fortune Journals

Research Article

JOURNAL OF FOOD SCIENCE AND NUTRITION RESEARCH

ISSN: 2642-1100

Comparison of Different Levels of Thyme and Rosemary Ether Extracts on Growth Performance and Carcass Characteristics of Broiler Chickens

Naderiboroojerdi N[1*], Zeinali A[2], Hoseini A[1]

Abstract

An experiment was conducted to compare the effects of different levels of thyme and rosemary ether extract on growth performance and carcass characteristics of broiler chickens. 336 male sexy chicks were used in a randomized complete design with 7 treatments and 4 replications cages (12 birds per cage). The experimental diets consisted of: 1: Control treatment: Basal diet based on corn-soybean meal without supplementation with medicinal plants, 2: base ration + 0.25% of rosemary ether extract, 3: base ration + 0.5% of rosemary ether extract, 4: base diet + 0.75% Rosemary ether extract, 5: base diet + 0.25% Thyme ether extract, 6: base diet + 0.5% Thyme ether extract and 7: base diet + 0.75% Thyme ether extract. Results showed that tratments 4, 6 and 7 (which contained 0.75% Rosemary ether extract, 50% extract of Thyme extract and 0.75% Thyme ether extract) average body weight and daily gain increased. At the end of the experiment, there was no significant difference between the treatments in feed intake. The best feed conversion coefficient in treatment was 0.75% of thyme extract and the other treatments also had less feed conversion than control treatment. Characteristics of carcasses were not significantly affected by experimental treatments. The level of 0.75% of rosemary ether extract showed better performance than the other two levels and its yield was similar to 0.75% of thyme ether extract. Supplementation of dietary of broiler chicks with Thyme extract at the level of 0.50% and 0.75% was the same results.

Keywords: Thyme; Broiler chicks; Rosemary; Medicinal plants

Introduction

For more than half a century antibiotics have been used as growth promoting feed supplements to enhance yields in poultry production [1]. However, the routine use of antibiotics in the diet of broilers is now considered to cause an increase in antimicrobial resistance of human and animal bacteria [2]. For this purpose, various compounds such as probiotics, prebiotics, organic acids, plant extracts and essential oils have been extensively studied as alternatives. Recent studies show that medicinal plants, extracts or active compounds in their perfume can have antimicrobial properties, and used as a suitable alternative to antibiotics. However, it has been suggested that their lipophilic property and chemical structure 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 [3]. Also, researchers in several studies have shown that some of the active oils in perfumes stimulate the gastrointestinal tract and increase the production of digestive enzymes, improve the use of digestive products and the body's immune response [4].

Affiliation:

[1]Master of Animal Science, College of Agriculture, Birjand Branch, Islamic Azad University, Birjand, Iran

[2]Master of Animal Science, College of Agriculture, Birjand Branch, Birjand, Iran.

***Corresponding author:**
Navid Naderi Boroojerdi. Master of Animal Science, College of Agriculture, Birjand Branch, Islamic Azad University, Birjand, Iran.

Citation: Naderiboroojerdi N, Zeinali A, Hoseini A. Comparison of Different Levels of Thyme and Rosemary Ether Extracts on Growth Performance and Carcass Characteristics of Broiler Chickens. Journal of Food Science and Nutrition Research 5 (2022): 682-689.

Received: September 14, 2022
Accepted: September 23, 2022
Published: October 14, 2022

Thymus vulgaris (thyme) is an aromatic plant of the *Lamiaceae* family and has received major attention as both a pharmaceutical and therapeutic agent across the globe [5]. Thymol, carvacrol, parasimol, linalool and cineol are the main components of thyme essential oil. Grigore et al. reported the antioxidant capacity of thyme extract is equivalent to ascorbic acid [5]. The antioxidant ability of thyme essential oils is attributed to the phenolic compounds thymol, carvacrol and thymohydroquinone [6]. While some studies suggest that the supplementation of feed with thyme improves the performance parameters of poultry [7,8] some other studies suggest that thyme has no effect [9,1]. Furthermore, thyme essential oil has also been reported that significantly reducing in levels of triglyceride, total cholesterol and glucose levels [10].

Rosemary is a perennial shrub with ascending branches, fragrant and belongs to Lamiaceae family.The leaves and flowers of this plant contain active ingredients. The active ingredients of this plant are essential oil, tannins and bitter substances. The amount of essential oil in dried leaves is between 0.5 to 1.5 percent. The most important components of rosemary essential oil are cinnamon, camphor, bornyl stato, rosemary acid [11]. Polat et al. investigated the dietary supplementation effects of rosemary plant (57, 86 and 115 g/kg) and its volatile oil (100, 150 and 200 mg/kg) in broilers [12]. They showed that supplementation of 100 mg/kg rosemary volatile oils or 8.6 g/kg rosemary plant increases the plasma superoxide dismutase (SOD) activity. In the other study, feeding 5, 10 and 15 mL/L rosemary essential oil increased the serum serum superoxide dismutase (SOD) activity in broilers under oxidative stress [13].

The objective of this study was to compare the effect of different levels of thyme and rosemary ether extracts on growth performance and carcass characteristics of broiler chickens.

Materials and Methods

Animal, management, and diets

A total of 336 (Ross 308) one-day-old male chicks were randomly allocated to one of seven dietary treatment groups of four replicates each with 12 chicks. The chicks were maintained on a 24-h light. The birds were reared in floor pens using sawdust as litter at Birjand Azad university poultry farm, Birjand, Iran. The temperature was set at 35°C to 32°C during the first week and gradually declined by 2°C per week. A relative humidity was about 60 to 65%. Routine vaccination and health care was given when it was necessary. Each group was fed for 42 days with isocaloric and iso-nitrogenous diets *ad libitum* (Table 1) that were formulated based on standard recommendation. Seven dietary treatments used: 1- Control treatment: Basal diet based on corn-soybean meal without adding ether extract, 2- Basal diet + 25% ether extract of rosemary, 3- Basal diet + 50% ether extract of rosemary, 4- Basal diet + 75% ether extract of rosemary, 5- Basal diet + 25% ether extract of thyme, 6- Basal diet + 50% ether extract of thyme and 7- Basal diet + 75% ether extract of thyme.

All animal experiments were approved by the state committee on animal ethics, Karaj Branch, Islamic Azad University, Karaj, Iran (IACUC no:4687; 4/10/2018). The recommendations of the European Council Directive (2010/63/EU) of September 22, 2010, regarding the standards in the protection of animals used for experimental purposes were also followed.

Sample collection and measurements

The birds were weighed at the beginning of the experiment (1 days-old) and on days 7, 14, 21, 28, 35 and 42 of age after two hours of starvation to empty the gastrointestinal tract. Body weight gain was calculated on weekly basis throughout the experimental period of 1-42 days of age. In order to determine the daily feed consumption of the animals, throughout the experimental period, weighed quantities of feed were provided in the morning and evening

Table 1: Ingredients and chemical composition of used diets at (1-21 d)

Experimental group	Control diet (1-21 d)	Control diet (22-42 d)
Ingredients (g/1000kg as-fed)		
Corn	558.66	653
Soybean meal	312	268
Fish meal	49	19.54
bran	10	10.25
Calcium phosphate	16.05	9.25
shell	8.25	9.7
Lysine	1.53	1.64
Methionine	2.1	2.12
Vitamin mineral premix1	5	5
Na chloride	1	1
Calculated chemical composition		
Metabolizable energy (MJ/kg)	3000	3000
Crude protein (%)	22	19
Fat (%)	6.57	4.95
Ca (%0	1.03	0.85
Available P(%)	0.44	0.4

1One kilogram of premix contained: calcium pantothenate, 4000 mg; niacin, 15,000 mg; vitamin B6, 13,000 mg;

Cu, 3000mg; Zn, 15,000mg;Mn, 20,000mg; Fe, 10,000mg;K, 300mg; vitamin A, 5 × 106 IU; vitamin D3, 5 ×

105 IU; vitamin E, 3000 mg; vitamin K3, 1.5 mg/g; vitamin B2, 1000 mg

and the remainder collected the following day was weighed and subtracted from the amount of feed provided. As the subgroups included 12 chicks, individual daily feed intake was calculated by dividing the daily feed intake values by 12. The feed conversion ratio (FCR) was calculated as g feed per g body weight gain. On day 21 and 42 of the trail, two birds from each pen were randomly selected for estimation of carcass characteristics. Chickens slaughtered by displacing the neck. Breast, drumsticks, spleen, and abdominal fat were removed and weighed; the empty or edible carcass weights were recorded (Shabani et al. 2015). Thighs were also weighed. Relative weights (RW) were calculated as follows: weight of cut or organ (g)/100 g of body weight. Broiler digestive enzymes gradually complete by the end of three weeks. Therefore, at the end of 21 days, slaughter was performed to determined difference of the effect of diet experiment.

Statistical analysis

Data were subjected to analysis of variance procedures appropriate for a completely randomized design and analyzed by one-way ANOVA using the General Linear Model procedures of SAS (SAS Inst. Inc., Cary, NC). Mean separation was accomplished using Duncan post hoc test. All significance level was set at $P < 0.05$.

Results

The results of the WG and DWG were shown in the tables 2 and 3. At the end of the second week of the experiment, the control treatment showed the lowest BW and its difference with other treatments except the treatment 2 was significant ($P<0.05$) Similar to the first week of the experiment, chickens fed the treatment 7 showed the highest BW, but the difference with treatments 4 and 6 was not significant ($P>0.05$). At the

Table 2: Effect of experimental diets on live weight of broiler chickens (g)

Age (d)	1	7	14	21	28	35	42
Experimental diet	Live weight (g)						
11	42.20^{a}	107.69^{c}	249.38^{c}	593.99^{c}	885.15^{c}	1309.61^{c}	1816.03^{c}
2	42.15^{a}	118.65^{b}	258.54^{bc}	608.83^{bc}	904.98^{b}	1388.48^{b}	1922.50^{b}
3	42.06^{a}	115.31^{b}	260.85^{b}	615.51^{b}	922.87^{b}	1393.36^{b}	1966.45^{b}
4	42.15^{a}	128.65^{a}	288.54^{a}	680.83^{a}	1015.96^{a}	1488.48^{a}	2010.50^{a}
5	42.19^{a}	103.33^{b}	118.54^{b}	614.89^{b}	900.98^{b}	1372.69^{b}	1959.50^{b}
6	42.22^{a}	108.84^{a}	132.63^{a}	696.27^{a}	1017.07^{a}	1490.01^{a}	2026.95^{a}
7	42.10^{a}	103.07^{a}	134.26^{a}	701.84^{a}	1024.74^{a}	1502.23^{b}	2033.53^{b}
± SEM[2]	0.3	2.38	5.73	10.21	13.54	18.98	24.31
P-value							
	NS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

1: 1- Control treatment: Basal diet based on corn-soybean meal without supplementation with medicinal plants, 2: base ration + 0.25% of rosemary ether extract, 3: base ration + 0.5% of rosemary ether extract , 4: base diet + 0.75% Rosemary ether extract, 5: base diet + 0.25% Thyme ether extract, 6: base diet + 0.5% Thyme ether extract and 7: base diet + 0.75% Thyme ether extract.
2: Mean error standard
Column means with common superscripts do not differ (P > 0.05).

Table 3: Effect of experimental diets on daily weight gain of broiler chickens (g/d)

Age (d)	1-7	8-14	15-21	22-28	29-35	36-42
Experimental diet	Daily weight gain (g/d)					
11	9.32^{c}	19.60^{c}	49.39^{c}	40.34^{c}	60.39^{c}	71.82^{c}
2	10.46^{b}	20.79^{b}	50.67^{c}	41.95^{bc}	62.31^{bc}	71.61^{bc}
3	10.92^{b}	20.94^{b}	50.38^{c}	42.29^{b}	65.59^{b}	77.05^{b}
4	10.99^{b}	21.62^{ab}	53.95^{b}	46.88^{a}	68.93^{a}	78.39^{a}
5	12.15^{a}	22.99^{a}	56.16^{ab}	46.85^{a}	64.31^{b}	71.61^{b}
6	12.33^{a}	23.11^{a}	56.16^{ab}	46.88^{a}	68.21^{ab}	81.86^{ab}
7	12.99^{a}	22.87^{a}	57.27^{a}	46.97^{a}	69.53^{a}	84.13^{a}
± SEM[2]	0.33	0.58	0.92	1.43	1.56	2.61
P-value						
	0.0001	0.0018	0.0001	0.0188	0.024	0.0023

1: 1- Control treatment: Basal diet based on corn-soybean meal without supplementation with medicinal plants, 2: base ration + 0.25% of rosemary ether extract, 3: base ration + 0.5% of rosemary ether extract , 4: base diet + 0.75% Rosemary ether extract, 5: base diet + 0.25% Thyme ether extract, 6: base diet + 0.5% Thyme ether extract and 7: base diet + 0.75% Thyme ether extract.
2: Mean error standard
Column means with common superscripts do not differ (P > 0.05).