

INFLUENCE OF PROBIOTIC PREPARATION LIVEBIOS ON THE PRODUCTIVITY AND MEAT QUALITY OF BROILER CHICKENS**

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Abstract: Probiotics are widely accepted as an alternative to in-feed antibiotics in poultry production. The objective of investigation was to research the effect of probiotic preparation LIVEBIOS for growth performance, meat and carcass quality of broiler chicks. The experiment was performed with 120 Hybro-PN broiler chickens 1–56-day-old, divided into 2 groups of 60 birds each. The both groups were fed crumbled feed mixtures *ad libitum*. The feed mixture of the experimental group was supplemented with probiotic preparation LIVEBIOS (2 kg/t feed). The birds were maintained on deep litter and watered from stationary watering containers. The results of experiments indicated, that probiotic preparation LIVEBIOS during all experiment period increased the weight of broiler chickens by 10% ($P < 0.001$) and decreased feed conversion ratio by 9% ($P < 0.005$) comparing with control group. A probiotic showed a tendency to improve the carcass yield and improve the yield of edible parts of broiler chickens. The culinary and chemical properties of poultry became better.

Keywords: probiotic preparation, broiler chickens, productivity, meat quality.

Introduction and literature review

As of Jan. 1, 2006, the European Union, of which Lithuanian is a member, has prohibited the use of antibiotics as growth promoters in poultry nutrition, so antibiotics have been replaced by other products in controlling

intestinal pathogenic bacteria (*Denli et al.*, 2003). Some probiotic microorganisms are an alternative to antibiotic to be used exclusively as a growth stimulant and for improvement of feed conversion rate in farm animal (*Denli et al.*, 2003). It may be defined as living microorganisms which, given to animals, assist in the establishment of an intestinal population which is beneficial to the animal and antagonistic to harmful microbes (*Green and Sainbury*, 2001). Besides, these microorganisms are responsible for stimulation of intestinal mucosa immunity, increasing protection against toxins produced by pathogenic microorganisms (*Pelicano et al.*, 2003).

The use of probiotics for meat and carcass quality improvement has been questioned and many unclear results have been shown. Some authors reported advantages of probiotic administration (*Stanley et al.*, 1996; *Jin et al.*, 1998), whereas others did not observe improvement when probiotics were used (*Owings et al.*, 1990; *Pelicano et al.*, 2003). Hence, the aim of this study was to evaluate the effect of probiotic preparation LIVEBIOS growth performance, meat and carcass quality of broiler chicks.

Materials and methods

The scientific investigations have been made following the provisions of Law of Republic of Lithuania on Protection, Keeping and Use of Animals.

The experiment was carried out at the poultry farm "Santoveta", Ltd (Jonavos district). It was performed with 120 Hybro-PN broiler chickens 1–56-day-old, divided into 2 groups of 60 birds each. The birds were maintained on deep litter and watered from stationary watering containers. The both groups were fed crumbled feed mixtures *ad libitum*. The feed mixture of the experimental group was supplemented with probiotic preparation LIVEBIOS, made from *Saccharomyces cerevisiae* yeasts, produced by "Biofeed Ras" (USA) (2 kg/t feed). Diets composition was adjusted to the respective requirements of the National Research Council (*NRC*, 1994).

At age 56 days, 10 males of the weight similar like the average for the group were slaughtered in each group to evaluate carcass characteristics (pre-slaughter weight, yields of carcass, edible parts, breast muscles and fat, some organ weights).

After carcass chilling (at about 10°C for 24 hours) meat samples were taken from breast muscles of broiler chicks for evaluating of chemical and physicochemical properties. Dry matter (draying samples at 105°C), pH

(with pH-meter Inolab-3), water-holding capacity (Grau and Hamm), cooking loss (vacuumed and boiled at 70°C for 30 min.), shear force (Warner-Bratzler test), intramuscular fat (Soxterm), ash (burning organic matter at 700°C) were determined.

Data were subjected to ANOVA procedures using the software package Statistical for Windows, Version 5.0 (*StatSoft Inc.*, 1995).

Results and discussion

Table 1 presents the body weight, daily weight gain and feed efficiency of broilers during the experiment. Body weight were effected by probiotic treatment in 30, 44 and 56 days of age, where body weight of probiotic supplemented birds were significant higher ($P<0.05$; $P<0.005$; $P<0.001$) than that of the control birds. At the end of trial (56 days) the body weight of experimental birds was 12% or 360 g ($P<0,001$) higher in comparison with control birds. Also, there was no significant differences in average daily weight gain during the experimental period (1-56 days), between control and probiotic-treated group ($P>0.05$).

Table 1. Means (\pm SD) for live body weight, daily weight gain and feed efficiency of broilers receiving control and experimental diet with probiotic preparation LIVEBIOS at different ages

Age (days)	Control group (n=60)		Experimental group (n=60)	
	Body weight (g/b)		Body weight (g/b)	
1	40 \pm 0.06		40 \pm 0.05	
7	142 \pm 2.18		141 \pm 3.01 ns	
20	733 \pm 10.23		738 \pm 14.61 ns	
30	1523 \pm 68.00		1653 \pm 65.14*	
44	2667 \pm 56.20		2933 \pm 60.30**	
56	3471 \pm 48.20		3831 \pm 66.21***	
	Daily weight gain (g/b)	Feed conversion ratio (FCR, g/g)	Daily weight gain (g/b)	Feed conversion ratio (FCR, g/g)
1-7	14.60 \pm 0.22	1.09 \pm 0.03	14.40 \pm 0.31 ns	1.04 \pm 0.03 ns
8-20	45.40 \pm 6.46	1.68 \pm 0.02	45.90 \pm 2.91 ns	1.57 \pm 0.11*
31-44	79.00 \pm 6.42	1.76 \pm 0.08	91.50 \pm 7.80 ns	1.60 \pm 0.01**
45-56	81.70 \pm 4.95	2.05 \pm 0.12	91.40 \pm 5.36 ns	1.87 \pm 0.09**
1-56	67.00 \pm 6.93	1.78 \pm 0.19	74.80 \pm 5.22 ns	1.62 \pm 0.08**

*; **; *** - Data significantly different (*: $P<0.05$; **: $P<0.005$; ***: $P<0.001$)
ns: non significant.

However, table 1 depicts that feed conversion ratio (FCR) in the

experimental group from 8 to 20 days was 6% less ($P < 0.05$) compared with control group. In the latest periods (31–44 and 45–56 days) FCR in the group with probiotic preparation were 9% ($P < 0.005$) less than in the group without addition.

Karaoglu and Durdag (2005) reported that prebiotic preparation consisted from *Saccharomyces cerevisiae* the weight of chicken broilers at the middle of trial (14–28 days) increased from 3.62 to 7.57%, while in the latest trial periods (30–42 days) had no effect on the growth of birds. In the same trial FCR at 1–7 days and 8–14 days were respectively by 8.5% and 16.67% lower than in the control group without probiotic supplementation.

Çelik et al. (2001) have found a positive effect of *Saccharomyces cerevisia* at the end of conducted experiment (37 days) where the weight of broilers were by 5.7% higher compared to control group without probiotic additive. Either above-mentioned probiotic had no effect on the FCR and was higher than that of this study, i. e. 1.78.

Some recent field reports (*Richter et al., 2000; Cmilianic et al., 2001; Bandy, Risam, 2002*) have suggested that probiotic supplementation improved performance of broilers.

Table 2. The results of slaughter of chicken broilers receiving control and experimental diet with probiotic preparation LIVEBIOS (means \pm SD)

	Control group (n=10)	Experimental group (n=10)
Pre-slaughter weight, g	3471 \pm 48.20	3831 \pm 66.21 ns
Carcass weight, g	2582 \pm 84.31	2996 \pm 105.60 ns
Carcass yield, %	74.40 \pm 1.42	78.20 \pm 2.03 ns
Mass of carcass edible parts, g	2071 \pm 72.64	2532 \pm 96.13**
Yield of edible parts, %	80.20 \pm 1.31	84.50 \pm 1.33*
Mass of breast muscles, g	684 \pm 50.70	791 \pm 68.40 ns
Yield of breast muscles, %	26.50 \pm 1.86	26.40 \pm 1.44 ns
Mass of internal fat, g	59.00 \pm 2.42	72.80 \pm 3.96**
Fat yield, %	1.70 \pm 0.07	1.90 \pm 0.10 ns
Internal parts:		
Heart, g	12.50 \pm 1.06	14.00 \pm 0.95 ns
Liver, g	38.90 \pm 2.04	48.30 \pm 2.41***
Gizzard (trimmed), g	34.50 \pm 3.15	43.50 \pm 6.14 ns

*; **; *** - Data significantly different (*: $P < 0.05$; **: $P < 0.01$; ***: $P < 0.005$)

ns: non significant.

Table 2 shows the slaughter traits. A probiotic significantly ($P < 0.05$) increased yield of edible parts, but no significant differences were observed

in carcass and breast muscles yields between control and treated groups. The results of the present study agreed with findings of *Moreira et al.* (2001) and *Vargas Jr. et al.* (2002) which have reported that probiotic supplementation had no effect on the carcass yield, while other authors give contrary findings about probiotic effect on the carcass yield of broiler chickens (*Pelicano et al.*, 2003). The mass of internal fat was statistically higher ($P < 0.01$), but no significant differences were observed in fat yield between control and treated groups.

In this study, some organ weights such as heart, liver and gizzard were determined. No significant differences, except for liver, were observed in non-carcass component weights between control and treated group. Such results were similar to the findings of *Karaoglu and Durdag* (2005).

The results of chemical and physicochemical properties of breast muscles of broiler chicks are showed in Table 3.

Probiotic preparation increased the water-holding capacity by 6.21% ($P < 0.025$), decreased the cooking loss and intramuscular fat respectively by 1.72% and 0.3% ($P < 0.05$) comparing with control group. Other authors found no significant differences in cooking loss or shear force of broiler meat between birds that were fed probiotics and control birds (*Pelicano et al.*, 2003; *Pelicia et al.*, 2004; *Pelicano et al.* 2005).

Table 3. Means (\pm SD) for chemical and physicochemical properties of breast muscles of broiler chicks

	Control group (n=10)	Experimental group (n=10)
Dry matter, %	26.54 \pm 0.25	26.33 \pm 0.21 ns
pH	5.64 \pm 0.02	5.77 \pm 0.04 ns
Water-holding capacity, %	55.08 \pm 1.15	61.29 \pm 0.94**
Cooking loss, %	20.74 \pm 0.66	19.02 \pm 0.42*
Shear force, kg/cm ²	0.96 \pm 0.10	1.36 \pm 0.16*
Intramuscular fat, %	2.19 \pm 0.11	1.89 \pm 0.09*
Ash, %	1.08 \pm 0.02	1.10 \pm 0.04

*; ** - Data significantly different (*: $P < 0.05$; **: $P < 0.025$)

ns: non significant.

Conclusions

The use of probiotic preparation LIVEBIOS improved growing rate and feed efficiency of broiler chickens, showed a tendency to improve the carcass yield and improve the yield of edible parts of broiler chickens. The

culinary and chemical properties of poultry became better.

UTICAJ PROBIOTIČKOG PREPARATA LIVEBIOS NA PRODUKTIVNOST I KVALITET MESA BROJLERA

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Rezime

Probiotici su široko prihvaćeni kao alternative upotrebi antibiotika u živinarstvu. Cilj ovog istraživanja je bio ispitivanje uticaja probiotičkog preparata LIVEBIOS na porast i kvalitet mesa i trupova brojlera. Ogljed je izveden na 120 Hybro-PN brojlera starosti od 1.-56. dana, koji su podeljeni u dve grupe sa po 60 pilića. Pilići obe grupe su hranjeni stočnom hranom u obliku prekrupe, *ad libitum*. Smeša ogledne grupe je dopunjena probiotičkim preparatom LIVEBIOS (2 kg/t hraniva). Pilići su držani na prostirci i dobijali su vodu iz stacionarnih pojilica. Rezultati ogljeda ukazuju da je probiotički preparat LIVEBIOS tokom čitavog oglednog perioda uticao na povećanje težine brojlera i to 10% ($P < 0.001$) i smanjenje konverzije hrane za 9% ($P < 0.005$) u poređenju sa kontrolnom grupom. Probiotik je pokazao tendenciju poboljšanja prinosa trupa i prinosa jestivih delova trupa brojlera. Kulinarske i hemijske osobine pilećeg mesa su poboljšane.

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