضافات مسحوق ازهار نبات ***Anemone coronaria L.*** وفيتامين ***C*** أدى الى التقليل من اثار الاجهاد الحراري الذي يصيب الطيور عند تعرضها الى درجات الحرارة المرتفعة صيفاً وبالتالي كان التأثير الإيجابي واضح على تحسن الاداء الإنتاجي وصحة الطيور.

الكلمات المفتاحية: شقائق النعمان الاكليلية، فيتامين ***C***، الأداء الإنتاجي، الدجاج البياض، الاجهاد الحراري.