EFFECT OF ADDINING VITAMINS E AND C TO BROILERS RATION CONTAINED HIGH LEVEL OF TALLOW IN CARCASS TRAITS

Baydaa Younis Ali ALnaamat* D.Th. Younis
Baydaaali85@gimal.com dr.duraid@uomosul.edu.iq
Mosul University / College of Agriculture and Forestry
Animal Production
*Ministry of Agriculture and Water Resources/ Kurdistan Rrgion/Iraq

Abstract

This study was conducted in poultry–Field which related to Animal production department – college of agriculture and forestry –University of Mosul. From a period From 5 November 2022 to 17 December 2022 for (42) days . The aim of the study the addition of fat to the feeding mixtures was identified the effect of adding Tallow as a source of energy instead of grains with addition of vitamin C or E or their combination to the ration on Carcass traits. Two hundred forty Ross (308) one day old unsexed chickens used in this study. Birds distributed to five treatments (Four replicate of each twelve birds in each replicate). Reared in semi- opened house and the treatments were as follows: T1 (control) without addition, T2: Addition 6% of Tallow to ration, T3: Addition 6% of Tallow to ration and 250 mg Vitamin E / kg feed, T4: Addition 6% of Tallow to ration and 250 mg Vitamin C / kg feed, T5: Addition 6% of Tallow to ration and 250 mg Vitamin E / kg feed and 250 mg Vitamin C / kg feed. Statistical analysis of data showed: Significant increase ($P \leq 0.05$) in Live body weight in treatments of Tallow and Vitamins as compared with control, also the adding of Tallow and Vitamins caused highest dressing percentage, High percentage of drip loss by cooling in treatments of adding tallow and adding Tallow and Vitamin C. No significant differences between treatments in the relative weight of the chest, thighs, back, two wings and neck. And reduce the speed of passing feed in digestive track for treatments of adding Tallow and Vitamins as compared with control. We can conclude the adding tallow as a source of energy instead of grains with addition of vitamin C or E or their combination to the diet significantly improved the broiler Carcass traits.

Introduction

There is an increasing demand for poultry meat by consumers, as white poultry meat is desirable and there is a demand for everyone to buy it. Economic projects in the production of poultry meat must take into account quality standards before paying attention to the large quantities produced by poultry. Also, quality is the main concern of researchers and producers before consumers, and it is an intertwined and integrated process that producers must follow with complete care in order to reach abundant and high-quality production (8).

Poultry meat contains a high amount of nutritional value because it contains all the amino acids and is characterized by a low percentage of fats that may harm human health. Unsuitable fodder for human consumption is transformed into valid food materials such as fat left over from slaughterhouses and poultry waste from slaughterhouses, which can be converted into food materials in poultry diets (15).

Feed composition involves judicious use of different feed ingredients to provide adequate quantity and proportions of the different nutrients needed by poultry. Poultry feed consists of different components, and these components are provided to meet the energy (fats, oils, and carbohydrates), protein (amino acids), vitamins and minerals that poultry needs from feed nutrients. Energy in diets is one of the most important nutrients because it affects the utilization of other food

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components through Its ability to regulate feed intake to a high degree. Poultry feed formulation should be done with the aim of achieving the optimum energy level based on the composition of the feed ingredients to reduce the cost of feed per unit of poultry products and to produce high quality end products. In animal feeds, energy supply represents a large part of production costs (3 and 28) and the energy required for broilers at different stages of growth and breeds is 3000 kcal/kg (5).

That fat is an energy-concentrated substance, as one gram of it contains 9 kilocalories. When the body consumes more than its energy needs, the excess amount is stored in the form of fat in the adipose tissue, as it provides the body with energy when it is needed. Also, fat is the only source of dissolved vitamins, which are important for feeling. Taste, satiating state, and being a source of solubilization of flavor and aroma substances, meat fat contains essential fatty acids in the diet, especially linoleic acid, which plays an important role in the growth and maintenance of skin (12 and 29)

The use of vitamin C aims to improve the immune response and the antioxidant capacity of birds (7). Vitamin C acts as a powerful reducing agent for free radicals (10), and acts as the body's first line of defense against free radicals. It also protects proteins and lipid membranes from Oxidative stress. Vitamin C also plays a role in the internal and external parts of body cells and as an oxidizing agent that contributes to the formation of hydroxyl radicals, which lead to the oxidation of fats, DNA and protein (24), and acts as a cofactor for many enzymes. Poultry needs more vitamin C in their diet than any other animal, firstly for nutritional requirements and secondly for resistance to oxidative stress. Due to the high costs of treating the disease and the potential harmful health consequences, preventive medicine is preferred over treatment (23), as vitamin C increases lymphocytes, and thus increases the production of antibodies (9), and this increases their resistance to disease, which Reduces Percent mortality (27).

Vitamin E, like other nutrients, affects the development and maintenance of immune competence through multiple functions by acting directly on immune cells, or by indirectly affecting treatment metabolic and endocrine parameters, which in turn affect the immune system. To boost the immune system so that it can resist bacteria and viruses. It also helps widen blood vessels and prevent blood from clotting inside them. Vitamin E is also used by cells to interact with each other and to carry out many important functions. Its deficiency for long periods in poultry causes many problems, such as striated muscle atrophy, cerebral laxity, and destruction of red blood cells, growth retardation, and poor productive performance (13, 17 and 16).

MATERIALS AND METHODS

This study was conducted at poultry farm/ Department of Animal Production / the College of Agriculture and Forestry / University of Mosul/ Iraq, for the period from 5/11/2022 to 17/12/2022 (42) days. The aim was to find out the effect of adding vitamin C or vitamin E or their mixture to broiler rations containing animal tallow and its effect on Carcass traits.

In this study, (240) one-day-old broiler chicks were used, of the type ROSS 308, unsexed, with an average weight of (42) gm per chick. The chicks were raised in a semi-open hall. Feed was provided manually using circular plastic trays from the age of one day until the age of one week, and then they were replaced with cylindrical feeders. The feed and water were freely available to the birds throughout the experimental period for a period of six weeks. The chicks were reared on two diets, Starter from 1-21 days and Finisher from 21-42 days. The diets were in the form of grits mixed homogeneously and the diets were formed according to the

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recommendations approved by the National Research Council (18). Table (1) shows the components of the starter diets and Table (2) the components of the Finisher diets in the study.

Table (1) Ingredients of starter diets used in the study and chemical analysis calculated the as %.

Ingredients	The percentage of the components of the diet				
	T1%	T2%	T3%	T4%	T5%
Ground yellow corn	53.000	7.835	7.835	7.835	7.835
Ground Wheat	5.000	49.345	49.345	49.345	49.345
Ground Soybean meal	38.500	33.320	33.320	33.320	33.320
Tallow	0.000	6.000	6.000	6.000	6.000
Protein concentrated	2.500	2.500	2.500	2.500	2.500
Salt	0.250	0.250	0.250	0.250	0.250
Ground limestone	0.750	0.750	0.750	0.750	0.750
Total	100	100	100	100	100
Chemical analysis calculated the as %.					
Metabolic energy (kcal/kg)	2958.1	2958.0	2958.0	2958.0	2958.0
Crude protein %	23.1	23.1	23.1	23.1	23.1
Energy / protein ratio	128.3	128.3	128.3	128.3	128.3

Table (2) Ingredients of Finisher diets used in the study and chemical analysis calculated the as %.

Ingredients	The percentage of the components of the diet				
	T1%	T2%	T3%	T4%	T5%
Ground yellow corn	61.5	25	25	25	25
Ground Wheat	3.36	37.5	37.5	37.5	37.5
Ground Soybean meal	31.64	28	28	28	28
Tallow	0	6	6	6	6
Protein concentrated	2.5	2.5	2.5	2.5	2.5
Salt	0.25	0.25	0.25	0.25	0.25
Ground limestone	0.75	0.75	0.75	0.75	0.75
Total	100	100	100	100	100
Chemical analysis calculated the as %.					
Metabolic energy)kcal/kg(	3007.5	3007.4	3007.4	3007.4	3007.4
Crude protein %	20.8	20.8	20.8	20.8	20.8
Energy / protein ratio	144.5	144.5	144.5	144.5	144.5

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The chicks were under veterinary care throughout the breeders period. The experimental transactions were as follows:-

The first treatment, T1: (control): standard diet (without tallow).

The second treatment T2: diet containing 6% animal tallow.

The third treatment, T3: diet containing 6% animal tallow with the addition of 250 mg vitamin E / kg diet.

The third treatment, T3: diet containing 6% animal tallow with the addition of 250 mg vitamin C / kg diet.

Fifth treatment T5: diet containing 6% animal tallow with the addition of 250 mg vitamin E / kg diet with the addition of 250 mg vitamin C / kg diet .

The following characteristics were studied: live body weight, Dressing Percentage, the relative weight of the carcass body parts, color measurement, measurement of drip loss, intestinal transit time.

Statistical Analysis

The data were analyzed statistically in (SAS® Studio) and a complete random design (CRD) was used. The Duacans Multiple Range Test (11) was used to test between the means at the 5% probability level, which indicates that the means followed by the same letters do not Significantly different from each other, while the averages followed by different letters are significantly different from each other (2).The standard error value was also found to be correlated with the mean $p<0.05$.

Results and discussion

The results obtained from Table. (3) indicate that there are significant differences between the average treatments in the average live body weight of birds during the first week, as the first treatment was significantly superior to the second and fifth treatments, as well as there were no differences between the treatments that contain animal tallow among them. There were no significant differences between the treatments to their effect on live body weight for the second and third weeks . During the fourth week, there was a decrease in the live body weight of the first treatment compared with the rest of the treatments, and they differed significantly from the third and fifth treatments. And there were no differences between the treatments that contain animal tallow .During the fifth week, there was no significant difference between the treatments that contain animal tallow, and they differed significantly from the first treatment by giving the best average of live body weight .During the sixth week, there was no significant difference between the treatments that contain animal tallow, and they differed significantly from the first treatment (without tallow) by giving the best average of live body weight. Perhaps the reason is due to the significant increase in the live weight of broiler chickens that are fed on diets that contain animal tallow, to the fact that the animal tallow led to a decrease in the speed of food passage Table No. (9), which led to an increase in the rate of digestion of the materials included in the diet and the action of This increased the absorption of vitamins and nutrients and had a positive effect on body weight. These results are consistent with the findings of (31) It was found that the body weight of birds was not affected when vitamin C was added to diets that contained tallow in their diet. (30) It was found that adding fats to the diet of quails led to live body weight of birds. and (1) it was found that adding tallow to the diet of quails led to live body weight of bird. And do not agree with the findings of (6) and (22).

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Table (3): The effect of adding tallow, vitamin E, and vitamin C on the average live body weight of broiler chickens (gm).

treatments	Weeks					
	1	2	3	4	5	6
T1	148.17a 1.29 ±	354.75a 22.83 ±	695.00a 33.03 ±	1349.58b 63.68 ±	2005.40b 100.77 ±	2673.20b 134.33 ±
T2	142.58b 0.65 ±	363.96a 23.84 ±	737.92a 47.07 ±	1467.67ab 61.13 ±	2219.85a 62.55 ±	2959.06a 83.38 ±
T3	144.50ab 1.76 ±	389.38a 10.36 ±	796.04a 28.68 ±	1526.11a 28.68 ±	2216.61a 34.47 ±	2954.74a 45.95 ±
T4	146.00ab 1.29 ±	375.83a 10.33 ±	755.63a 17.02 ±	1486.75ab 13.89 ±	2190.72a 12.81 ±	2906.93a 42.02 ±
T5	143.00b 1.83 ±	381.46a 14.12 ±	756.67a 22.93 ±	1516.67a 42.49 ±	2204.94a 20.87 ±	2950.04a 33.66 ±

***Means in column followed by the same letter(s) are not significantly different at P≤ 0.05, according to Duncan's Multiple Range Test (1955).**

****(T1: control treatment. T2: tallow addition. T3: tallow and vitamin E addition. T4: tallow and vitamin C addition. T5: tallow and vitamins E and C addition.**

Table No. (4) shows the effect of adding tallow and vitamins E and C to the diet on the weight of the prepared carcass, Dressing Percentage, the relative weight of the carcass parts, as the results of the statistical analysis showed that there were no significant differences between the five treatments in the weight of the carcass, as the values for the weight of the carcass reached (2910.0, 2936.7, 2821.0, 2806.7, and 2926.7 g) respectively .

As for the Dressing Percentage, it was shown in the Dressing Percentage for the five transactions (80.7, 81.8, 81.8, 80.1, 82.5%), respectively. Statistical analysis showed that there were no significant differences between the treatments, except for the fourth treatment, as it gave the least relative weight , and it differed significantly compared to the fifth treatment.

As for the relative weight of the chest, the statistical analysis showed that there were no significant differences between the five treatments, as the values for the relative weight of the chest were (40.0, 39.0, 38.5, 39.0, 37.8%), respectively.

Also, the statistical analysis of the relative weight of the thighs showed that there were no significant differences between the five treatments, as the values for the relative weight of the thighs were (25.0, 26.2, 26.2, 25.6, 26.1%), respectively.

Also, the statistical analysis of the relative weight of the back showed that there were no significant differences between the five treatments, as the values for the relative weight of the back were (17.0, 17.7, 17.6, 17.9, 17.7%), respectively.

The statistical analysis of the relative weight of the two wings showed that there were no significant differences between the five treatments, as the values for the relative weight of the two wings were (11.0, 10.8, 11.1, 11.5, 11.1%), respectively.

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Where the statistical analysis of the relative weight of the neck showed that there were no significant differences between the five treatments, as the values for the relative weight of the neck reached (6.3, 6.3, 6.2, 6.5, 6.3%), respectively, and this result is consistent with what (4) concluded, who concluded that the Dressing Percentage and the relative weight of carcass pieces when adding vitamin C to the diets, (19) found that the Dressing Percentage and the relative weight of the pieces of the carcass was not affected by the addition of tallow to the diets, and (30) as he found that the Dressing Percentage was not affected when vitamin E was added to the diets containing On tallows, and (1), as they found that the Dressing Percentage was not affected when adding tallow to the diets, and did not agree with what was reached by (6), as they concluded that adding tallow to the diets leads to a significant decrease in the Dressing Percentage and the relative weight of carcass pieces , and. (25) found that the addition of tallow to the diet leads to a significant increase in the Dressing Percentage and the relative weight of carcass pieces.

Table (4) Effect of adding tallow, vitamin E and vitamin C on carcass weight (gm), Dressing Percentage cuts and the relative weight of the carcass pieces of the body of the broiler.

treatments	carcass weight (gm)	Dressing %	chest %	thighs %	back %	wings %	neck %
T1	2910.0a 49.2 ±	80.7ab 0.45 ±	40.0a 0.52 ±	25.0a 0.17±	17.0a 0.25 ±	11.0a 0.23 ±	6.3a 0.21 ±
T2	2936.7a 40.6 ±	81.8ab 0.57±	39.0a 0.36 ±	26.2a 0.3 ±	17.7a 0.64 ±	10.8a 0.18 ±	6.3a 0.20 ±
T3	2821.0a 24.9 ±	81.8ab 0.52 ±	38.5a 1.14 ±	26.2a 0.41 ±	17.6a 0.30 ±	11.1a 0.56 ±	6.2a 0.12 ±
T4	2806.7a 24.4 ±	80.1b 1.23 ±	39.0a 0.81 ±	25.6a 0.59 ±	17.9a 0.38 ±	11.5a 0.30 ±	6.5a 0.30 ±
T5	2926.7a 69.3 ±	82.5a 0.22 ±	37.8a 0.82 ±	26.1a 0.29 ±	17.7a 0.20 ±	11.1a 0.40 ±	6.3a 0.21 ±

Means in column followed by the same letter(s) are not significantly different at P≤ 0.05, according to Duncan's Multiple Range Test (1955).

****(T1: control treatment. T2: tallow addition. T3: tallow and vitamin E addition. T4: tallow and vitamin C addition. T5: tallow and vitamins E and C addition.**

Table number (5) shows the effect of adding tallow and vitamins E and C to the diet on color measurement. for the pectoral muscle, as the L* values for the five treatments were (53.8, 57.1, 47.7, 59.0, and 55.2) respectively, the treatments containing tallow (the second, third, fourth, and fifth) did not differ from the first treatment (without tallow), and the third treatment differed For the second, fourth and fifth transactions .

As the values for color a* reached for the five treatments (13.7, 9.1, 11.2, 10.9, 10.2), respectively, there were no significant differences between the treatments that contain animal tallow among them. The treatment of the second was significantly

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different from the treatment of the first, and the rest of the treatments did not differ from the first.

The values for color b* for the five treatments were (11.3, 5.3, 5.2, 9.1, 8.9) respectively. The second and third treatments differed significantly from the first and fourth treatments, and did not differ from the fifth treatment. There was no significant difference between the first, fourth, and fifth treatments, and these results are consistent with the findings of (21, 26 and 31).

Table (5) shows the effect of adding tallow and vitamins E and C to the diet on measurement of drip loss. for the pectoral muscle The results of the statistical analysis indicate that there are significant differences for the treatments in their effect on measurement of drip loss, as the values for the percentage of measurement of drip loss at a temperature of 4° after 24 hours for the treatments were 2.0, 3.5, 2.1, 3.4, and 2.2%, respectively. The second and fourth addition treatments did not differ between them and differed from the rest of the transactions. And there was no significant difference between the first, third and fifth treatments, and these results are consistent with the findings of (20), they concluded that adding vitamin E to diets that contained Tallow reduced the amount of weight loss due to cooling.

Table (5) Effect of adding tallow, vitamin E and vitamin C on color measurement, measurement of drip loss % of the broiler.

Treatments	**color measurement**			**drip loss%**
	L* (lightness)	a*(redness)	b*(yellowness)	
T1	± 2.253.8ab	± 1.613.7a	± 1.011.3a	± 0.162b
T2	± 1.857.1a	± 1.09.1b	± 0.25.3b	± 0.443.5a
T3	± 2.447.7b	± 1.911.2ab	± 1.75.2b	± 0.412.1b
T4	± 0.859.0a	± 1.310.9ab	± 0.49.1a	± 0.383.40a
T5	± 3.455.2a	± 0.310.2ab	± 1.78.9ab	± 0.262.2b

***Means in column followed by the same letter(s) are not significantly different at P≤ 0.05, according to Duncan's Multiple Range Test (1955).**
****(T1: control treatment. T2: tallow addition. T3: tallow and vitamin E addition. T4: tallow and vitamin C addition. T5: tallow and vitamins E and C addition.**

Table No. (6) shows the effect of adding tallow and vitamins E and C on intestinal transit time, as the results of the statistical analysis showed that there were significant differences for the treatments in their effect on the intestinal transit time, as the time taken for the treatments containing tallow differed from the first, where The passage of food was during a shorter period of 95.00 minutes, which differed significantly compared to

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treatments that contain animal tallow. And there were no significant differences between the treatments that contain tallow (second, third, fourth, fifth) among them, as the values for the time it took for food to pass through their digestive system reached (115.50, 117.75, 115.00, 109.00 minutes), respectively, and these results are consistent with Findings from (14 and 30).

Table (6): The effect of adding tallow, vitamin E, and vitamin C on the intestinal transit time of broiler food.

Treatments	**transit time (min)**
T1	± 1.9695b
T2	± 4.11115.50a
T3	± 4.15117.75a
T4	± 4.15115.00a
T5	± 3.42109.00a

***Means in column followed by the same letter(s) are not significantly different at P≤ 0.05, according to Duncan's Multiple Range Test (1955).**

****(T1: control treatment. T2: tallow addition. T3: tallow and vitamin E addition. T4: tallow and vitamin C addition. T5: tallow and vitamins E and C addition.**

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