

PROBIOTIC BIOPLUS 2B EFFECT ON SOWS PRODUCTIVITY AND PIGLETS WEIGHT

Degola Lilija^{1*}, Bula Sanita¹

¹Latvia University of Agriculture, Jelgava, Latvia

Abstract

Sustainable, environmentally friendly manufacturing strategy, which guarantees a secure, safe food production, is very important worldwide, so the increasing popularity of bio-derived and integrated farming methods is growing. That was the reason of antibiotics prohibition as growth promoters, which were long time used as a feed additive. Antibiotic prohibition in Latvia came into validity on 1st of January 2006. Scientists in both Europe and the world intensely focused on new livestock production strategies up to resolve issues that require antibiotics instead. Nowadays biotechnology generated a lot of new feed additives, which can ensure good health and productivity of sows. They can be divided into five groups: organic acids or acidifiers, enzymes, probiotics (beneficial microorganisms), prebiotics (nutrients for desired flora), immune system stabilizing agents and plants extracts, vegetable oils. The aim of the research was to evaluate the influence of probiotic BioPlus 2B on the weight loss of sows during lactation, piglet's weight and insemination frequency of sows. A total of 126 sows from two weeks before farrowing to weaning from commercial pig farm SIA "Korkalns", Rudbarži region, were used for the research. The sows were split into two groups: the trial group was given probiotic BioPlus 2B supplemented feed, and the control group was given non-supplemented feed. The trial was performed in three replications. The results showed that the live weight loss of sows was 42.1 ± 1.78 kg (16%) in the control group, but in the trial (probiotic) group 21.3 ± 1.42 kg (7.8%). The difference of live weight loss of sows was significant ($p < 0.05$). The higher feed intake (6.6 kg per day) of the sows in the probiotic group resulted in smaller live weight loss. The feed intake of the control group sows was 5.6 kg per day. Although insemination of sows in the control and experimental groups followed on the 4th – 5th day after weaning piglets, comparatively more sows needed re-insemination in the control group – 22 sows or 36% of the total number of sows, but of the trial group, 13 or 20.0% were re-inseminated. Number of weaned piglets increased by 7.5% and weaned piglets litter live weight was significantly higher in trial group ($p < 0.05$).

Key words: probiotic, sows, live weight, weaned piglets

INTRODUCTION

Scientists in both Europe and the world intensely focused on new livestock production strategies up to resolve issues that require antibiotics instead.

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Nowadays biotechnology generated a lot of new feed additives, which can ensure good health and productivity of sows. They can be divided into five groups: organic acids or acidifiers, enzymes, probiotics (beneficial microorganism), prebiotics (nutrients for

desired flora), immune system stabilizing agents and plants extracts, vegetable oils.

The removal of growth-promoting antibiotics from animal feeds has led to big interest in the use of live microbial cultures - probiotics as growth promoting agents, in addition to their current involvement in the control of enteric disease. The intestinal micro flora of the pig is, in itself, capable of resisting the establishment of certain intestinal pathogens [1] and it has often been shown that certain lactic acid bacteria within the pig intestinal micro flora possess an inhibitory activity towards coliform pathogens, and that the addition of large numbers of these bacteria to the porcine microflora in vitro results in a consistent and

*Corresponding author: lilija.degola@llu.lv

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reproducible increase in the rate of removal of the pathogen [2].

Probiotics are live cultures of organisms supplemented in pig diets that can beneficially affect the host animal by improving the microbial balance in the gut. Organisms commonly used include *Lactobacillus acidophilus*, *Enterococci faecium*, *Bacillus species*, *Bifidobacterium bifidum*, and the yeast *Saccharomyces cerevisiae*. As feed additives, they are supplemented in diets to improve the balance of bacteria in the gut. To be effective, a probiotic must have the following traits:

- Stability and ability to survive in feed.
- Ability to replicate after passage through the stomach.
- Ability to block the effects of harmful microorganisms or excrete metabolites that can inhibit growth of harmful bacteria. The proposed benefits from probiotics are improved digestion, stimulation of gastrointestinal immunity, and increased resistance to infectious diseases of the gut. Another possible mechanism by which a probiotic may exert its beneficial effect is through its effect on the permeability of the gut, which may increase nutrient uptake and thus improve growth performance [3].

The aim of this research was to evaluate the influence of probiotic BioPlus 2B on the weight loss of sows during lactation, piglet's weight and insemination frequency of sows.

MATERIAL AND METHODS

The research was carried out in the Latvia, district of Liepaja, Ltd. Korkalns full-cycle pig farm, which specializes in breeding and realization of gilts. On the 1st of January 2010 in farm had been inseminated 2395 sows.

The previous year was obtained 2427 litters with the total number of 27 727 piglets. The average number of piglets per litter was 11.42 from which 10.38 born alive. The average indices of Landrace breed in state of last year was, respectively, 11.2 and 10.5. Number of litters weaned on 2009 was 2351 with the total 22 308 piglets, and weaned an average of 9.49 per litter.

Sows in groups consisted of pregnant sows. Fourteen days before farrowing sows were weighted and moved into individual farrowing pens where sows were stayed till the end of the lactation period (28 days). The animals were divided into control and trial groups, each of 21 sows, similar by age, live weight and number of piglets on previous litters. In trial, only Landrace pig breed sows were used. Effects of probiotics estimated at the end of farrowing and suckling period of sows (42 days total). The trial was performed in three replications. Housing conditions were similar. Feeding technology was the same for all sows in the group. Drinking water was freely available free from automatic water bowls.

The control group received a lactating sow feed. The trial group of sows was fed with the same basic ration plus the probiotics were added (400 g BioPlus 2B to ton of feed). Both groups were fed *ad libitum*. Total amount of feed consumed in sows groups were recorded.

Nutritional support: 13.2 MJ ME kg⁻¹, 160g kg⁻¹ crude protein, 7.7g kg⁻¹ lysine, 5.7g kg⁻¹ methionine + cystine, 19g kg⁻¹ crude oils and fats, 39 g kg⁻¹ crude fiber, macroelements, microelements and vitamins, according to the requirements of sows. The active ingredients of the BioPlus 2B were 1.3×10^9 CFU kg⁻¹ strains of the *B. licheniformis* and *B. subtilis*. They have been isolated from soybean fermentation products and soil. The bacterial spore form is highly protected and becomes an active form when the environmental conditions are optimal – in gastro-intestinal tract of sow [6, 7].

To estimate the effect of probiotics on sow productivity, we recorded indicators: live weight of lactating sows was determined at the end of the lactation, each sow was weighted and live weight changes were calculated, litter size were recorded, number of piglets born alive and number of weaned, weaned piglets litter live weight, the number of lactation days, the mortality of piglets before weaning. The live weight was calculated by one piglet at the end of suckling period and also the sow's insemination results were recorded.

RESULTS AND DISCUSSIONS

Pathogenic bacteria competition principle with the preferred bacteria is well known as probiotics principle. Probiotics for animal nutrition is a live micro-organism in feed additives that promote and maintain intestinal micro-balance. Pig production affects the intestinal tract causing micro-balance of diarrhoea, especially in healthy piglets; it can be reduce the exploitation and conservation. Modern animal housing conditions and micro-organisms in pigs digestive tract continuously beneath the pressure to the potential pathogenic bacteria's and balanced supply is practically impossible [5]. When a change in external conditions will occur, such as stress or a change of feed composition, this balance may be upset and potential pathogenic bacteria begin to dominate in some harmless digestive tract compartments. When such stressed sows move from the pregnant pig groups to individual farrowing pens, they rapidly lose weight during lactation. This cause diarrhoea, change milk composition and make sufferings suckling piglets by decreasing growth rates, a worsening health condition and may increase the mortality rate [5].

Sows enhanced intestinal micro-balance prevent the appearance of diarrhoea. Intestinal flora has a direct and indirect impact on the following active functions: a short-chain fatty acids and vitamins, depleting undigested nutrients, keep intact intestinal epithelium, stimulates an immune response in protecting against pathological microorganisms. One of the most important tasks of this research was to evaluate the probiotic BioPlus 2B effects on live weight loss reduction of sows during lactation piglet (Table 1).

Weight loss of sows during lactation in trial group differed significantly ($p < 0.05$) from the control group, although a trial group sows also lost weight during lactation, but

almost two times less than the sows in the control group. A trial group of sows consumed more feed than the control group. The higher feed intake (6.6 kg per day) of the sows in the probiotic group resulted in smaller live weight loss. The feed intake of the control group sows was 5.6 kg per day.

Increased feed consumption improved sows prevailing conditions and slightly reduced the incidence of re-insemination compared with the control group. Dry periods of sows were not significantly different 4.5 ± 0.14 and 4.6 ± 0.1 , in control and trial groups, respectively. The twenty two sows of control group were re-inseminated and thirteen in trial group, which was respectively 36% and 20% of total number of sows.

Probiotic additive showed beneficial effect not only on the sows live weight, but also had influence to the piglet health, which increase piglet growth and development. Number of piglets weaned in litter increased by 7.5% and was significantly higher weaned piglets litter live weight in trial group ($p < 0.05$) (Table 2). The results in the literature agree with our study, where significantly increased litter size by 8% and mortality of suckling piglets decreased from 12% to 7% [4]. The same results reached scientists in Denmark where they have very positive effects especially on sows on liquid feed diets. The application of abundant viable probiotic bacteria have resulted in an increased appetite and a better feed uptake for the sow giving: better and successful farrowing, resulting in fewer stillborn or enfeebled piglets, more milk during the first weeks of lactation, more uniform litter at weaning and greater number of weaned piglets.

Piglet mortality decrease could be explained by an increase in piglet immunity and lower diarrhoea occurrence.

Table 1 Weight changes of sows during lactation

Traits	Control group n=63	Trial group n=63	± with control group
Live weight at the beginning of trial, kg	264.3 ± 4.09	271.3 ± 4.86	+ 7.0
Live weight at weaning of piglets, kg	222.1 ± 3.88*	250.0 ± 4.92*	+ 27.9*
Weight loss, kg	-42.1 ± 1.78*	-21.3 ± 1.42*	-20.8*
% of the live weight at the beginning	16.0	7.8	-

* $p < 0.05$

Table 2 Productivity traits of sows

Traits	Control group n=22	Trial group n=22
Litter size, piglets	12.0±0.64	12.2±0.47
Number of piglets born alive, piglets	11.5±0.63	11.9±0.49
Stillborn piglets, %	4.1	2.5
Number of weaned, piglets	9.8±0.50	10.6±0.39
Litter weight at weaning, kg	80.0±2.80*	86.8±2.64*
Weaned piglet weight, kg	8.16±0.24	8.96±0.12
Suckling days	27.0	27.5
Piglet mortality, %	14.8	10.9

*p<0.05

CONCLUSIONS

1. As feed additive, Probiotics BioPlus 2B, significantly ($p < 0.05$) reduced sows live weight loss during lactation. A trial group of sows lost weight about two times less than the sows in the control group. A trial group sows consumed more feed than the control group.

2. Number of repeated insemination cases decreased. The twenty two sows of control group were re-inseminated and thirteen in trial group, which was respectively 36% and 20% Dry period after weaning, did not differ significantly between control and trial groups, 4.5 ± 0.14 and 4.6 ± 0.1 , respectively.

3. Number of weaned piglets increased by 7.5% and weaned piglets litter live weight was significantly higher in trial group ($p < 0.05$).

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