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Original Article

The Effect of Adding Tartaric Acid and Salicylic Acid on the Chemical Composition of Eggs Produced from Lohman Chickens

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Abstract

This experiment was conducted in the poultry field of the College of Agriculture, University of Diyala, and the Biochemistry Laboratory in the Department of Animal Production to show the effect of using tartaric and salicylic acids on the chemical composition of eggs produced by Lohman chickens raised at high temperatures, in which 210 laying hens of brown Lohman strain were used. Sixty weeks were divided into seven treatments: T1, the control treatment, T2 and T3, in which 0.2% of tartaric and salicylic acid were added to drinking water, respectively, and T4 added to it a mixture of organic acids at a rate of 0.4% to the drinking water, and treatments T5 and T6 were added. It contained 0.2% of tartaric and salicylic acid to the ration, respectively, and T7 was added to the ration of 0.4% of the two organic acids to the diet formulation. At the age of 75 weeks, eggs were taken randomly from the treatments and at a rate of 5 eggs/treatment to know the effect of the treatments on the chemical composition of the eggs produced, and the results of the statistical analysis showed It is proved in Appendix 1 that there was no significant effect ($P \geq 0.05$) of the different treatments on the studied traits, which included the percentage of moisture, protein, fat, carbohydrates and ash in each of the whites and yolks. The present study showed that adding tartaric and salicylic acids to water and feed did not significantly affect the quality of eggs produced from Lohman chickens.

Keywords: Tartaric Acid, Salicylic Acid, Chemical Composition, Egg, Lohman

1. Introduction

The poultry industry is one of the main pillars of the economies of many countries because of its advantages, which include a rapid turnover of capital and a significant contribution to limiting consumers' food needs and thus contribute to achieving national food security and can be highly relied upon in providing job opportunities. Therefore, many countries and companies developed the poultry industry, but this great development was accompanied by many problems, including increased sensitivity to heat stress, decreased immunity and increased poultry disease (1).

Two decades ago, the trend began to prevent the use of antibiotics in poultry feed and to use non-traditional methods to raise the efficiency of the immune system and reduce the incidence of diseases, especially viral ones, and improve poultry products without the need to use materials that accumulate in bird products and pass on to the final consumer (2). The use of organic acids as food additives created an acidic environment in the digestive tract system by lowering the pH in the intestinal tract, which prevented the development of pathogens and microorganisms and increased the activity of digestive enzymes as well as increasing the absorption of mineral elements, especially zinc, iron,

calcium and phosphorous, as well as increasing the efficiency of protein digestion and the efficiency of utilizing amino acids (3, 4). Recent studies have shown that using organic acids in poultry diets leads to improved egg production, improved growth rate, food conversion efficiency, reduced mortality and increased Volumetric criterion for antibodies against viral diseases, especially Newcastle, cumbura and bronchitis Aerobic (5).

Tartaric acid is an organic acid produced in the body as an intermediate in the stress cycle. It is an odourless white crystalline solid with a pungent taste and contributes to the distinctive flavours of some fruits. Tartaric acid is naturally present in some plants, including tamarind, bananas, and grapes. Users are related to the basic properties of chickpea tartaric with its salts that have a variety of uses; these uses include as a pH control agent and as a preservative (6). Another effect is antipyretic and to avoid clots that cause heart attacks, as effected by blood thinners. Recent studies also found that aspirin can be used to prevent colon cancers. It also improves the inner lining of blood vessels and lowers blood pressure (7); in a study conducted by Fathi and Haydari (8), it was found that the addition of 80 mg of aspirin/kg of feed improved the productive performance of broiler chicks compared to the control treatment when reared during the spawning season. The addition of aspirin improved the efficiency of food conversion in broilers, and Balog, Huff (9) found that aspirin has a positive role in lowering blood viscosity, expanding peripheral blood vessels and increasing water drinking, thus reducing body temperature and relieving heat stress, which leads to increasing feed intake and improving production performance.

Therefore, this study aims to demonstrate the effect of using tartaric and salicylic acids on the chemical composition of eggs produced by Lohmann chickens raised at high temperatures.

2. Materials and Methods

2.1. Study Design

This experiment was conducted in the poultry field of the College of Agriculture and the Biochemistry Laboratory in the Department of Animal Production, in which 210 laying hens of the Lohmann Brown strain were used, aged 60 weeks at the beginning of the experiment, and 75 weeks old when collecting samples, and weighing 1800 g to show the effect of adding acid Tartaric acid and salicylic acid in water and feed on the chemical composition of the eggs produced, the chickens were divided into seven treatments according to table 1.

Table 1. Treatment groups

Group	Treatment
T1	control transaction
T2	A basal diet with 0.2% of tartaric acid in water
T3	A basal diet with 0.2% salicylic acid in water
T4	A basal diet with a mixture of two organic acids, at a rate of 0.4%, was added with water
T5	A basal diet with 0.2% of tartaric acid in the feed
T6	A basal diet with 0.2% salicylic acid was added to the feed
T7	A basal diet with a mixture of two organic acids added 0.4% in the feed

2.2. Diet Preparation Conditions

The supplementation treatments were prepared every two weeks in order to maintain the effectiveness of the added organic acids during this period and to ensure that the fats added to the diet would not go rancid due to the high temperatures. The required homogeneity was then mixed with this quantity with the rest of the feed until reaching the required homogeneity between the feed particles. As for adding acids to water, these acids were mixed manually in small amounts and then gradually increased to obtain the required homogeneity between water and acid. Mixing weekly, and after the mixing was completed, it was filled with sealed plastic containers, each marked according to the transactions to which it belongs, and the pots were closed carefully. Tartaric and salicylic acids were obtained from one of the scientific offices in Baghdad, which is of English origin, with a concentration of 99.5% for both acids. The acids were in powder soluble form.

2.3. Chemical Analysis of Eggs

At the end of the experiment, samples of eggs were taken at a rate of 5 eggs for each treatment group, the

chemical composition of each of the yolk and white was measured separately after separating the yolk from the white to conduct the following chemical tests.

2.3.1. Determination of the Percentage of Dry Matter

The percentage of dry matter was estimated according to what was stated in AOAC (10), where 5 g of eggs were placed in an earthenware jar of a predetermined weight. Percentage of solid matter.

2.3.2. Estimation of the Percentage of Ash (Ash)

After knowing the weight of the dry matter above, the ceramic jars containing the dry model were placed in the incinerator at a temperature of 550 °C for six hours. After cooling, they were weighed according to the percentage of ash (10).

2.3.3. Protein Estimation

The protein percentage was estimated by the Kjeldahl method (10) by taking 2 g of eggs and placing them in a digestion tube with the addition of 0.5 g of the Cuso4 cofactor, then 20 ml of concentrated sulfuric acid at a rate of 98%, and the digestion tubes were placed on the heater to digest the sample, and the product was distilled Ammonia gas was received in 20 ml of 2% boric acid solution, then the samples were flushed with 0.1N hydrochloric acid, and the protein percentage was estimated according to the following equations:

N = (HCL sample – HCL blank) * 0.1 * 0.014 / 2 P = N * 6.25

2.3.4. Lipid Estimation

The lipid percentage was estimated according to AOAC (10) by weighing 2 g of egg yolk in a bowl, adding 50 ml of chloroform: methanol (1:1) mixture, and after mixing well on a magnetic mixer for an hour, filtering the mixture, evaporating the filtrate, and recording the weight Remaining fat only as a percentage.

2.3.5. Carbohydrates Estimation

The carbohydrate percentage was calculated as follows:

Carbohydrates % = 100 – (% moisture +% protein+%fat + % ash)

2.4. Statistical Analysis

It was conducted by applying the complete random design (CRD) to study the effect of the studied treatments on the different traits using the ready-made statistical program (11) and tested the significant differences between the means using Duncan (12) multilevel test at the level (0.05) according to the following mathematical model:

$Y_{ij} = \mu + t_i + \varepsilon_{ij}$

Y_{ij} = observational value of the studied trait

μ= general mean

t_i = effect of treatment i=1, 2, 3, 4, 5, 6, 7.

ε_{ij} = experimental error usually and independently distributed with a mean of zero and a variance of σ^2.

3. Results and Discussion

Figure 1 shows the effect of adding tartaric and salicylic acids in water and feeding on the moisture content of the egg. It is noted from the figure that there was no significant effect ($P \geq 0.05$) for the different treatments on the moisture content of the egg, as the moisture percentage in the egg was 85.52' 86.37' 86.83' 86.16' 86.39' 85.81 and 86.31 % in the two control treatments and the treatments of adding the two acids in the feed and water respectively, and there was no significant effect of the addition on the moisture content in the yolk as shown in figure 1.

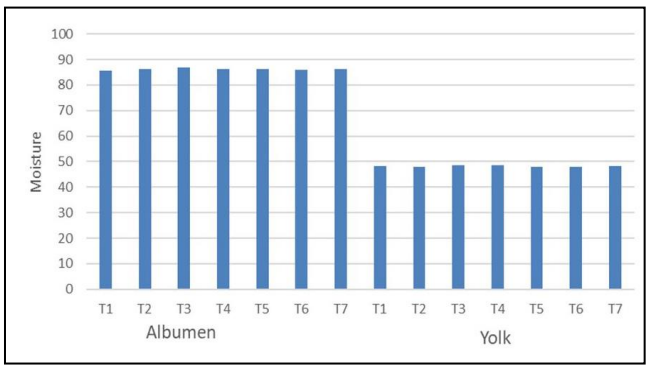

Figure 1. Effect of adding tartaric and salicylic acids to water and fodder on the moisture content of white and yolk

It is also noted from figure 2 that there was no significant effect ($P \geq 0.05$) of adding tartaric and salicylic acids in water and feed on the protein percentage in the white and yolk, as the percentage of protein in the yolk was 12.17, 11.50, 10.89, 11.86, 11.27, 12.03 and 11.98 The percentage of protein in the yolk was 16.52, 16.45, 15.86, 16.16, 16.37, 16.49 and 16.32% in the control and T2 - T7 treatments, respectively.

The two traits of fats and carbohydrates took the same path as the previous traits, as there was no significant effect ($P \geq 0.05$) of adding tartaric and salicylic acids in water and forage on the two traits, as shown in figures 3 and 4

Also, the treatments of adding tartaric and salicylic acids in water and forage did not have a significant ($P \geq 0.05$) effect on the percentage of ash in whites and yolks, as noted in figure 5.

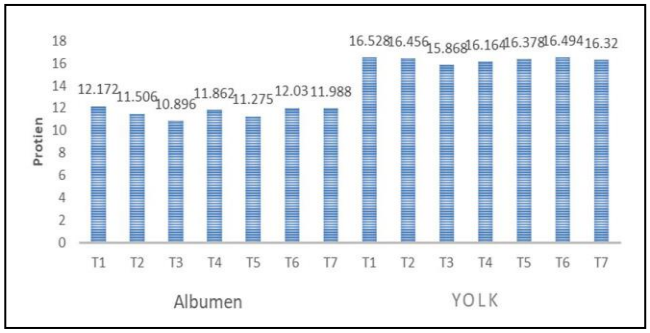

Figure 2. Effect of adding tartaric and salicylic acids to water and feeding on the protein content in white and yolk

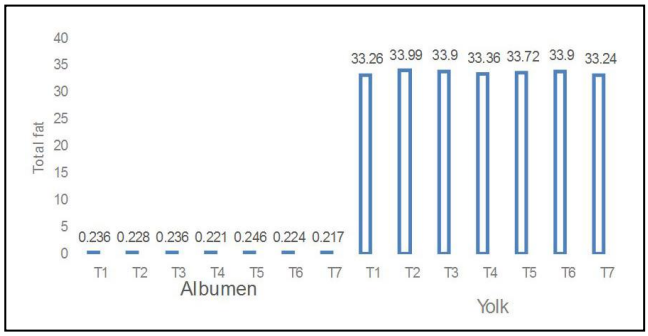

Figure 3. Effect of adding tartaric and salicylic acids to water and feed on the percentage of fat in the white and yolk

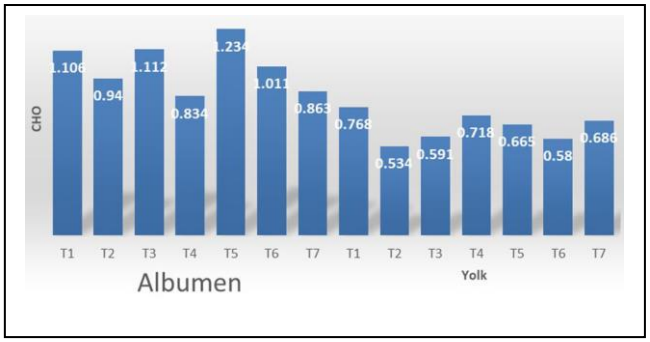

Figure 4. Effect of adding tartaric and salicylic acids in water and feed on the percentage of carbohydrates in the white and yolk

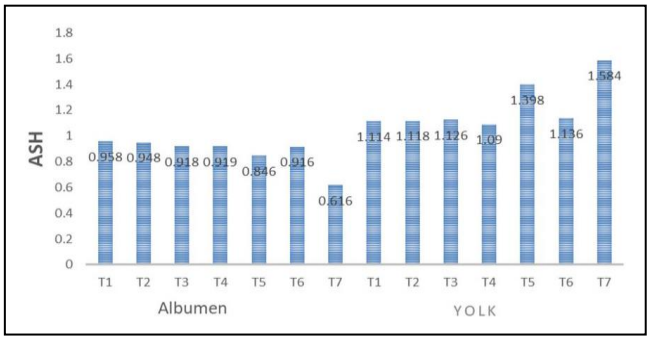

Figure 5. Effect of adding tartaric and salicylic acids to water and feed on the percentage of ash in whites and yolks

A study by Hidalgo, Rossi (13) showed slight differences in protein and saturated fatty acid concentrations, but these changes were minimal when they were regular eggs, and no significant differences were found in the composition of unsaturated fatty acids. Bölükbaşi, Erhan (14) showed that No effects on the total cholesterol content of eggs occurred when layer diets were supplemented with aromatic herb oils (thyme, sage or rosemary). While the qualitative results of egg characteristics in the feeding of laying hens with the addition of organic acids (tartaric and salicylic) had a significant effect on their improvement (15). The present study showed that adding tartaric and salicylic acids to water and feed did not significantly affect the quality of eggs produced from Lohman chickens.

Authors' Contribution

Study concept and design: S. M. A. A.
Acquisition of data: N. A. M.

Analysis and interpretation of data: N. A. M.
Drafting of the manuscript: N. A. M.
Critical revision of the manuscript for important intellectual content: A. T. D.
Statistical analysis: S. M. A. A.
Administrative, technical, and material support: S. M. A. A.

Ethics

The study procedure were approved by the ethics committee of the University of Diyala, Baqubah, Iraq.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. AL-Fayadh HAAS, A. H. N.; and Nadi, A. H. N. . Poultry production technology. Iraq: Ministry of higher education and scientific research, university of baghdad. 2009.
2. Diba F, Alam F, Talukder AA. Screening of acetic acid producing microorganisms from decomposed fruits for vinegar production. Adv Appl Microbiol. 2015;5(05):291.
3. Ragaa NM, Korany RM, Mohamed F. Effect of thyme and/or formic acid dietary supplementation on broiler performance and immunity. Agric Agric Sci Procedia. 2016;10:270-9.
4. Vinus NS, Tewatia B. Organic acids as alternatives to antibiotic growth promoters in poultry. Pharm Innov. 2017;6:164-9.
5. Tollba A, Shabaan S, Abdel-Mageed M. Effects of using aromatic herbal extract and blended with organic acids on productive and physiological performance of poultry 2-the growth during cold winter stress. Egypt Poult Sci J. 2010;30(1):229-48.
6. Allaw AA. Effects of Tartaric acid Supplementation to drinking water on Broiler Performance and some Blood Parameters. Iraqi Poult Sci J. 2015;9(1):129-35.
7. Osborne C, Pack M, Lewis D. Aspirin: Royal Society of Chemistry; 2003.
8. Fathi M, Haydari M. Influence of dietary aspirin on growth performance, antioxidant status, and mortality due to ascites in broiler chickens. Poultry Science Journal. 2016;4(2):139-46.
9. Balog J, Huff G, Rath N, Huff W. Effect of dietary aspirin on ascites in broilers raised in a hypobaric chamber. Poult Sci. 2000;79(8):1101-5.
10. AOAC BAM. Association of official analytical chemists. Official methods of analysis. 2000;12.
11. SPSS. Statistical Package for Social Science version 20 for window LEAD Technologies. USA: Inc; 2011.
12. Duncan DB. Multiple range and multiple F tests. Biometrics. 1955;11(1):1-42.
13. Hidalgo A, Rossi M, Clerici F, Ratti S. A market study on the quality characteristics of eggs from different housing systems. Food Chem. 2008;106(3):1031-8.
14. Bölükbaşi Ş, Erhan MK, Kaynar Ö. The effect of feeding thyme, sage and rosemary oil on laying hen performance, cholesterol and some proteins ratio of egg yolk and Escherichia coli count in feces. Arch Geflugelk. 2008;72(72):231-7.
15. Dhiab AT, Al-Saadi YAK. Effect of Adding Tartaric and Salicylic Acids and Their Mixture to Water and Diet in Egg Quality Characteristics of Aged Laying Hens. Diyala Agric Sci J. 2021;13(2):32-51.