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The using of clove bud powder (Syzygium aromaticum) and vitamin C to reduce heat stress and its effect on the productive performance of broiler chickens .

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ABSTRACT

This study conducted in the poultry fields of the Department of Animal Production/College of Agriculture/ University of Kirkuk, for the period from 2024/7/4 to 2024/8/8, to know the effect of adding clove bud powder and vitamin C as a heat stress reliever and its effect on the productive performance of broilers. 240 one-day-old ROSS 308 Unsexed broiler chicks were used and the average initial weight was (39. 09) g. The chicks were randomly distributed into eight treatments with 3 replicates of 10 birds per replicate. The following experimental treatments :(T0) Control treatment,(T1) Vitamin C 250g/ Ton,(T2) clove bud powder 250g/ Ton Feed,(T3) clove bud powder 500g/ Ton Feed, (T4) clove bud powder 1000g/ Ton Feed ,(T5) clove bud powder 250g + 250g vitamin C Ton /Feed ,(T6) clove bud powder 500g + 250g vitamin C Ton /Feed ,(T7) clove bud powder 1000g + 250g vitamin C Ton / Feed. The results showed significant differences between the supplementation treatments and the control treatment in the average live body weight, the average weight gain, and the feed conversion ratio, and most of the weight increases occurred in the second treatment in all weeks. As for feed intake , a significant decrease was observed in favor of the sixth treatment.

***Keywords*:** Silver Cloves, Vitamin C, Heat Stress, Production Traits.

Introduction

The change in food consumption patterns among people, especially after the spread of ready-made foods, has led to the emergence of new bacterial strains that have led to mutations and the spread of many modern diseases, and consequently, to the emergence of previously unknown animal diseases [1] [2]. Broiler chicken is one of the most consumed foods among the people of the world, with total consumption during the past year reaching approximately 70 billion broiler chickens. This huge number needs to be managed from all aspects, and thus the intensive breeding of broiler chickens has led to the emergence of many modern pathogens, which required the creation of a group of medicines to preserve this important protein source for humans [3].

Cloves (*Syzygiumomaticum*) are aromatic flower buds of an evergreen tree belonging to the Myrtaceae family [4]. It is a medicinal plant that contains many elements, whether vitamins or minerals. Research has proven that it contains substances that help birds increase their activity rate and treat lethargy. It also increases the efficiency of the immune system and is considered a medicinal plant in addition to spice[5] .

In China and Eastern countries, it is used for the prevention and treatment of many bacterial diseases, Therefore, many studies have been conducted to evaluate the effect of broiler feed supplemented with cloves on performance, carcass yield, and productive traits [6]. Studies have also shown that vitamin C is one of the most powerful antioxidants that can be used to mitigate the negative effects of heat stress within the body [7]. This is due to its significant effect in protecting birds from heat stress and improving their resistance to disease by enhancing the function of their immune system [8] [9] .

Research objective: Reducing the effect of heat stress on the productive traits of broiler chickens using vitamin C with clove bud powder.

Materials and methods

This experiment was conducted to study the use of clove bud powder compared to vitamin C as a heat stress reliever and its effect on the productive performance of broiler chickens. Two hundred and forty one-day-old, unsexed Ross 308 broiler chicks were used, with an average weight of 39.09 grams. These chicks were raised on the floor in a closed hall using 24 cages measuring 1 x 1 m on a bed of sawdust.

5cm thick wood, chicks were randomly distributed into eight treatments with three replicates for each treatment and 10 birds

per replicate. The replicates were randomly distributed starting from the first day of age. The chicks were fed a first stage feed for 10 days, a growth feed for 11-24 days, and a final feed for 25-34 days. The temperature was (30-33)°C throughout the experiment, and the lighting program was (23 hours of light and 1 hour of darkness) in the first week to accustom the chicks to darkness.

From the second week until the end of the experiment, the lighting program was (21 hours of light and 3 hours of darkness), and the relative humidity was within the required limits of 65-70% according to the instructions of the production guide. The feed was provided in crushed form, and clove bud powder and vitamin C were added to the broiler feed starting from the first week.

The treatments were as follows:

1- (T0): Control treatment.

2- (T1): Vitamin C was added according to the company's standard recommendations (250 g/ton).

3- (T2): Clove bud powder was added at a rate of 250 g/ton of feed.

4- (T3): Clove bud powder was added at a rate of 500 g/ton of feed.

5- (T4): Add 1000g of clove bud powder per ton of feed.

6- (T5): Add 250g of clove bud powder + 250g of vitamin C per ton of feed.

7- (T6): Add 500g of clove bud powder + 250g of vitamin C per ton of feed.

8- (T7): Add 1000g of clove bud powder + 250g of vitamin C Ton/feed.

Table (1) the experimental diets

Feed %materials	Starter ration 1-10 kg day	Feed %materials	Growth ration 11-24 days kg	Feed %materials	The final ration is 25-42 days, kg
Wheat	377.35	Wheat	372.25	Wheat	588.85
Bran	100	Bran	100	Bran	100
Soya	320	Soya	272	Soya	165
yellow corn	150	yellow corn	200	yellow corn	100
Oil	10	Oil	16	Oil	10
B-S-0.1% Permix	10	B-G-0.8% Permix	8	Between Finisher	7
Lysine	1.3	Methionine	0.25	Methionine	1
Colin	1	Lysine	1.2	Lysine	2
Threonine	1	Coline	1	Coline	0.5
Enzyme	0.5	Threonin	1.2	Threonin	0.8
Toxbond fort	1	Enzyme	0.5	Enzyme	0.5
Limestone	18.25	Anticoccidia	0.5	Anticoccidia	0.25
Mono Calcium	8	Toxbond fort	1	Toxbond fort	1
table salt	1.6	Limestone	17	Genex	0.5
		Mono Calcium	7	Limestone	15.25
		sodium bicarbonate	0.4	Mono Calcium	5.5
		table salt	1.7	sodium bicarbonate	0.25
				table salt	1.6

Statistical Analysis

Averages means were compared using the Duncan multiple range test [10]. and the Completely Randomized Design-CRD was utilized by using statistical program (SAS)[11] according to The following mathematical model: $Yij = \mu + Ti + eij$.

Results

The results in Table (2) showed a significant superiority in body weight rate in favor of treatment T2 over the control treatment and all treatments.

Table 2: Effect of the treatments used on the average live body weight (g/bird) of broiler chickens (standard error ± mean).

Treatment	W1	W2	W3	W4	W5
T0	1.32 ± 261. 6 de	6.28±641.97d	20.56±1238cd	51.10±1937.3d	182.19±3065.7a
T1	6.23 ±280.43abc	12.64±719.53ab	20.50±1311.3abc	3.33±2094.3abcd	66.01±3197a

T2	1.67±291.77a	3.18±749.77a	4.26±1368.67a	1±2189 a	202.33±2989a
T3	3.39±285.33ab	13.13±724.77ab	11.24±1323ab	38.66±2123abc	80.90±3124.3a
T4	1.45±292.77a	16.65±738.10a	39.21±1347ab	96.10±2109.3abc	81.54±3140.3a
T5	4.93±274.77bc	10.42±696.43b	22.93±1317.3abc	15.01±2131ab	67.66±3257.7a
T6	6.41±255.93e	8.50 ± 658. 10cd	39.27±1203d	63.67±1960.3cd	145.18±3107.7a
T7	0.57±269.1cd	14.99±691.27bc	21.36±1264.3bcd	45.32±1972bcd	56.34±2880.3a

The different letters within the same column indicates that thereis a significant difference between the treatments at the level of significance p≤0.05, values were standard error ± mean .

The results in Table (3) showed a significant superiority in the rate of weight gain in favor of treatment T2 over the control treatment and all treatments.

Table 3: Effect of the treatments used on the weight gain rate (g/bird) of broiler chickens (standard error ± meanError).

Treatment	W1	W2	W3	W4	W5	Total weigt gain	
T0	1.32 ± 22 1.7 ed	5.40±38 0.4d	15.51±5 96.0 ab	38.89±6 99.3 b	138.07± 1128.3a	138.23 ±1350.1a	
T1	6.23± 24 0.6 abc	6.57±43 9.1a b	7.86±59 1.8a b	19.98±7 83.0 ab	69.34 ± 1126.7a	67.35± 1343.2a	
T2	1.67±2 51. 9a	4.73±45 8.0a	.003±61 8.9a	4.98±82 0.3a	201.78±800.0a	202.54± 1051.9a	
T3	3.34±2 45. 6ab	9.94±43 9.4a b	2.03±59 8.2a b	39.23±8 00.0 ab	72.99±1001.3a	76.36 ± 1246.8a	
T4	1.45±2 52. 9a	15.30±4 45.3 ab	24.58±6 08.9 ab	57.94±7 62.3 ab	117.1±1031.00a	115.67± 1283.9a	
T5	4.93±2 34. 9bc	6.43±42 1. 7bc	12.52±6 20.9 a	22.93±8 13.7 ab	64.62± 1126.7a 61.56 ± 1361.6a	61.56 ± 1361.6a	
T6	6.41±2 16. 1e	14.74±4 02.2 cd	46.86±5 44.9 b	25.21±7 57.3 ab	95.15±1147.3a 101.52 ± 1363.4a	101.52 ± 1363.4a	25.21±757.3ab
T7	0.58±2 29. 2cd	14.42±4 22.2 bc	6.69±57 3.1a b	39.37±7 07.7 ab	28.35±908.3a 28.87 ± 1137.6a	28.87 ± 1137.6a	39.37±707.7ab

The different letters within the same column indicates that thereis a significant difference between the treatments at the level of significance p≤0.05, values were standard error ± mean The results in Table (4) showed a significant superiority in the feed consumption rate in favor of treatment T2 over the control treatment and all treatments

Table 4: Effect of the treatments used on the feed consumption rate (g/bird) for broiler chickens (standard error ± mean).

Treatment	W1	W2	W3	W4	W5
T0	2.52±266.0ab	22.88±568.7a	15.55±759.0ab	13.43±884.0 d	46.84±1403.3a
T1	6.08±260.0ab	15.10±572.7a	14.17±765.3ab	11.67±1050. 3bc	20.58±1392.3ab
T2	9.02±274.3a	16.70±582.0a	16.52±810.0a	79.99±1210. 3a	32.37±1353.3abc
T3	3.51±264.0ab	10.20±577.7a	2.91±778.7ab	65.34±1224. 7a	23.30±1262.0bcd
T4	3.06±262.0ab	6.74±553.3a	2.52±743.0b	32.68±987.7c d	38.65±1238.7cd

T5	2.33±260.3ab	28.76±579.3a	39.83±813.0ab	37.33±1138.3ab	72.34±1270.0bcd
T6	6.94±242.7b	19.62±549.3a	31.52±744.7b	19.09±1045.3bc	28.87±1100.0e
T7	20.74±260.3ab	17.34±580.0a	13.89±754.0ab	51.81±1063.3bc	40.96±1166.7de

The different letters within the same column indicates that there is a significant difference between the treatments at the level of significance p≤0.05, values were standard error ± mean .

The results in Table (5) showed a significant superiority in the feed conversion ratio, with treatment T6, T3 and T2 outperforming the control treatment and all treatments in the third, fourth and fifth weeks, respectively.

Table (5) Effect of the treatments used on the feed conversion ratio (g/bird) for broiler chickens (standard error ± mean)

Treatment	W1	W2	W3	W4	W5
T0	0.01±1.19 a	0.04±1.45 a	0.01±1.27 ab	0.08±1.27c	0.22±1.30 ab
T1	0.04±1.08ab	0.05±1.31b	0.01±1.29ab	0.05±1.34 abc	0.07±1.27 ab
T2	0.04±1.09 ab	0.03±1.27b	0.02±1.32ab	0.10±1.48 abc	0.6 8±2.04a
T3	0.03±1.08 ab	0.04±1.32b	0,01±1.30ab	0.07±1.53a	0.10±1.28ab
T4	0.01±1.04b	0.03±1.24b	0.05±1.22 b	0.05±1.30 bc	0.16±1.24 ab
T5	0.03±1.10 ab	0.08±1.38ab	0.04±1.31 ab	0.07±1.40 abc	0.11±1.14 ab
T6	0.07±1.13ab	0.09±1.37ab	0.06±1.38a	0.02±1.38 abc	0.11±0.98 b
T7	0.09±1.14 ab	0.05±1.38ab	0.02±1.32 ab	0.04±1.50 ab	0.01±1.28 ab

The different letters within the same column indicates that there is a significant difference between the treatments at the level of significance p≤0.05, values were Mean ±standard error

Discussion:

The improvement in relative weight, weight gain, feed consumption, and feed conversion ratio (FCR) is attributed to the benefits and advantages of clove bud powder and vitamin C. The antioxidant effect of cloves, vitamin C, or some of their components is responsible for improving the productive performance of birds. Most plants have medicinal benefits, according to the World Health Organization (WHO), and the benefits and importance of medicinal plants lie in their products and the effectiveness of these components as antioxidants[12]. This is due to the high antioxidant activity of clove bud ethanol extract, compared to synthetic antioxidants such as butylhydroxytoluene (BHT) . As demonstrated in a study by [13]. when using cloves at different concentrations, all growth parameters improved significantly. The results of [14]. also showed that adding different levels of cloves to drinking water on the productive characteristics of broiler chickens led to an increase in some productive characteristics (final body weight, total weight gain, feed consumption, and FCR). This is also due to the positive effect of vitamin C in improving the digestibility of nutrients by enhancing the activity of digestive tract enzymes (trypsin, chymotrypsin, lipase, and amylase), thus maximizing the nutrient utilization, which leads to improved feed conversion efficiency in chickens [15]. demonstrated that adding vitamin C to the feed of birds exposed to high temperatures leads to a decrease in blood corticosterone levels and an improvement in the secretion of thyroid hormone from the thyroid gland, which plays a role in maintaining body metabolism and regulating temperature in birds[16]. This demonstrates the vitamin's ability to regulate body temperature, thus improving the feed conversion ratio in birds. Vitamin C acts as an antioxidant in the body through rapid oxidation to form a compound (dehydroascorbic acid), which protects cell membranes and unsaturated fatty acids from membrane oxidation and causes oxidation of free radicals. As it was reached [17]. As [18]. found in a study, using cinnamon led to a significant increase ($P \leq 0.05$) in body weights and feed conversion efficiency compared to the control treatment.

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استخدام مسحوق براعم القرنفل (Syzygium aromaticum) و فيتامين سي مخففاً للإجهاد الحراري وأثره على الاداء الانتاجي لفروج اللحم.

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الخلاصة

أجريت هذه التجربة في حقل الدواجن التابع لقسم الانتاج الحيواني في كلية زراعة /جامعة كركوك، لدراسة تأثير أستخدم مسحوق براعم القرنفل مقارنة بفيتامين سي مخففا للإجهاد الحراري واثره على الاداء الانتاجي لفروج اللحم للمدة من 2024/7/4 ولغاية 2024/8/8 ، تم استعمال 240 فرخاً من افراخ فروج اللحم نوع *ROSS 308* بعمر يوم واحد غير مجنسة وبلغ معدل الوزن الابتدائي (39.09) غم ، حيث تم توزيع الافراخ عشوائيا الى ثمانية معاملات بواقع 3 مكررات لكل مكرر 10 طير. وكانت معاملات التجربة كالتالي: معاملة السيطرة خالية من اي اضافة، تمت اضافة فيتامين سي (250غم/طن)، تمت أضافة 250غم/ طن علف مسحوق برعم القرنفل، تمت أضافة 500غم/ طن علف مسحوق برعم القرنفل ، تمت أضافة 1000 غم / طن علف مسحوق برعم القرنفل ، تمت أضافة مخلوط مسحوق القرنفل بنسبة 250غم/طن مع فيتامين 250 سي غم/ طن علف، تمت أضافة مخلوط برعم القرنفل بنسبة 500 غم / طن مع فيتامين 25 سي غم/ طن علف، تمت أضافة مخلوط برعم القرنفل بنسبة 1000 غم / طن مع فيتامين سي 25 غم/ طن علف. أظهرت النتائج وجود فروق معنوية ($P \leq 0.05$) بين معاملات الاضافة ومعاملة السيطرة في معدل وزن الجسم الحي ومعدل الزيادة الوزنية ومعامل التحويل الغذائي تراوحت بين جميع المعاملات الأضافة واغلب الارتفاعات في الاوزان حصلت في المعاملة الثانية تقريبا في جميع الاسابيع. أما بالنسبة لاستهلاك العلف فيلاحظ حصول انخفاض معنوي لصالح المعاملة السادسة.

الكلمات المفتاحية: قرنفل، فيتامين سي ، الاجهاد الحراري، الصفات الانتاجية.