Effect of Probiotic Strain Enterococcus faecium M74 Supplementation on the Carcass Parameters of Different Hybrid Combination Chickens

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Abstract

The aim of the present study was to evaluate the effect of addition of *Enterococcus faecium M74* in drinking water on performance and carcass characteristics of broiler chickens. Totally 120 chickens (60 of hybrid Hybro, 60 of Ross 308) were divided to two groups. Experimental chickens of Hybro (n=30) and Ross 308 (n=30) received a probiotic preparation in drinking water from day 1 to day 42 with concentration of $2x10^9$ CFU of *Enterococcus faecium* M 74 in 1 g of nutrient medium with dextrose. The control group of Hybro (n=30) and Ross 308 (n=30) received water in same total amount as experimental group without any additives. The feeding period lasted 42 days. In case of Hybro, we showed higher effect of *Enterococcus faecium M74* supplementation on slaughter weight (1807.51 vs. 1929.08 g; $P<0.05$) in comparison with Ross 308 (2126.63 vs. 2199.31g; $P>0.05$). Differences in percentage of valuable parts (thigh and breast) and carcass yield of Hybro and Ross 308 were not statistically significant ($P>0.05$) by addition of probiotic On the end of fattening, Ross 308 broiler chickens fed diet with probiotic strain *Enterococcus faecium* had significantly less ($P<0.05$) abdominal fat than those fed without the probiotic. In Hybro broiler chickens we recorded not significant difference between groups ($P>0.05$).

Keywords: chicken, *Enterococus feacium,* probiotic, nutrition, carcass parameters

Introduction

Under normal production circumstances broilers and turkeys hatch in hatcheries, thus a transfer of microorganisms, established in the intestinal tract of the parent animals, is not possible. It is therefore important to support the desired microflora when the microbial colonization of the intestinal tract begins and to counteract the multiplication of undesired germs. Just as during the rearing period of other species this can be done by means of probiotics. However, specific features of the feed production and the short stay of the chymus in the intestinal tract of fattening poultry must be considered [1].

Probiotics are defined as live microbial food supplements, which beneficially influence only not human [2], but also poultry health, chickens [3], hens [4], turkeys [5] and waterfowl [6].

A good probiotic must fulfil some selection criteria such as membership among the normal intestinal microbiota, acid and bile tolerance, gut colonization, production of antimicrobial substances or bacteriocin. Then, it must easily to survive growth on a large scale, retain its viability under storage and field conditions, and be cost-effective to use for farm animals [7].

The objective of this study was to evaluate the effect of addition *Enterococus feacium* M74 strain in drinking water on carcass parameters of broiler chickens Hybro and Ross 308.

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2. Material and methods

The experiment was realised in half-operation conditions of experimental basis of Department of Poultry Science and Small Animal Husbandry (Certificate of Authorization to Experiment on Living Animals, State Veterinary and Food Institute of Slovak Republic, no. SK PC 30008). Totally 120 chickens (60 of hybrid Hybro, 60 of Ross 308) were divided to two groups. Experimental chickens of Hybro (n=30) and Ross 308 (n=30) received a probiotic preparation Protexin Professional (Probiotics International, UK) in drinking water from day 1 to day 42 with concentration of $2x10^9$ CFU of *Enterococcus faecium* M 74 in 1 g of nutrient medium with dextrose (1% in preparation). Quantization of drinking water and probiotic preparate are presented in Table 1. The control group of Hybro (n=30) and Ross 308 (n=30) received water in same total amount as experimental group without any additives.

Table 1. Dosage of drinking water and probiotic strain in experimental groups

Week of fattening	Total amount of drinking water per day (l)	Dose of probiotic preparate (g)	CFU in 1 ml of drinking water
1.	2.50	5.04	$4.03x10^6$
2.	3.50	2.10	$1.20x10^6$
3.	4.60	2.10	$9.13x10^5$
4.	6.70	2.10	$6.27x10^5$
5.	8.60	2.10	$4.88x10^5$
6.	10.60	2.10	$3.96x10^5$

The feeding period lasted 42 days. Two types of complete feed mixtures (Boskop, a.s., Trenčín, Slovak Republic) have been distributed according to periods of fattening: HYD–01 (d1–d21) in powdery form and HYD–02 (d22–d42) in granular form, both no inclusions of anticoccidials. Nutritional value of diets is shown in Table 2. Feeding was provided on an ad libitum basis from containers on the front of the cages.

Table 2. Nutritional value of complete feed mixtures

Nutritient	Unit	HYD–01	HYD–02
Crude protein	g/kg	min. 210	min. 190
ME	MJ/kg	min. 12	min. 12
Lysine	g/kg	min. 11	min. 9.5
Methionine and cistine	g/kg	min. 7.5	min. 7.5
– from that methionine	g/kg	min. 4.5	min. 4
Linoleic acid	g/kg	min. 10	min. 10
Calcium	g/kg	min. 8	min. 7
Phosphorus	g/kg	min. 6	min. 5
Sodium	g/kg	1.2–3.0	1.2–2.5
Manganese	mg/kg	min. 50	min. 50
Iron	mg/kg	min. 60	min. 60
Copper	mg/kg	min. 6	min. 6
Zinc	mg/kg	min. 50	min. 50
Vitamin A	i.u./kg	min. 10000	min. 8000
Vitamin B2	mg/kg	min. 4	min. 3
Vitamin B12	µg/kg	min. 20	min. 20
Vitamin D3	i.u./kg	min. 1200	min. 1200
Vitamin E	mg/kg	min. 15	min. 15

Birds were stabled in a 3-etage cage technology (MBD, Czech Republic) consisted of 18 cages with proportions 75x50 cm (0.375 m^2).

At the end of the experiment, 10 broiler chickens of similar body weight to the group average were selected from each group, weighted and killed by severing of the bronchial vein. The weights of carcass, breast, thigh and abdominal fat were recorded individually. The research data analyses were made by the usual variation statistics methods and Student's *t*-test was used to compare means.

3 Results and Discussion

Table 3. The effect of group on slaughter weight, carcass yield, percentage of valuable parts and abdominal fat of Hybro broiler chickens

	Control group	Experimental group	P
Slaughter weight (g)	1807.51±51,07	1929.08±52.69	*
Carcass yield (%)	75.16±2.06	75.59±2.21	ns
Breast (%)	28.63±2.11	28.99±2.57	ns
Thigh (%)	31.69 ±2.78	30.45±3.05	ns
Abdominal fat (g)	23.69±3.49	21.87±2.74	ns

ns = P>0.05; * = P<0.05
Values shown are mean ± SD (standard deviation).

Table 4. The effect of group on slaughter weight, carcass yield, percentage of valuable parts and abdominal fat of Ross 308 broiler chickens

	Control group	Experimental group	P
Slaughter weight (g)	2126.63±63.49	2199.31±67.21	ns
Carcass yield (%)	76.96±1.58	76.21±1.84	ns
Breast (%)	29.91±2.08	30.13±2.47	ns
Thigh (%)	31.46±2.87	31.74±3.32	ns
Abdominal fat (g)	43.08±4.57	32.58±3.28	*

ns = P>0.05; * = P<0.05
Values shown are mean ± SD (standard deviation).

The effect of supplementation of *Enterococcus faecium* M 74 strain on the composition of Hybro and Ross 308 broiler chickens are shown in Table 3 and Table 4.

For Hybro, the slaughter weight of the broiler chickens in experimental group was significantly higher (P<0.01) as compared with the control group (1807.50 vs. 1929.00g). In contrast, for Ross 308 we observed statistically not significant difference (P>0.05) between groups (2126.63 vs. 2199.31g). In case of Hybro, our results are compatible with the results with Haščík et al. (2007) [8] who concluded that there is statistically significant influence of the supplementation of probiotics on slaughter weight. Yalcinkayal et al. (2008) [9] reported that using of probiotic had not significant effect on slaughter weight of chickens and these conclusions corresponded with our results in case of Ross 308.

There were no differences (P>0.05) between control and experimental group on carcass yield of Hybro and Ross 308 broiler chickens. Also, Pelicano et al. (2004) [10] found similar values of carcass yields in broiler chickens supplemented or not with probiotics.

Differences in breasts and thighs of chicken from control and experimental group were not statistically significant (P>0.05). Opposite tendency observed Kabir et al. (2004) [11] who reported that addition of probiotic would increase of efficiency of thigh and breast.

On the end of fattening, Ross 308 broiler chickens fed diet with probiotic strain *Enterococcus faecium* had significantly less (P<0.05) abdominal fat than those fed without the probiotic. In Hybro broiler chickens we recorded not significant difference (P>0.05) between groups but broiler chickens with supplementation of probiotic preparate had less abdominal fat. Kalavathy et al. (2006) [12] observed significant reduction of abdominal fat content by supplementation of probiotic on of the chicken.

4. Conclusions

Probiotic preparation with probiotic strain *Enterococus feacium* applicated to drinking water affected: for Hybro, the slaughter weight of the broiler chickens in experimental group was significantly higher (P<0.01) as compared with the control group (1807.50 vs. 1929.00g) and Ross 308 broiler chickens fed diet with probiotic strain *Enterococcus faecium* had significantly less

(P<0.05) abdominal fat than those fed without the probiotic.

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