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Zoo-Hygienic Substantiation Of The Effect Of The «NIST» Enzyme Preparation On The Intestinal Microflora Of Pigs.

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ABSTRACT

On the basis of the carried studies, it was established that high-temperature fermentation of the half grain feeds by the multienzyme preparation "NIST" according to its requirement for the sows and pigs ration during weaning and fattening for a long period has a positive effect on the quantitative and qualitative composition of the large intestine microflora, promoting an increase in the number of lactic acid bacteria and helps to the growth of pathogenic and opportunistic microflora.

Keywords: multienzyme preparation, fermentation of grain feeds, microclimate, microflora of the large intestine.

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INTRODUCTION

Enzyme preparations are substances that break down the nutritional ingredients of the feed of high molecular nature (starch, proteins, lipids) to easily digestible components, supplementing the enzymes of the gastrointestinal tract, and after performing their function in the digestive tract, they, being proteins, decompose as well as feed proteins, without accumulating in the body of animals. So, A. W. Jongbloed et al [11] in his research proved a complete breakdown of the phytase in the animal organism, which was already absent in the ileum of the small intestine.

The need for the use of enzyme preparations in feeding pigs is due to the imperfection of the enzyme system of the digestive organs in monogastric animals, and the content of hard-to-digest ingredients in grain feeds that reduce the digestibility of nutrients. They are also effective in violation of the enzymatic functions of the gastrointestinal tract in animals as a replacement therapy [4, 10, 14]. In the digestive tract of monogastric animals there are no enzymes that would break down cellulose, hemicellulose, lignin, pectin, salts of phytic acid, and other anti-nutrients [12, 8], where the main representatives of this group are pentosans (arabins and xylans), hexosans (cellulose, (β-glucans, manans, galactans), pectins, lignin contained in wheat, rye and triticale, barley, legumes [5, 23]. Non-starchy polysaccharides are characterized by high viscosity, as a result of which in the digestive tract of animals feed increases to significant volumes, causing a false sense of saturation, regardless of the caloric content of food, disturbed intestinal motility and slowing the rate of passage of food through the gastrointestinal tract, which ultimately leads to excessive reproduction of pathogens and suppression of normal intestinal microflora [22]. One of the ways to eliminate this factor is the use of enzyme preparations in animal feeding, which helps to reduce the body's vital products and normalizes the bowel [21, 16].

The use of enzyme preparations for piglets of early age is most justified, since the enzymatic system of the digestive tract is mainly adapted for digestion of mother's milk [8, 9]. M. D. Lindeman et al [15], using the enzyme preparation Vegpro, said best score in growing pigs 26-63 kg, from 63 to 109 kg the efficiency of the use of the drug declined. Partridge [17, 18] with the addition Ofporzyme enzyme preparation, the average daily gain was increased by 5% and the conversion rate was improved by 4.5%. A. L. P. De Souza [6] found that the addition of the enzyme preparation Vegpro in the feed of pregnant and suckling sows, contributed to an increase in digestibility and digestibility of nutrients feed.

Based on the data of the literature, the question of the duration of the enzyme preparations, as well as their impact on the intestinal microflora of pigs, based on this, the aim of our work was to study the effect of the enzyme preparation "NIST" on the body of pigs in General, and on the intestinal microflora in particular, for a long time.

MATERIALS AND METHODS

The experiments were conducted on 10 pigs of large white breed in the conditions of the farm OOO«Agricultural firm VAMIN-bua»Buinsky district of RT, divided into two groups: the first control and the second experimental 5 goals each. At the age of 10 months, pigs weighing 120 kg were inseminated. The experiment on animals lasted during the pregnant and suckling period in sows, and in offspring – from birth to slaughter. During the experiment, sanitary and hygienic inspection of livestock premises was carried out, as well as microbiological studies of samples of intestinal contents in experimental animals.

Animals of both groups received a diet according to generally accepted norms [1]. Animals of the second experimental group were subjected to high-temperature fermentation of half of the grain feed, and the control-50% of the grain feed was subjected to all technological processing, but without the introduction of enzymes.

The technological process was as follows: the feed was filled with hot (55-60°C) water in an amount of 600 liters per 1 ton of the required feed, where 1.5 kg of the drug was added per 1 ton of feed to be processed, mixed in the same hot water. The wet agitator was periodically stirred, maintaining the temperature of 50-55°C with steam for 1-2 hours, at the end, for pasteurization of the agitator, the temperature was brought to 70 ° C. The remaining half of the concentrated feed was given without any treatment.

Sanitary and hygienic inspection of the premises was carried out using conventional laboratory, instrumental and physical methods, namely: temperature and relative humidity using a thermohydrometer (AZ-8721), air velocity using a thermoanemometer (AZ-8906), light measurement using a hand luxmeter (model 8581), determination of harmful gases using a bellows am – 5M aspirator and a set of indicator tubes, noise level-sound level meter (AZ-8922), bacteriological contamination – sedimentation method. The studies were conducted at three points diagonally and at three levels of the surveyed pig housing.

Microbiological examination of samples of intestinal contents of animals was performed by standard methods [2]. The number of E. coli, enterococci, staphylocci, Clostridium, lactococci, lacto - and bifidobacteria was determined. To do this, the contents of the large intestine were prepared by successive dilutions in a sterile isotonic sodium chloride solution, followed by sowing each dilution on the appropriate nutrient media. Analysis of the isolated microorganisms was carried out according to the determinant of Berge [7] by morphological, tinctorial, cultural, biochemical (using multipication MMT E1, E2 MMT Lachema test systems) and antigenic characteristics. The quantitative content of the isolated microorganisms was expressed as lg CFU/g.

RESULTS AND DISCUSSION

During the entire period of the study, the clinical status of both groups of experimental animals was within the physiological norm. It should be noted that experienced pigs with a great appetite ate food treated with an enzyme preparation. This is probably due to the fact that the fermentation contributed to the acquisition of grain feed sweet taste.

Experimental pigs were kept in typical livestock premises built in accordance with the departmental standards of technological design of pig enterprises (VNTP – 2-96).

Table 1: Parameters of the microclimate in livestock buildings

Indication	Premises for keeping during the period			
	gestation	suckling	weaning	fattening
Temperature, °C	14,2	19,1	18,8	16,0
Humidity, %	70,2	66,8	65,2	61,8
Airspeed, m/s	0,21	0,11	0,15	0,19
DensityNH_3, mg/m^3	14,8	7,8	9,4	13,2
Density H_2S, mg/m^3	2,9	1,2	1,8	3,8
Density CO_2, mg/m^3	0,16	0,11	0,13	0,15
Illumination, lk	41,2	38,1	36,7	48,1
Dustconcentration, mg/m^3	0,72	0,45	0,62	0,78
Microbialbodies, thousands/m^3	25,8	21,7	24,5	28,7

Determination of the parameters of the microclimate is of great importance for the health of animals and the data shown in the table indicate that the parameters of the microclimate of premises for keeping of pigs, depending on the age of the group was in compliance with hygienic norms (guidelines on process design pig farms RD-APK 1.10.02.04-12).

In pigs in the contents of the large intestine is still quite a lot of nutrients – it is, basically, undiluted fiber and cells covered with a shell consisting of fiber. Therefore, the digestive process in the large intestine continues and proceeds quite intensively. Since the food masses move here for a very long time, favorable conditions for the development of microorganisms are created here. That is why, to control the quality of feeding experimental animals, it is so important to determine the quantitative and qualitative composition of the microflora of the contents of the large intestine.

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Table 2: Content of microorganisms in the large intestine of experimental pigs

Group	Number of microorganisms lgКОЕв 1 g intestinal contents						
	E. coli	Enterococcus	Staphylococcus	Clostridium	Lactococcus	Lacto bacterium	Bifidum bacterium
	sows						
1	10,8±0,5	10,2±0,7	3,8±0,2	4,3±0,2	8,9±0,5	8,3±0,4	9,1±0,4
2	9,7±0,4	9,5±0,6	3,0±0,2	3,5±0,1	10,9±0,5	9,9±0,5*	10,8±0,5*
	Weaned piglets						
1	8,4±0,5	6,2±0,4	3,6±0,3	4,1±0,3	8,5±0,4	8,7±0,6	8,2±0,5
2	7,9±0,4	5,8±0,3	3,2±0,2	3,2±0,2	9,7±0,5	9,5±0,5	8,9±0,4
	Pigs on fattening						
1	11,3±0,5	8,5±0,5	4,2±0,3	6,3±0,4	8,0±0,5	7,6±0,4	8,0±0,5
2	10,3±0,5	8,1±0,4	4,1±0,2	5,9±0,3	8,3±0,4	8,4±0,5	8,5±0,4

Note: *P<0,05.

The data of the table indicate that in the contents of the large intestine of all groups of experimental pigs was found a large number of representatives of normal microflora, which have different physiological activity. The number of microorganisms in experimental and control animals differed slightly.

Microflora is represented by opportunistic enterococci, which have lysozyme and antibacterial activity to the pathogens of intestinal diseases. E. coli, causing permanent antigenic stimulation of local immunity and keeping it in a physiologically active state, the second sows the experimental group in 1 g of intestinal contents was of 9.5 to 10.7 at SOME lglg CFU in control, weaners and 8.4 lg SOME lg SOME at 7, and 9 in the control and fattening pigs - 10,3 11,3 SOME lg when lg CFU in the control, respectively.

The content of lacto-and bifidobacteria, regulating the quantitative and qualitative composition of intestinal microflora in the norm, retarding the growth and reproduction of pathogenic and opportunistic microbes in it, in experimental sows was 9.1 and 10.8 lg CFU at 8.3 and 9.9 lg CFU in the control, piglets weaned-9.5 and 8.9 lg CFU at 8.7 and 8.2 lg CFU in the control and fattening pigs-8.4 and 8.5 lg CFU at 7.6 and 8.0 lg CFU in the control, respectively ahhh! No pathogenic Enterobacteriaceae were found in the intestinal contents of experimental pigs of both groups.

The study of the microflora of the gastrointestinal tract revealed an increase in lactic acid bacteria that produce lactic acid, inhibit the growth of pathogenic microflora and reduce the growth of opportunistic microflora in experimental pigs compared to the control. Another reason for normalization of the intestinal microflora is the breakdown of the subjects multienzyme preparation "NIST" Filatov feed contained in the cereal, phosphorus and Inositol (misonoza), stimulating the growth of lactic acid bacteria [13].

P. M. Siba et al [20] explains the reduction of gastrointestinal diseases, using enzyme preparations in feeding of pigs, reduced fermentation in the large intestine, caused by the decrease in the number of end waste products of their body and its humidity. The application of enzymes, due to better assimilation of feed nutrients, are able to neutralize the negative effect of anti-nutritional factors such as ß-glucans, phytate, pentosans, acting beneficially on the intestinal microflora contribute to the reduction of the number of conditionally pathogenic microflora and increase of lactic acid, which results in a lower susceptibility of pigs to disease [3, 19].

CONCLUSIONS

Thus, it can be concluded that long-term feeding of feed treated with the studied enzyme preparation "NIST" does not have a negative impact on the quantitative and qualitative composition of the microflora of the gastrointestinal tract of pigs during gestation and suction, weaning and fattening, increasing the microflora of the large intestine in the form of lactic acid bacteria, while reducing the growth of pathogenic and opportunistic microflora.

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