EFFECT OF ADDINING VITAMINS E AND C TO BROILERS RATION CONTAINED HIGH LEVEL OF TALLOW IN PRODUCTIVE PERFORMANCE

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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 of 5 November 2022 t0 17 December 2022 for (42) days. The aim of the study 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 ratio. two hundred forty Ross 308 one day old unsexed Broiler chicks 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 Weight gain in the treatments of adding Tallow and Vitamins as compared with control , also the adding of Tallow and Vitamins caused highest dressing percentage. Significant improvement in feed conversion ratio for treatments adding Tallow and Vitamins as compared with control. No significant differences between treatments in in feed consumption and relative weight of heart and liver. Significant decrease relative weight of gizzard in digestive track for treatments of adding Tallow and Vitamins as compared with control.

Introduction

The poultry industry is one of the important economic sectors in many countries of the world, especially the developed ones, and one of the main pillars of animal production, as it works on the availability of white meat in addition to the material profits for the breeder. One of the most important difficulties facing poultry breeders is the high prices of fodder materials that are included in the composition of diets, as the costs of broiler diets represent 65-70% of the total cost of production. And because of the rise in feed prices globally, there is now a focus in poultry farming to move towards alternative or non-traditional components of diets to increase profits, through balanced food that meets the nutritional needs of poultry. Adequate nutrients necessary for the function of metabolism and animal health, as nutrition is affected by several factors, including the high and low content of energy and proteins and the presence of anti-nutritional factors [16] and [28] and given the "increased demand for maize for human and poultry nutrition or for use in fuel production As well as an increase in the demand for wheat, and among the alternative materials is animal tallow, which contains 2.25 times more energy than carbohydrates.

Fat is a source of energy for animals and has the highest caloric value among all

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nutrients. The addition of tallow to animal feed increases the cohesion between feed particles, the absorption of fat-soluble vitamins, extra the palatability for diets, the efficiency of energy utilization, and the provision of fatty acids. It also reduces the rate at which food passes through the digestive system, allowing for better absorption of all the nutrients present in the diet. Given diets with similar nutritional values, birds fed diets containing tallow perform better than birds fed no tallow. The use of tallow in broiler feed may alter both the composition and quality of the carcass [6] and [22].

Vitamin C is an essential nutrient for poultry. Poultry can manufacture ascorbic acid in the body, and it also works to improve the performance of animals by adding it to poultry diets, furthermore improves animal health, which increases the growth performance of birds. It acts as antioxidants and anti-inflammatory, which increases their resistance to disease. It acts positively on the stress response and regulates stress when temperatures rise. All of these factors help in increasing production [12] and [24].

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, and preferably Prevention than cure [23], as ascorbic acid increases lymphocytes, thus increasing the production of antibodies [9], and this increases their resistance to disease, which reduces mortality [27]. And that vitamin E is one of the basic elements in poultry nutrition. This is due to its ability to dissolve in fats and is present in foods containing fats, as it acts as a powerful antioxidant, which increases cell resistance to damage caused by free radicals. With this feature, lipid peroxidation prevents polyunsaturated fatty acids inside the cell, thus protecting the cell from the danger of free radicals, and improves humoral and cellular immunity in broiler chicks [7] and [15] and [21].

Vitamins C and E work together to protect lipids from oxidative stress, making a combination of the two viable anti-oxidant options. And get rid of oxygen radicals and help the immune system to work better and improve blood biochemical characteristics. Vitamin C works to maintain vitamin E levels by reducing the degraded metabolism of vitamin E and thus increasing its antioxidant efficiency, thus mixing vitamin C and E together effective in improving the performance and immune response of poultry[5],[11] and [26].

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 their productive performance.

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 in 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 recommendations approved by the National Research Council (NRC)[16]. Table (1) shows the components of the starter diets and Table (2) the components of the Finisher diets in the study

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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%
yellow corn	53.000	7.835	7.835	7.835	7.835
Wheat	5.000	49.345	49.345	49.345	49.345
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)	2958.06	2958.04	2958.04	2958.04	2958.04
Crude protein %	23.06	23.06	23.06	23.06	23.06
Energy / protein ratio	128.28	128.28	128.28	128.28	128.28

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%
yellow corn	61.5	25	25	25	25
Wheat	3.36	37.5	37.5	37.5	37.5
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

*

Protein concentrate: Prepared by (WAFI B.V.) Dutch company, contains 30.01% crude protein, 5624.22 kcal / kg M.E poultry (Calc.), 2% crude fat, 0.79% crude fiber, crude ash 42.95%, moisture 3.20%, lysine 8.19 %, 9.52 % methionine, 9.62 % Meth + Cyst, 5.06 % Calcium, 5.26 % phosphorus, 5.30 % sodium, chloride 6.20 %, Tryptophane 0.12 %, Threonine 3.05 %, Isoleucine 0.42 %, Valine 2.11 %, Arginine 0.65 %, 2400 mg Mn from manganese oxide mg/kg, 2800 mg Zn from zinc oxide mg/kg, 1800 mg Fe from iron sulfate mg/kg, 600 mg Cu from copper sulfate mg/kg, 80 mg I from calcium iodate mg/kg, 16

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mg Se from sodium selenite mg/kg, 400000 IU/kg Vitamin A, 100,000 IU/kg Vitamin D3, 60,000 IU/kg 25-Hydroxyvitamin D3, 3000 mg/kg Vitamin E, 120 mg/kg Vitamin B1, 320 mg/kg Vitamin B2, 240mg/kg Vitamin B6, 1000 mcg/kg Vitamin B12, Calcium D Pantothenate 600mg/kg, 2400mg/kg Niacin, 80mg/kg Folic Acid, 140mg/kg Vitamin K3, 19900.80 mg/kg choline, 600 mg/kg cooper. Antioxidants Hydroxytoluene B.M.T 1340 mg/kg, Propyl Galate 112 mg/kg, Citric Acid 200 mg/kg, 6-Fytase EC 3.1.3:6 Ronozyme HiPhos 40000 Fyt/Kg ،Endo-1,4-Beta-glucosidase activity 3200 units/kg ،Endo-1,3(4)-Beta-glucosidase activity 2800 units/kg،Endo-1,4-Beta-xylanase activity 10800units/kg ،Mycotoxin binder 40 dosage..

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 fourth treatment, T4: 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: weight gain, feed consumption, feed conversion ratio, dressing percentage, Relative weight for (liver, heart and gizzard).

Statistical Analysis

The data were analyzed statistically using statistical analysis software (SAS® Studio) and a complete random design (CRD) was used. The Duacans Multiple Range Test [10] 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 [3].The standard error value was also found to be correlated with the mean values.

Results and discussion

It is clear from Table. (3) that there are significant differences between the treatments due to their impact on the rate of weight gain. The average weight gain values for the five treatments were (2631.20, 2917.06, 2912.74, 2864.93, 2908.04 g/bird), respectively. There is no significant difference between the treatments that contain animal tallow among them, and they differed significantly from the first treatment (without tallow) by giving the best rate of weight gain. This results may be due to that Animal tallow leads to a decrease in the speed of food passage, which leads to an increase in the rate of digestion of the materials included in the diet, and this works to increase the absorption of vitamins and nutrients, and this is reflected positively on weight gain. These results are consistent with the findings of [1],[2],[13] and [29] and are inconsistent with the findings of [8],[14] and [30].

And the absence of significant differences between the treatments in the average amount of feed consumption, and perhaps the reason is due to the fact that all diets are equal in energy, Tables (1 and 2) as it is known that the bird eats to satisfy its desire of energy, these results came in agreement

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with the results of [5],[20] and [30]. It did not agree with the results of [2],[8] and [13]. And there were significant differences in the feed conversion ratio, where the addition of tallow to the treatments led to a significant improvement in the feed conversion ratio when compared to the first treatment (without tallow), and they did not differ among them. These results are consistent with the findings of [2],[13],[17] and [29] and did not agree with the findings of [8],[20] and [25].

Table (3) Effect of adding tallow, vitamin E, and vitamin C on weight gain (gm), feed consumption (gm), and feed conversion ratio (Feed kg / live weight kg).

treatments	weight gain	feed consumption	feed conversion ratio Feed kg / live weight kg
T1	2631.20b 134.33 ±	4519.86a 242.15 ±	1.72a 0.02 ±
T2	2917.06a 83.38 ±	4556.67a 157.02 ±	1.56b 0.02 ±
T3	2912.74a 45.95 ±	4503.54a 92.18 ±	1.55b 0.02 ±
T4	2864.93a 42.02 ±	4419.76a 132.23 ±	1.54b 0.05 ±
T5	2908.04a 33.66 ±	4409.59a 44.19 ±	1.52b 0.03 ±

***Values with different letters vertically show a significant difference at P≤0.05.**
****(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.**

It is clear from Table. (4) the effect of adding tallow and vitamins E and C to the diet on the dressing percentage and the relative weight of Relative weight for (liver, heart and gizzard).

As for the dressing percentage, the fifth treatment showed the highest dressing percentage compared to the fourth treatment, and there was no significant difference with the rest of the treatment .

Also, the statistical analysis showed that there were no significant differences between the five treatments, as the values for the relative weight of the heart were (0.680, 0.639, 0.655, 0.723, 0.719) %, respectively.

The relative weight of the liver showed no significant differences between the five treatments, as the values for the relative weight of the liver were (2.640, 2.424, 2.503, 2.787, 2.564) %, respectively.

The results of the statistical analysis showed that there were significant differences in the relative weight of the gizzard, as the values for the five treatments were (2.172, 1.812, 1.815, 1.861, 1.723) %, respectively. As the treatments that contain animal tallow differed significantly from the first treatment and did not differ among themselves, the reason may be attributed to the effort exerted by the gizzard in grinding the diet free of tallow. These results are consistent with the findings of [4],[5] and [19] and did not agree with the findings of [8].

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Table (4) Effect of adding tallow, vitamin E, and vitamin C on dressing percentage, and the relative weight of Relative weight for (heart, liver and gizzard), in vivo of broiler chickens.

treatments	**dressing percentage** %	**heart** %	**liver** %	**gizzard** %
T1	80.7ab 0.45 ±	0.680a 0.025±	2.640a 0.175±	2.172a 0.130 ±
T2	81.8ab 0.57±	0.639a 0.054±	2.424a 0.116±	1.812b 0.017 ±
T3	81.8ab 0.52 ±	0.655a 0.029±	2.503a 0.117±	1.815b 0.032 ±
T4	80.1b 1.23 ±	0.723a 0.045±	2.787a 0.125±	1.861b 0.061 ±
T5	82.5a 0.22 ±	0.719a 0.047±	2.564a 0.024±	1.723b 0.016 ±

***Values with different letters vertically show a significant difference at P≤0.05.**
****(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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