



## EFFECT OF SUPPLEMENTATION OF THE DIET WITH HUMIC ACIDS ON GROWTH PERFORMANCE AND CARCASS YIELD OF BROILERS

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### ABSTRACT

The aim of this study was to confirm the effects of the product HUMAC Natur (humic acid source) supplemented to broiler feed during 39 days of fattening on the; final body weight, carcass yield and percentage of the carcasses. Eighty broilers COBB 500 included in the experiment were fed commercial diet. Humic acids were added to the feed of experimental broilers (n=40) as a 0.6% concentrate, from the first day of fattening. On day 39 of fattening, the mean body weight of the experimental broilers was lower ( $2\,498.0 \pm 244.6$  g) in comparison to the control ( $2\,535.0 \pm 268.2$  g) ( $P > 0.05$ ). The addition of the humic acid product to feed as a 0.6% concentrate affected positively the carcass yield ( $P < 0.05$ ), but had no significant positive effect on the live body weight ( $P > 0.05$ ). The mean weight of the breast and thigh muscles in the experimental and control groups was comparable.

**Key words:** broiler; carcass yield; fattening; humic acids

### INTRODUCTION

Humic substances are natural organic compounds occurring in water, soil, carbon and other sources. They are heterogeneous high molecular organic substances and their composition differs according the geographic region. According to their solubility in acid or alkaline media, they are divided to humic acids, fulvic acids and humins. Humic acids are considered to be a new suitable alternative of adsorbents, because of various binding sites present in their structure [8], [11]. It has been assumed that humic acids are able to reduce the absorption and systemic availability of bacterial endotoxins, which can be of great importance in the protection of animal and human health [10]. Moreover, many positive effects on the performance and

health of animals have been attributed to humic acids. They inhibit the growth of pathogenic bacteria and moulds and decrease the level of mycotoxins and thus may lead to improved gut health [5], [12]. Humic acids stabilize the intestinal flora, and by this, improve the utilization of nutrients from animal feed, which results in increased weight gains of animals without increasing the amount of feed given to them. Humic acids are said to improve protein digestion, as well as calcium and trace element utilization. They act as dilators, increasing the cell wall permeability that allows easier transfer of minerals from the blood to bone and cells [5], [9].

Humic acids seem to be a suitable alternative with a favourable impact on production parameters of animals. Replacing antibiotics as growth stimulators by humic acids may affect positively parameters such as weight gain, live performance, carcass weight and feed conversion by better utilization of nutrients from feed [5], [7]. Moreover, humic acids are natural substances and their utilization in animal nutrition excludes the presence of undesirable residues and the development of bacterial resistance similar to antibiotic resistance. As a result of higher food conversion rates and enhanced absorption of nitrogen, the release of odorous compounds are reduced. This is also desirable because the odour presents certain problems.

The aim of this experiment was to investigate the impact of supplementation of a broiler diet with humic acids as a 0.6% concentrate on the; growth performance, final body weight, carcass, and the breast and thigh muscle yield.

## MATERIALS AND METHODS

This experiment was conducted at an approved animal quarters of the Clinic for birds, exotic and wildlife animals, University of Veterinary Medicine and Pharmacy in Kosice. Eighty one-day-old unsexed hybrid broiler chicks COBB 500 were purchased from a commercial hatchery. They were randomly divided into 2 groups ( $n=40$ ), 4 replications with 10 birds in each. The chicks were kept in pens with wood shavings in agreement with technological instructions for COBB 500 chickens regarding light regimen, temperature, animal hygiene and feeding. The birds were fed commercial starter and finisher diets (from day 1 to 24 and from 25 to 39, respectively).

The birds were fed as follows:

1. Control group (C) — fed a standard diet without any supplementation.
2. Experimental group (H) — fed a standard diet supplemented with humic acids (HUMAC Natur, purchased from Humac s.r.o., Kosice) as a 0.6% concentrate, from day 1 of fattening.

Throughout the fattening period, the broilers had free access to water and feed. The temperature was gradually decreased from 33°C on day 1 to 21°C on day 21 and kept constant afterword. The lighting regimen provided 24h of continuous light per day. The relative humidity of the environment was 50—70%. The experiment was approved by the Ethics Committee of the University of Veterinary Medicine and Pharmacy in Kosice.

The chicks were weighed at arrival and the mean weight was recorded as the one-day-old weight. The mean live body weight (BW) of the broilers in each group was recorded weekly. The carcass yield (CY) of broilers, and mean weight of the breast and thigh muscles were also recorded. On day 39 of the fattening, prior to stunning, the broiler chicks were slaughtered and processed. To determine the CY and BW of the broilers before slaughtering and carcass weight (CW) without offal was recorded. CY (%) was calculated as a ratio between CW after evisceration and BW of broilers before slaughter. Thigh and breast muscles used for the determination of their proportion to total CW, were deboned and weighted. Proportions of thigh and breast muscles were calculated as a ratio of individual parts and CW after evisceration (%).

The data obtained were analysed statistically using GraphPad Prism 5.0 software. The results are given as means and standard error of the mean (SD). The results obtained for each group were compared by t-test and  $P < 0.05$  was considered as the statistically significant difference.

## RESULTS AND DISCUSSION

The effects of supplementation of humic acids (as a 0.6% concentrate) to the diet on mean body weight of broilers is presented in Table 1. During the experiment, no significant difference ( $P > 0.05$ ) was recorded in the BW of the experimental groups in comparison to the control chicks. Our results also showed that humic acids had no influence on body weight and breast and thigh muscle weight

**Table 1. The effect of supplementation of humic acids on mean live body weight of broilers during fattening (g)**

Group	Day of fattening					
	1	14	21	28	35	39
<b>Control</b>	53.0	493.0	943.8	1611.0	2202.0	2535.0
<b>± SD</b>	± 5.4	± 54.6	± 79.0	± 91.7	± 169.3	± 268.2
<b>Experimental</b>	52.0	480.0	917.7	1537.0	2183.0	2498.0
<b>± SD</b>	± 3.4	± 37.7	± 53.6	± 96.0	± 202.1	± 244.6

Data are presented as means (n = 20) ± standard deviation (SD)

**Table 2. The results of carcass, breast and thighs muscles yield**

Group	BW	CW	CY	Breast		Thighs	
	[g]	[g]	[%]	[g]	[%]	[g]	[%]
<b>Control</b>	2535.0	1812.0a	71.2 a	486.9	27.1	506.3	28.1
<b>± SD</b>	268.2	130.7	2.1	40.60	1.4	47.84	1.5
<b>Experimental</b>	2498.0	1922.0b	78.1b	516.7	26.5	535.3	27.5
<b>± SD</b>	244.6	145.9	2.2	31.57	1.2	40.00	1.4

Data are presented as means (n = 20) ± standard deviation (SD)

BW—body weight; CW—carcass weight; CY—carcass yield

a, b—means with different superscripts in the same column differed significantly (P < 0.05)

(Table 2). The feed conversion ratio was 1.62 for both groups and the mean feed intake was 4002 g in the experimental group and 4021 g in the control group. Celik et al. [1] reported an increase of the final BW and also higher CY after the addition of humic acids, as a 0.25 % concentrate, to the broiler diet which is inconsistent with our results. Also, other authors [7], [11], [3] reported that the body weight and the feed conversion ratio of the broilers were positively affected by the supplementation of humic acids. On the contrary, Karaoglu et al. [6] reported that humic acid supplementation to diets of broilers (at concentrations of 0.1, 0.2 and 0.3 %) had no effect on the broilers performances.

The results of; carcass, breast and thigh weight and ratio between individual parts and carcass weight are reported

in Table 2. There was no influence of humic acids on body weight of the broilers, but the carcass yield was significantly higher in the experimental group compared to the control group (P < 0.05). The weights of the breast and thigh muscles were slightly higher in the groups supplemented with humic acids, but the differences were not significant (P > 0.05). Kocabagli et al. [7] reported a higher percentage of CY after supplying feed with humic acids (0.25 %) in comparison to the control group (P < 0.05), which does not agree with our results.

The supplementation of the broiler diet with humic acids had a positive effect on poultry meat production. Recently, it has been observed that humates included in the feed and water of poultry promoted their growth [2], [4], [5]. Kocabagli et al. [7] investigated the effects of the

supplementation of the diet with humic acids on the live performance, carcass weight and the abdominal fat pad of broilers during different feeding periods. They found that feeding with humic acids had a beneficial effect in terms of growth and feed conversion and that humic acids might constitute a promising group in a search for an agent in terms of immunity enhancement [13].

## CONCLUSION

It was reported that the addition of humic acids to diets may positively affect all production parameters in poultry meat production. These compounds are believed to enhance growth, decrease feed consumption and feed conversion ratio. However, in our experiment, the body weight of the chickens fed diets supplemented with humic acids was comparable to control group without humic acids in the diet. The carcass weight and carcass yield was significantly higher in the experimental group. The values of breast and thigh yield were comparable in both groups. The advantage was in the lower feed consumption. There is no doubt that humic acids have many beneficial effects on the production parameters and appear to be a suitable non-nutritive agent in poultry meat production.

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