

ISBN 978-86-82431-73-2



11th
INTERNATIONAL
SYMPOSIUM

MODERN
TRENDS
IN LIVESTOCK
PRODUCTION

P R O C E E D I N G S

11th - 13th October 2017 - Belgrade, Serbia

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Circulation 200 copies.

The publication of this Proceedings is sponsored by the Ministry of Education and Science of the Republic of Serbia.

The Proceedings is printed by the Institute for Animal Husbandry, Belgrade, 2017

ISBN 978-86-82431-73-2



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REVIEWING THE POSSIBILITY OF THE SUBSTITUTION OF ANTIBIOTICS WITH PROBIOTICS IN DIET FOR WEANED PIGLETS

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Original scientific paper

Abstract: The effects of the use of antibiotics and probiotics in the nutrition of weaned piglets were examined. The trial was conducted on 36 piglets divided into two groups during the entire investigation period. In the first study period, a feed mixture with 20% protein was used, while in the second period, a mixture with 18% protein. The first group, control, was fed with mixtures containing antibiotics in the amount of 0.2%, while the experimental group was fed with mixtures containing probiotic in the concentration of 0.03%. The obtained results showed that the use of probiotics, instead of antibiotics, resulted in the increase of gain by 4.09%, as well as food conversion ratio by 5.37% during the entire research period, while the cost was reduced by 6.48% per kilogram of gain.

Key words: piglets, nutrition, probiotic, antibiotic, production results

Introduction

In the last ten years, in the nutrition of domestic animals, there has been an indication of the negative consequences of the use of antibiotics in the diet of domestic animals. There is a legal pressure that is constantly growing to stop feeding animals feeds containing low levels of antibiotics as additives. Antimicrobials, when used as growth promoters, improve the daily gain by 3-9% and food utilization by 2-7%. For these reasons, they are commonly used even in farms with a high health status.

One of the first definitions of probiotics is that they are organisms and substances that contribute to the maintenance of intestinal microbial balance - eubiosis (*Sperti, 1971*). When using the probiotics, effects similar to antibiotics can be achieved, while avoiding possible side effects (residues, withdrawal, resistance, allergies, genotoxicity, etc.). They can increase their gain by stimulating the animal's immune system, and thus increase resistance to infectious agents. In addition, the disadvantage of antibiotics is that it takes longer, 5-10 days from the beginning of consumption, before their action starts.

In view of the increase in restrictions on the use of antibiotics as growth stimulants, more attention is directed to the use of alternative stimulants, such as probiotics that have a positive impact on animal health (*Reuter, 1997; Sinovec, 2001*).

The mechanism of probiotic action has not been sufficiently clarified to date. *Fuller et al. (1984)* consider that probiotics act similarly to normal intestinal microflora: neutralize toxins, suppress microflora growth, compete with adhesive sites, cause metabolic disorders of other bacteria, stimulate immunity, produce vitamins, and restore normal intestinal microflora after antibiotic therapy.

Several studies have shown that average daily gain and food conversion ratio are significantly improved after treatment with probiotics (*Živković et al., 2004; Živković et al., 2006*). The final effect according to *Kalivoda (1983)* is a better use of food, increase of the gain, improvement of the meat, fat and water, milk and fertility ratios, etc. The aim of this paper is to evaluate the ability of probiotics to act as a substitute for antibiotic growth promoters in respect to health and productivity of weaned piglets.

Material and methods

The trial included 36 pigs of the same bred composition (F1) distributed in two feeding treatments (Table 1). Immediately after the piglets were weaned, on the basis of uniform initial weight, they were distributed to experimental groups, taking into account that in each group the sex ratio is the same. In the initial period of the experiment, animals were fed during 27 feeding days, with a starter mixture containing 20% of the crude protein, and in the final period of the experiment, which lasted 16 feeding days, the meals were formulated to contain 18% of the crude protein (grower).

The first group of piglets, control, was fed with mixtures based on the use of antibiotics, and the other group of piglets with mixtures where instead of antibiotics Digestarom for piglets was included at a concentration of 0.03% of the diet (Table 1). Food and water were *ad libitum*.

Table 1 . Composition of diets for weaned piglets in the trial

Group	Starter, Day 30-56		Grower, Day 57-72	
	%	%	%	%
	1 (control)	2 (trial)	1 (control)	2 (trial)
Probiotik Digestarom	+	-	+	-
Antibiotic Neodox	-	+	-	+
Crude protein, %	20.0	20.0	18.0	18.0
	%	%	%	%
Maize	42.3	42.47	-	-
Amiloproteks*	-	-	63.8	64.07
Barley	15.0	15.0	15.0	15.0
Triticale	-	-	5.0	5.0
Milk replacer	3.0	3.0	-	-
Ekofiš meal	5.0	5.0	3.0	3.0
Soybean meal	23.5	23.5	7.0	6.9
Oil	1.0	1.0	1.0	1.0
Premiks 1	10.0	10.0	-	-
Premiks 2	-	-	5.0	5.0
Antibiotic - Neodox	0.2	-	0.2	-
Digestarom	-	0.03	-	0.03
Total:	100.0	100.0	100.0	100.0
Din/kg	42.05	41.75	33.91	33.59

*Amiloproteks is mixture of maize and full fat soybean, in ratio 70:30, heat treated prior to mixing into diet

During the research period, the following production indicators were monitored: body weight, average daily gain, average daily food consumption, food conversion, by trial periods, and economic justification for the introduction of Digestarom over the kilogram of piglets gain in the trial. One-way analysis of variance was performed using the SPSS 20.0 software (IBM SPSS Statistics, Version 20, IBM Corp., USA).

Results and discussion

In the first period of the experiment, during feeding by a starter mixture, the control group of piglets achieved an average daily gain of 268 g (Table 2). The introduction of Digestor instead of antibiotics in the mixture has led to a

deterioration in the gain, on average by 27 g or 10.08% compared to the control group of piglets. Somewhat lower food consumption per feeding day, by 0.023 kg or 4.84%, was achieved by the piglets of the experimental group. The use of Digestor in the mixture, caused the food conversion to deteriorate by 0.10 kg or 5.65% in relation to diet with a mixture based on antibiotics.

Table 2. Production results in piglets in the initial research period

<i>Group</i>	<i>1 (control)</i>	<i>2 (trial)</i>
Initial body weight of piglets, kg	9.77	9.63
Final body weight of piglets, kg	17.02	16.12
Trial duration, days	27	27
Average daily gain, g	268	241
Index, %	100.00	89.92
Average daily food consumption, kg	0.475	0.452
Index, %	100.00	95.16
Feed conversion ratio, kg	1.77	1.87
Index, %	100.00	105.65

Unlike the first trial period, in the final part of the experiment, when grower mixture was used, the the experimental group achieved on average by 81 g or 24.25% higher gain compared to piglets fed the mixture in which the antibiotic was incorporated. In addition to better gain, the second group consumed on average by 0.016 kg or 1.97% more food and had lower food conversion ratio compared to the control group of piglets (Table 3).

Table 3. Production results in piglets in the final research period

<i>Group</i>	<i>1 (control)</i>	<i>2 (trial)</i>
Initial body weight of piglets, kg	17.02	16.12
Final body weight of piglets, kg	22.36	22.76
Trial duration, days	16	16
Average daily gain, g	334	415
Index, %	100.00	124.25
Average daily food consumption, kg	0.813	0.829
Index, %	100.00	101.97
Feed conversion ratio, kg	2.43	2.00
Index, %	100.00	88.30

During the entire research period, piglets fed diet with the addition of antibiotics Neodox achieved average daily gain of 293 g, food consumption of 0.601 kg and feed conversion ratio of 2.05 kg per kilogram of gain (Table 4). The introduction of the tested Digestar instead of antibiotics led to improvement of gain on average by 12 g or 4.09%, decrease in food consumption by 0.09 kg or 1.50% on average, and improvement in food conversion on average by 0.11 kg or 5.37 %

relative to the control group fed the mixtures in which the Neodox antibiotic was used.

Table 4. Production results in piglets for total research period

<i>Group</i>	<i>1 (control)</i>	<i>2 (trial)</i>
Initial body weight of piglets, kg	9.77	9.63
Final body weight of piglets, kg	22.36	22.76
Trial duration, days	43	43
Average daily gain, g	293	305
Index, %	100.00	104.09
Average daily food consumption, kg	0.601	0.592
Index, %	100.00	98.50
Feed conversion ratio, kg	2.05	1.94
Index, %	100.00	94.63

Table 5. Economic analysis of the use of Digestar during the entire research period

<i>Group</i>	<i>1 (control)</i>	<i>2 (trial)</i>
Value of the food, din/kg	37.95	37.50
Value of the food, %	100.00	98.81
Food conversion, kg	2.05	1.94
Food conversion, %	100.00	94.63
Cost of gain of weaned piglets, din/kg	77.79	72.75
Cost of gain of weaned piglets, %	100.00	93.52

Table 5 gives indicators of the economic justification for the introduction of Digestar into mixtures for weaned piglets. Using the tested additive, on the basis of consumed food, the price of food is reduced by 0.45 dinars or 1.19%, and with better food conversion, the price of piglets that consumed Digestar was more favorable by 5.04 dinars or 6.48% compared to the control group. Statistical analysis showed that there were no statistically significant differences in the use of these two diets. In the case of weaned piglets, positive effects of probiotic compared to antibiotics were noted by *Garcia et al. (2003)*, *Parrot and Rehberger (2004)*, *Lawrence (2005)* and *Estienne et al. (2005)*. Similar to these results, the addition of probiotics showed an improvement in the gain (*Yang et al., 1998*; *Burnham et al., 2004*), as well as food conversion (*Yang et al., 1998*).

The overall results obtained showed that it was recommended that Digestrom be used as a substitute of Neodox antibiotics in mixtures for weaned piglets.

Conclusion

The obtained results showed that the introduction of the examined Digestar in diets had following effects:

- lower gain by 10.1%, and unfavorable food conversion, by 5.65%, in piglets during the initial period of trial,
- in the second, final, period increase of gain by 24.2% and more favorable food conversion by 17.7%,
- during the entire trial period, Digestar additive showed positive effects on the gain, which was better by 4.09%, and the conversion of food was more favorable by 5.37% compared to the group of piglets fed with mixtures based on antibiotics,
- The Digestar in the mixture showed positive effects on the price of piglets growth which was more favorable by 6.48% compared to this indicator realized when animals were fed mixtures in which the Neodox antibiotic was incorporated.

Istraživanje mogućnosti aplikacije probiotika umesto antibiotika u ishrani zalučene prasadi

Vladimir Živković, Branislav Stanković, Bogdan Cekić, Miloš Marinković, Saša Obradović, Marija Gogić, Čedomir Radović

Rezime

Ispitivani su uticaji korišćenja antibiotika i probiotika u ishrani zalučene prasadi. Ogljed je sproveden na 36 prasadi podeljenih na dve grupe tokom celog perioda istraživanja. U prvom periodu istraživanja korišćena je smeša hraniva sa 20% proteina, dok je u drugom korišćena smeša sa 18% proteina. Prva kontrolna grupa je hranjena smešama sa antibiotikom u količini od 0,2%, dok je ogledna grupa hranjena smešama sa probiotikom u koncentraciji od 0,03%. Dobijeni rezultati su pokazali da korišćenjem probiotika, umesto antibiotika, dolazi do poboljšanja prirasta za 4,09%, kao i konverzije hrane za 5,37% u toku celog perioda istraživanja, dok je cena koštanja smanjena za 6,48% po kilogramu prirasta.

Ključne reči: prasad, ishrana, probiotik, antibiotik, proizvodni rezultati

Acknowledgement

Research was financed by the Ministry of Education, Science and Technological Development of Republic of Serbia, Project TR 31081.

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