THE EFFECT OF SUPPLEMENTING CHICKEN FEED WITH THE BIOMIN IMBO SYNBIOTIC

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Abstract: *the effect of growth promoters used in animal feed on their growing performances is very variable, being more visible the more deficient the growing conditions are. Associating prebiotics with probiotics has generated a new growth promoter class – synbiotics – a category which the Biomin IMBO products belong to. It was tested in the broiler chicken feed regarding the growing performance, the intestinal flora and biochemical blood parameter. The experiment was carried out in two broiler chicken experimental lots, Rosso 503 hybrids, with 10 chicken per lot, between the ages of one day and 28 days. The combined chicken feed from the experimental lot was supplemented with 0.15 % Biomin IMBO. The growth parameters (body mass, daily average growth rate, daily average usage and specific usage) were monitored. A faeces microbiological exam was carried out in order to determine the type of intestinal flora and a biochemical exam, to determine the serum cholesterol and the high density lipoproteins (HDL). The usage of the Biomin IMBO synbiotic at a 0.15 % rate determined, at the age of 21 days, in the experimental lot, a daily average growing rate increase of 84.23 %, a daily average usage rate increase of 53.35 % and a specific usage decrease (Kg NC/Kg growing rate) with 40.33 %, as compared to the control lot. The microbiological faeces exam at 21 days of life showed a 75.34 % total number of germs (NTG) decrease and the coliform germ number and E. coli 77.27 % decrease while the control lot registered a 13.55 % NTG decrease, a 21.43 % coliform germ decrease, and a 40.91 % E. coli decrease thus proving the beneficial effect of the product on intestinal flora structure, facilitating the development of beneficial intestinal flora, a fact reflected in the growth performance. The Biomin IMBO supplement (0.15 %) of the broiler chicken feed until the age of 21 days determined a total cholesterol decrease of 34.15 % and a 25.67 % high density lipoproteins (HDL).*

Key words: *growth promoters, synbiotic, broiler chicken, growth parameters, intestinal flora, cholesterol*

INTRODUCTION

Large-scale use of antibiotics in animal feed has lead, in time, to bacterial stems resistant to antibiotics, questioning the efficiency of antibiotic treatments of some serious diseases in humans and animals (1).

A viable alternative to the use of antibiotics in animal feed is natural growth promoters (3). Probiotics are known as viable concentrates carefully selected from bacteria that, administered to the animals, can improve growth performance and health by changing the intestinal bacterial balance (6). Prebiotics are feed additives that support the growth of beneficial bacteria affecting the host organism by selective stimulation of growth and/or the action of one or several bacteria species in the digestive tract (4).

Associating prebiotics and probiotics has generated a new class of growth promoters – synbiotics – a category to which belongs Biomin IMBO, a product manufactured and marketed on a large scale by the company Biomin GmbH Austria. The synbiotic Biomin IMBO includes mainly as a probiotic the bacterium *Enteroccocus faecium* that prevents the development of pathogen bacteria such as *Salmonella* (5), and as a prebiotic, fructo-oligosugars (FOS) that

stimulate the growth of bifidobacteria and, together with *Enteroccocus*, acts as a barrier to the development of pathogen bacteria.

MATERIALS AND METHODS

The experiment was carried out on two groups of broiler chickens of the Rosso 503 hybrid; each group contained 10 broiler chickens aged 1-21 days.

The broiler chickens were weighed at the ages of 1, 7, 14, and 21 days. The broiler chickens in the control group (M) were fed on prestarter combined feed (1-19 days of age) and standard feed (11-21 days of age); in the experimental group (E), the combined feed was supplemented with 0.15% Biomin IMBO. Feed consumption was measured on a weekly basis, calculating mean daily intake and specific intake depending on the mean daily gain weight. The differences between the two groups were interpreted statistically with the nonparametric Mann Whitney U Test.

The broiler chickens in the two groups were weighed on a weekly basis. At the age of 1 day and of 14 days, the broiler chickens were vaccinated against avian pseudo pest, administered in the water as attenuated live vaccine La Sota.

At the age of 1 day and of 21 days, we sampled collective faeces samples from both groups to determine the total number of germs and the number of coliform germs and of *Escherichia coli* germs/g of faeces through classical methods with selective growth means.

RESULTS AND DISCUSSION

The evolution of body weight in the experimental group of broiler chickens is shown in Table 1. Growth parameters in broiler chickens in the two experimental groups are shown in Table 2 and Figures 1 and 2.

Table 1

Evolution of body weight in broiler chickens

	Body weight (g)							
	1 day		**7 days**		**14 days**		**21 days**	
	M	**E**	**M**	**E**	**M**	**E**	**M**	**E**
1	36	38	137	113	202	303	361	614
2	37	36	122	114	183	241	376	582
3	35	39	150	120	106	329	343	663
4	38	36	108	106	222	350	361	657
5	41	37	74	121	235	283	350	684
6	38	38	114	122	160	330	357	531
7	41	35	86	94	223	336	351	521
8	37	39	99	122	196	327	294	575
9	39	37	104	102	129	232	365	627
10	41	40	113	112	210	277		581
Mean	**38.3±2.16**	**37.5±1.58**	**110.7±22.42**	**112.6±9.46**	**186.6±42.59**	**300.8±41.08**	**350.89±23.37**	**603.5±55.16**
Total number	10	10	10	10	10	10	9	10

M-control group; E-experimental group.

Table 2

Growth parameters in experimental broiler chickens

Age	**Group**							
	Control group				**Experimental group**			
	body weight (g)	mean daily gain (g)	mean daily intake (g)	specific intake (kg of combined feed/kg weight gain)	body weight (g)	mean daily gain (g)	mean daily intake (g)	specific intake (kg of combined feed/kg weight gain)
1 day	38.3				37.5			
7 days	110.7	10.34	23.33	2.26	112.6	10.73	18.06	1.68
14 days	186.6	10.84	32.5	3.99	300.8	26.88	45.75	1.70
21 days	350.89	23.47	85.10	3.62	603.5	43.24	130.5	2.16

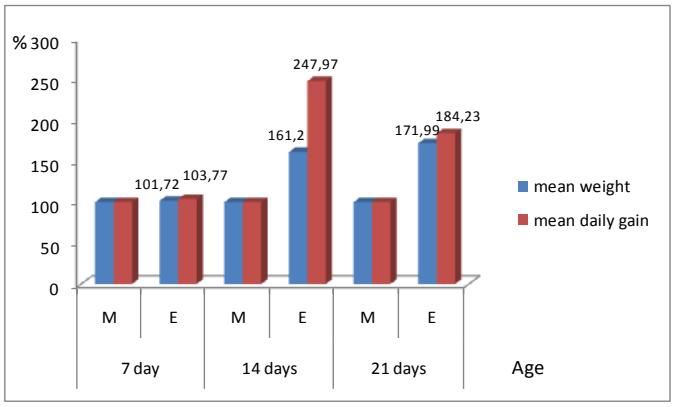

Figure 1. Comparative effect of Biomin IMBO in the feed of broiler chicken on body weight and mean daily gain

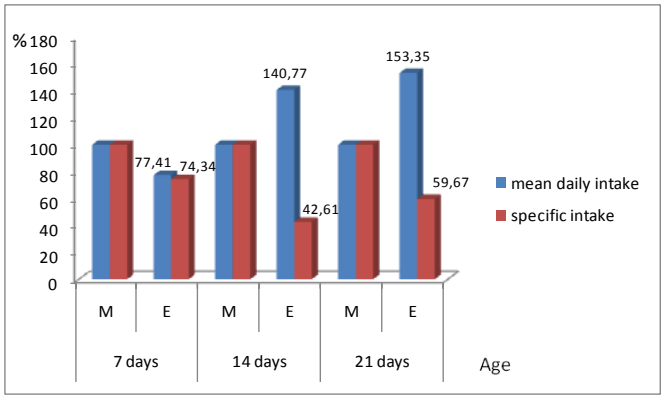

Figure 2. Comparative effect of Biomin IMBO in the feed of broiler chicken on mean daily intake and specific intake

We saw that, at the age of 7 days, there are no differences in mean body weight and mean daily gain, but mean daily intake was 22.59% lower in the experimental group and specific intake (kg of combined feed/kg weight gain) 7 days after supplementing with Biomin IMBO decreased with 25.66% because of the increase of feed digestibility.

At the age of 14 days and at 21 days, the beneficial effect of Biomin IMBO is even more obvious: in the experimental group, mean body weight is 61.2% and 71.99%, respectively, higher and mean daily weight gain is 147.97% and 84.23%, respectively. Mean daily intake was, in the experimental group, 40.77% higher at the age of 14 days and 53.35% higher at the age of 21 days. Specific intake of combined feed decreased with 57.39% at the age of 14 days and 40.33%, respectively, at the age of 21 days.

Statistical comparison (Mann Whitney U Test) of body weight in the broiler chicken whose feed was supplemented with Biomin IMBO showed that at the age of 1 day and of 7 days there are no significant statistically differences between the groups ($p>0.05$). At the age of 14 and 21 days, body weight in the broiler chicken whose feed was supplemented with 0.15% Biomin IMBO is significantly higher than in the control group ($p<0.05$).

Microbiological examination of faeces 7 days after supplementing the feed with Biomin IMBO points out the effect of the synbiotic on the total number of coliform germs and

of *Escherichia coli* germs considered as part of the "bad" flora. We could see in the experimental group, reducing the total number of germs to 13.85%, the number of coliform germs/g of faeces to 78.57% without changing the number of germs of the Escherichia coli genus.

After 21 days of supplementing the feed with Biomin IMBO in the experimental group, the total number of germs shared 3.95% of the total number of germs in the control group, the number of coliform germs shared 22.73% of the total number of coliform germs in the control group, and the number of *Escherichia coli* germs decreased with 55.55% (Table 3, Figure 3).

The microbiological examination of the faeces in the control group shows that between the age of 7 days and the age of 21 days, the total number of germs decreased with 13.55%, the number of coliform germs decreased with 21.43%, and the number of *Escherichia coli* germs decreased with 40.91%.

In the experimental group, supplementing the feed with Biomin IMBO caused, after 21 days compared to 7 days measurements, a decrease of the total number of germs with 75.34%, of the number of coliform germs with 77.27%, and of the number of germs of the genus *Escherichia coli* with 77.27% (Figure 4).

It is thus shown that Biomin IMBO reduces in the digestive tract the total number of germs and the number of coliform germs favouring the increase of the share of bacteria of the flora that is beneficial to the body. The results of microbiological examination support the differences in feed use between the groups through the supplementing of feed with Biomin IMBO (0.15%).

Table 3

Microbiological examination of faeces in broiler chickens whose feed was supplemented with Biomin IMBO

	Age					
	7 days			**21 days**		
	M	**E**	**E (% from M)**	**M**	**E**	**E (% from M)**
Total number of germs (NTG)	1193 x 10^7	165.3 x 10^7	13.85	1031.3 x 10^7	40.75 x 10^7	3.95
Number of coliform germs	140/g	110/g	78.57	110/g	25/g	22.73
E. coli	110/g	110/g	100	45/g	25/g	55.55

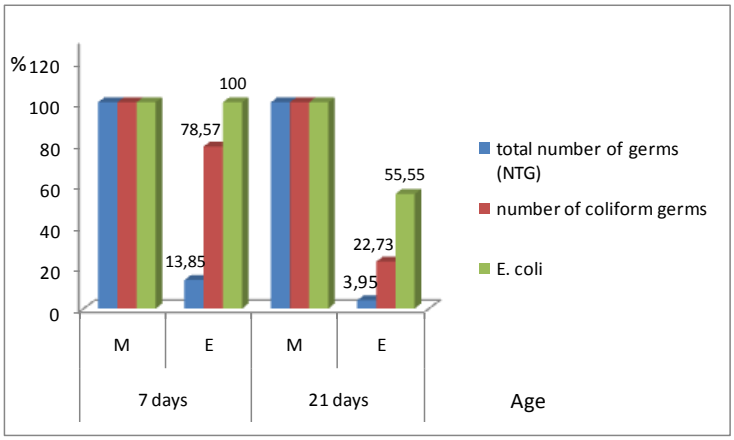

Figure 3. Evolution of the total number of germs, of the number of coliform germs and of the number of *Escherichia coli* germs in the faeces of broiler chicken whose feed was supplemented with Biomin IMBO

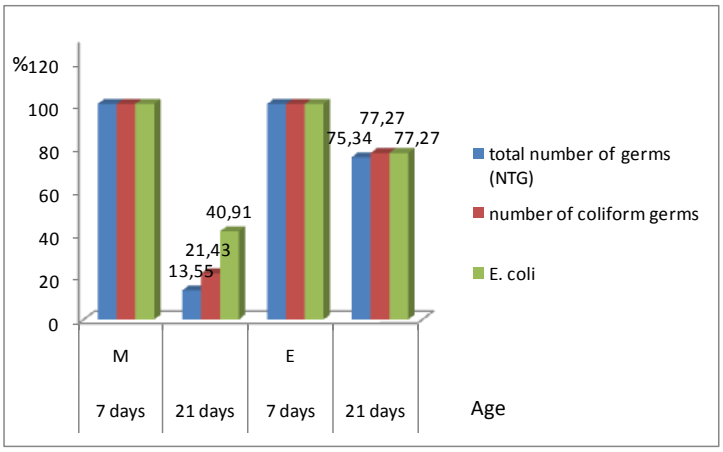

Figure 4. Evolution of the total number of germs, of the number of coliform germs and of the number of *Escherichia coli* germs in the faeces of broiler chicken whose feed was supplemented with Biomin IMBO at the age of 7 and 21 days

The biochemical examination of the blood determined the seric level of total cholesterol and high-density lipoproteins as shown in Table 4 and Figure 5. Data analysis shows that Biomin IMBO determines, in broiler chickens aged 21 days, a decrease of the level of cholesterol with 34.15% and of high-density lipoproteins with 25.67%.

Table 4.

Level of total cholesterol (mg/dl) and of high-density lipoproteins (mg/dl) in broiler chickens aged 21 days whose feed was supplemented with Biomin IMBO

	Group			
	Control group		**Experimental group**	
	Total cholesterol	**High-density lipoproteins (HDL)**	**Total cholesterol**	**High-density lipoproteins (HDL)**
	162.74	51.99	132.81	56. 58
	234.48	100.35	115.40	49.21
	197.36	73.58	143.33	62.15
Mean	**198.19±24.04**	**75.31±16.70**	**130.51±16.98**	**55.98±4.85**
%	100	100	65.85	74.33
Reference *	123.50±5.86	84.25±4.49		

* Dibaji et al. 2012 (2)

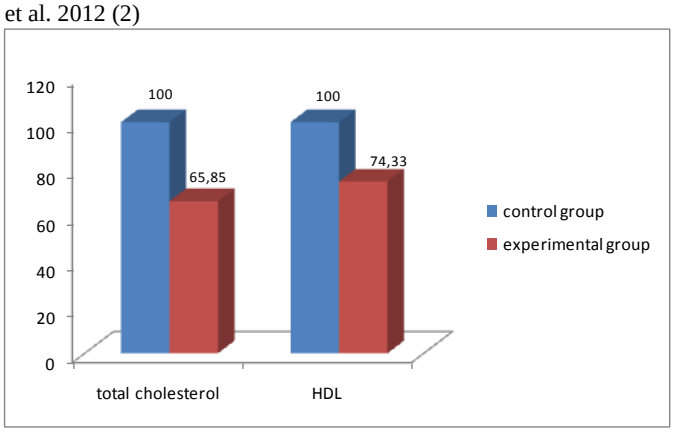

Figure 5. Comparison of the total cholesterol level and of high-density lipoproteins in broiler chickens whose feed was supplemented with Biomin IMBO (%)

CONCLUSIONS

1. Using in the feed of broiler chicken the synbiotic Biomin IMBO (0.15%) increased at the age of 21 days the mean daily weight gain with 84.23%, the mean daily intake with 53.35% and decreased specific intake (kg concentrated feed/kg weight gain) with 40.33%.
2. Microbiological examination of faeces at the age of 21 days pointed out the beneficial effect of Biomin IMBO (0.15% of the feed) on the structure of bacterial flora between the age of 7 and 21 days by reducing the total number of germs with 75.34% and the total number of coliform germs and of the number of *Escherichia coli* germs with 77.27%; in the control group, the total number of germs decreased with 13.55%, the total number of coliform germs decreased with 21.43%, and the total number of *Escherichia coli* germs decreased with 40.91%.
3. Compared to the control group, in the group of broiler chickens whose feed was supplemented with 0.15% Biomin IMBO, the total number of germs shared, at the age of 21 days, 3.95%, the number of coliform germs shared 22.73%, and the number of *Escherichia coli* germs/g faeces shared 55.55%.
4. Using Biomin IMBO (0.15%) in broiler chickens feed favours the development of beneficial flora in the digestive tract, which reflects in the growth performance.
5. Supplementing Biomin IMBO (0.15%) in the feed of broiler chickens until the age of 21 days determined a decrease of total cholesterol with 34.15% and of high-density lipoproteins with 25.67%.

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