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EFFECT OF *ERUCA SATIVA* OIL (ESO) ON BROILERS PERFORMANCE AND SOME BLOOD TRAITS

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ABSTRACT
This study was conducted to identify The effect of using *Eruca sativa* oil (ESO) on the performance and some blood traits of broiler . one hundred and fifty one day - old unsexed broiler (cobb) were divided into five groups of 30 birds each and assigned to five feeding treatment Group1 is considered as a control group where there was no addition of ESO. Group 2,3,4 and 5 involved the addition of 250, 500, 750 and 1000 mg oil / kg diet mg ESO/ kg diet respectively results showed that the supplementation dietary broiler with ESO especially of level 1000 mg oil / kg diet significantly ($p< 0,05$) improve the final live body weight and weight gain and had significantly ($p< 0.05$) better feed conversion ratio and serum cholesterol were significantly ($p\leq 0.05$) lower in all supplemented groups than the control . It could be concluded from this study that the supplementing broiler diets with ESO have beneficial effect on broiler performance.

KEY WORD: *Eruca sativa* oil, broiler performance blood traits.

INTRODUCTION

Subsequent to banning of use of antibiotics as growth promoters in poultry nutrition, numerous studies turned to finding of alternative solutions which would have positive effect on chicken growth and feed conversion (Peric *et al*., 2009). Essential oils have recently emerged as alternative to antibiotics in animal production (Mellor, 2000). The positive effects of essential oils can be expressed through better appetite, improve feed conversion via increase secretion of the digestive enzymes, stimulation of immune system and increased vitality, regulation of the intestinal micro- flora and besides, they exhibit antibacterial, antiviral and antioxidant activity (Lee *et al*., 2004; Ertas *et al*., 2005; Cross *et al*., 2007). The *Eruca sativa* oil (Eso) posses medicinal and therapeutic properties (Varga *et al*., 2009), It has been reported that the ethologic and petroleum ether extract of *Eruca sativa* exert prophylactic and treatment role against oxidative stress by increasing or maintaining the levels of antioxidant molecules and antioxidant enzymes (Said *et al*., 2005; Alam *et al*., 2007; Jihan *et al*., 2010), Its extract also posses protective effect on mercuric chloride induced renal toxicity, anti- ulcer activities against gastric lesions and antigeno toxicity on human hepatoma (Hep G2) cells towards benzo (a) pyrene toxicity (Alam *et al*., 2007; Lamy *et al*., 2008, Al-Qasoumi *et al*., 2010). On the other hand El- Gengaihi *et al.* (2004) and Al –Dogohechi *et al*. (2010) suggested that the *E. sativa* seed oil showed pronounce effect in hyperlipidemia treatment in rat and human. There is mounting evidence that *E. sativa* oil have been found to have antibacterial and antifungal activity (khoobechandani *et al*., 2010; Rani *et al*., 2010; Gulfraz *et al*., 2011). Finally, the rocket seed extract was used as anit-inflammatory (Yehuda *et al*., 2009) However the effect to *E. sativa* oil has not yet been studied in broiler , thus the present study aimed to examine of *E. sativa* oil on performance and some blood metabolites of broiler .

MATERIAL & METHODS

This experiment carried out at the poultry farm/ animal Resources and Fisheries/ Ministry of science and technology, from 1 September to 12 October, to study the effect of inclusion of *Eruca sativa* oil (Eso) on broiler performance and some biochemical blood traits. A total of 150 one day old (cobb) broiler chicks were allocated randomly utilization a complete randomize design (CRD) to 5 dietary treatment from 1-42 days of age , with three replicate pens (10 birds/ per) and fed a starter diet from day 1 to 21 and a finisher diet from day 22 to 42 (table 1). *Eruca sativa* oil was purchased from local market and dissolved in vegetable oil and then gently mixed with standard diets. The experimental diets were as follows: The birds were fed the based diet with no added Eso as control group (T1) , the other four groups (T2,T3,T4 and T5) were given Eso in diets at levels of 250, 500 750,1000 mg Eso /kg diet Feed and water were provided *ad libitum* during the experiment .standard management practice of commercial broiler production was applied, chicks were vaccinated against New– castle and Gumboro disease according to their age. During the 42 days experimental period, a performance criterion includes body weights; body weight gain, feed consumption and feed conversion ratio were recorded weekly. mortality was recorded throughout the study At the end of study, 6 birds of each group with closest mean weight to treatment were selected (2 birds per replicate). Blood samples were collected via wing vein puncture into clean tubes and allowed to clot then sera were separated by centrifugation (3000 rpm for 15 minutes). The concentrations of glucose, total protein and cholesterol were assayed by using commercial kits from Biolabe As (France), serum Aspartate amino transferase (Ast) and alanine amino

transferease (ALT) were estimated by using RANDOX kits (UK) .

Data were subjected to analysis of Variance (SAS, 2002) and significant means were separated by Duncan's multiple rang test (1955).

TABLE 1: composition of experimental diets in different periods of the experiment

Ingredient	Starter 1-21 days	Finisher 22- 42 days
Yellow corn	37	46
Wheat	28	22
Soybean meal (42%)	28	24
Protein can[I] (40%)	5	5
Sun flower oil	1	2
Dicalcium phosphate	1	1
Total	100	100
Calculated chemical and analysis of the diet		
Crude protein (%)	21.94	20.07
ME (kcal/kg)	2921.9	3038.2
Calcium (%)	0.84	0.84
Avail. Pho (%)	0.42	0.42
Lysine (%)	1.20	1.20
Meth + Cys (%)	0.82	0.82

Protein concentrate contain: Crude protein 40% crude fat 7.5%, crude fiber 3%, calcium 12% , phosphorus (av) 4.8 % methionine 3.7 % , meth+ cys 4.0% , lysine 3.9%, sodium 2.2 % metab. Energy 2000k. cal.

RESULTS & DISCUSSION

Broiler performance: Data of broiler chick's body weight and body weight gain are presented in table (2). Chicks fed diet supplemented 1000mg Eso /kg diet (T5) had significantly (p≤ 0,05) higher body weight and body weight gain compared to control group (T_1), T_2 and T_3 , while there were no significant differences between T_5 and T_4 also it was noticed from seam table (table 2) that Eso groups T_2, T_3 and T_4, tended to have higher body weight values than control group in spite of the differences not significantly among these groups. The results in table 2 suggest that basal diet supplemented with different levels of Eso had lower (P≤ 0,05) the feed consumption than control group, and the T_5recorded the lowest value than other experimental groups T_2 ,T_3 and T_4 but no significant differences were observed among these groups, as well as we observed from table 2 that chicks in group 5 (1000mg Eso /kg. diet) had better (P≤ 0,05) Feed conversion ratio compared to the control and T_2 , also had better ratio than $T_3$and T_4 but the differences were not statistically, on the other hand the feed conversion ratio were better in chicks fed diet containing the Eso 250, 500 and 750 mg Eso/k diet compared with control group, However this improvement was not significantly (p≤ 0,05) different among these groups. As seen in table2, it was confirmed that percentage of mortality were significantly lower (p≤ 0,05) in all birds receiving the diet supplemented with Eso (250, 500, 750 and 1000 mg / kilo diet compared with the control group ,the decrease was inversely proportional to the increase level of oil in the diet ,that they were 2% in groups 2 and 3 while quite absent in groups 4 and 5 (0%) .

TABLE 2: Performance parameters of broiler fed different levels of *Eruca sativa* oil for 6 weeks

Parameters	T1	T2	T3	T4	T5
Average body weight (g)	2037.5 ± 4.5 b	2056.0 ± 6.0 b	2106.0 ± 6.0b	2135.0 ± 6.5ab	2236.0 ± 5,5a
Average body weight gain(g)	1899 ± 2.7 b	1918.0 ± 5.0 b	1969.0 ± 7.0 b	1997.0 ± 6.5ab	2099.0 ± 7,0a
Total feed consumption (g/bird	3538 ± 4.91 a	3402. 29 ± 8.36 b	3340.7 ± 8.9 b	3403.54 ± 11.1 b	3363.14 ± 4,4a
Feed conversion ratio Feed/gain	1.86 ± 0.72a	1.77 ± 0.31 a	1.96 ± 0.9 ab	1.7 ± 0.3 ab	1.6 ± 0,2b
Mortality rate (%)	6.0 ± 1.3 a	2.0 ± 0.89 b	2.0 ± 1.1b	0.0 ± 0.0 c	0.0 ±

Diets Values are mean ± SE. Means within row with no common letter are significantly different (p≤ 0.05)
T_1: control; T_2: 250 mg Eso /kg diet; T_3: 500 mg Eso / kg diet; T_4: 750 mg Eso /kg diet; T_5: 1000mg Eso / kg diet

Generally, as to our knowledge this the first report utilizing Eso as growth promoters in broiler. the present results demonstrated that the improve growth performance in broiler that fed diets containing different levers of ESO especially at level 1000mg oil / kg diet may be attributed to the presence of Essential oil in diet, which encourages secretion of endogenous digestive enzymes and then enhance nutrient digestion and get passage rate in broiler (Lee *et al*., 2003) this statement could be consistent with several studies that indicated that the supplementation of essential oil stimulate secretion and activity of pancreatic digestive enzymes *i.e*. amylase, lipase, trypsin and chymotrypsin (Lee *et al*., 2003 and Lee *et al*., 2004 ; Jang *et al*., 2004). In addition, Hernandes *et al.* (2004) reported that the supplementation of essential oils improved apparent whole - tract and ileal digestibility of all nutrients , similar positive effects reported by Jamroz and Kamel (2002), They found that the essential oils increased digestion of protein, cellulose and fat. Furthermore Geyra *et al*. (2001) and Choct (2009) they

noticed significantly increased villi width and surface area, improve nutrient absorption and broiler performance when fed diets contained essential oils, on the other hand previous studies recorded that ESO showed antibacterial effect due to higher concentration of Erucic acid, is suggested to contributed to the antibacterial activity of ESo (khoobchandani *et al*., 2010 ; Gulfarz *et al*., 2011), thus we expect that the supplementation of ESo to broiler diets affected the gastrointestinal microflora, other report have shown that essential oils have the capacity when fed to broiler, to lowered the number of *E. coli* and *C. perfringens* and increased the number of lactobacillus spp. At the same time many works indicated that the ESo possess a potent antioxidant properties, that is thought to be related to presence of glucosinolates and their breakdown products *e.g.* isothiocyanates (Bennett *et al*., 2006) which protect cells and tissues against oxidative free radicals through increasing/ maintaining the levels of antioxidant molecules and antioxidant enzymes , resulting in the prevention of diseases (Kim *et al*., 2004; Alam *et al*., 2007) these may be the explanation for why birds fed ESo especially at level 1000 mg oil/ kg diet had better performance .

Blood Serum parameters

Blood serum parameters data are presented in table 3. there were no differences ($p \leq 0.05$) between treatments in blood biochemistry parameters expect for cholesterol values which were lower ($p \leq 0.0$) for birds in treatments T_2,T_3, T_4 and T_5 compared with the control group (T_1) , The hypocholesterolemic effect of ESO may be due to the high percentage of unsaturated fatty acids (85%) or due to of effect of β- sitosterol (6.5%) (E1-Gengaihi *et al*., 2004). Grundy *et al*. (1976) reported that the supplementing diet with β- sitostirol produces maximum blockage of cholesterol absorption and blood cholesterol reduction. on the other hand several studies indicated the essential oils inhibit hepatic 3 –hydroxy-3- methylglutaryl coenzyme A (HMG-CoA) reductase activity, which is a key regulatory enzyme in cholesterol synthesis (Craig , 1999; crowell , 1999). According to Case *et al.* (1995), a 5% inhibition of HMG-CoA reductase lowered serum cholesterol by 2% in poultry. It can be concluded from this study that inclusion dietary broiler chicken with ESO especially et level 1000mg / kg diet improve broiler performance and lowering effect on blood serum cholesterol

TABLE 3: Blood serum parameters of the broiler feed different levels of Eruca sativa oil for 6 weeks.

Parameters	T1	T2	T3	T4	T5
Glucose mg/dl	188.8±4.3a	183.3±6.2a	184.6±3.1a	181.9±5.2a	183.7±7.1a
Cholesterol mg/dl	196.75±9.3a	169.30±7.5b	171.32±3.6b	167.6±5.2b	165.6±6.6b
SAT u/L	170.33±5.83a	167.87±13.07a	166.64±10.17a	171.22±9.04a	164.03±5.57a
ALT u/L	17.40±1.9a	18.81±0.9a	16.73±1.2a	16.31±2.5a	15.55±1.3a

Diets Values are mean ± SE. means within row with no common letter are significantly different ($p \leq 0.05$)T_1: control ; T_2: 250 mg Eso/kg diet ; T_3 : 500 mg Eso / kg diet ; T_4 : 750 mg Eso /kg diet ; T_5: 1000mg Eso / kg diet

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