

Effect of Adding Different Levels of Dried Olive Pomace to the Diet on some Productive Traits of Broilers

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Abstract. This experiment was conducted at the poultry field, Agricultural Research and Experiment Station, College of Agriculture, Al-Muthanna University, from 21 February 2022 to 26 March 2022. A total of 180 unsexed, 1 day old, Ross 308 broiler chicks were used, chicks were randomly distributed to four experimental treatments, 45 chicks for each treatment with three replicates of the treatment (15 chicks/duplicate) for 35 days, the treatments were as follows: T1: Control treatment; T2: Add 1.5% dry olive pomace to the diet; T3: Add 3% dry olive pomace to the diet; T4: Add 4.5% dry olive pomace to the diet. The results indicate that there were no significant differences among all olive-pomace treatments compared to the control treatment on the studied productive traits (Body weight, weight gain, feed intake and food conversion factor), it was concluded that the olive pomace has an economic importance in the productive characteristics of broilers.

Keywords. Olive pomace, Productive traits, Broilers.

1. Introduction

Feed costs represent about 70% of the total cost of poultry production, especially in developing countries [1]. With the decline of feed resources, researchers reported from an early age to search for alternative feed materials, unconventional and inexpensive, to reduce the total costs of poultry production [2,3]. Without causing negative effects on the growth and production of birds, especially in intensive education systems, as a result, the use of by-products of some agricultural crops, like tomatoes, dates and olives in chicken feed,

meat and whites are a good way, to recycle this waste on the one hand [4]. Agricultural by-products are useful for feeding both livestock and poultry [5]. The possibility of using these resources as feed supplies, to provide traditional feed sources such as grain for human consumption [6]. Reducing the cost of waste management and eliminating its environmental and health damages [7].

The use of olive pomace in poultry feed is a useful way to recycle this waste, therefore, there is a need to formulate improved ratios for the different uses of olive pomace, to avoid metabolic disorders, caused by the unbalanced

ratios of energy and protein as a result of the use of olive pomace [5]. Reducing taste factors, that may limit feed intake, thus the effect on the productive performance of chickens [8].

Zarei *et al.* [9] showed that a 6-week trial was conducted in late production, 120 Lohman layer hen were used, by dried olive pomace with partial substitution of wheat (0 and 9%), it had no significant differences in egg production, feed intake, egg mass and feed conversion rate, it was concluded that the use of 9% of olive pomace had no adverse effects on the productive performance of birds.

The current study aims to demonstrate the effect of adding different levels of olive pomace on the productive performance of broilers.

2. Materials and Methods

This experiment was conducted at the poultry field, Agricultural Research and Experiment Station, College of Agriculture, Al-Muthanna University, from 21 February 2022 to 26 March 2022. A total of 180 unsexed, 1 day old, Ross 308 broiler chicks were used, chicks were reared in a hall whose dimensions were 40×10 m, in four-storey batteries, each floor contains a cage with dimensions of 1.5×1 m. Chicks were randomly distributed to four experimental treatments, 45 chicks for each treatment with three replicates of the treatment (15

chicks/duplicate) for 35 days, the treatments were as follows:

T1: Control treatment..

T2: Add 1.5% dry olive pomace to the diet.

T3: Add 3% dry olive pomace to the diet.

T4: Add 4.5% dry olive pomace to the diet.

The chicks were fed a primary diet for all treatments for the period between 1-7 days, then the diet was changed to four types, for each treatment, according to the treatments for the period from 7-35 days (to the end of the experiment).

2.1. Olive Pomace Source

The olive pomace was purchased from the olive oil press, Majid Al-Taei, in Al-Diwaniyah-Al-Jadida area, this material was the residue left after the extraction of local olive oil, which was harvested from the great olive farm in the Al-Nouriah area of Al-Diwaniyah Agriculture Directorate.

2.2. Preparing the Olive Pomace

A quantity of olive pomace was brought from the pressing of the local olives in the automatic presses, mattress on a concrete floor covered with a nylon bag, it was dried in the open air and under the sun for 10 days, stirring several times a day, after drying, samples of the pomace were taken for the purpose of conducting chemical analyzes later.

Table 1. Analysis of the olive pomace used in the experiment.

Chemical analysis	Value
Dry matter	85.50%
Protein	9.07%
Fiber	30.25%
Fat	10.25%
Soluble carbohydrates	41.49%
Ash	13.00%
Lignin	38.20%
Energy ME	6.16 Mega joules
Calcium	2.30%
Phosphorus	0.30%
Potassium	1.10 mg/ kg
Magnesium	10.00 mg/ kg
Copper	14.20 mg/ kg
Zinc	97.20 mg/ kg

The analysis was carried out in the Baghdad National Laboratory in the province of Baghdad - Bab Al-Moadham.

3. Results and Discussion

Table (2) shows the effect of adding dried olive pomace to the diet provided in different proportions to the experimental treatments, except for the control treatment, on the average weekly live body weight (gm) of broilers. There were no significant differences in the first week of bird life in all treatments, the results also appeared during the second week, from the beginning of which different diets were given to the birds, including varying percentages of olive pomace (1.5, 3 and 4.5%). There were no significant differences between the treatments to which the pomace was added at different rates and the control treatment, there were simple arithmetic differences in

favor of addition coefficients, especially the higher addition percentage, these results continued for the subsequent weeks (third, fourth and fifth) until the end of the experiment. The reason may be due to the fact that the percentages used in the experiment were within the safe limits, which does not affect the overall performance of the bird. In addition to the percentage of fiber in the pomace, it did not have a detrimental effect on the health of the bird or on the components of the diet [10].

Table 2. The effect of adding different levels of olive pomace to the diet on the weekly body weight (gm) of broilers (Mean± standard error).

Treatment s	Age (week)				
	1	2	3	4	5
T1	3.618±164.62	10.425±381.36	18.581±827.65	20.109±1411.65	12.548±2077.31
T2	0 ±158.93 4.08	575±386.78.1 8	4.635± 810.73	3.590±1381.06	3.862±2075.05
T3	0.913±157.61	10.805±370.90	4.020 ± 802.77	743±1378.10.2	18.554± 2067.57
T4	.626 ±156.55 1	8. 434±370.86	17.129 ±817.11	6.196±1381.80	16.081±2067.84
Sig.	N.S	N.S	N.S	N.S	N.S

Table (3) shows the effect of adding olive pomace provided to all experimental treatments except for the control treatment, from the beginning of the second week until the end of the five-week trial period. The table indicates that there were no significant differences during the first week in the rate of weight gain between the different experimental treatments, this applies to the subsequent weeks (second, third, fourth and fifth) of the

trial period, the table also indicates that there were no significant differences in the rate of cumulative weight gain of birds from the day they entered the breeding hall until the end of the experiment (1-35 days). Noting that there were simple arithmetic differences in favor of the pomace addition coefficients and from the ratio of the highest addition to the lowest addition compared to the control treatment.

Table 3. The effect of adding different levels of olive pomace on the weekly weight gain (gm) of broilers (Mean± standard error).

Treatment s	Age (Week)					Cumulative weight gain
	1	2	3	4	5	
T1	.61±124.6 3	8.01±216.7	8.48±446.2	1.52±584.0	7.83±665. 6	12.54±2037.3
T2	4.08±118. 9	20.74±227. 8	23.17±423. 9	7.85±570. 3	7. 35±693.9	3.86±2035.0
T3	9.13±117. 6	11.71±213. 2	±431.8 54.14	6.64±575. 3	18.63±689. 4	18.55±2027.5
T4	1.62±116. 5	7.36±214.3	.89±446.2 8	10.74±564. 6	10.29±686. 0	16.08±2027.8

Sig.	N.S	N.S	N.S	N.S	N.S	N.S
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It may be concluded that olive pomace is a valuable food item that can be included in the diet of broilers [11,12], with the possibility of feeding it to broilers in all proportions used in the experiment without harmful effects on growth and feed intake [11], or at least to keep performance on par with the control treatment [12]. It may be due to pomace containing important nutritional components such as protein, monounsaturated fatty acids, important mineral elements and vitamins, especially fat-soluble [13].

Table (4) shows the effect of adding olive pomace at different levels on the weekly feed intake (gm) of broilers, it was noted from the same table that there were no significant differences during the first week in feed intake among all experimental treatments. This

applies to the second week, while in the third week we find a significant difference ($P \leq 0.05$) in T2 compared to T4, while there were no significant differences ($P \leq 0.05$) between the treatments T1, T2 and T3 on the one hand and T1, T3 and T4 on the other hand. As for the fourth and fifth weeks of the experiment, the table indicates that there were no significant differences among all treatments, including the control group, with regard to the total feed intake, the same table indicates a significant decrease for the fourth treatment compared to the control treatment, while we did not find significant differences among T1, T2 and T3, the same result was also observed with the three treatments that include the dregs coefficients at their different levels in the experiment.

Table 4. The effect of adding different levels of olive pomace on the weekly feed intake (gm) of broilers (Mean± standard error).

Treatment	Age (Week)					Cumulative feed intake
	1	2	3	4	5	
T1	1.61±222.8	8.72±386.2	5.79±787.6 _{ab}	.95±992.2 ₅	6.61±1144.6	28.37±3533.6 ^a
T2	2.32±212.0	12.36±384.3	2.85±791.3 _a	1.81±989.6	2.97±1143.1	11.25±3529.5 _{ab}
T3	1.44±218.7	10.26±371.8	2.90±783.7 _{ab}	4.71±985.8	2.12±1138.5	4.64±3498.7 ^{ab}
T4	1.77±216.5	4.80±366.6	2.07±777.3 _b	2.54±982.3	3.27±1232.1	12.98±3475.0 ^b
Sig.	N.S	N.S	*	N.S	N.S	*

The reason may be attributed to the decrease in the rate of feed intake in the fourth treatment, which included (4.5% olive-pomace), due to the high percentage of fiber in the diet, with a similar increase in the amount of unsaturated fatty acids such as oleic, linoleic and linolenic. In addition to arachidonic acid as an energy source and as an antioxidant, this supports the maximum benefit from food due to filling the deficiency caused by these acids for energy [14], this differs from what Herrero *et al.* [15] found when using olive pomace at a rate of 750 ppm that there were no statistically significant differences in the amount of feed intake between different treatments, the reason for this difference in results may be due to the difference in the concentration of olive pomace

in the diet, or it may be attributed to the reason for the significant difference ($P \leq 0.05$) in the intake of fodder in the treatment that included 4.5% olive pomace, to an improvement in the intestinal digestive enzyme chymotrypsin, fat digestion is further improved due to the increase in conjugated fatty acids [16].

Table (5) indicates the effect of adding different levels of olive pomace on the feed conversion factor (gm of feed / gm of weight gain) of broilers during the weeks of rearing, it indicates that there were no significant differences ($P \leq 0.05$) during the first week of breeding among all experimental treatments. There was no significant difference ($P \leq 0.05$) during the second, third, fourth and fifth weeks among T2, T3 and T4 compared to the control

treatment. Noting that there were simple arithmetic differences in each week between the different treatments. Mathematically, the cumulative feed conversion factor for treatments T4 and T3 was better than treatment T1 and T2, according to Sateri et al., [17] reported that was consistent with the study by, which found that adding up to 8% of olive pomace in the diet of broiler chickens had no significant effect on the feed conversion factor. Also with the study conducted by Omar [18].

Table 5. Effect of adding different levels of olive pomace on the feed conversion factor (gm of feed/gm of weight gain) of broilers (Mean± standard error).

Treatment	Age (Week)					Cumulative feed conversion
	1	2	3	4	5	
T1	0.038±1.79 0	0.029±1.78 4	0.020±1.76 5	0.005±1.69 9	0.030±1.72 0	0.003±1.734
T2	0.085±1.86 4	0.216±1.72 5	0.102±1.87 7	0.026±1.735	0.020±1.64 7	0.002±1.734
T3	0.025±1.86 0	0.046±1.74 8	0.057±1.81 8	0.025±1.71 4	0.047±1.65 4	0.015±1.725
T4	0.024±1.87 4	0.017±1.76 4	0.013±1.76 7	0.043±1.75 1	0.012±1.66 2	0.007±1.732
Sig.	NS	NS	N.S	N.S	NS	NS

Conclusion

There were no significant differences among all olive-pomace treatments compared to the control treatment on the studied productive traits (Body weight, weight gain, feed intake and food conversion factor), it was concluded that the olive pomace has an economic importance in the productive characteristics of broilers.

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The reason may be due to the fact that most of the previous studies used olive pomace as a substitute for a main food item such as corn, wheat and others, or a second substance is used with the pomace in order to improve it, such as some enzymes, yeasts, and vital enhancers, or add some protein and vitamins to enhance the nutritional benefit of pomace, while this study is the addition of olive pomace as an abstract secondary feed without any additives, auxiliary enzymes, yeasts or probiotics.

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