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Effect of different levels of coriander oil on performance and blood parameters of broiler Chickens

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ABSTRACT

This study was conducted to investigate the effects of using different levels of coriander oil on carcass traits, blood biochemical and immunity parameters of broilers. In this study that started 1 day following until 42 days, at first 375 one day old broiler chicks were divided to 5 groups and five replicates of 15 chicks each. Experimental groups included T1, control group with no coriander oil supplementation, T2, T3, T4, and T5 received 0.75%, 1%, 1.5%, and 2% coriander oil. The results showed that the use of different levels of coriander oil has significant effects on performances and carcass traits of broilers ($P < 0.05$). The highest percent of breast and thigh were observed in group 5 and the lowest percent of abdominal fat was observed in group 4. The results evidence that the using of coriander oil in broiler feeds have significantly effects on performance and blood biochemical and without having any significantly effects on immunity parameters.

Keywords: Blood parameter, Broiler, Performance, Cinnamon.

INTRODUCTION

Essential oils are complex compounds, and their chemical composition and concentrations of various compounds are variable [1]. 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 [2]. Organic poultry is a relatively new expression in western countries which is going to expand in other countries. In this kind of poultry method, farmers do not use chemical compounds at all or in a very low level for sake of costumers, instead they use alternatives like organic acids, probiotics, and medicinal plants, and despite of higher price of this method, these products have more fans in the costumers [3]. As one of the alternatives, herbal extracts are already being used

as feed supplements to improve growth performance under intensive management systems [4]. Plant extracts and spices as single compounds or as mixed preparations can play a role in supporting both performance and health status of the animal [5-6]

Herbs have been used for some disease since long time ago because of availability, easy usage, non side effects. Many herbs have a long history of use even prehistoric use, in preventing or treating human and animal diseases. Aromatic plants have been used traditionally in therapy of some diseases worldwide for a long time. Research on the use of herbal mixtures in broiler diets has produced inconsistent results [7]. Some authors state significant positive effects on broiler performance [8-10], whereas another group of authors established no influence on gain, feed intake or feed conversion [9,11]. The exact anti-microbial mechanism of essential oils such as coriander oil is poorly understood. However, it has been suggested that their lipophilic property [12] and chemical structure [13-14] can play a role. It was suggested that terpenoids and phenylpropanoids can penetrate the membranes of the bacteria and reach the inner part of the cell because of their lipophilicity [15]. Moreover, structural properties, such as the presence of the functional groups and aromaticity [16] are also responsible for the antibacterial activity of essential oils. The objective of this study was to investigate the effects of using different levels of coriander oil on performance, carcass traits, blood biochemical and immunity parameters of broilers.

MATERIALS AND METHODS

In this experiment that started 1 day following until 42 days that there are five treatments, at first 375 one day old broiler chicks were divided to 25 groups of 15 chicks each. Each 4 groups randomly assigned to one of the 4 treatments. control group with no cinnamon supplement, T2, T3, T4, and T5 received 0.75%, 1%, 1.5%, and 2% coriander oil respectively. There were similar partition for male and female birds into treatment groups. The rations were similarly formulated in all treatment groups based on the NRC, 1994 Nutrients recommendations (table 1).

Dried cinnamon was supplied from local market and after fine milling, mixed with other ingredients. The diets and water was provided *ad libitum*. The lighting program during the experiment period consisted of a period of 23 hours light and 1 hour of darkness. Environmental temperature was gradually decreased from 33°C to 25°C on day 21 and was then kept constant.

Performance parameters

During days 0-42, unbound water and dietary was in poultries' 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 was done via SAS [17] (Statistical Analyses Software) in the statistical level of 5% according to data gathered from dietary, average of FCR.

Carcass traits

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.

Immunity system:

In the 35th day of experiment, three chicks were chosen from each group and inoculated from brachial vein by 0.1 ml (5 %). Heterophils to Lymphocytes ratio were determined and Globulin and Albumin proportion in blood were counted from blood samples which had been obtained from brachial vein of three randomly chosen chicks from each group in the 49th day of experiment.

Serum parameters:

Blood samples were obtained from brachial vein and centrifuged in order to getting serum, after 12 hours of fasting in the 49th day of experiment. Serums have been analyzed for glucose, Cholesterol, Low-density lipoprotein (LDL), High-density lipoprotein (HDL) and Triglyceride by ELISA set.

Statistical analysis:

After obtaining the data, they were analyzed by variance method (ANOVA) considering $P < 0.05$ using SPSS 18 software. The significant differences were taken to Duncan multiple range test to compare the means.

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

Ingredients (g/kg)	1-2829-42	
Maize	557	300
Wheat	--	330
Soybean meal	370	300
Soybean oil	30	40
Fish meal	20	--
Limestone	10	--
Oyster shell	--	12
Dicalcium phosphate	5	15
Vitamin-mineral mix ²	5	5
dl-methionine	1	1
Sodium chloride	2	2
Vitamin E (mg/kg)	--	100
Zn	--	50
Analyzed chemical composition (g/kg)		
Dry matter	892.2	893.5
Crude protein	222.3	200.7
Fat	62.4	62.9
Fiber	36.1	35.6
Ash	61.7	57.0
Calcium	8.22	8.15
Phosphorus	5.48	5.57
Selenium (mg/kg)	0.53	0.58
ME by calculation (MJ/kg)	12.78	12.91

¹ starter diet fed to birds from 0 to 21 days. ² Provides per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,000 IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg; 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

The effects of different levels of coriander oil on performance of broilers are shown in Table 2. Using different levels of coriander oil have significant effects on food intake, weight improvement, average of Weight and feed conversion of broilers ($P > 0.05$).

The effects of different levels of coriander oil on carcass traits of broilers are in Table 3. Application of different levels of coriander oil significantly affected the carcass traits ($P < 0.05$). The highest percent of breast was observed in group 5. These results agree with the work of Langhout [18], who showed that herbal plant could stimulate the digestion system in poultry, improve the function of liver and increase the pancreatic digestive enzymes. Enhancement of the metabolism of herbal plant, carbohydrates and proteins in the major organs would increase growth rate of these organs [19-20]. Al-Kassie [21] who found that herbal plant effect on the live weight gain and the improvement of the health of poultry, in addition to other performance traits, feed conversion ratio and feed intake.

The presence of antioxidants and phenolic substance in coriander oil may be the main cause of improvement in breast percent of broilers carcass. The presence of harmful bacterial populations in the gastrointestinal tract may cause breakdown of amino acids and thereby reduce their absorption as antimicrobial substances are present in coriander oil can reduce the harmful bacterial populations in the gastrointestinal tract and improve the levels of absorbed amino acids [22-23]. The carvacrol in herbal plant has stimulatory effects on pancreatic secretions [17] by increasing the secretions of digestive enzymes more amounts of nutrients like amino acids can be digested and absorbed from the digestive tract and thereby improve carcass traits. Else increasing the percents of gizzard and liver by use of coriander oil can have positive effects via physically grinding and increasing bile secretion on nutrient digestion. With increased amounts of absorbed amino acids, organs like breast and thigh drawn more growth.

Table 2: Effects of treatments on performance of broilers.

Experiment Treatments ¹	Weight Improvement	Food Intake (G)	Average of FCR	Average Of Weight
T1	40.6 ^a	86.3 ^a	1.76 ^a	1998.2 ^a
T2	40.2 ^a	86.6 ^a	1.73 ^a	1998.3 ^a
T3	41.1 ^a	86.5 ^a	1.62 ^a	1998.4 ^a
T4	41.4 ^{ab}	87.5 ^a	1.64 ^{ab}	2005.1 ^a
T5	42.6 ^{ab}	88.8 ^{ab}	1.61 ^{ab}	2012.5 ^{ab}
SEM	0.619	0.98	0.03	35.5
P-value	0.04	0.006	0.003	0.02

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

The effects of different levels of coriander oil in starter and grower feeds on blood biochemical and immunity parameters of broilers are summarized in Table 4 and 5. The mean values of serum constituents in broiler chicken fed different supplemented diets are shown in table 5. The serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in group of 4 compared to the control group ($P < 0.05$). The concentration of serum HDL and were not significantly reduced in groups compared to the control groups. The use of different levels of cinnamon did not have any significant effects on immunity parameters of broilers. Dhanapakiam

et al.[24].showed that the concentration of LDL in animal fed coriander.The inhibition in the enzyme activity maybe because of 3-enzym 3-methylglutaryl CoA (HMG-CoA) in liver that make a key role in pathway of cholesterol biosynthesis [25].

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

Parameters	Treatments					SEM
	T1	T2	T3	T4	T5	
Abdominal Fat	3.88	3.94	3.72	3.21	3.22	0.42
Gizzard	3.29 ^{ab}	3.26 ^{ab}	3.28 ^{ab}	3.76 ^a	3.95 ^a	0.25
Breast	32.08 ^b	32.33 ^b	34.12 ^{ab}	34.77 ^{ab}	35.33 ^{ab}	0.44
Thigh	26 ^a	26.08 ^a	26.46 ^a	27.33 ^{ab}	27.30 ^{ab}	0.53
Liver	3.07 ^a	2.93 ^a	3.20 ^a	3.71 ^{ab}	3.81 ^{ab}	0.30

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

Table 4: Effect of treatments on immunity system of broilers.

Parameters	T1	T2	T3	T4	T5	SEM
Heterophils to Lymphocytes ratio	0.23	0.23	0.22	0.24	0.26	0.04
Globulin	1.41	1.50	1.53	1.62	1.61	0.30
Albumin	1.498	1.52	1.64	1.55	1.62	0.32

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

Table 5. The effect of different levels of coriander oil on blood biochemical of broilers

Blood Parameters	Treatments					SEM
	T1	T2	T3	T4	T5	
Glucose (mg/dl)	171.14 ^a	170.95 ^a	187.35 ^b	188.26 ^b	188.74 ^b	18.24
Cholesterol (mg/dl)	135.65	133.10	134.72 ^a	130.11 ^b	130.18 ^b	29.46
Triglyceride (mg/dl)	41.12 ^a	39.73 ^a	38.21 ^a	38.55 ^a	34.29 ^b	11.70
LDL	32.10 ^a	33.22 ^a	32.42 ^a	30.18 ^b	29.26 ^b	1.73
HDL	78.88 ^a	79.16 ^a	78.56 ^a	79.18 ^a	79.10 ^a	2.91

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

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