The Effect of the Humic Acid and Herbal Additive Supplement on Carcass Parameters of Broiler Chicken

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Abstract
The aim of this study was the assessment of an influence of dietary humic acids and dietary herbal additive (clove (*Syzygium aromaticum),* lavender (*Lavendula angustifolia)* and black pepper (*Piper nigrum* L.) on carcass parameters of Ross 308 broiler chicken (n=60). Broiler chicken were divided into 3 treatments (n=20). The chicken of the control group were fed with complete feed mixtures without any additives. Chicken in treatments T1 were fed a diet containing 1% of humic acid and drank a water containing 150 mg/l of dietary herbal additive, chicken in treatments T2 were fed with complete feed mixture without any additives and drank a water containing 150 mg/l of herbal additive. The carcass weight, weight of heart, liver, gizzard and neck without skin and carcass yield were evaluated. The carcass weight was in the treatment T2 statistically significantly higher ($P \leq 0.05$) in compare with control group (values in the order of the groups: 1293.1±179.0; 1429.3±156.1 and 1531.6±282.3 g±SD). In the treatment T1 was weight of gizzard (43.7±7.5 g±SD) significantly higher ($P \leq 0.05$) compared to control group (34.9±5.2 g±SD). In the treatment T2 was weight of liver (72.8±11.4 g±SD) significantly higher ($P \leq 0.05$) compared to control group (49.3±10.3 g±SD). In indicators weight of heart, weight of neck without skin and carcass yield were recorded nonsignificant different ($P \geq 0.05$) compared to the control group.

Keywords: broiler chicken, carcass parameters, herbal addtitive, humic acid.

1. Introduction

Recent limitations on the application of antibiotics as feed additives have prompted poultry farmers to search safe and healthy alternatives to produce food products [1]. The use of plants and plant bioactive compounds dates back thousands of years to the ancient Egyptians, Chinese, Indians and Greeks [2]. Phytogenic feed additives are a new class of growth promoters, originating principally from herbs, spices and their products, which have gained widespread attention in the feed industry in recent years [3]. Beneficial effects of herbs or botanicals in farm animals may arise from activation of feed intake and secretion of digestive secretions, immune stimulation, antibacterial, coccidiostatic, anthelmintic, antiviral or antiinflammatory activity and inhibition or particularly antioxidant properties [4]. The other potential substances alternatives to antibiotics in the diet of poultry are humic acids. Humic acids are formed from decayed plant matter with the aid of living bacteria in the soil [5]. Humic acids are known for their antidiarrheal, analgesic, immunostimulant and antimicrobial properties [6].

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The aim of this study was to determine the effect of humic acid with dietary herbal additive and dietary herbal additive on carcass parameters of broiler chicken of hybrid Ross 308.

2. Materials and methods

Animal and diets

The experiment was realized at the Department of Poultry Science and Small Farm Animals in the experimental poultry house on College farm in Kolíňany.

In every experiment a total 60 one-day-old ROSS 308 meat hybrid chicken was included. Chickens were randomized into three groups, each containing 20 birds. Chickens in individual groups were stabled on deep budding, with a maximum occupation of the breeding areas 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 decreased to 20-22°C during the experiment. The temperature was maintained using electronic hen-like devices providing radiant heat.

The fattening lasted 42 days. 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 is presented in Table 1.

In control group we used complete feed mixture without any additives. Group of chickens marked as treatment 1 (T1) was fed a diet containing 1% of humic acid and drunk a water containing 150 mg/l of dietary herbal additive, and the group marked as treatment 2 (T2) was drunk a water containing 150 mg/l of dietary herbal additive. Dietary herbal additive contains a blend of high-quality active substances of clove flower (*Syzygium aromaticum*), medical lavender (*Lavendula angustifilia*) and black pepper (*Piper nigrum* L.).

Performance parameters

At the end of the experiment 10 chickens from each group were selected (5 male and 5 female) and were slaughtered. In the laboratory of the Department of Poultry Science and Small Farm Animals in Slovak University of Agriculture in Nitra analysis of samples of chickens was realized. We focused on the carcass weight, weight edible offal and carcass yield.

Statistical analysis

All data were analyzed 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 $P \leq 0.05$.

3. Results and discussion

The objective of the present study is to investigate the effect humic acid with dietary herbal additive and herbal additive to carcass weight, weight edible offal and carcass yield of broiler chicken. We presumed that potential synergistic effects between humic acid and herbal additive could result in beneficial effect on carcass characteristic. Humic acid were given in complete feed mixture and herbal additive were given in drinking water to avoid potential interactions among the active substances. Carcass weight is presented in Figure 1.

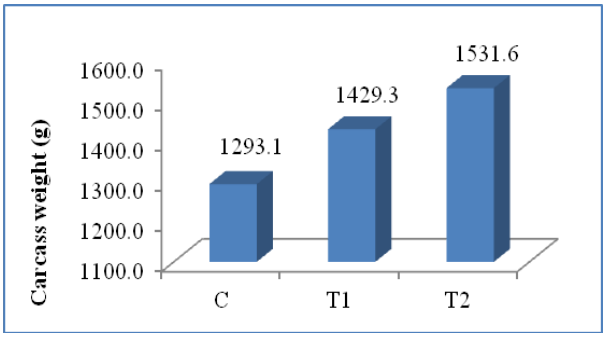

Figure 1. Average carcass weight of broiler chicken (g)

Carcass weight in treatment groups was higher compared to control group, with significant different ($P \leq 0.05$) between the group of chickens drank water containing 150 mg/l of herbal additive (T2) and control group (C). The observed results of the effect of this herbal supplements on carcass characteristic of broiler chicken are inconsistent across various studies. In some studies, the dietary clove powder and black pepper supplementation has been reported to improve the carcass weight of broilers [7,8], whereas others [9,10] reported that clove powder and black pepper had no effect on the carcass weight of broilers. Marcinčák et al. (2011) [7] reported, that the average weight of carcasses from experimental groups were

significantly higher (P≤0.05) compared to controls.

Table 1. Composition of starter, grower and finisher diets

Ingredient	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
Limestone (%)	1.00	1.05	1.10
Monocalcium phosphate (%)	1.00	0.70	1.00
Salt (%)	0.10	0.15	0.20
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

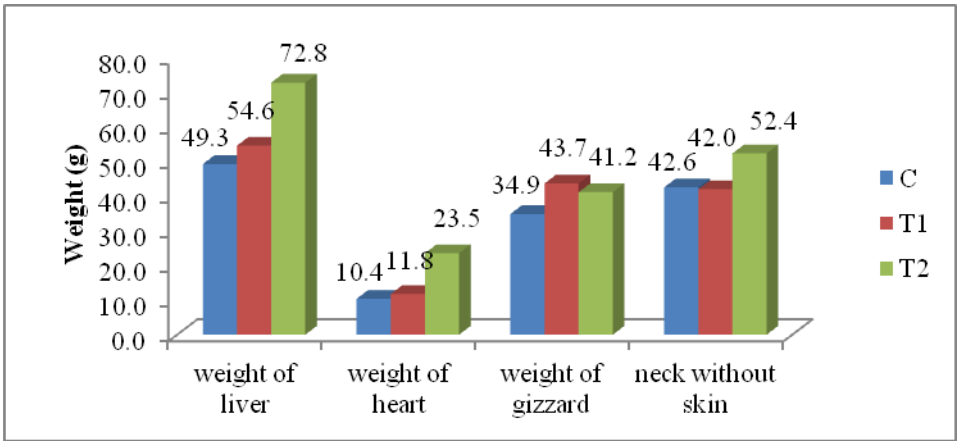

Figure 2. Weight of heart, liver, gizzard and neck without skin of broiler chicken (g)

Weight of heart, liver and gizzard is presented in Figure 2. Diet had no significant effect (P≥0.05) on weight of heart between groups, however, weight of gizzard was significantly different greater (P≤0.05) in chicken fed a diets containing 1% of humic acid and drank a water with dietary herbal additive (T1) compared to control group (C) and weight of liver was significant different (P≥0.05) between group of chicken who drank a water with herbal additive (T2) and control group (C). This is not in accordance to results obtained by Abou-Elkhair et al. (2014) [8], who introduced that the black pepper added into broiler feed had not significantly effect on edible offal of broiler chicken.

Carcass yield of broiler chicken fed a diets containing 1% of humic acid and drank a water with herbal additive (T1) was smaller and chicken who drank a water with herbal additive (T2) was greater, but not significantly different (P≥0.05) compared to control group (C). Marcinčák et al. (2011) [7] recorded, that the highest carcass yield percentage was in experimental group with clove in feed and extract of agrimony in water.

4. Conclusions

The effect of humic acid and dietary herbal additive on carcass parameters was studied.
Based on the obtained results, it can be concluded that the dietary herbal additive, has positive effect on carcass weight. Broiler chickens drank 150 mg/l of dietary herbal additive (T2) showed significantly higher ($P \leq 0.05$) carcass weight and weight of liver compared to control group (C). The other carcass parameters, as carcass weight, weight of heart, liver, neck without skin and carcass yield of broiler chicken fed a diets containing 1% of humic acid (T1) and drank a water with 150 mg/l of dietary herbal additive (T2) was not a significant different ($P \geq 0.05$) compared to control group (C).

Acknowledgements

This study was supported by Grant Agency for Science, KEGA of Slovak Republic, Grant No.035SPU-4/2015.

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