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PROBIOTIC *FARM PACK Y* IN FEED FOR SOWS AND PIGLETS: EFFECT ON INITIAL PIGLET'S BODY WEIGHT

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The intensive production of healthy and high value food of animal origin, sets the high recommendation for animal husbandry and industry of the animal food. Maximal demonstration of animal's performance can be attained only by balanced feed and preserved health status. Therefore, some pronutritive materials are added in the animal feed. The most used group of additives in swine production, for the last decade, is the group of probiotics. Probiotics use physiological mechanism of health animals for stimulating the growth, but for preserving the normal health status, too, by working against pathogens in the small intestine. The aim of this study was to evaluate the effect of the probiotic *FARM PACK Y* to performance and health status, at late pregnancy and lactation in sows, and in the suckling period for piglets. The experiment was carried out at 30 sows and their litters, which were allocated into three groups, according to different concentrations of probiotic. The results of this study showed that the initial piglet's body weight was higher at the groups with applied probiotic in their feed.

Key words: probiotic; sows; suckling piglets; morbidity; mortality

ПРОБИОТИКОТ *FARM PACK Y* ВО ИСХРАНАТА НА МАТОРИЦИ И ПРАСИЊА: ЕФЕКТ ВРЗ ПОЧЕТНАТА ТЕЛЕСНА МАСА НА ПРАСИЊАТА

Интензивното производство на здрава и висококвалитетна храна од животинско потекло поставува високи критериуми за одгледување на домашни животни, како и за индустријата на храна за домашни животни. Максималното постигнување на перформансите на животните може да се постигне само со балансирана исхрана и зачуван здравствен статус. Затоа во животинската исхрана се додаваат некои пробиотски материи. Групата на адитиви кои се најмногу користени во продукцијата на свињите во последната декада е групата на пробиотици. Пробиотиците го користат физиолошкиот механизам на здравите животни за стимулирање на растењето, а во исто време го штитат нормалното здравје дејствувајќи против патогените во тенкото црево. Целта на студијава беше да се прикаже ефектот на пробиотикот *FARM PACK Y* врз перформансите и здравствениот статус за време на касната спрасност и лактацијата кај маториците, а во дојниот период кај прасињата. Во експериментот беа вклучени 30 маторици и нивните легла, кои беа поделени во три групи, зависно од различната концентрација на пробиотикот. Резултатите од оваа студија покажуваат дека почетната телесна маса на прасињата беше повисока кај групите со вклучени пробиотици во нивната исхрана.

Клучни зборови: пробиотик; маторици; дојни прасиња; морбидитет; смртност

INTRODUCTION

Many investigations have been provoked with the ban of the European Union for the use of antibiotics, as growth promoters, from 1st January, 2006, onwards, to find alternatives without antibiotics sides' effects, such as resistance, genotoxic effects, and presence of residua in the food of animal origin. In the large group of growth promoters, probiotics became the most used so called "alternatives to antibiotics".

The most recent definition for probiotics is that probiotics are live microbial cell preparations or microbial cell components with a positive effect on health and performance of the microorganism, by improving its intestinal balance (Fuller, 2005). Even the concept of probiotic is linked with Ilija Mechinkov, who proposed that bacteria in the fermented milk product may be capable to control bacterial fermentation in the human intestine, over the years the concept of probiotic has been applied in animal nutrition, as well. Havenaar et al. (1992) were the first who applied the concept of probiotic in animals, too.

The benefits claimed for probiotics in animal nutrition are improved health status and performance, with increasing growth rate, improving feed conversion and improving the resistance to disease. Thus, probiotics play their role in microorganism through sanitary and nutritional effects. Probiotics reduce metabolic reactions that produce toxin, stimulate indigenous enzymes, such as protease in the small intestine (Keuzer, 1994), and stimulate production of vitamins (K vitamin) and antimicrobial substances.

They also increase colonization resistance, via competitive inhibition (Sinovec et Šefković, 1998) with pathogens for gut surface adhesion or for nutritional compounds, and stimulate the immune response, via increasing local (IgA) or systematic antibody (IgG, IgM) and response of the lymphocyte population. Probiotics have the key role in balancing the gut microflora, which is a very complex ecosystem. The quality and proportion of micro-organisms in the gut are relatively constant and typical for the particular periods of life of individual. It can be changed, depending on the consumed feeds, or feed additives (Rekiel Anna et al., 2005). If sterile piglets gut is colonized with beneficial microflora, either through faeces of mothers, or through oral administration of proboitic supplementation in the suckling period, positive effect can be expected in lower diarrhea score (Jurgens, 1997; Karput et Pudenko, 1996; Hadani et al., 2002; Lazaro et al., 2005; Stamati et al., 2006), higher number of weaned piglets/litter (Taras et al., 2005; Zeyner and Boltd, 2006; Milanović Valentina et al., 2009), higher daily weight gain (Tortuero et al., 1995; Alexopoulos et al., 2001; Stamati et al., 2006; Zeyner and Boltd, 2006) and higher piglets body weight at weaning (Alexopoulos et al., 2004, Milenković et al., 2009).

The aim of this study was to evaluate the effect of the probiotic *FARM PACK Y*, administrated through food at late pregnancy and lactation in sows, and in the suckling period to their piglets, on their health status and performance.

MATERIAL AND METHODS

Thirty sows, crossbred (Large Yorkshire × Swedish Landrace), and their litters were used to determine the effect of food additive probiotic *FARM PACK Y*, added to conventional diets. Pregnant sows (II-VII parity), were inducted to the experiment at the 100th day of gestation. They were allocated in three equal groups, as it follows:

– C group – no treatment;

– O_1 group – fed with probiotic, added in a diet in a dose of 1 kg per ton of feed;

– O_2 group – fed with probiotic, added in a diet in a dose of 2 kg per ton of feed.

Probiotic supplementation started at 100th day of gestation, and terminated at weaning, at 28th day after farrowing.

Piglets from their litters were allocated in three groups, according to the mothers group, so piglets in C group were without the treatment, piglets in O_1 group with probiotic supplementation in a dose of 0.1% and in O_2 group with probiotic supplementation in a dose of 0.2%. Probiotic was applied from 5th day of age, till weaning, at 28th day of age.

This experiment had been taken at an industrial farrow-to-finish farm, "Halovo", near by the city Zaječar, in Eastern Serbia. Pregnant sows were housed in the gestation house, at the start of the trial, when they're allocated to the farrowing house, each in the individual pen. The conditions were equal for all groups, including the temperature (18–22ºC, and for litters 28–36ºC) and relative humidity of the air (70–80 %), but the only difference was in probiotic supplementation.

The dams were fed with mixed feed for pregnant sows in the amount of 3.5 kg/sow/day, and lactating sows were fed with diets for lactating sows, ad libitum. Diets were based on corn, wheat and soybean meal (Table 1), according to recommendation of NCR. Piglets were fed with mixed feed for suckling piglets, mainly consisting of corn, soybean meal, wheat, milk replacer, minerals and vitamins, ad libitum, from 5th day of age.

Sows and piglets had free access to water via nipple drinkers, and to food, in separate feeders.

The experimental substance was probiotic *FARM PACK Y*, based on the microbial species *Lactobacillus acidophilus*, *Bacillus subtilis* and yeast *Saccharomyces cerevisiae*, applied into feed mixtures, which were prepared in the feed mill, at this farm.

Table 1

Chemical compounds of the mixed feed

Content of nutritional materials, %	Value in sample		
	Diet for pregnant sows	Diet for lactating sows	Diet for suckling piglets
Total solid contents	85.16	85.27	74.27
Moisture	14.84	14.73	25.63
Protein	15.23	16.05	20.08
Lipids	3.56	4.53	5.02
Cellulose	4.82	4.56	3.25
Ash	4.55	4.68	6.01
Nitrogen-free extract	49.15	48.28	47.80
Total	100.00	100.00	100.00
Ca, g/kg	6.53	6.57	6.68
P, g/kg	4.33	4.51	5.62
Lysine, %	0.63	0.70	1.86
Methionine, %	0.25	0.27	0.47
Tryptophan, %	0.26	0.26	0.22
ME MJ/kg	12.93	13.10	11.50

The recorded data for piglets, for this trial were the number of piglets born alive or dead, morbidity, mortality, the number of weaned piglets, the initial body weight, the body weight at weaning, the daily weight gain, the feed intake and feed conversion ratio for the suckling period. Data were analyzed statistically, with the software package Statistica 6.0.

RESULTS AND DISCUSSION

The average initial body weight was higher for 3.85 % in the O_1 group of piglets, compared with the C group, and 11.01 % in the O_2 group, compared with the C group (Table 2.).

Even the number of totally born piglets/litter was higher in the C group, the initial body weight was lower and less homogeny, compared to probiotic groups, which had more equal initial body weight within the litter.

Table 2

Litter performance parameters

Parameters	Experimental groups of piglets		
	C	O_1	O_2
Number of piglets totally born/litter	11.3	10.8	10.8
Number of piglets born alive/litter	9.7	9.8	9.7
Number of piglets born dead/litter	1.6	1.0	1.1
Number of sick suckling piglets	3.6	1.5	0.8*
Number of dead suckling piglets	0.9	0.5	0.5
Number of weaned piglets/litter	8.8	9.3	9.2
Initial piglets body weight	1.460	1.537	1.643
Piglets body weight at weaning	6.727	7.010*	7.602**
Average daily weight gain	5.247	5.473*	5.959**

*Means differ significantly ($P < 0.05$)
**Means differ very significantly ($P < 0.01$)

According to available literature, those data are very variable. Even in some studies there were no differences in the initial piglet's body weight (Jurgens et al., 1997; Živković et al., 2006), results from other studies showed the opposite. Probiotics applied in the late pregnancy at sows could influence higher initial body weight at piglets (Lazaro et al., 2005) and could make a significant increasing of initial body weight (Stamati et al., 2006).

The initial body weight is responsible, in a great deal, for surviving and losses in the suckling period. Losses of piglets with initial body weight lower than 1 kg were about 55 – 100 %, with initial body weight of 1.2 – 1.6 kg were 20 % and with initial body weight of 1.8 – 2.0 kg were only 10 % (Kalich, 1970). Piglets with lower initial body weight had higher risk to survive, compared with heavier piglets (Miligan et al., 2002). Higher initial body weight is in correlation with daily weight gain during the suckling period (Quinon, 2001), and consecutively, with higher body weight at weaning (Alexopoulos et al., 2004; Milenković et al., 2009) and lower morbidity and mortality (Pupavac Snježana et al., 2000; Alexopoulos et al., 2001; Lazaro et al., 2005; Stamati et al., 2006).

CONCLUSION

Probiotic *FARM PACK Y*, administrated to sows and their litters, had shown positive effect on the initial body weight at piglets, which was resulted in significantly higher piglets body weight at weaning, and a higher number of piglets in probiotic groups, at weaning. The improved performances led to a positive conclusion about probiotic's usage and to continuing the investigation about the adequate dose and microbial species for probiotic, which could be applied to farm animals.

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