

Evaluation of Medicinal Plant Oil (*Teucrium Polium*) in Diets of Broilers

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ABSTRACT

The effects of *Teucrium Polium* oil of medicinal plants on performance, carcass characteristics, and blood biochemical of broiler chickens were studied in this experiment. During the experiment 400 chicken broilers were divided in four experimental groups with five repetitions: control group (Y1) without any herbal plant, group 2 (Y2) received 100 ppm of *Teucrium Polium* oil, group 3 (Y3) with 150 ppm of *Teucrium Polium* oil, group 4 (Y4) received 200 ppm of *Teucrium Polium* oil. The addition of different levels of *Teucrium Polium* oil to the broiler diet had significant effect on performance ($p < 0.05$). The highest amount of daily feed intake and body weight gain was observed in the group 2 but the best result for FCR was in Y2. The lowest percent of abdominal fat was observed in experimental group 3 and the highest percent of breast was in experimental group 4. There is not significant effect on blood biochemical parameters of broiler chickens ($p > 0.05$).

Keywords: Carcass characteristics, *Teucrium Polium* oil, Broilers, Blood.

INTRODUCTION

Essential oils basically consist of two classes of compounds, the terpenes and phenylpropenes, depending on the number of 5- carbon building blocks. A manipulation of gut function and microbial habitat of domestic animal with feed additives has been recognized as an important tool for improving growth performance and feed efficiency [1-2]. With the development and wide use of synthetic and semi-synthetic antibiotics, pros and cons have been experienced throughout the last 50 years which have been directed research back to natural antimicrobial products as indispensable resources [3]. In the European Union (EU) this led to a ban on the use of antibiotics as antimicrobial growth promoters in animal nutrition. At present and up till 2006 only four antibiotic growth promoters are permitted for use in poultry nutrition. On the other hand, there is increasing public and government pressure in several countries of the EU and some non-EU to search for natural alternatives to antibiotics [4-5]. The antimicrobial activity of essential oils derived from spices and herbs [6-7] is of interest as these oils could be used as feed additives alternative to antibiotics [8]. Due to growing concerns about antibiotic resistance and the potential for a ban for antibiotic growth promoters in many countries, there is an increasing interest in finding alternatives to antibiotics in poultry production because of some negative effects of these products like microbial resistance and increase of the blood cholesterol level in the poultry lead to the ban of these commercial antibiotics [9-10].

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 [11]. Medicinal plants and their products including plant extracts or essential oils are introduced as candidates for use in broiler diets in which their beneficial effects as phyto-genic feed additives have been proven [12].

The objective of this study was to investigate the effects of using different levels of *Teucrium Polium* oil on performance, carcass traits, and blood biochemical of broilers.

MATERIAL AND METHOD

In this experiment 500 chicken broilers were divided in four experimental groups with 25 chicken in five repetitions: control group (Y1) without any herbal plant, group 2 (Y2) received 100 ppm of *Teucrium Polium* oil, group 3 (Y3) with 150 ppm of *Teucrium Polium* oil, group 4 (Y4) received 200 ppm of *Teucrium Polium* oil. Unbound water and dietary was in poultries' access. Dietary and chick

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weigh were going on weekly. Feed consumed was recorded daily, the uneaten discarded, and feed conversion ratio (FCR) was calculated. At the end of experiment, some analyses was done via SAS (Statistical Analyses 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 the end of experiment, four chicks (one female and one male) were randomly chosen from those who their weight's were close to the average weight of group. Intake feed, and feed conversion ratio were calculated weekly for all chickens, also mortality rate were determined and recorded.

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%) in order to getting 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	554	293	
Wheat	10337		
Soybean meal		372	298
Soybean oil	2237		
Fish meal	105		
Limestone	10	--	
Oyster shell	--	12	
Dicalcium phosphate		5	15
Vitamin-mineral mix	5		5
dl-methionine	1		
Sodium chloride		2	2
Vitamin E (mg/kg)		598	
Zn	--	52	
Analyzed chemical composition (g/kg)			
Dry matter		892.18	892.8
Crude protein		222.12	200.6
Fat	62.3	363.1	
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)		12.60	12.82

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 E2, 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

The results obtain on the performance of broiler chicken under different levels of *Teucrium Polium* oil on performance of boiler chickens are shown in table 2. The highest amount of daily feed intake and body weight gain was observed in the group 2 but the best result for FCR was in Y2. 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 [13]. Therefore, the main compound of *Teucrium Polium* oil may probably improve the digestibility of diet as a digestion stimulant, and also increase the nutrient entry rate at an early stage of bird's life without affecting feed conversion. Phytochemicals 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 [14].

Table 2: Effects of treatments on performance of broilers in 1-42 days.

Experiment Treatments ¹	Weight Improvement	Food Intake (G)	Average of FCR
Y1	41.00 ^a	83.8 ^a	1.83 ^a
Y2	41.10 ^a	84.1 ^a	1.79 ^a
Y3	41.13 ^a	85.4 ^{ab}	1.63 ^{ab}
Y4	42.01 ^{ab}	85.8 ^{ab}	1.69 ^{ab}
SEM	1.08	1.12	0.02
P-value	0.03	0.004	0.002

a-b 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	Y1	Y2	Y3	Y4	SEM
Gizzard	3.12	3.13	3.11	3.16	0.09
Abdominal Fat	3.29 ^a	3.31 ^a	3.05 ^{ab}	3.13 ^{ab}	0.22
Breast	33.19 ^a	33.39 ^a	34.20 ^{ab}	34.33 ^{ab}	1.36
Thigh	25.11	25.19	25.20	26.08	0.95
Liver	3.38	3.42	3.48	3.55	0.43

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

The addition of different levels of *TeucriumPolium* oil to the broiler diet had significant effect on carcass and it's parameters (p<0.05) are shown in table 3. The lowest percent of abdominal fat was observed in experimental group 3 and the highest percent of breast was in experimental group 4. 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 [10]. The existence of harmful microbes in digestive system causes an increase in the lysis of protein and amino acids of nutrients, di-amination activity of proteins and amino acids and rapid decomposition of these molecules due to secretory substances from bacteria like urease. Considering this fact and antimicrobial activity of these herbs, the whole matter seems sensible [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 [13]. 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 4. The effect of different levels oregano oil on blood biochemical of hens

Blood Parameters	Y1	Y2	Y3	Y4	SEM
Glucose (mg/dl)	172.02	171.98	172.62	171.76	1.86
Cholesterol (mg/dl)	133.29	133.65	134.01	133.52	1.86
Triglyceride (mg/dl)	42.44	41.13	41.29	40.87	1.03
LDL	34.26	34.00	33.65	33.12	1.02
HDL	83.39	83.55	84.26	84.69	2.69

a-b Means with different subscripts in the same column differ significantly (P < 0.05)

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