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RESEARCHES ABOUT INFLUENCE OF PRO-BIOTICS ON BROILER PRODUCTION PERFORMANCES

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Abstract

Same as the whole European poultry industry Romanian poultry industry is facing worldwide competition and so Romanian poultry industry had to produce a product better than in other countries. This prospect depends on several factors, among them being the use of probiotics as an alternative to antibiotic growth promoters. That is precisely why this paper is aiming to present the influence of probiotics on the production performance in broilers reared in industrial system. The study was conducted over the course of five consecutive growth series, using the three-phase feeding technology on two experimental batches - batch A that received feed containing probiotics in commercial quantity of 550 grams per ton of feed and batch B that received conventional feed without probiotic. The values obtained at 42 days are demonstrating the beneficial effect of pro-biotic products in all used feed recipes as body weight (2908.20 ± 53.30 g), mortality (1.912 ± 0.01 %) and specific consumption (1596.98 ± 38.98 g/kg) are better in batch A which is why probiotics can be used successfully to enhance production performances of industrial produced broilers.

Key words*: broilers, production performances, probiotic.*

INTRODUCTION

Poultry production in Romania during next years should be well prepared and assess its situation and establish its priorities and build up a strategy to deal with extreme harsh competition same as other world producers. Romanian European Production Indexes and Romanian European Efficiency Indexes are guaranteeing that Romanian poultry industry is going to grow appropriately both quantitatively and qualitatively to fulfill the following objectives: Romanian poultry products should cover interne populations auto-consume; Romanian poultry products competitiveness on the world market to enable our country to balance trade balance with poultry products any import quantity and value being compensated for with compensating exports of Romanian poultry products.

The objective pursued by this strategy is raising broiler's production potential in order to obtain the desired product in as short time as possible by substantially improving technological operating conditions based on the application of specific immune-prophylaxis programs.

There are different natural or synthetically feed additives which could be used as an alternative to antibiotic growth promoters to enhance technical and economical performances (Pop, 2009). Amongst these supplements there are probiotics as they are improving production parameters - body weight, specific consumption, mortality (Weis et al., 2007; Martin et al., 2012; Nawaz et al., 2016) and cellular immune responses (Huang et al., 2004; Kabir et al., 2004). It was also proven that adding pro-biotics in diet prevents the spread of pathogens (Karaoglu and Durdag, 2005; Wondwesen et al., 2017; Mohamed et al., 2013) and that pro-biotics have the potential to modulate the composition of microbial communities in the intestines (Apata, 2008; Kabir, 2009).

MATERIALS AND METHODS

Broiler production has grown spectacularly last years as remarkable productive performances

have been acquired and feeding technology has been improved and progresses have been acquired in animal health, bio-security and welfare.

Considering the ban of antibiotics as growth promoters in animal feeds probiotics are a reasonable alternative for poultry meat production with beneficial effects for production performances and pathogens inhibition and modulation of intestinal micro flora.

However, in the literature there are conflicting data which are showing that responses from performance and microbial balance were not significantly constants (Pop, 2009; Apata, 2008).

In this regard, the goal of these researches was observing and makes a contribution as strong as possible to knowledge of pro-biotic effect on production performances to improve their usage in industrial raised broilers.

Our studies and researches were performed at S.C. Avicola Buzău S.A. which is a private owned broiler production company with Ross 308 commercial hybrid.

In this aim two experimental lots were organized - Group A receiving feeds containing a commercial pro-biotic at 550 grams for ton of feeds and Group B receiving a conventional feed without pro-biotic.

Groups have day old chicks from the same hatchery and each group had 16000 heads by cycle. Chicks came from parents of same age in order to attenuate the genetic influence on results obtained.

Experimental period was five consecutive series of growth using three-phase feeding technology.

Combined feed used in experiments was prepared according to nutritional requirement of chicks according to the experimental design.

Chicks were raised in same housing conditions according to standard technology and feed and water were provided „*ad libitum*".

During the experiment for each group bird's live weight, feed intake and live ability were monitored weekly.

Statistical data processing was performed by usual means and averages and their errors and variability were revealed and significance of difference between groups was tested by multiple Student test.

RESULTS AND DISCUSSIONS

The following results were obtained after processing the data (Table 1).

Table 1. Body weight progression in hybrid Ross 308

Specification	Group				Student (t)
	A		B		
	$\bar{X}$	$S\bar{x}$	$\bar{X}$	$S\bar{x}$	
Week 1	203.08	2.6	193.50	1.64	3.1165 *
Week 2	526.20	4.8	486.30	1.86	7.7511 **
Week 3	1030.40	24.2	980.00	14.1	1.7995 NS
Week 4	1606.50	26.1	1518.90	29.3	2.2325 NS
Week 5	2368.10	32.2	2261.90	27.8	3.2017 *
Week 6	2908.20	53.3	2620.50	33.7	4.5624 *

It is found from the analysis of the dynamics of the body weight in hybrid Ross 308 that diets based on recipes with probiotics has led to achieving higher performance compared using classic recipes.

As early as the first week we may see a growth rate differentiation in favor of feed with pro-biotic.

From analysis of the data presented in Table 1 we can see the following:

- in the first week of growth, no difference between the body weight are significant: 203.08 ± 2.60 g – at group A (fed with the diet with pro-biotic) and 193.10 ± 1.64 g – at group B (fed with the diet without pro-biotic) respectively;
- in the second week of life, the values remain with performance in favor of lot A, differences in calculating Student test being distinctly significant, (t =7.7511** 526.20 ± 4.80 g at group A and 486.30± 1.86 g at group B respectively);
- the trend is the same in the following weeks: 1030.40 ± 24.20g at group A and 980.00 ± 14.10 g at group B in third week (1.7995^{NS}), 1606.50 ± 26.1g and 1518.900 ± 29.30 g in forth week (t =2.2325^{NS}), 2368.10 ± 32.20 g, 2261.90 ± 27.80 g in fifth week (t =3.2017*) respectively and 2908.20 ± 53.30 at group A and 2620.50 ± 33.70 g at group B (t = 4.5624*) at the end of last production week.

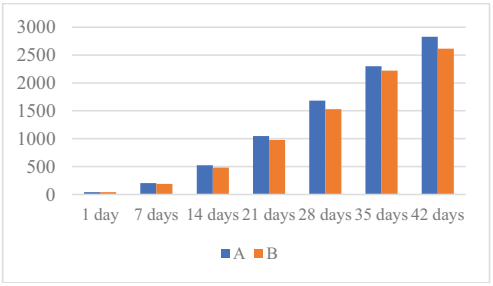

Figure 1. Body weight dynamics in hybrid Ross 308

Therefore following the results we have been able to form a picture on how rations of forage influences performance productive hens hybrid Ross 308, media weight being significantly higher when feeds were in the compound included pro-biotic

Analyzing the evolution of mortality it is observed as early as the first week of life that we have a lower mortality rate at group A. This trend is maintained throughout the period under review (Table 2).

Table 2. Evolution of the weekly mortality of hybrid Ross 308

Specification	Group				Student (t)
	A		B		
	X̄	Sx̄	X̄	Sx̄	
Week 1	0.843	0.05	1.011	0.09	1.6318 NS
Week 2	0.241	0.01	0.337	0.01	6.7884 **
Week 3	0.225	0.01	0.329	0.01	7.3541 **
Week 4	0.128	0.01	0.521	0.02	17.5760 ***
Week 5	0.244	0.04	1.091	0.06	11.7461 ***
Week 6	0.231	0.03	0.6669	0.01	13.7879 ***

In first week difference between the averages of mortalities are small and insignificant statistically (1.011 ± 0.09% at group B and 0.843 ± 0.05% at group A).

In second and third week difference between the averages of mortalities are small and insignificant statistically.

In forth week mortality at group B increases (0.521 ± 0.02%) compared to group A at which mortality decreases compared to precious weeks (0.128 ± 0.01%).

In fifth week mortality decreases at group B and difference between the two averages are very significant (1.091 ± 0.06% at group and 0.244 ± 0.04% at group A.

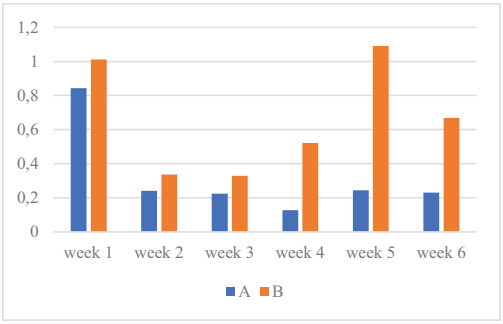

Figure 2. Weekly mortality in Ross 308 hybrid

In sixth week mortality decreases approximately by half relative to previous week at group B (0.6669 ± 0.01%) and at group A mortality still remains low (0.231 ± 0.03% t = 13.7879***)

Average weekly gain during weeks 0-6 has an evolution similar to those of body weight with a steady increase in both groups and a higher increase in forth and fifth week.

So, average weekly gain is increasing until fifth week at both groups (Table 3, Figure 3), which is the higher weekly gain registered fifth week at both groups (761.60 ± 6.75 at group A and 743.00 ± 9.81 in birds from group B).

During first week of life there are significant difference between average gains of the two groups with 165.00 ± 2.56g at group A and 155.50 ± 1.85 g at group B (t = 3.0078*).

At the end of second week difference between average weekly gains significantly in favor of group A: 322.40 ± 4.97 g compared to 292.80 ± 2.32 g (t = 5.5281*).

This trend is maintained until the age of slaughter and average gain is significantly higher in birds from group A: 504.20 ± 6.86 g compared to 493.70 ± 5.98 g in third week of life and 576.10 ± 9.72 g and 538.90 ± 8.48 g respectively in forth week and 540.10 ± 8.42 g at group A and 358.60 ± 8.41 g at group B in last week of life (t = 15.2517***).

Figure 3 is showing a fairly uniform increase of average gain until fifth week with higher performances in group A after a sudden decrease of weekly gain in last week of life

Table 3. Weekly gain evolution in hybrid Ross 308

Specification	Group				Student (t)
	A		B		
	X̄	Sx̄	X̄	Sx̄	
Week 1	165.00	2.56	155.50	1.85	3.0078 *
Week 2	322.40	4.97	292.80	2.32	5.5281 *
Week 3	504.20	6.86	493.70	5.98	1.1538 NS
Week 4	576.10	9.72	538.90	8.48	2.8839 *
Week 5	761.60	6.75	743.00	9.81	4.0814 *
Week 6	540.10	8.42	358.60	8.41	15.2517 ***

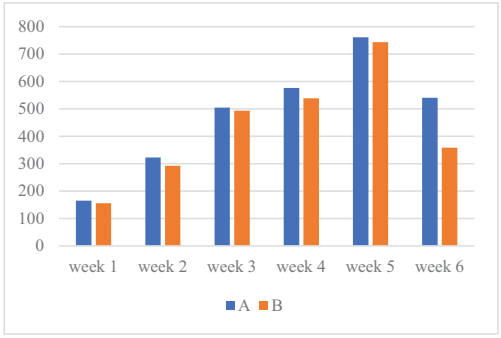

Figure 3. The average increase in weekly gain of hybrid Ross 308

In Table 4 and Figures 4 and 5 final production performances of hybrid ROSS 308 might be analyzed for the two experimental groups.

Table 4. Final production performance of hybrid ROSS 308

Specification	Group				Student (t)
	A		B		
	X̄	Sx̄	X̄	Sx̄	
Average live weight (g)	2908.20	53.30	2620.50	33.70	4.5624 *
Average daily gain (g)	68.32	1.78	61.46	1.72	2.7715 *
Cumulative Mortality (%)	1.912	0.01	3.9559	0.15	13.5962 ***
Specific consumption (g)	1596.98	38.98	1623.31	46.80	0.4326 NS
Efficiency index (points)	425.2960821		369.1510439		-

Average live weight was higher in group A (2908.20 ± 53.30 g) than in group B with an average live weight of 2620.50 ± 33.70 g.

Average daily gain was 61.46 ± 1.72 g at group B and 68.32 ± 1.78 at group A.

Results are showing that mortality is almost double at group B (3.9559 ± 0.15 %) than at group A (1.912 ± 0.01 %, t = 13.5962***).

Specific consumption recorded higher values at group B (1623.31 ± 46.80 g combined feed/1000 g gain) compared to group A (1596.98 ± 38.98 g combined feed/1000 g gain).

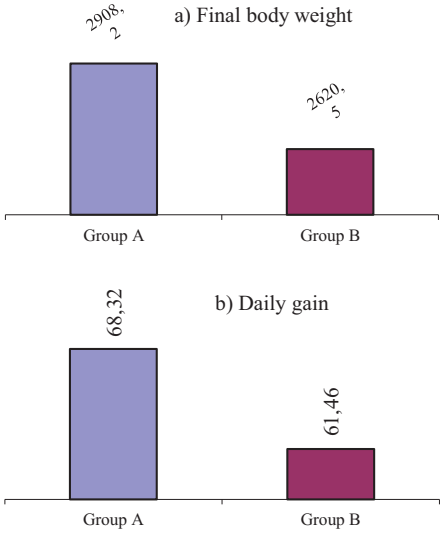

Figure 4. Final production performances in hybrids ROSS 308 (a - final body weigth, b - daily gain)

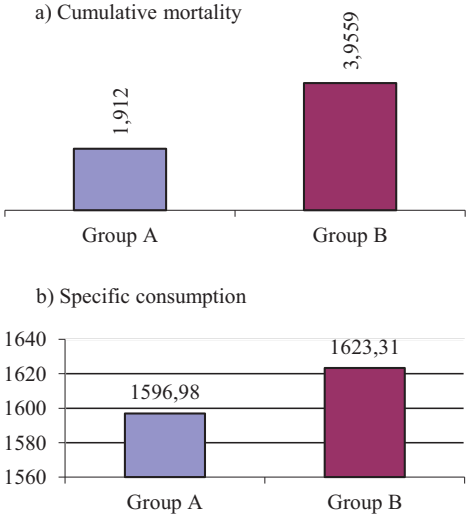

Figure 5. Final production performances in hybrids ROSS 308 (a – cumulative mortality, b – specific consumption)

CONCLUSIONS

The beneficial role of probiotic has been proven on the basis of five production parameters which allow us to draw following conclusions:

- It was demonstrated the existence of a positive correlation between providing a feed with pro-biotic and production parameters;
- weight at the end of the production cycle (42 days) was 287.7 grams higher in group receiving feed with pro-biotic (2908.20 grams) compared with group receiving classical feed (2620.50 grams);
- mortality was lower in chickens which have consumed feed with pro-biotic due to low incidence of bacterial diseases, especially infections collibacilosis due to inhibitory effect of pro-biotic on pathogen bacteria;
- average daily increase was 68.32 grams in group consuming feed with pro-biotic and 61.46 grams in the other group. This can be explained by improving the intestinal integrity, notably through the inhibition of pathogenic bacterial flora of the digestive apparatus;
- chicks consuming feeds with pro-biotic have a lower feed consumption which are decreasing production costs as feed represents a heavy part of the price cost;
- the health of offspring who ate feed with pro-biotic is clearly superior with a reduction of collibacilosis enteritis proven by the analysis bulletins performed during the experimental period as a result of the reduced incidence of digestive diseases characteristic for this category of animals.

So production parameters are superior by adding pro-biotic in broiler feed and for this reason pro-biotic might be successfully used for improving broiler production performances.

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