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Performance, carcass quality, blood parameters and Immune System of broilers fed diets supplemented with oregano oil (*Origanum sp.*)

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ABSTRACT

Present experiment was performed to study the effects of oregano oil (*Origanum sp.*) medicinal plant on performance, blood biochemical and immunity parameters of broiler chickens. During the experiment 400 chicken broilers were divided in four experimental groups with five repetitions: control group (C) without any oregano oil, group 1 (G1) received 100 ppm of oregano oil, group 2 (G2) with 150 ppm of oregano oil, group 3 (G3) received 200 ppm of oregano oil. From 1 day to 42 days, the highest amount of body weight gain and the lowest level of FCR were observed in the group G3 but the best result for daily feed intake was in G2 and the lowest group was observed in control group. The lowest percent of abdominal fat was observed in experimental group 2 and the highest percent of breast was in experimental G3. The results showed that using oregano oil (*Origanum sp.*) in chickens diet had not significant effects on blood biochemical parameters and immune system of broiler chickens ($p > 0.05$).

Keywords: Oregano oil, Broilers, Carcass traits, Blood biochemical.

INTRODUCTION

There are a lot of reports indicating the positive effects of herbs like anti-coccidial, anti-oxidant, anti-fungi and etc. Some of medical effects of herbs are related to their secondary metabolites such as phenols, necessary oils, saponins and etc [1]. Consequently there is considerable research interest in the possible use of natural products, such as essential oils and extracts of edible and medicinal plants, herbs and spices, for the development of new additives in animal feeding. Aromatic plants like Sea-buckthorn contain flavonoids described previously as stimulators of the immune response, these dietary flavones having an effect against microbial infection [2-3]. The antimicrobial activity of essential oils derived from spices and herbs [4-5] is of interest as these oils could be used as feed additives alternative to antibiotics [6].

Lots of studies on phytochemical compounds of plants essential oils have been performed while there are limited evidences about the effect of herbal solid forms on live birds health and performance. Easy and practical application, availability and less cost are known as advantages

of the whole herbs application in compare to extracted or essential oil forms. In the other hand, a synergistic effect of phytochemical compounds have been reported in studies with essential oils [7]. A recent study involving live birds showed that blends of the primary components of the essential oils could be used to control *Clostridium perfringens*, the bacterium that causes necrotic enteritis in broilers. Ground thyme has been shown to inhibit the growth of *S. typhimurium* when added to media [8]. The main functions of the essential oils cover pathogen control including antimicrobial activity [9], antioxidant activity [10], digestion aid including stimulation of endogenous enzyme activity and nitrogen absorption [11] and inhibition of odour and ammonia control [12].

Therefore, present experiment was planned to study the effects of oregano oil (*Origanum sp.*) on performance, carcass quality, blood biochemical parameters and immunity parameters of broiler chickens.

MATERIALS AND METHODS

During the experiment 400 chicken broilers were divided in four experimental groups with five repetitions: control group (C) without any oregano oil, group 1 (G1) received 100 ppm of oregano oil, group 2 (G2) with 150 ppm of oregano oil, group 3 (G3) received 200 ppm of oregano oil. Unbound water and dietary was in poultry's access. Dietary and chick weight were going on weekly. Feed consumed was recorded daily, the uneaten discarded, and feed conversion ratio (FCR) was calculated (total feed : total gain). At the end of experiment, some analyses were done via SAS (Statistical Analysis Software) in the statistical level of 5% according to data gathered from dietary, weight improvement, average of FCR, weight of rearing period and carcass yield. At 42 days of age, four birds per replicate were randomly chosen, slaughtered and carcass percent to live weight and percent of carcass parts to carcass weight were calculated.

In the 35th day of experiment, three chicks were chosen from each group and inoculated from brachial vein by 0.1 ml (5 %). Heterophil to Lymphocytes ratio were determined which had been obtained from brachial vein of three randomly chosen chicks from each group in the 42th day of experiment. Blood samples were obtained from brachial vein and centrifuged in order to get serum, after 12 hours of fasting in the 42th day of experiment.

Table 1. Ingredients and chemical analyses composition of the starter and grower diets

Ingredients	Starter	Grower
Maize	559	296
Wheat	--	334
Soybean meal	368	298
Soybean oil	32	42
Fish meal	18	--
Limestone	10	--
Oyster shell	--	12
Dicalcium phosphate	5	15
Vitamin-mineral mix	5	5
dl-methionine	1	1
Sodium chloride	2	2
Vitamin E (mg/kg)	--	98
Zn	--	52
Analyzed chemical composition (g/kg)		
Dry matter	891.9	893.1
Crude protein	221.1	200.8

Fat	62.3	63.1
Fiber	36.1	35.6
Ash	61.7	57.0
Calcium	8.22	8.15
Phosphorus	5.45	5.39
Selenium (mg/kg)	0.58	0.56
ME by calculation (MJ/kg)	12.69	12.71

vitamin A, 9,000 IU; vitamin D3, 2,000, IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg B2,; vitamin B3, 10 mg; vitamin B5, 30 mg; vitamin B6, 3.0 mg; vitamin B9, 1 mg; vitamin B12, 1.5 mg; vitamin K3, 2 mg; vitamin H2, 0.01 mg; folic acid, 0.21 mg; nicotinic acid, 0.65 mg; biotin, 0.14 mg; choline chloride, 500 mg; Fe, 50 mg; Mn, 100 mg; Cu, 10 mg; Zn, 85 mg; I, 1 mg; Se, 0.2 mg.

RESULTS AND DISCUSSION

Table 2 shows the effect of different dietary oregano oil (*Origanum sp.*) on performance of boiler chickens. According to comparisons of this table it has been proven that the highest amount of body weight gain and the lowest level of FCR were observed in the group G3 but the best result for daily feed intake was in G2 ($p < 0.05$).

The beneficial effect of growth promoting feed additives on animals arises from stabilizing feed hygiene and beneficially modulating the gut ecosystem by controlling potential pathogens. Phytochemical compounds have a number of active ingredients and pharmacologically active substances that are beneficial for maintaining health and improving performance of poultry and other livestock species. They are reported to stimulate secretion of digestive enzymes (lipase and amylase) and intestinal mucous in broilers, to stimulate feed digestion, to impair adhesion of pathogens and to stabilize microbial balance in the gut [13].

Table 3 shows the effect of plants and their different combinations on carcass and its parameters. According to the data, there are significant differences in the carcass characters ($p < 0.05$). The lowest percent of abdominal fat was observed in experimental group 2 and the highest percent of breast was in experimental G3. Aromatic plants and essential oil extracted from these plants have been used as alternatives to antibiotics. For this reason, these plants are becoming more important due to their antimicrobial effects and the stimulating effect on animal digestive system [14]. The active principles of essential oils act as a digestibility enhancer, balancing the gut microbial ecosystem and stimulating the secretion of endogenous digestive enzymes and thus improving growth performance in poultry [15]. The effects of experimental plants on blood biochemical parameters are presented in Table 4. There is no effect on blood biochemical parameters and immune system of broiler chickens.

Table 2: Effects of treatments on performance of broilers.

Experiment Treatments ¹	Weigh Improvement	Food Intake (G)	Average of FCR	Average Of Weight
C	40.9 ^a	84.9 ^a	1.81 ^a	1998.9 ^a
G1	41.1 ^a	85.3 ^a	1.80 ^a	1999.4 ^a
G2	41.3 ^a	86.6 ^{ab}	1.70 ^{ab}	2000.7 ^a
G3	41.8 ^{ab}	86.1 ^{ab}	1.61 ^{ab}	2005.3 ^{ab}
SEM	0.98	1.12	0.02	28.6
P-value	0.02	0.006	0.003	0.02

a-c Means with in columns with different superscript differ significantly

Table 3. The effect of different levels of Oregano oil on carcass traits of broilers

Parameters	C1	G1	G2	G3	SEM
Abdominal Fat	3.86 ^a	3.74 ^a	3.53 ^{ab}	3.60 ^{ab}	0.35
Gizzard	3.08	3.10	3.15	3.25	0.11
Breast	33.18 ^b	33.09 ^b	34.20 ^b	35.24 ^{ab}	1.52
Thigh	26.11	25.48	25.43	28.23 ^a	1.02
Liver	3.27 ^a	2.90 ^a	3.62 ^a	4.14 ^{ab}	0.33

Means with different subscripts in the same column differ significantly ($P < 0.05$)

Table 4: Effect of different levels oregano oil on immune system parameters of broiler chickens.

Parameters	C1	G1	G2	G3	SEM
Heterophils to Lymphocytes ratio	0.20	0.22	0.20	0.21	0.03
Globulin	1.40	1.41	1.44	1.43	0.19
Albumin	1.40	1.53	1.44	1.55	0.12

^{a-c} Means with different subscripts in the same row differ significantly ($P < 0.05$)

Table 5. The effect of different levels oregano oil on blood biochemical of hens

Blood Parameter	C	Treatments			SEM
		G1	G2	G3	
Glucose (mg/dl)	170.36	171.03	171.42	173.30	1.46
Cholesterol (mg/dl)	134.60	135.02	135.22	134.90	2.12
Triglyceride (mg/dl)	42.60	41.97 ^a	41.60	42.10	1.80
LDL	33.13	33.29	32.19	32.69	1.02
HDL	82.22	82.65	83.16	83.29	1.55

Means with different subscripts in the same column differ significantly ($P < 0.05$)

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