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## Sporobacterin Probiotic and Its Influence on the Physiological, Morphological and Biochemical Status of Piglets.

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### ABSTRACT

The effect of probiotic sporobacterin liquid on physiological, morphological, and biochemical status of piglets. Found that the drug promotes the blood of pigs erythrocytes, hemoglobin and serum - the level of total protein, albumin, globulin, and gamma globulins.

**Keywords:** probiotics sporobacterin, morphological and biochemical status, indicators of blood and of blood serum pigs.

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## INTRODUCTION

In the conditions of industrial complexes and large-scale pig-breeding farms, various fodder antibiotics and hormonal preparations are widely applied. They negatively influence resistance of animals and quality of the received production. In this regard, the attention of scientists and practitioners especially attracts in recent years the fact of salutary impact on an organism of young growth of pigs of new pro-biotic, antibacterial preparations who are ecologically safe and in too time highly effective means. One of such preparations, recently created in scientific merging of LLC Bakoren (Orenburg) is sporobakterin liquid [4,8,9].

The purpose of the real work – to define zootechnical and veterinary feasibility of application of a sporobakterin at cultivation of pigs. According to the letter of the management of LLC Bakoren, the task - to study influence of the specified preparation on the physiological, morphological and biochemical status of young growth of pigs has been set for us.

## MATERIAL AND METHODS

Scientific and economic experiment on studying influence of a sporobakterin on physiological, morphological and biochemical indicators of blood and serum of blood of animals, has been carried out to the winter, spring and summer periods of 2013, lasting 90 days on the basis of large pig farm of agricultural production cooperative collective farm of Lenin of the Cheboksary region of the Chuvash Republic.

Objects of researches for performance of this work were healthy, well developed, average fatness, 1-day age, with a live weight of 1,1-1,2 kg 75 pigs of large-white breed. Animals by the principle of analogs, have been divided into three groups (control and two skilled) up to 25 heads in everyone. Animals skilled and control groups contained in identical zoohygienic conditions, fed them for the entire period of experience according to the existing norms [2,5,6]. Within 30 days pigs of the first skilled group daily, in inside received sporobakterin liquid in a dose of 0,2 ml / a goal., and animals of the second skilled group, by the same technique accepted this preparation in a dose of 0,5 ml / a goal. Animals of control group were grown up on the main diet. Supervision over animals control and skilled groups have continued to 90-day age.

During experimental work the following methods of researches [10] are used:

- Kliniko-physiological – definition at animals control and skilled groups of physiological indicators (body temperature, pulse rate and breath) carried out on the standard and approved in veterinary medicine methods;
- Zoohygienic – at determination of temperature and relative humidity of air in pigsties used the modern universal device "TKA-PKM (model 42), measured the speed of the movement of air – the TKA-PKM thermoanemometer (model 50), concentration of carbon dioxide – according to Subbotin, the content of ammonia – a universal gas analyzer of UG-2;
- Hematologic – quantity of erythrocytes, leukocytes of blood counted in a calculating chamber of Goryaev, hemoglobin level – gemometry;
- Biochemical – conducted researches of serum of blood of animals: amount of the general protein – the IRF-454B2M refractometer, separate fractions of protein – a turbidimetric method.

Sporobakterin liquid is a suspension of live bacteria of a strain of *Bacillus subtilis* 534. This is one of the first representatives of new group of pro-biotic antibacterial preparations. His creation has become possible after detection of earlier unknown mechanism of protection of an organism of warm-blooded animals against infections. Ways of production of preparations and structure are protected by patents of the Russian Federation. This preparation is allowed for application in medical and veterinary practice for prevention and treatment of enterit of various ethology, dysbacterioses and other diseases of a digestive tract of young growth of animals.

In an organism of animals sporoobrazuyushchy bacteria of the specified strain emit the antibacterial substance of the proteinaceous nature suppressing development of pathogenic and is conditional - pathogenic bacteria and fungi: stafilokokk, streptococci, escherichias, protea, salmonellas, shigellas, fungi Candida, neklostrialnykh of anaerobe bacterias, klostridiya, barmy fungi, actinomycetes, etc. These bacteria also

produce the proteolytic enzymes promoting improvement of digestibility of a protein on average for 4%, fat for 6%, cellulose for 10,7%. At the same time improvement of digestion of mineral substances for 7,3% and nitrogen for 9,3% is noted. Bacteria allocate the immunomodulator having antiallergenic effect and synthesize irreplaceable amino acids. A preparation expiration date – 2 years [8].

### RESULTS OF RESEARCH

The conducted researches have shown that key parameters of a microclimate in pigsties for cultivation of pigs generally conformed to zoohygienic requirements. Air temperature in them fluctuated at the level of 20,15±0,42–21,86±0,54°C, relative humidity varied within 70,44±1,19–73,38±1,22%, the speed of the movement of air was 0,19±0,01–0,21±0,02 m/s. Concentration of harmful gases (ammonia, carbon dioxide, hydrogen sulfide), dust and microorganisms in air of rooms also corresponded to zoohygienic standards [1,3,7].

The obtained data demonstrate that the tested preparation has made a certain impact on a physiological condition of skilled animals (tab. 1).

Against application of a preparation for the 15th days there was a reliable temperature increase of a body at skilled animals of the first group, in comparison with control analogs, on average on 0,3 °C (P<0,05), in the second - on 0,4 °C (P<0,05). Approximately such fluctuation of body temperature at skilled animals was observed in 30 and 60-day age.

Similar regularity was observed in dynamics of the respiratory movements. Depending on an age cycle, skilled animals of the first group, in comparison with control, had these indicators for the 15th days of supervision 7 movements/min. higher (P<0,05) or for 10,77%, and in the second skilled group – for 9 movements/min. (P<0,05) or for 13,8%.

**Table 1: Key physiological parameters of an organism of pigs against application of a sporobakterin**

Indicators	Age, days	Control group	1 skilled group	2 skilled group
body temperature, °C	1	39,6±0,05	39,4±0,05	39,5±0,06
	15	39,5±0,05	39,8±0,04*	39,9±0,06*
	30	39,4±0,03	39,6±0,03*	39,7±0,06*
	60	39,5±0,06	39,9±0,03*	39,9±0,05*
pulse rate, fluctuations/min.	1	228,0±1,50	230,0±1,50	229,0±1,44
	15	111,0±1,50	120,0±1,26*	121,0±1,67*
	30	74,0±3,50	93,0±2,93	95,0±3,53
	60	71,0±0,63	76,0±1,26	78,0±1,6
frequency of respiratory movements /min.	1	84,0±1,67	82,0±1,67	85,0±1,96
	15	65,0±1,67	72,0±2,30	74,0±2,02
	30	52,0±0,57	56,0±2,02	59,0±2,45
	60	47,0±0,75	45,0±0,57	46,0±0,75

Pulse rate tended reliable growth to 15-day age: in the first skilled group this growth has averaged 9 fluctuations/min. (P<0,05) or 8,11%, in the second – 10 fluctuations/min. (P<0,05) or 9,0% respectively. Results of a blood test of animals are presented in table 2.

Apparently from table 2, at animals as control, and at skilled groups natural increase in morphological and biochemical indicators of blood in process of their gradual growth was observed. In too time their reliable increase in both skilled groups depending on use of a pro-biotic preparation is accurately traced. So, for the 15th days of experience growth of quantity of erythrocytes in blood of pigs of the first skilled group, against use of a probiotic of a sporobakterin in a dose of 0,2 ml / a goal., in comparison with control analogs, I have averaged 4,01% (P<0,05), hemoglobin - 5,11% (P<0,05), leukocytes - 2,52%. In the second skilled group of animals, at application of the tested preparation in number of 0,5 ml / a goal., these indicators in relation to control were characterized by 4,86% (P<0,05), 6,08% (P<0,05), 2,68% respectively. For the 30th and 60th days of supervision growth of levels of erythrocytes has made 4,27% and 4,89% (P<0,05), hemoglobin - 4,35% and 5,91% (P<0,05), leukocytes - 2,35% and 2,95% respectively. However growth of level of leukocytes in blood at

skilled animals in all cases was statistically not reliable.

Nature of change of biochemical indicators of serum of blood of skilled animals during the entire period of experience was various. For the 15th days of experience the maintenance of level of the general protein in serum of blood of pigs of the first and second skilled groups, against application of a preparation, in relation to control has considerably and authentically increased on average by 7,13% and 8,18% ( $P < 0,01$ ), and for the 30 and 60 days of supervision – for 8,29%, 8,73% and 8,95%, 8,98% ( $P < 0,01$ ). Increase in this indicator in blood serum at skilled animals generally happened at the expense of albumine and globulins.

**Table 2: Dynamics of morphological and biochemical indicators of blood of pigs at Sporobakterin's application**

Показатели	Age, days	Groups of pigs		
		Control	1 skilled	2 skilled
Erythrocytes, $10^{12}/l$	15	4,73±0,04	4,92±0,01*	4,96±0,01*
Leukocytes, $10^9/l$		12,28±0,31	12,59±0,05	12,61±0,22
Hemoglobin, g/l		91,14±0,59	95,80±0,74*	96,69±0,81*
General protein, g/l		62,10±0,32	66,53±0,18**	67,18±0,26**
Albumine, g/l		25,78±0,13	27,54±0,10**	27,55±0,09**
Globulins, g/l		36,32±0,08	38,99±0,24**	39,53±0,24**
α-globulins, g/l		11,14±0,16	11,55±0,05	12,01±0,36
β- globulins, g/l		10,12±0,11	10,32±0,08	10,38±0,12
γ- globulins, g/l		15,06±0,04	17,12±0,20 ***	17,24±0,05 ***
Erythrocytes, $10^{12}/l$	30	5,90±0,05	6,15±0,12*	6,14±0,01*
Leukocytes, $10^9/l$		11,87±0,29	12,15±0,20	12,22±0,22
Hemoglobin, g/l		94,98±0,55	99,12±0,30*	100,03±0,50*
General protein, g/l		63,75±0,19	69,04±0,37**	69,32±0,42**
Albumine, g/l		26,12±0,12	28,16±0,21**	28,66±0,18**
Globulins, g/l		37,63±0,34	42,17±0,16**	42,79±0,26**
α-globulins, g/l		11,22±0,06	11,46±0,11	11,65±0,21
β-globulins, g/l		10,54±0,07	10,59±0,09	10,60±0,09
γ-globulins, g/l		15,87±0,04	20,12±0,07***	20,54±0,14***
Erythrocytes, $10^{12}/l$	60	5,72±0,04	5,96±0,04*	6,00±0,05*
Leukocytes, $10^9/l$		11,83±0,26	12,17±0,23	12,18±0,24
Hemoglobin, g/l		93,96±0,59	98,70±0,77*	99,51±0,86*
General protein, g/l		65,45±0,55	71,31±0,14**	71,88±0,07**
Albumine, g/l		25,91±0,11	27,50±0,09**	27,82±0,11**
Globulins, g/l		39,54±0,30	43,81±0,29**	44,06±0,29**
α-globulins, g/l		12,20±0,05	11,93±0,10	12,00±0,18
β- globulins, g/l		11,23±0,08	11,30±0,08	11,43±0,09
γ- globulins, g/l		16,11±0,06	20,58±0,04***	20,63±0,07***

Contents an alpha - and a beta - globulins in blood serum at skilled pigs slightly, within 2,32-2,66% exceeded those at the intact peers, however they were statistically not reliable. It is known that scale - globulins represent the special proteins possessing protective properties of antibodies which participate in formation of specific immunity in an organism of animals [7]. Against use of a preparation noticeable and reliable increase of this indicator in blood serum at skilled animals, in comparison with control, throughout experience was observed. So, at application of a sporobakterin, depending on his dose and terms of supervision, in blood serum at skilled animals of the first group level scale - globulins for the 15th days of experience increased on average on 1,96 g/l or for 13,01% ( $P < 0,01$ ), for the 30 and 60 days of supervision – on 4,25 g/l and 4,47 g/l or for 26,78% and 27,74% ( $P < 0,001$ ), and in the second skilled group - on 2,18 g/l, 4,67 g/l, 4,82 g/l that there correspond 14,47%, 29,42%, 29,91% ( $P < 0,001$ ).

## CONCLUSION

Antibacterial preparation sporobakterin liquid in doses of 0,2 ml / a goal. and 0,5 ml / goal. possesses quite high physiological activity:

- The morphological and biochemical composition of blood at pigs of skilled groups to 60-day age improved: the quantity of erythrocytes increased for 4,19% and 4,89% ( $P<0,05$ ), hemoglobin – for 5,04% and 5,90% ( $P<0,05$ );
- Level of the general protein in serum of blood of pigs has increased by 8,95% and 8,98% ( $P<0,01$ ), albumine - for 6,13% and 7,37% ( $P<0,01$ ), globulins - for 10,79% and 11,43% ( $P<0,01$ ), scale - globulins - for 27,74% and 28,05%;
- When using a preparation to pigs in a dose of 0,5 ml / a goal., its efficiency was higher on average for 0,75%.
- The received results allow to recommend a sporobakterin liquid in the corresponding doses at cultivation of young growth of pigs.

## REFERENCES

- [1] Ostrovskij M. Immunitet teljat // Zhivotnovodstvo Rossii.- 2007.-№2.-P.49-50.
- [2] Pogodaev V.A. Ajsanova B.A. Ispol'zovanie kompleksnogo immunomoduljatora v skotovodstve // Zootehnija.-2008.-№ 7.-P.6-7.
- [3] Smolentsev S.Yu., Papunidi E.K., Korosteleva V.P., Matveeva E.L. Yusupova G.R. Prospects for the use of therapeutic and preventive immunoglobulin in veterinary // Research Journal of Pharmaceutical, Biological and Chemical Sciences.-2014.-№5(6).-P.1448-1452.
- [4] Samartsev V.N., Smirnov A.V., Zeldi I.P., Markova O.V., Mikhova E.N., Skulachev V.P. Involvement of aspartate/glutamate antiporter in fatty acid-induced uncoupling of liver mitochondria // Biochimica et Biophysica Acta (BBA)- Bioenergetics.-1997.-T.-1319.-№ 2-3.-C. 251-257.
- [5] Mosmann T.R. Two types of murine helper T cell clone. J. Definition according to profiles of lymphokine activities and secreted proteins / T.R. Mosmann // Immunology.-2006.-№136.-P.2348—2357.
- [6] Nagaoka I., Tamura H., Hirata M. An antimicrobial cathelicidin peptide, human CAP18/LL37, suppresses neutrophil apoptosis via the activation of formyl-peptide receptor-like 1 and P2X7 // Immunology.-2007.-Vol. 176.-P. 3044-3052.
- [7] Termeer C., Hennies J., Voith U. Oligosaccharides of hyaluronan are potent activators of dendritic cells // Immunol.-2011.-Vol. 165.-P. 1863-1870.
- [8] Waldmann T.A. Immunotherapy: past, present and future // Nat.Med.-№3.-2003.-P.267-277.
- [9] Escrivá L., Font G., Manyes L. *In vivo* toxicity studies of fusariummycotoxins in the last decade: A review // Food and Chemical Toxicology, Volume 78, April 2015, Pages 185-206.
- [10] Raynal M, Bailly J.D., Benard G., Guerre P. Effects of fumonisin B1 present in Fusarium moniliforme culture material on drug metabolising enzyme activities in ducks // Toxicology Letters, Volume 121, Issue 3, 19 May 2001, Pages 179-190.