The Effect of Date Palm Powder Soaked by Vinegar Instead Wheat in The Diet on The Blood Traits of Laying Hens

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Abstract

This study was conducted in the poultry field, Department of Animal Production, College of Agriculture, Al-Muthanna University, from 1/7/2020 to 22/9/2020. To determine the effect of date palm powder soaked by vinegar instead wheat in the diet on the blood trait of laying hens. A total of 105 laying hens, ISA Brown, 60 weeks old, were randomly distributed to 5 treatments, with 3 replicates. The treatments were as T1: (control treatment) without date palm powder soaked by vinegar. T2, T3, T4 and T5 date palm powder soaked by vinegar with 25, 50, 75 100% respectively instead wheat in the diet. Results show that a significant differences on some biochemical traits in the plasma of laying hens blood such as triglycerides, while a significant decrease on the concentration of glucose and cholesterol and triglycerides at 72 weeks of age, with a significant increase on calcium and phosphorous in the date palm powder soaked by vinegar treatments instead wheat at the age of 72 weeks.

Keywords: Laying Hens, Powder, Soaked, Vinegar.

1. Introduction

The date palm are used as fodder for various agricultural animals, especially if they are soaked in water for several days. The palms become soft and easy to eat like animal feed. It is also suitable for human consumption as the palms, and when the palms are soaked for several days, then softened, pounded, boiled with milk and eaten [1]. It is also used as a medicinal preparation, where the palm are roasted in a boiler, powder and the powder is boiled with water to become a coffee extract. It is drunk as a diuretic and a treatment for kidney diseases and diabetics. The palm powder and rose water are also used to treat the eyes [2].

Date seed powder is a good and important source of antioxidants, as it contains active flavonoid compounds such as Luteolin and Rhamentin. It also provides protection against acute poisoning. It is similar to the effectiveness of estrogen. In addition, date seed powder contains tannin, which is used as an astringent for the digestive system and the skin [3]. Studies have proven that the alcoholic and aqueous extract of date palms has a remarkable effect on some pathogenic microbes [4]. Furfural is produced from date palms, which are used in the production of insecticides [5]. The content of date nuclei of iron is useful in treating iron deficiency anemia. It is also possible to use date nuclei to treat gout and date nuclei help in relieving toothache, as the substance in date nucleus anesthetizes the teeth because it contains tannins [6] and nuclei oil can be used Dates protect the skin from ultraviolet rays, which are responsible for the damage of many cellular cells in the skin [7].

[8] indicated when feeding birds on rations that contained powdered date palms in proportions (0, 10, 20 and 30)% of the ration that there were no significant differences in blood characteristics in the concentration of triglycerides and cholesterol, and that the treated sugar concentration was 20%. Significantly higher compared to the control treatment, while there were no significant differences in the concentration of glucose sugar between the treatment containing 20% date palm powder and the treatment containing 30% date palm powder in the ration. [9] pointed when feeding laying hens of the Lohman breed on three diets: soybean meal, the second diet corn, soybean meal fat, corn and soy ration containing date palm powder at an amount of 240 g / kg feed with or without the addition of Endo enzyme -Xylanase (0 and 0.07 g/kg feed), no significant differences were observed in all triglycerides, cholesterol and glucose sugar between treatments, whether with or without the addition of Endo-Xylanase enzyme.

[10] indicated in a study to find out the effect of using acetic acid in Japanese quail diets during the growth phases from 15 to 42 days old and production from 43 to 84 days old with ratios (0, 1.5, 3, 6)% to the emergence of a significant increase in the stack Blood (PCV) at 42 days of age in all treatments compared with the control treatment, while a significant decrease in this trait appeared during the production stage at the age of 84 days when using 1.5 and 3% of vinegar in the ration, while no
significant differences appeared. In each of the albumin, globulin and total protein between treatments during the period of egg production.

Our current study aims to determine the effect of powder date palm soaked with vinegar instead wheat on some blood traits of laying hens, which were glucose, cholesterol, triglycerides, calcium and phosphorous.

2. Materials and Methods

2.1 Experiment site

The field work of this study was conducted in the poultry field of the Department of Animal Production, College of Agriculture, Al-Muthanna University located in the Umm Al-Akf region, from 1/7/2020 to 22/9/2020.

2.2 Experiment design and bird management

A total of 105 ISA brown laying hens, prepared from the poultry field located in the Agricultural Research and Experiment Station, College of Agriculture, Al-Muthanna University, aged 60 weeks were used, were housed in one of the ground breeding halls located in the poultry field of the Animal Production Department, where they were distributed among five treatments. Distributed into five places (3 x 3 m) and each was divided into three equal sections, each section containing 7 laying hens (21 laying hens/ treatment) in which the improvement of the nutritional value of date pits soaked in vinegar and its effect on the blood traits of laying hen. The experiment parameters are as follows:

T1: (control treatment): ) without date palm powder soaked by vinegar.
T2: date palm powder soaked by vinegar with 25% instead wheat in the diet
T3: date palm powder soaked by vinegar with 50% instead wheat in the diet.
T4: date palm powder soaked by vinegar with 75% instead wheat in the diet.
T5: date palm powder soaked by vinegar with 100% instead wheat in the diet.

The water was continuously supplied using hanging plastic pipes, and the lighting program was 16 hours a day (from five in the morning until nine in the evening), and the temperatures were between 25-28 ° C during the duration of the experiment. No vaccinations were conducted on the herd during the trial period, except for giving the herd vitamin C at a rate of 1 ml/5 liters for one week only. The data of the experiment were recorded from its inception at the age of 62 until the end of the experiment at the age of 72 weeks.

2.3 Preparing powder date palms for the purpose of soaking them in vinegar

Prepare the date palms from one of the private molasses factories in the governorate of Babylon, and after confirming that the date palms are clean and free of impurities, foreign materials and dust, washed with water and left to dry, then the date palms were powder with a size of 1 mm using the grinder of the production department The animal is located in the agricultural research and experiment station belonging to the College of Agriculture, Al-Muthanna University, after the grinding process was completed, it was transferred to the field to complete the processing of the diet.

Vinegar was obtained from the local markets, as it is available in the market at a cheap cost, and then the necessary percentage of vinegar to be added to the powder date cores was measured, as well as the time required for soaking the powder date cores with vinegar, and the powder date cores were soaked with vinegar by adding 3 liter of vinegar per liter of water, and then put 15 kg of powder date palms in special basins for the purpose of soaking and leaving the date palms in these basins for 24 hours. After the soaking was completed, the powder date palms soaked in vinegar were taken out and dried in a private, clean and empty place. from insects and impurities. After completion of the drying period, the humidity was measured with a special device so that it does not exceed 10%. And prepare the powder dates palm soaked with acid in the form of successive meals and according to the need of it in the experiment so that the period does not exceed one week between one meal for the powder dates palm soaked with vinegar, knowing that the method used to prepare the powder dates palm soaked with vinegar is according to what was reported by [11].

After that, the powder dates palm soaked in vinegar were mixed with the fodder according to the ratios used in the experiment, and the rest of the powder dates palm soaked in vinegar were packed in bags marked, each according to the treatment to which it belongs until it is used and presented to the chickens, taking care to close the bags tightly to maintain the effectiveness of the powder nuclei. Dates soaked in vinegar.

[12] indicated that the effect of using organic acids in the feed remains continuous for a month in the case of availability of appropriate storage conditions, and the positive effect of adding organic acids in improving the nutritional value of date palms used in the diet remains.
2.4 studied traits

2.4.1 Biochemical traits of blood

All analyzes of the biochemical characteristics of the blood were carried out in the Bashaer Al-Harithiya Laboratory for pathological analyzes (individual laboratory). Blood samples were collected twice, the first at the beginning of the experiment (at the age of 62 weeks), and the second at the end of the experiment (at the age of 72 weeks) by taking blood samples from the brachial vein from 6 Birds for each treatment, the blood was collected in 10 ml glass tubes that do not contain an anticoagulant and were placed horizontally to get rid of the clot (fibrinogen proteins), then the blood was placed in a centrifuge at a speed of 3000 rpm for 15 minutes. The serum was kept in other sterile tubes at a temperature of Temperature -18°C for the purpose of conducting laboratory analyzes and according to the instructions attached with the ready-made kits for the purpose of estimating cholesterol, triglycerides, and glucose.

2.4.1.1 Glucose (mg/100 ml serum)

Followed the [13], method based on the enzymatic hydrolysis of glucose and followed the steps supplied with the off-the-shelf measurement kit from Linear Chemicals, S.L. Spanish for the estimation of glucose in bird serum.

2.4.1.2 Cholesterol (mg/100ml serum)

The method of enzymatic degradation of cholesterol in the serum of birds was followed according to the method of Richmond [14] using ready-made kits from the Stain bio laboratory (American).

2.4.1.3 Triglycerides (mg/100ml serum)

The concentration of triglycerides in the serum of birds was estimated by enzymatic hydrolysis of serum according to the method of[15].

2.4.1.4 Total Protein (g/100 ml serum)

The method of [16], was used after the reagent solution was mixed with the zeroing and standard solution and the sample sequentially. The solutions were left for half an hour at a temperature of 25°C, zeroing the spectrophotometer with the zeroing solution. Read the absorption coefficient of the standard solution and the sample solution at a wavelength of 570 nm. To calculate the total protein concentration, the following equation was applied:

\[
\text{Total protein concentration (g/100 ml)} = \frac{\text{Sample reading}}{\text{Read the standard solution}} \times \text{Standard Concentration (6 g/100ml)}
\]

2.4.1.5 total albumin (g/100 ml serum)

The method referred to by [17] was adopted after mixing the contents of the tubes (the zeroing solution, the standard solution and the sample) with the reagent solution well and left for 5 minutes at 25°C, then zeroing the spectrophotometer with the zeroing solution, and the absorbance of the standard solution and the sample solution was measured along 570 nm wavelength. According to the two albums, according to the following equation:

\[
\text{Total protein concentration (g/100 ml)} = \frac{\text{Sample reading}}{\text{Read the standard solution}} \times \text{Standard Concentration (5 g/100ml)}
\]

2.4.1.6 total globulin (g/100 ml serum)

The concentration of globulin was calculated from the difference between the concentration of total protein and albumin, as reported by [18], and globulin was measured in (g / 100 ml of serum).

2.5 Statistical analysis

Completely Randomized Design (CRD) was used to study the effect of partial or total replacement of powder date palms soaked in vinegar instead of wheat to laying hens diet on the studied traits. The significant differences between the means were compared with [19] multiple range under the significance level of 0.05 and 0.01. SPSS [20] were used.
3. Results and Discussion

3.1 Biochemical blood characteristics of laying hens

3.1.1 Concentration of glucose, cholesterol and triglycerides

Table 1. show that the effect of using powder date palms soaked with vinegar instead of wheat in the diet on the biochemical blood characteristics of laying hens represented in each of the concentrations of glucose, cholesterol and triglycerides, which indicates a significant decrease (P≤0.05) on the glucose in favor of the treatment. The fifth in which the mashed dates soaked in vinegar were substituted for wheat by 100% in the ration compared to the treatment of powder date palms soaked in vinegar, while no significant differences among all the treatments in which the replacement, whether partially or completely on the one hand, and the absence of any appearance among the second, third and fourth substitution treatments compared to the control treatment on the other hand at the age of 72 weeks, while the differences were not significant among all treatments in the experiment on the glucose concentration at the age of 61 weeks, while cholesterol concentration was not different between all treatments in the experiment at the age of 61 weeks, a significant decrease (P≤0.05) on the concentration of cholesterol in the blood was observed in the third, fourth and fifth treatments compared to the second and control treatment, which did not show any significant differences (P≤0.05) between them in these two treatments, for a trait at the age of 72 weeks with no significant differences between the third and fourth treatment on the one hand and between the fourth and fifth treatment on the other hand, and at the same age. As for the concentration of triglycerides, it was not significantly different between all treatments, whether when measuring at the age of 61 weeks or at the age of 72 week during the experiment.

Table 1. The effect of using different levels of powder dates soaked in vinegar in diets on the glucose, cholesterol and triglycerides in the blood plasma of laying hens at the age of (61-72) weeks (mean ± standard error).

| Treatment | Glucose (mg/100 ml serum) | Cholesterol (mg/100 ml serum) | Triglycerides (mg/100 ml serum) |
|-----------|---------------------------|-------------------------------|---------------------------------|
|           | 61 weeks | 72 weeks | 61 weeks | 72 weeks | 61 weeks | 72 weeks | 61 weeks | 72 weeks | 61 weeks | 72 weeks | 61 weeks | 72 weeks |
| T1        | 3.70±205.93 | 0.19±206.32c | 4.29±295.25 | 0.33±285.53a | 1.07±143.71 | 0.06±144.00 |
| T2        | 0.09±207.81 | 0.08±207.03a | 0.79±299.50 | 0.29±282.09a | 0.56±144.66 | 0.10±143.95 |
| T3        | 0.60±207.69 | 0.08±206.85ab | 0.85±300.37 | 0.26±280.12b | 0.02±144.70 | 0.11±143.91 |
| T4        | 0.83±210.01 | 0.08±206.55bc | 0.99±299.76 | 0.04±279.54b | 0.31±144.23 | 0.03±143.94 |
| T5        | 0.36±210.59 | 0.09±206.74ab | 0.52±301.43 | 0.10±279.12b | 0.27±144.07 | 0.07±144.00 |

The results of this experiment were inconsistent with what was reached by [8] when he noticed a significant increase in the concentration of glucose in the treatment in which powder date palms were used by 20% of the free diet compared to the control treatment, as well as [9] mentioned that there was no The appearance of significant differences when feeding laying hens of the Lohmen strain in the blood sugar concentration of laying hens who ate a diet that contained powder date palms at an amount of 240 g/kg feed with or without the addition of Endo-xylanase enzyme compared to the control treatment. This discrepancy in the amount of effect on the level of blood sugar concentration for laying hens may be due to the difference in the percentage used of powder dates soaked in vinegar were substituted for wheat by 100% in the ration compared to the treatment of powder date palms soaked in vinegar, while no significant differences among all the treatments in which the replacement, whether partially or completely on the one hand, and the absence of any appearance among the second, third and fourth substitution treatments compared to the control treatment on the other hand at the age of 72 weeks, while the differences were not significant among all treatments in the experiment on the glucose concentration at the age of 61 weeks, while cholesterol concentration was not different between all treatments in the experiment at the age of 61 weeks, a significant decrease (P≤0.05) on the concentration of cholesterol in the blood was observed in the third, fourth and fifth treatments compared to the second and control treatment, which did not show any significant differences (P≤0.05) between them in these two treatments, for a trait at the age of 72 weeks with no significant differences between the third and fourth treatment on the one hand and between the fourth and fifth treatment on the other hand, and at the same age. As for the concentration of triglycerides, it was not significantly different between all treatments, whether when measuring at the age of 61 weeks or at the age of 72 week during the experiment.

3.1.2 Albumin, globulin, and total protein

Table 2. show that the effect of using powder date palm soaked with vinegar instead of wheat in the diet on the biochemical blood characteristics of laying hens represented by the concentration of protein, albumin and globulin in the serum of birds, as the table shows that no significant differences appeared in the concentration of total protein at age 61 weeks among all treatments in the experiment, while significant differences (P≤0.05) appeared in the trait of total protein between treatments when measuring this trait at the age of 72 weeks, as a significant decrease was observed (P≤0.05) between the third, fourth and fifth treatments, which did not show any differences significant compared to the second treatment and the control treatment, which did not differ between them in this trait.

As for the albumin trait, there were no significant differences between the treatments in the experiment when the measurement was taken at the age of 61 weeks of the experiment, while a significant decrease (P≤0.05) on the concentration of protein, albumin and globulin in the serum of birds, as the table shows that no significant differences appeared in the concentration of total protein at age 61 weeks among all treatments in the experiment, while significant differences (P≤0.05) appeared in the trait of total protein between treatments when measuring this trait at the age of 72 weeks, as a significant decrease was observed (P≤0.05) between the third, fourth and fifth treatments, which did not show any differences significant compared to the second treatment and the control treatment, which did not differ between them in this trait.
of albumin in the blood appeared in the third, fourth and fifth treatments compared to the second and control treatments and no significant differences (P≤0.05) appeared in this trait between the second treatment and the control on the one hand, and between the third, fourth and fifth treatments on the other hand.

As for globulin, there were no significant differences between all treatments in the globulin trait in the blood of birds when this measurement was made at the age of 61 weeks from the production period of laying hens, while was a significant decrease (P≤0.05) in the fourth and fifth treatments compared to the second and control treatments in this trait with no differences Significant between the third, fourth, and fifth treatments on the one hand, and between the third and second treatments, and the control treatment at 72 weeks of age on the other hand.

### Table 2. The effect of using different levels of powder dates soaked in vinegar in diets on albumin, globulin, and total protein in the blood plasma of laying hens at the age of (61-72) weeks (mean ± standard error).

| Treatment | Total protein (mg/ 100 ml serum) | Albumin (mg/ 100 ml serum) | Globulin (mg/ 100 ml serum) |
|-----------|---------------------------------|-----------------------------|----------------------------|
|           | 61 weeks | 72 weeks | 61 weeks | 72 weeks | 61 weeks | 72 weeks |
| T1        | 0.043±4.70 | 0.040±4.65a | 0.014±2.30 | 0.017±2.28a | 0.028±2.40 | 0.023±2.36a |
| T2        | 0.014±4.72 | 0.058±4.61a | 0.003±2.30 | 0.029±2.26a | 0.011±2.42 | 0.029±2.34a |
| T3        | 0.017±4.75 | 0.028±4.45b | 0.006±2.31 | 0.014±2.17b | 0.011±2.44 | 0.014±2.27b |
| T4        | 0.029±4.74 | 0.031±4.39b | 0.010±2.32 | 0.011±2.13b | 0.020±2.42 | 0.020±2.29ab |
| T5        | 0.032±4.80 | 0.034±4.47b | 0.003±2.32 | 0.017±2.16b | 0.006±2.45 | 0.017±2.31ab |
| Sig.      | N.S       | 0.05     | N.S       | 0.05     | N.S       | 0.05     |

The reason for the decrease in sugar, cholesterol and protein in the blood of laying hens in which powder dates soaked with vinegar were used in diets and in different proportions, especially in the high proportions of powder dates soaked with vinegar in place of wheat in diets, may be due to the lack of nutrients in energy and protein, so birds tended to rely on energy sources in the body such as sugar and cholesterol and destroy them to meet the needs necessary for maintenance, growth and production, and then the concentration of these elements in the blood decreased. Stress or deficiency in the nutrients supplied to the ration that birds feed on [21,22].

### 3.1.3 Calcium and Phosphorus

Table 3. show the effect of using powder date palm soaked in vinegar in place of wheat in the bush on the concentrations of calcium and phosphorous in the blood of birds. It was noticed that there were no significant differences in the calcium concentration between the treatments when measuring the calcium concentration in the blood at the age of 61 weeks, while a significant increase in the calcium concentration appeared with an increase in the percentage of substitution for the dates soaked in vinegar in diets on calcium and phosphorus in the blood of laying hens. It was noticed that there were no significant differences in the calcium concentration between the treatments when measuring this trait at the age of 61 weeks from the production period of laying hens, while a significant increase in this characteristic in the third, fourth and fifth treatments compared to the second and control treatments in this trait with no differences Significant between the third, fourth, and fifth treatments on the one hand, and between the third and second treatments, and the control treatment at 72 weeks of age on the other hand.

### Table 3. The effect of using different levels of powder dates soaked in vinegar in diets on calcium and phosphorus in the blood plasma of laying hens at the age of (61-72) weeks (mean ± standard error).

| Treatment | Calcium (mg/ 100 ml serum) | Phosphorus (mg/ 100 ml serum) |
|-----------|----------------------------|-------------------------------|
|           | 61 weeks | 72 weeks | 61 weeks | 72 weeks |
| T1        | 0.15±29.58 | 0.04±29.04b | 0.05±6.35 | 0.04±6.26b |
| T2        | 0.05±29.51 | 0.06±29.35a | 0.01±6.41 | 0.05±6.42ab |
| T3        | 0.14±29.57 | 0.10±29.40a | 0.01±6.42 | 0.08±6.48a |
| T4        | 0.23±29.60 | 0.06±28.42a | 0.03±6.37 | 0.12±6.54a |
| T5        | 0.31±29.53 | 0.09±28.43a | 0.04±6.39 | 0.01±6.58a |
| Sig.      | N.S       | 0.05     | N.S       | 0.05     |

While there were no significant differences in the phosphorus concentration in the blood between the fifth, fourth and second treatments on the one hand and between the fourth, third and second treatments and control on the other hand when the measurement was made at the age of 72 weeks of the experiment period.
The increase in calcium and phosphorous concentrations in the serum of laying hens and significantly when measuring calcium and phosphorous concentrations at the age of 72 weeks of rearing and with the increase of the replacement of powder date palm soaked with vinegar in the diets may be due to the high calcium and phosphorous ratios in the powder date palm. Significant in blood concentration with increased replacement of date kernel powder compared to the control treatment [23].

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