The Effect of the Humic Substances and Thyme on Carcass Parameters of Broiler Chickens

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Abstract

The aim of this experiment was to determine the influence of humic substances or humic substances and thyme on carcass parameters of broiler chickens. A total of 60 Ross 308 broiler chickens were divided into 3 groups (n=20). The control group of chickens was fed with complete feed mixtures without any additives. Chickens in the first experimental group were fed a diet containing 1.5% of humic substances. Chickens in the second experimental group were fed a diet containing 1.5% of humic substances and 0.5% of thyme. In 42 day of fattening, 5 male and 5 females with body weight similar to the mean were chosen from each group of chickens. The carcass weight (g), the breast and thigh percentages (%), edible weight (g) and carcass yield (%) were recorded. We found statistical significant increase ($P<0.05$) of heart weight in the first experimental group in comparison with other groups. The favourable tendency of the effect of the supplements used, although without a statistically significant differences ($P>0.05$), was observed in both experimental groups in liver and gizzard weights. We recorded statistically non-significant differences ($P>0.05$) in carcass weight, carcass yield, breast a thigh percentage in the both experimental groups compared with control group.

Keywords: broiler chickens, carcass parameters, humic substances, thyme (*Thymus vulgaris*)

1. Introduction

Poultry researchers and nutritionists are looking for viable additives since conventional supplements have been criticised for negative impact on the food chain [1]. Animal feed additives are used worldwide for many different reasons. Some of them help to cover the needs of essential nutrients and others to increase growth performance [2]. The use of feed additives is more and more questioned by with antioxidant effect [3]. Humic acids have a positive impact on meat quality, increasing weight gains and improve the immune system of broiler chickens [4, 5]. The other alternatives to antibiotics as growth promoters are phytogenic feed additives [6]. As a phytobiotics can be applied whole plant, parts of plant in the form of powder, or essential oils [7]. *Herba Thyme* contains minimum 1.0% essential oils and minimum 0.5% phenols. Essential oils are quantitative designated by steam distillation and per cent content of phenols expressed as a thymol is designated by the consumers. Therefore, the feed industry is highly interested in valuable alternatives which could be accepted by the consumers [8]. Humic acids are one of the potential substances alternatives to antibiotics in the diet of poultry. Humic substances are used for their detoxifying, antiseptic and antifungal properties and as natural growth stimulator [9]. Humic acids are the most active substances spectrophotometry analyse [10]. Mansoub (2011) [11] reported composition of substance active in thyme oil assignet gas-liquid chromatography (v %): β-myrcén 3; γ-terpinén10; *p*-cymén 18; linalol 6,5; terpinén-4-ol 2,5; tymol 55 and karvakrol 4. The thiamine oil components of p-terpineol-2,3-

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diol and thymol showed antioxidant activities [12].

The objective of this study was to determine the effect of supplement of humic substances and humic substances with thyme (*Thymus vulgaris*) into feed mixtures on carcass parameters of broiler chickens Ross 308.

2. Materials and methods

A total 240 unsexed one-day-old Ross 308 meat hybrid chicken were randomized into three groups, each containing 80 chickens in four replicates. Chickens in individual groups were stabled on deep litter with housing density 33 kg.m^2. During the fattening period, the light regimen based on 23 h of light and 1 h of dark was used. The temperature at the beginning of the experiment was 31-33°C and weekly fell by 2°C to 20-22°C. Heating was maintained using electronic hen-like devices providing radiant heat. The fattening lasted 42 days. Broiler chickens were fed commercial feed mixtures. The feeding program included three phases: starter (1-21 days of age), grower (22-35 days of age), and finisher (36-42 days of age). Feed and water were supplied *ad libitum.* Composition of complete feed mixtures (Biofeed a.s. Kollárovo, Slovak Republic) is presented in Table 1. In control group were used complete feed mixture without any additives.

Animals and diets

The first experimental group (E1) of chickens was fed a diet containing 1.5% of humic substances (humic acids 65%; fluvic acids 5%; Ca 42 278 mg/kg, Mg 5111 mg/kg, Fe 19 046 mg/kg, Cu 15 mg/kg, Zn 37 mg/kg, Mn 142 mg/kg, Co 1.24 mg/kg, Se 1.67 mg/kg, V 42.1 mg/kg, Mo 2.7 mg/kg; humidity 15% from Humic Acid Manufacturer Co., Košice, Slovakia). The second experimental group (E2) of chickens was fed a diet containing 1.5% of humic substances (humic acids 65%; fulvic acids 5%; Ca 42 278 mg/kg, Mg 5111 mg/kg, Fe 19 046 mg/kg, Cu 15 mg/kg, Zn 37 mg/kg, Mn 142 mg/kg, Co 1.24 mg/kg, Se 1.67 mg/kg, V 42.1 mg/kg, Mo 2.7 mg/kg; humidity 15% from Humic Acid Manufacturer Co., Košice, Slovak Republic), and 0.5% of thyme (*Thymus vulgaris*). We used Thyme (Vetservis s.r.o., Nitra, Slovak Republic) in the form of dried ground leaves.

Table 1. Composition of starter, grower and finisher diets

Ingredient	Unit	Feed mixture		
		Starter	**Grower**	**Finisher**
Wheat	%	35.00	35.00	36.82
Maize	%	35.00	40.00	37.00
Soybean meal	%	21.30	18.70	20.00
Fish meal 71%	%	3.80	2.00	0.00
Dried blood	%	1.25	1.25	-
Limestone	%	1.00	1.05	1.10
Monocalcium phosphate	%	1.00	0.70	1.00
Salt	%	0.10	0.15	0.20
Sodium	%	0.15	0.20	0.25
Palm oil	%	0.70	0.16	2.50
Lysine	%	0.05	0.07	0.29
Methionine	%	0.15	0.22	0.29
Premix	%	0.50	0.50	0.50
Chemical composition				
Metabolic energy	MJ	12.01	12.03	12.37
Crude protein	g	210.76	190.42	170.58
Crude fiber	g	30.18	29.93	30.54
Crude ash	g	24.24	19.93	38.49
Lysine	g	11.30	9.89	9.95
Methionine	g	4.96	5.21	5.46
Ca	g	8.15	7.27	7.37
P	g	6.75	5.70	6.00

Carcass parameters

In 42 day of fattening, 5 male and 5 females with body weight similar to the mean were chosen from each group for slaughter weighted and subjected to a 12-hours feed withdrawal. After slaughter, carcass were chilled, weighed and subjected to simplified dissection. Edible giblets and breast and thigh parts were collected and weighed. The results obtained were used to calculate dressing percentage and the percentage of carcass components.

Monitored parameters: The weight of the carcass (g), weight and the percentage of valuable parts, namely the breast part (%), the thigh part (%), weight of edibles (g) and the carcass yield (%).

Statistical analysis

Data were analysed by analysis of variance using the general linear model procedure of the software program Statistical Analysis System. Differences between the indicators were tested using one-way analysis of variance by Duncan's test. Significance was considered at $P<0.05$.

3. Results and discussion

The objective of the present study is to investigate the effect humic substances with thyme powder to carcass weight, weight edible offal and carcass yield of broiler chicken. We presumed that potential synergistic effects between humic substances and thyme could result in beneficial effect on carcass characteristic. The influence of adding additive on carcass parameters is presented in Table 2. Carcass weight in treatment groups was no significant higher compared to control group ($P>0.05$). Mansoub et al. (2011) [11] introduced significant higher average carcass weight by using humic acids. The observed results of the effect of this herbal supplements on carcass characteristic of broiler chicken are inconsistent across various studies. Results of Fiamegos, and Kastritis (2011) [12] showed that garlic powder had no influence on cold carcass weight or dressing percentage. However, values for cold carcass weight and dressing percentage were numerically higher in birds fed diets containing 0.50% garlic powder when compared with the other treatments. Differences in breast part and thigh part of chicken from control and experimental treatments were not statistically significant ($P>0.05$) in our experiment. Our results agree with the work of Marcinčáková et al. (1999) [13] who observed that dietary herbal supplementation no affected the proportion of breast and thigh part. Statistically non-significant increase in the proportion of the breast and leg muscle recorded [14]. Partially opposite tendency observed Results of Marcinčák et al. (2011) [15] who reported that addition of garlic powder significant increased percentage of breast part. In contrast, the addition of garlic powder caused a significantly increases [16] in the proportion of breast and thigh in the carcass. As shown in Table 2, there were no differences ($P>0.05$) between groups on carcass yield of broiler chickens in our experiment.

Table 2. Effect of humic substances and thyme (*Thymus vulgaris*) on carcass parameters of broiler chickens Ross 308

Parameter	C	E1	E2
Carcass weight (g)	1247.94±173.62	1377.98±247.40	1341.55±109.56
Breast part (%)	30.31±3.42	29.57±1.86	29.72±2.91
Thigh part (%)	31.20±1.53	32.67±2.70	32.17 ±3.29
Weight of liver (g)	47.53±9.98	52.38±8.95	54.00±10.20
Weight of heart (g)	9.99±1.81	12.18±3.67	11.62±2.58
Weight of gizzard (g)	33.63±5.04	41.52±9.03*	37.55±6.75
Carcass yield (%)	70.82±2.97	71.15±4.67	71.13±2.90

n=10; C=BD-complete feed mixture, E1=BD+1.5% humic substances; E2=BD+1.5% humic substances+0.5% thyme; Mean * with the superscript are significantly different at ($P<0.05$); Mean±SD (standard deviaton)

Carcass yield of males and females in our experiment was higher in the second experimental group in both sexes that received humic acid, garlic and walnut compared to the control group, but the differences were not significant ($P>0.05$). Equally, Ashayerizadeh et al. (2009) [17] or

Brzoska et al. (2015) [18] recorded that addition of thyme non-significantly influenced carcass yield of broiler chickens. Similar results were obtained by Raeesi et al. (2010) [19] and Kirkpinar et al. (2011) [20] that the carcass yield of which increased as a result of humic acids supplementation, but the differences were not significant. The result of the study [21] revealed that garlic and onion did not affect the carcass yield of the birds. Similarly, Avci et al. (2007) [22] recorded non-significant differences of carcass yield in treatment group with humic acid supplementation in compare with control group. Other research teams [23, 24] in their study not recorded positive influence of supplementation of garlic extract on carcass yield of broiler chicken also. Different results were recorded in previous research [25-27] when supplementation of garlic, thyme, cinnamon and rosemary as well as thyme and cumin had negative effect on carcass yield. The supplementation of humic substances and herbal additives in broiler chickens from the experimental treatments in our experiment had significant effect ($P<0.05$) on weight of heart and non-significant increased weigh of liver and gizzard. Similarly, a positive increase of weight of liver in group with garlic supplementation was observed [16, 17, 25, 26, 28]. Shirzadegan's study [29] shows no significant effect ($P>0.05$) of cinnamon powder on heart, gizzard and abdominal fat weights percentage and a significant effect on liver weight percentage ($P<0.05$). In contrast, no statistically significant differences in weight of heart, liver and gizzard between treatment groups with supplement of humic substances and control group were investigated [23] or [5].

4. Conclusions

The results from this experiment show that supplementation of humic substances or humic substances with thyme powder (*Thymus vulgaris*) positive affected carcass weight. The humic substances and the combination of humic substances with thyme only slightly no significantly positive affected carcass yield. Subsequently, we recorded beneficial effect of additives in both experimental groups on weight of edibles, namely weigh of liver and weight of heart. The humic substances addition in first experimental group had a significant effect on weight of gizzard. The values in the breast part were in both experimental groups little lower and in the thigh part little higher in comparison to the control group. The additives in both treatment groups had indistinctive consequently non-significant effect on percentage of breast and thighs from carcass body.

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