



THE EFFECT OF USING DIFFERENT LEVELS OF VITAMIN E ON THE PRODUCTIVE TRAITS OF BROILER CHICKENS

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High temperatures weaken productive performance through a decrease in feed consumption and feed conversion factor, and then a decrease in live body weight [5], and high temperatures cause the release of corticosterone hormone, which causes disturbances in endocrine function and a decrease in the rate of metabolism with oxida-

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Abstract: This study was conducted at the Poultry Research Station of the Livestock Research Department in the Agricultural Research Department. 126 One-day-old chicks were used in the study, with an average starting weight of 38 g from Ross 308 strain. The chicks were distributed randomly into 3 treatments, and each treatment contained three replicates. 14 chicks for each replicate, where the first treatment was control, and the chickens in the second and third treatments were given vitamin E at a level of 350 and 600 mg / kg feed, respectively, as the continuous lighting system was followed (24 hours / day) in the hall until the end of the experiment, which reached 42 days and the temperature was 35 m throughout the study. The results of the study showed a significant ($P < 0.01$) superiority of the two vitamin E treatments (350 and 600 mg/kg feed) over the control treatment in each of live body weight, weight gain rate, relative growth rate, production index, economic indicator, and feed consumption rate. Significant in the mortality rate and a significant improvement in the feed conversion coefficient for the two experimental treatments compared with the control treatment.

Keywords: Vitamin E, Weight Gain Rate, Relative Growth Rate, Production Index, Economic Indicator.

1. Introduction

High temperatures are dangerous for broiler chickens and make them uncomfortable and lead to an increase in the breathing rate immediately when exposed to broiler chickens [1]. In addition to that, water consumption increases and feed consumption decreases, and accordingly, a rise in the body temperature of chickens occurs to reach more than 43 ° C, and the birds become uncomfortable and unable to breathe normally and then leads to the destruction of broiler chicken [2]. The high temperature leads to a decrease in the antioxidant defense system in the body [3], which leads to an increase in the level of free radicals, which causes an increase in oxidative stress, oxidative stress and a decrease in immunity [4].

tion [6]. Unsaturated fats in the body then weaken the immune response, which makes the body more susceptible to disease [7]. Therefore, it was necessary to use many means and methods in order to reduce the severity of the high temperatures on the birds [8], such as adding aspirin or vitamin E, C, and E is one of the most powerful natural antioxidants because it works to protect unsaturated fatty acids inside and outside the cells of the body from free radicals and also prevents the reactions of the formation of free radicals resulting from respiratory processes [9]. These reactive chemicals are essential in the host-pathogen interaction because they cause pathogen detection, host defense system activation, and gene expression [10]. Organisms have specific antioxidant defense mechanisms that include enzymatic and non-enzymatic substances like catalase (CAT), superoxide dismutase (SOD), glutathione S-transferase (GSH), glutathione (GSH), thioredoxin, melatonin, carotenoids, Vitamin E, and Vitamin C to lessen ROS- and RNS-induced alterations [11]. By boosting the synthesis of reactive chemicals, the RNA virus known as the ND virus is known to cause oxidative stress [12].

However, only vitamin E supplementation at 120 mg/kg was shown to increase GSH-Px activity in plasma, while at 160 mg/kg vitamin E supplementation was associated with decreased malondialdehyde (MDA) and reactive oxygen species (ROS) in plasma measured fluorometrically by using 2',7'-Dichlorofluorescein Diacetate as a reactive agent [13]. Furthermore, increased dietary vitamin E levels (from 30 to 60 mg/kg) for 10 wk was shown to be responsible for significant increase in antioxidant defense indexes evidenced by increased serum α -tocopherol concentrations, SOD activity, and the antioxidant capacity of serum measured by FRAP assay based on reduction of Fe^{3+} to Fe^{2+} by antioxidants present in the serum with the following formation of a colored complex with 2,4,6 tripyridyltriazine present in the solution [14]. In practically relevant stress conditions of industrial poultry production, antioxidant defense mechanisms are in charge of preventing the negative effects of free radical overproduction and oxidative stress [15]. The principal chain-breaking antioxidant in the cell, found in biological membranes, is thought to be vitamin E, which has been shown to be a key factor in antioxidant defense. In reality, studies have shown that vitamin E is necessary for both male and female reproduction, immune function, efficient growth and development, high-quality eggs and meat, and strong resilience to a variety of stresses [16].

Therefore, this study aimed to find out the effect of adding different levels of vitamin E to the diet on the productive performance of broiler chickens under heat stress.

2. Materials and Methods

This study was conducted at the Poultry Research Station in the Livestock Research Department of the Agricultural Research Department, as (126) one-day-old chicks were used in the study, with an average starting weight of 38 g of Ross 308 strain. The chicks were distributed randomly to 3 treatments, and each treatment contained three Replicates of 14 chicks for each replicate, where the first treatment (T1) was control, and the chickens in the second (T2) and third treatments (T3) were given vitamin E at the level of 350 and 600 mg/kg feed, respectively, as the continuous lighting system was followed (24 hours/day) in the hall until the end of the experiment, which reached 42 days and was a degree The temperature was 35 C throughout the study, and the birds feeding as ad libitum from the diet used in the study, whose components, percentages, and chemical composition are shown in Table (1), and water was also provided to the birds freely.

Table 1. Composition and calculated nutrient content of the experimental diets (%).

Ingredients	Diets Types		
	Starter (1-10 day)	Grower (11-22 day)	Finisher (23-42 day)
Yellow corn	47.5	50.85	54.84
Wheat	10	10	10
soybean meal*	32	28	24
Proteins concentration **	5	5	5
Hydrogenated plant fat	3	4.15	4.3
Calcium diphosphate	0.7	0.5	0.4
Salt NaCl	0.1	0.1	0.1
Limestone	1.2	1.14	1.1

Methionine	0.25	0.13	0.13
Lysine	0.25	0.13	0.13
Total	100	100	100
Calculated nutrient content N [17]			
Metabolism Energy (kcal / kg)	3059	3177	3277
Crude protein (%)	22.5	20.9	19.3
Crude Fibers (%)	3.5	3.4	3.2
Lysine%	1.38	1.19	1.09
Methionine + cysteine %	1.08	0.92	0.88
Calcium %	1.02	0.95	0.9
Available phosphorus%	0.45	0.41	0.38

* Soybean meal used from Argentine Origin Crude protein content 48% and 2440 kcal / kg represented energy. ** Proteins used in the production of Dutch Holland (imported) Wafi containing 40% crude protein, 2107 kcal / kg represented energy, 5% raw fat, 2.20% raw fiber, 4.20% calcium, 2.65% phosphorus, 3.85 Lysine, 3.70% methionine, 4.12% methionine + cysteine. It contains a mixture of rare vitamins and minerals that satisfy the bird's needs from these elements.

Vitamin E manufactured by the United Company for Veterinary Pharmaceutical Industry Ltd. (Jordanian Yovidco) was used, which could be obtained from the local markets, as it was added on the basis of the active substance (α -Tocopherol acetate), which was at a level of 50%, so the addition was doubled in the diets to reach The active substance was reduced to 100%, and the idea of doubling the additives was for the purpose of increasing the effectiveness of the vitamin under the condition of heat stress. The diets were prepared in the feed laboratory of the Agricultural Research Department by grinding and mixing the components of the diet according to the required proportions in table (1).

Mortality was recorded daily, and chick weight and feed intake per pen were measured on d 7,14,21,28,35 and 42 for determination of weight Gain, Feed Consumption, feed conversion rate (FCR), Relative growth rate (RGR) the production efficiency factor (PEF), and economic indicator by Ross 308 Broiler Performance Objectives - Aviagen, 2016 [18].

The Statistical Analysis System-SAS [19] was used to analyze the data of the study to find out the effect of different coefficients on the studied traits according to a completely randomized design (CRD). Significant differences between the means were compared with the Duncan [20] multinomial test.

3. Results and Discussion

Table (2) shows a significant ($P < 0.01$) superiority of the two vitamin E treatments mg/kg feed over the control treatment in each of the live body weight, weight gain rate, relative growth rate, production index, economic indicator, and feed consumption rate. Mortality percentage and a significant improvement in the feed conversion coefficient for the two experimental treatments compared with the control treatment. The reason for the superiority of the additional treatments in productive performance over the control treatment is due to the effect of the additions that contributed to reducing the intensity of heat stress on the chickens [21]. Vitamin E is one of the most powerful antioxidants in the body, as it prevents the formation of free radical peroxide in fat cells by hindering the formation of free radicals, and thus provides an important cover in the protection of unsaturated fatty acids [22].

The main function of vitamin E is as an antioxidant, as it inhibits the reactions of the formation of free radicals resulting from a high respiratory rate when exposed to a high temperature or from imbalance and irregular [23], and thus it performs an important function which is to protect unsaturated fatty acids in the body from oxidation and then maintains all body tissues [24]. The reason for the superiority in productive characteristics may be attributed to the effect of additives that worked to reduce high temperatures on chicken, as vitamin E is one of the most powerful natural antioxidants, as it protects unsaturated fatty acids in the body [25]. Vitamin E works to prevent the reactions that form free radicals resulting from the increase in respiratory processes as a result of the entry of large amounts of oxygen in order to cool the body of the bird during exposure to high temperatures. It was found that the oxidation process affects broilers, which leads to a rise in body temperature [26], as it has been proven that vitamin E works to strengthen the antioxidant systems in the body, which reduces

the oxidation processes occurring in the body, and this leads to maintaining the temperature of the chickens [27].

Table 2. Effect of addition of different levels of vitamin E on the productive traits to diet broiler in cumulative production performance (1-42) day, under heat stress conditions.

Traits	Treatments			Significant
	T1	T2	T3	
Body W. g/ bird	1365 ± 73.7 b	2029 ± 47.8a	2041 ± 114 a	0.01
Weight G. g/ b	1326 ± 210 b	1991 ± 34.5a	2003 ± 307 a	0.01
Relative g. rate	188.8 ± 0.549 b	192.7 ± 0.163 a	192.7 ± 0.350 a	0.01
feed con. g/ bird	2481 ± 2.01 b	3193 ± 34.5a	3228 ± 307 a	0.01
Feed conve. g bird / g W. G	1.87 ± 0.068 a	1.61 ± 0.020 b	1.62 ± 0.065 b	0.01
Mortality rate	2.4 ± 2.38 a	0.00 ± 0.00 b	0.00 ± 0.00 b	0.01

* ±: Average standard error. a, b, c: The different letters within one row indicate significant differences between the coefficients at a significant level ($P \leq 0.05$). (T1): basal diet (control) (T2): Vitamin E at the level of 350 mg/kg feed.(T3): Vitamin E at the level of 600 mg/kg feed.

Figure 1 shows Effect of addition of different levels of vitamin E on the productivity and economic Index to diet broiler in cumulative production performance (1-42) day, under heat stress conditions, if a significant superiority is observed in the second and third treatments compared with the control treatment in the indicator of the productivity index, while there was a superiority of the second and third treatment over the first treatment (the control treatment) in the indicator of Economic Index. The reason for the increase in the treatments of the experiment in the productivity and economic Index may be due to the increase achieved in increasing the body weight of the experimental treatments compared with the control treatments [28].

As well as the role of vitamin E on the meat quality and immunological response of broiler chickens are widely acknowledged. Vitamin E acts directly on the cell or indirectly modifies metabolic and endocrine characteristics as a main antioxidant of cell membranes [29]. Recent research, however, has produced conflicting findings on the effects of vitamin E on broiler chicken development performance, particularly in relation to the size of the vitamin E response in accordance with the quantity of supplementation used [30].

As an antioxidant, vitamin E lessens the pathology caused by free radicals in both inflammatory and regular metabolic conditions [29]. Vitamin E modifies the expression of genes that are regulated by free radical signaling by regulating free radical synthesis, which in turn impacts free radical-mediated signal transduction processes [31].

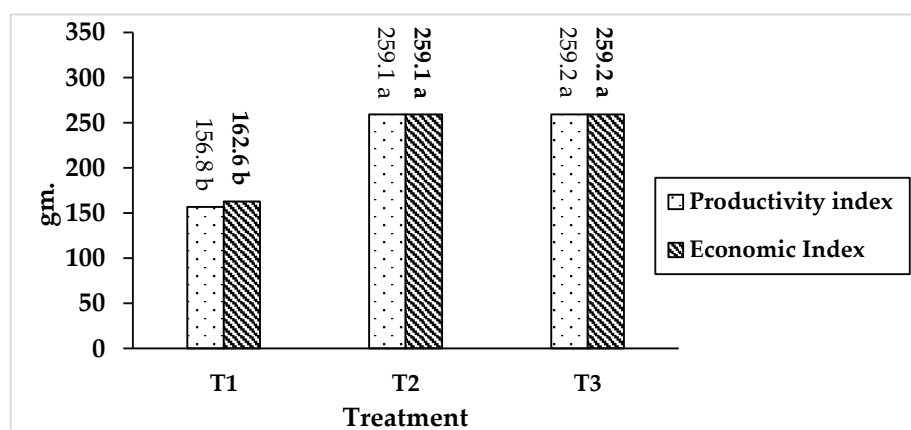


Figure 1. Effect of addition of different levels of vitamin E on the Productivity and Economic Index to diet broiler in cumulative production performance (1-42) day, under heat stress conditions.

* \pm : Average standard error. a, b, c: The different letters within one row indicate significant differences between the coefficients at a significant level ($P \leq 0.05$). (T1): basal diet (control) (T2): Vitamin E at the level of 350 mg/kg feed. (T3): Vitamin E at the level of 600 mg/kg feed.

4. Conclusions

In conclusion that different levels of vitamin E to the diets as appetite stimulants in the production Performance of broiler males under heat stress conditions. led to a significant increase the performance characteristics Cumulative (1-42) day, especially the third treatment T3 compared with the control treatment, in both live body weight, body weight gain, relative growth rate, feed consumption, cumulative feed ratio, the production index, and the economic index.

Supplementary Materials:

No Supplementary Materials.

Author Contributions:

A. Tatar, R. Kasaeizadeh; methodology, writing—original draft preparation, B. Shobeirinia and L. Abdal; writing—review and editing, R. Baeelashaki; paraphrasing. All authors have read and agreed to the published version of the manuscript.

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The study was conducted in accordance with the protocol authorized by the University of Anbar, Ethics Committee, Iraq in cooperation with The Islamic Republic of Iran, From a commercial farm, fertile eggs from Ross (308) strain broiler breeder hens were obtained.

Informed Consent Statement:

No Informed Consent Statement.

Data Availability Statement:

No Data Availability Statement.

Conflicts of Interest:

The authors declare no conflict of interest.

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