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Effect of adding the different levels of olive leaf (Olea europaea L.) extract to broiler diets on the growth performance of Ross 308

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ABSTRACT

This study aimed to evaluate the possibility of using olive leaf extract (OLE) as a feed additive in the diets of broilers. A total of 180 one-day-old broiler Ross 308 chicks were distributed into four groups, fed on isoprotein and isoenergetic diets with different replacement ratios of OLE as: 0.5, 1, 1.5 % respectively. A control group (0% OLE). Body weight, body weight gain, feed intake (FI), and feed conversion ratio (FCR) were recorded weekly, and production index (PI) and economic figures (EF) were considered at 35 days old. No significant difference in Body weight, body weight gain, Feed intake (FI) and feed conversion ratio (FCR) between experimental groups as compared to control during total period. FCR was more enhanced in the OLE groups than control group during the total period (1-35 days of age). The PI and EF differ with OLE groups and control group which improved in OLE experimental groups compared to control during 1 - 35 d of age. OLE groups were more favorable than the control group. It is safely used of OLE meals in broiler diet to improve broiler performance.

KEY WORDS: Broiler; olive leaf; Performance

تأثير أضافة مستويات مختلفة من اوراق الزيتون *(Olea europaea L.)* الى العليقة في الأداء الإنتاجي لفروج اللحم روز 308
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الخلاصة

أجريت التجربة لمعرفة إمكانية إضافة مستويات مختلفة من اوراق الزيتون كاضافة غذائية في عليقة فروج اللحم. استخدم 180 فرخا بعمر يوم واحد لفروج اللحم روز 308 و وزعت على أربعة معاملات التي غذيت افراخها بعلائق متماثلة الطاقة و البروتين و بنسب إضافة من من اوراق الزيتون المجففة و المطحونة بـ 0 و0.5 و 1 و 1.5 % على التوالي. درست الصفات التالية معدل وزن الجسم الحي و الزيادة الوزنية و كمية العلف المتناول و معامل التحويل الغذائي حيث سجلت هذه الصفات أسبوعيا ، اما الدليل الإنتاجي و المؤشر الاقتصادي فحسبت عند عمر 35 يوما . وكانت النتائج كما يلي: عدم وجود فروق معنوية بين المعاملات في صفة وزن الجسم الحي و كمية العلف المتناول و معامل التحويل الغذائي الذي تحسن في معاملات إضافة اوراق الزيتون بقدار 1.5 % مقارنة مع معاملة المقارنة و خلال المدة الكلية من 1-35 يوما من العمر، و سجل فروق معنوية بين المعاملات اضافة اليرقات و معاملة المقارنة في صفتي الدليل الانتاجي والموشر الاقتصادي حيث تحسن المؤشران مع زيادة نسبة الاضافة لاوراق الزيتون حيث كانت الأعلى قيما في الطيور المغذات على علائق تحتوي مسحوق اوراق الزيتون مقارنة مع معاملة المقارنة. ان إضافة مسحوق اوراق الزيتون لم يوثر سلبا في قيم معامل التحويل الغذائي للمعاملات التجريبية مقارنة مع معاملة المقارنة حيث خفضت الإضافة من كمية العلف المتناول مما حسن من قيم معامل التحويل الغذائي للمعاملات التجريبية. تشير النتائج الى ضرورة استخدام مسحوق اوراق الزيتون كونه حسن من العديد من صفات النمولدى فروج اللحم روز 308

الكلمات المفتاحية: فروج اللحم، اوراق الزيتون ، الأداء الإنتاجي.

INTRODUCTION

The worldwide production of chicken meat reach about 135 million tons during 2021, reached about 40% of livestock production (Shahbandeh 2022). In commercial production the oxidative stress because of the production performance, that effected on health and meat quality of broiler (Sola-ojo et al. 2019). The BHT, BHA and propyl gallate as an antioxidants as an active tools in animal farms, and safe for animals or human beings (Felter et al. 2021). Antioxidants was safe, effective, dependable and varied sourced in used. So, it works for lowering the oxidative stress led to improve broiler performance and meat quality. Olive leaf (Olea europaea L.), is a kind of additive in animal nutrient used to improve the meat quality, which reach about 330,000 tons/year-round the world. The demand of green and healthy products using natural polyphenols is increased (Achat et al. 2012). OLE rich in crude fiber (over 26%), that cause a difficulty in digestion and palatability for broiler (Altop et al. 2018). Oleuropein in olive leaf around 8% to 14% (Japon-Lujan and de Castro 2006). OLE content a flavonoid like (luteolin, apigenin and rutin, etc.) and phenols like (vanillin, caffeic acid, tyrosol, hydroxytyrosol, etc.) (Rahmanian et al. 2015). OLE has a stronger antioxidation as comparation with vitamins C and E (Benavente-Garcıa et al. 2000). Oleuropein work as anti-inflammation (Hassen et al. 2015). The European Food Safety Authority authorized the safely addition of OLE in feed for all animal diet (Authority EFS 2007). More studies about feed additives to enhance the meat quality by using natural plant (extracts) for safety use (Kone et al. 2019; Paiva et al. 2021). A meat quality and growth linked with cecal microbiota in broiler (Zhang et al. 2021a, 2021b). OLE can be used as thereby to improve growth performance poultry, by using olive byproducts or with other phytogenic leaves or extracts (i.e. Moringa oleifera) that content high level of phenolic compounds by improved health status too (Saleh et al. 2014, 2020; Saleh and Alzawqari 2021; Selim et al. 2021). OLE is a cheap and abundant source of phenolic compounds which were widely used in foods and husbandry fields, in ruminant (goat, sheep and cow) and rabbits (Molina-Alcaide and Ya~ nez-Ruiz 2008; Ribeiro et al. 2012). The effectiveness of OLE improving meat quality in feeding broiler. This study purposes to assess the effect of OLE on growth performance, production criteria. Also, OLE could be able of possibly as

feed additives in broiler diet for enhancing health status.

MATERIALS AND METHODS

The experiment was located on poultry farm in the faculty of agriculture in Najaf governorate (Iraq). Four treatment groups were used; (45 chicks per treatment, with 3 replicates of 15 birds. Total of 180 Ross broiler chicks, one-day old with average about 43 g of live body weight). The broiler chicks housed in closed building with 12 floor pens (1 × 1 m2/pen) covered with wood litter (7-10 cm depth), according to Ross Broiler Management (2018). The experiment started at 2 November to 6 December 2024 for a period of 35 days. The experiments were fed on starter and finisher isoprotein and isoenergetic diets in Table1, according to N.R.C.(1994). The diets only differed in additives as 0.5, 1, and 1.5 % of olive leaf extract (OLE) powder (As a feed additives) for treatments OLE 0, OLE 1, OLE 2 and OLE 3 respectively. A control group (0% OL). Body weight (BW) and feed intake (FI) were recorded weekly, thereafter body weight gain (BWG), feed conversion ratio (FCR) was calculated weekly, in the same interval period as for body weight. The rate of mortality was recorded daily. GLM procedure of SAS (2000) was used for Analysis of variance by using Duncans' test (1955).

Table1: Starter and finisher isoprotein and isoenergetic diets.

Ingredient %	Starter diets (1-21d)	Finisher diets (22-35d)
Yellow Corn	45	45
Wheat	16.6	23.1
Soybean meal SBM(48%)	32.7	24.7
Premix [a]	2.5	2.5
Limestone	0.5	0.5
Salt	0.2	0.2
Di-calcium Phosphate	1.5	1.5
Vegetable fat	1	2.5
Crude protein %	23	20
Energy (Kcal ME/kg)	3007	3165
Calcium %	0.12	0.10
Available phosphorus %	0.45	0.41
Cysteine +Methionine %	0.66	0.60
Total Fiber %	3.89	3.57

[a.] Premix contained: Protein45%, 2200 Kcal/kg Met. Energy, Fiber 3%, Fat 8%, Phosphorus (av) 0.12%, calcium 6%, meth. 2%, Lys.3%, Cys.+ meth. 2.5%. E 500 mg, A 30.000 IU, K 40 mg, D3 30.000 IU, B1 30 mg, B6 60 mg, B2 75mg, Folic acid 15 mg, Pantothenic acid 120 mg, Niacin 400 mg, choline 1.7%, biotin1500 mg, Cu 70%, Na 1.5 %, Fe 450 mg, Zn 600 mg, potassium iodine 5 mg, Se1 mg and cob 1 mg.

RESULT AND DISCUSSION

During the experimental period there were no deaths in any group. Table 2 and 3 shows the effect of the use of OLE on BW and BWG of broilers Ross308 during 35 days of experiment. No significant differences were found between experimental treatments (OLE) and control.

Table 2: Mean value ± SD of body weight(g) of Broiler Ross 308 feed OLE

Treatments	Body weight of age			
	14 day	**21 day**	**28 day**	**35 day**
OLE 0	310.4 ±9.919	675.067±2.126	1315.53±35.226	247.33±42.807
OLE 1	300.4±7.434	684.733±4.537	1347.6±9.947	283.3±28.022
OLE 2	311.8±1.000	686.167±3.113	1367.13±12.808	2113.3±21.685
OLE 3	299±6.293	668.677±8.819	1370.9±19.159	2136.63±2.896
***Significant level**	N.S	N.S	N.S	N.S

Different letters within column indicating of significant differences (p<0.05); OLE 0, OLE 1, OLE 2 and OLE 3 addition of olive leaf extract (OLE) powder 0, 0.5, 1 and 1.5 % of diets respectively.

No significant differences between experimental groups in feed intake FI (Table 4) during the 3rd, 4 rd and 5th week of age and during the total experiment period.

Table 3: Mean value ± SD of Body weight Gain (g) feed OLE

Treatments	Body weight Gain age				
	8-14 day	**15-21day**	**22-28 day**	**29-35 day**	**8-35 day**
OLE 0	199.2±9.876 A	364.63±8.214	640.40±33.313	731.73±19.444	1936.07±41.772
OLE 1	155.13±10.017B	384.24±3.589	622.83±7.133	735.67±21.495	1939.70±35.374
OLE 2	171.67±5.238AB	377.77±5.206	680.93±15.791	750.9±10.324	1967.60±37.850
OLE 3	158.97±11889B	379±10.751	683.9±27.304	759±18.396	2004.40±4.006
*Significant level	*	N.S	N.S	N.S	N.S

Different letters within column indicating of significant differences (p<0.05); OLE 0, OLE 1, OLE 2 and OLE 3 addition of olive leaf extract (OLE) powder 0, 0.5, 1 and 1.5 % of diets respectively.

OLE experimental groups has recorded a significantly lower FI as compared to control during the 2nd period.

The FCR was similar for the experimental and the control groups during the entire period of experiment, but in the day 8-35 of age, the OLE experimental groups showed a better FCR than control group.

Table 4: Mean value ± SD of feed Intake (g) of Broiler Ross 308 feed OLE

Treatments	Feed Intake (g)				
	8-14 day	**15-21day**	**22-28 day**	**29-35 day**	**8-35 day**
OLE 0	274.4±10.622	530.63±12.113	849.10±12.439	1166.07±24.989	2820.30±53.181
OLE 1	227.60±18.100	539.50±26.954	808.03±3.323	1148.57±31.433	2724.23±46.897
OLE 2	262.83±16.438	537.37±28.614	853.73±45.352	1150.93±29.066	2773.50±42.158
OLE 3	224.73±16.850	537.37±13.562	849.50±48.306	1113.33±40.551	2754.23±32.034
*Significant level	N.S	N.S	N.S	N.S	N.S

Different letters within column indicating of significant differences (p<0.05); OLE 0, OLE 1, OLE 2 and OLE 3 addition of olive leaf extract (OLE) powder 0, 0.5, 1 and 1.5 % of diets respectively.

A significant improvement (P≤0.05) for OLE groups as compared with control in production index (PI) and economic figure (EF) were found; as the PI and EF values were normal for OLE treatments despite the low FI as shown in table 6.

Table 5: Mean value ± SD of Feed conversion ratio of Broiler Ross 308 feed OLE

Treatments	Feed conversion ratio of age				
	8-14 day	**15-21day**	**22-28 day**	**29-35 day**	**8-35 day**
OLE 0	1.380±0.047	1.456±0.043	1.331±0.051	1.595±0.053	1.457±0.027 A
OLE 1	1.464±0.030	1.405±0.129	1.219±0.008	1.561±0.019	1.404±0.009 AB
OLE 2	1.529±0.062	1.421±0.058	1.252±0.039	1.533±0.036	1.409±0.005 AB
OLE 3	1.413±0.027	1.418±0.029	1.239±0.020	1.466±0.031	1.374±0.014 B
*Significant level	N.S	N.S	N.S	N.S	*

Different letters within column indicating of significant differences (p<0.05); OLE 0, OLE 1, OLE 2 and OLE 3 addition of olive leaf extract (OLE) powder 0, 0.5, 1 and 1.5 % of diets respectively.

The high concentrations of OLE treatments were significantly improved the broiler performance.

Table 6: Mean value ± SD of Production index (PI) and economic figure (EF) of Broiler Ross 308 feed OLE

Treatments	Production index (PI)	economic figure (EF)
OLE 0	395.85±20.0420 B	395.85±20.042 B
OLE 1	417.05±4.409 AB	417.05±4.409 AB
OLE 2	434.30±0.569 A	434.30±0.569 A
OLE 3	449.26±2.410 A	449.26±2.410 A
*Significant level	*	*

Different letters within column indicating of significant differences (p<0.05); OLE 0, OLE 1, OLE 2 and OLE 3 addition of olive leaf extract (OLE) powder 0, 0.5, 1 and 1.5 % of diets respectively.

The results showed that the use of OLE tile 1.5% in broiler diet has reduced the feed consumption and gave the same marketing body weight.

OLE, an antioxidant that used in foods because of richness in oleuropein, phenolic acids, flavonoids and many phenols (Moudache et al. 2016). Though, it used in broiler diet as an additive is deficient. During the period of 35days, an addition of OLE as 0.5 - 1.5% did not reduced FI of broiler and not affect the diet palatability (Cecchi et al. 2013). The body weight gain still normal even the bitter taste of oleuropein in the OLE, also feed intakes did not effected as well and no significant difference in the feed conversion ratio effected by OLE. Specially, the 1.5% of OLE enhances the FCR, as Table 5 indicated. This was possible credited to the low of oleuropein and polyphenol level. The normal doses of OLE as 0.5 or 1.5% did not increased the death rate. The 0% of mortality for broilers could be a good sign of the effect of plant extract. In this study, OLE has a low bitter taste, even in high dose of supplement in 1.5%, the dietary consumption became a significantly effect on FCR. The results of this study were also consistent with the findings of many researches, which showed that adding OLE to broiler feed significantly increased feed efficiency and weight gain. The ability of OLE to improve growth as well as FCR can be explained by the effective role of OLE in increasing the ability to digest nutrients by enhancing the role of digestive enzymes and microbial diversity in addition to improving gut health [21].

CONCLUSION

The safely used of OLE in broiler diet through whole growing life with no adverse effects on diet palatability. So, the positive effects by reducing FI when OLE were used in diet. The acceptable range of phenolic continents that recommends a superior response, may be work as a prebiotic. Further research is needed to assess this result in diets of different type of poultry like layer and broiler breeder.

CONFLICT OF INTEREST

None of conflict of interest declared by authors.

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