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Influence of two herbal extracts on performance, carcass quality and blood parameters in broiler chicken

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ABSTRACT

The research was conducted to examine the effects of supplementation of alfalfa and rosemary extracts on performance and serum composition of broiler chickens. A total of 300 broiler chickens were divided into 4 groups and 3 repetitions with 25 chicken each. G1, First group as control group did not receive any herbal plant extract, G2) 200 ppm of alfalfa extract, G3) 200 ppm of rosemary extract, G4) 200 ppm of both herbal plant. The results showed that using these medicinal plant extracts in their diet had significant effects on performance, carcass traits and blood biochemical parameters of broilers ($p < 0.05$). The highest amount of daily feed intake and body weight gain was observed in the group 2 and the highest percent of liver was observed in experimental group 3, the highest percent of breast and lowest percent of abdominal fat was in experimental group 4. Also the serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in groups of 4 compared to the control group ($P < 0.05$).

Keywords: Broilers, Carcass, Alfalfa, Rosemary, Blood, Performance

INTRODUCTION

There is need to find more efficient alternatives or combinations of different alternatives for maintaining health and improving performance of poultry and other livestock species. Phytochemical compounds are the groups of feed additives that have been reported to possess a potential for growth enhancement of livestock species due to presence of a number of pharmacologically active substances. They are supposed to enhance feed intake, activate digestive enzymes and stimulate immune function [1].

Nowadays, there are a lot of concerns to finding non-synthetic alternatives for antibiotics among the scientists. The positive effect of herbal plants on broilers have been reported by many studies. Their antibacterial potential, hypocholesterolemic effects, growth promoting and availability are the most beneficial part of herbs, which have drawn the scientists attention themselves [2]. Approximately 80% of domestic animals have been fed synthetic compounds for the purpose of either medication or growth promotion [3]. Recently, the concerns about possible

antibiotic residues and antibiotic resistance have aroused great caution in the usage of antibiotics in the animal industry. In a study by addition of 200 ppm carvacrol to a corn-soybean meal based diet lowered weight gain from 1-28 days of age by 3%. Carvacrol in the diet also lowered feed intake, but significantly improved the feed:gain ratio. Enrichment of a corn-soybean based diecontaining Carboxymethyl cellulose with 100 ppm cinnamaldehyde increased group mean weight gainfrom 1-21 days of age by 14%. Carboxymethyl cellulose is a non-fermentable fiber that raises the viscosity of intestinal digesta and impairs growth performance of broiler chickens [4-6] Specific effects of the essential oils on chicken performance have not received much attention because poultry may not acutely respond to flavor when compared to pigs [7], although there is an evidence that flavors could affect feed intake negligibly in chicken[8].

According to the aforementioned details, this study was conducted in order to evaluate the effect of *alfalfa and rosemary extracts* on performance, carcass quality and blood biochemical parameters of broilers and to find the most optimum combination of them for those parameters.

MATERIALS AND METHODS

A total of 300 chickens were divided into 4 groups and 3 repetitions with 25 chickens each. G1, First group as control group did not receive any herbal planet extract, G2) 200 ppm of alfalfa, G3) 200 ppm of rosemary, G4) 200 ppm of both herbal planet.

Performance parameters

During days 0-42, unbound water and dietary was in poultries' access. Dietary and chick weigh 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 (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.

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 vien by 0.1 ml (5 %). Heterophils to Lymphocytes ratio were determined which had been obtained from barchial vein of three randomly chosen chicks from each group in the 42th day of experiment.

Serum parameters:

Blood samples were obtained from barchial vein and centrifuged 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 (g/kg)	1-28	29-42
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. ²Provides 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 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

The effect of oil extract derived from alfalfa and rosemary extracts on performance are shown in Table 2. The highest amount of daily feed intake and body weight gain was observed in the group 2 also results showed that using these two herbal planets have positive effects on performance in other groups. Table 3 shows the effect of plants and their different combinations on carcass and it's parameters. The lowest percentage of abdominal fat and the highest percent of breast were in the 4 group. The effects of experimental plants on blood biochemical parameters are presented in Table 4. The effects were significant on biochemical parameters ($p < 0.05$), which the lowest cholesterol level, serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in groups of 2 compared to the control group ($P < 0.05$) but there is no effect on glucose and HDL in all groups.

Table 2: Effect of different combinations of herbal plants on performance of broiler chickens

Treatment	Feed conversion ratio (g:g)	food Intake (g)	Body weight gain (g)
G1	1/ 80±0/52 ^a	79/42±2/61 ^b	45/19±1/32 ^a
G2	1/ 57±0/24 ^{ab}	82/ 07±2/21 ^{ab}	47/41±1/29 ^{ab}
G3	1/ 72±0/12 ^a	81/ 62±1/16 ^{ab}	46/98±1/93 ^{ab}
G4	1/ 67±0/33 ^{ab}	81/ 91±2/43 ^{ab}	47/21±1/18 ^{ab}

a-b: in each column the numbers which have different letters have significant differences ($p < 0.05$).

Table 3: Effect of different combinations of Treatments on quality of broiler chicken's carcass

G4	G3	G2	G1	Characters (%)
3/67± 0/45 ^{ab}	3/92±0/32 ^{ab}	3/64±0/01 ^{ab}	3/22± 0/11 ^a	Abdominal Fat
2/45±0/32 ^a	2/67±0/1 ^a	2/61±0/21 ^a	2/32±0/40 ^a	Gizzard
32/19±0/23 ^{ab}	31/92± 0/23 ^{ab}	32/12±0/25 ^{ab}	30/64±0/32 ^a	Breast
26/32±0/38 ^a	27/23±0/48 ^a	27/34±0/25 ^a	27/15±0/83 ^a	Lap
3/39±0/21 ^a	3/99±0/13 ^{ab}	3/24±0/19 ^a	3/23±0/43 ^a	Liver

a-b: in each column the numbers which have different letters have significant differences ($p < 0.05$).

Table 4. The effect of different levels of alfalfa and rosemary on blood biochemical of hens

Blood Parameter	Treatments				SEM
	G1	G2	G3	G4	
Glucose (mg/dl)	174.12	174.48	174.38	174.64	0.89
Cholesterol (mg/dl)	137.46 ^a	133.05 ^{ab}	134.83 ^{ab}	134.13 ^{ab}	5.02
Triglyceride (mg/dl)	43.36 ^a	40.61 ^a	43.09 ^a	40.63 ^{ab}	4.064
LDL	34.98 ^a	32.11 ^a	33.90 ^a	32.88 ^b	1.26
HDL	84.32	83.87	84.02	83.19	1.81

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

DISCUSSION

Using alfalfa and rosemary extracts have significant effects on feed intake, weight gain and feed conversion of broilers ($P > 0.05$). The improvement of body weight gain and feed conversion are due to the active materials found in herbal, causing greater efficiency in the utilization of feed, resulting in enhanced growth. There is an evidence to suggest that herbs, spices and various plant extracts have appetite and digestion stimulating factors, in addition to their antimicrobial activity against bacteria found in the intestine [9]. The carvacrol in these herbal plants has stimulatory effects on pancreatic secretions 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 [2]. There is a possibility of gathering these to antimicrobial herbs made a remarkable decrease in the amount of intestine microbial colony and this prevented from lysis of amino acids and they used in formation of proteinic tissues and increased the breast percentage [1]. The main reason of cholesterol and triglycerid decrease in blood of chicks is substances like carvacrol and tymol which are present in herbs such as these herbal. These substances have effect on cholesterol and triglyceride and decrease these harmful parameters in blood [10]. According to Akiba and Matsumoto high level of fibers can increase the excretion of bile and this can decrease the cholesterol level of blood [11].

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