



INFLUENCE OF IMMUNOSTIMULATING PREPARATIONS ON RESISTANCE OF PIGS KEPT UNDER NON-REGULATED MICROCLIMATE CONDITIONS

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Summary

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The purpose of the research was to study the effect of stimulating drugs – the regenerating biological stimulant (RBS) and Immunolac on the resistance of pigs and their productive qualities. The hygienic, clinical, biochemical, immunological, veterinary, zootechnical methods and methods of variation statistics were used to reach the goal. The piglets of 1–60 days of age age of Large White breed and Landrace hybrids were used as an object for the experiment. The blood and blood serum, immunological (CIC, T- and B-lymphocytes) humoral (BASK, LASK), cellular indices (FAN and FCH) and the parameters of live weight were the subject of the study. The choice of the object for the research was determined by the lack of the data on the use of RBS and immunolac for the pigs and the effect of the above preparations on the health and immunological status of the pigs. The results of the experiment showed that when piglets were grown in the conditions of uncontrolled microclimate without the use of the drugs their genetic productive potential was not fully realised, the above preparations do not cause immunosuppression, they are harmless at doses of 0.05 mL/kg of body weight, they improve general condition of the pigs and do not cause any changes that indicate about pathological condition and growth depression.

Key words: globulins, immunostimulants, live weight, microclimate, piglets, resistance

INTRODUCTION

Pork production can be effective only if hygienic requirements are met and the animals are provided with full-value feeds (Sokolov *et al.*, 2003). The appearance of stress and the development of immunodeficiency in young animals as a result of the discrepancy between the physiological capabilities of the pigs and the biotic factors of the environment (indoor maintenance, fluctuations of temperature, high

humidity and bacterial pollution of the air) that reduce the immune status of the piglets, especially in the early postnatal period interfere the introduction of the intensive technologies in many pig-breeding enterprises (Maslyanko *et al.*, 2001). In this connection, one of the problems in pig-breeding (Vakar, 2004) is first the development of measures aimed at the reduction of the effect of the unfavourable

microclimate factors on swine homeostasis, and second, the prevention of immunodeficiencies (Adamenko, 1981, Vasil'yeva, 1974) by the use of pro-and-prebiotics, immunostimulants (Petryankin, 2010, Masalov et al, 2009) that lead to the considerable damage. In our experiment we used immunostimulants that increase the level of realisation of the bioresource potential of pigs according to the instructions that led to the research. The purpose of the study was to study the effect of the immunostimulating drugs – RBS and Imunolac on the immunological state and productive parameters of piglets. The regenerating biostimulator (RBS) is a complex of organic compounds of the animal tissue that stimulates nonspecific immunity, increases the protective functions of the body in relation to microbes and viruses, activates T- and B- lymphocytes. Imunolac is a product of enzymatic hydrolysis from the cell wall of *Lactobacillus*, it enhances haematopoiesis, activates cellular and humoral factors of nonspecific resistance.

MATERIAL AND METHODS

The research was carried out at the Stepnoy pig-breeding plant, Zaporizhzhya region. Three groups of 15 piglets 1 day of age of Large White breed × Landrace were formed. The piglets of the control group were administered 0.9% sodium chloride solution at the dose of 1 mL/head, the piglets of the experimental group 1 received Imunolac at the dose of 0.05 mL/kg body weight, the piglets of the experimental group 2 received RBS at the dose of 0.05 mL/kg live weight on the 3, 7, 15 day of life. The above drugs were administered intramuscularly at the indicated doses on days 3, 7, 15. During the experiment the sanitary and hygienic state in the sections was monitored for the pa-

rameters: temperature, relative humidity, air velocity, content of carbon dioxide, ammonia, the contamination of the air with microflora. The clinical and physiological state of the animals was assessed by the morphological parameters of the blood by counting erythrocytes and leukocytes in the Goryaev's chamber with net.

The phagocytic activity of neutrophils was determined in relation to *E. coli* culture – by Gostev (1950). The concentration of immunoglobulins of classes G, M, A was studied according to Mancini *et al.* (1965), bactericidal activity of blood serum (BABS) – by the method of Smirnova & Kuzmina (1966), the lysozyme activity of blood serum (LASK) – according to Dorofeychuk (1968). The content of T-lymphocytes was determined according to Jondal (1973), B-lymphocytes – according to Merdes (1973). The incidence and safety of piglets were determined by the results of daily observations and clinical examination.

RESULTS AND DISCUSSION

The average value of the microclimate parameters in the pens where the experimental animals were kept within: the air temperature – 20–18 °C, relative humidity – 64–78%, air velocity – 0.15–0.30 m/s, concentration of harmful gases: 15–20 mg/m³ for ammonia, 0.15–0.25 L/m³ for carbon dioxide and 70–86 thousand CFU/m³ of air for bacterial contamination.

The live weight and growth intensity of the piglets are the integral index of their natural resistance (Plyashchenko *et al.*, 1987).

The studies have shown (Table 1) that the pigs from 0-2 group grew most intensively ($P \leq 0.01$), the animals from group 0-1 grew less intensively, which, in our

Table 1. Change in live weight and live weight gains of the experimental piglets (mean $\pm$ SD, n=5)

Group	Age of piglets, days					SSP, g	Weight gain, kg
	I	10	20	30	60		
K	1.10 $\pm$ 0.07	2.47 $\pm$ 0.19	4.72 $\pm$ 0.11	7.08 $\pm$ 0.21	15.48 $\pm$ 0.24	239.6 $\pm$ 10.46	14.38 $\pm$ 0.20
0-1	1.09 $\pm$ 0.09	2.70 $\pm$ 0.15	5.19 $\pm$ 0.20	7.84 $\pm$ 0.18	17.11 $\pm$ 0.17*	267.0 $\pm$ 17.30	16.02 $\pm$ 0.18
0-2	1.12 $\pm$ 0.12	2.81 $\pm$ 0.20	5.87 $\pm$ 0.11	8.10 $\pm$ 0.15*	17.86 $\pm$ 0.22**	279.0 $\pm$ 15.19	16.74 $\pm$ 0.21

Table 2. Dynamics of immunological parameters of blood in piglets (mean $\pm$ SD, n=5)

Group	Initial data	Research, in days				
		5	10	20	30	60
CEC,g/L						
K	17.24±0.38	17.50±0.22	17.41±0.61	17.31±0.70	17.28±0.51	18.01±0.43
0-1	17.22±0.40	17.33±0.44	17.67±0.29*	18.04±0.70*	19.84±0.42*	19.24±0.40*
0-2	17.44±0.38	17.59±0.50	18.36±0.41*	18.49±0.62*	19.48±0.33	20.76±0.43*
T-lymphocytes						
K	4.38±0.21	4.28±0.09	3.97±0.70	4.52±0.11	4.50±0.12	4.39±0.12
0-1	4.48±0.10	4.57±0.12	5.02±0.14*	5.17±0.12*	5.21±0.11	5.46±0.13*
0-2	4.19±0.20	4.32±0.55	4.77±0.09*	5.22±0.61*	5.24±0.37*	5.39±0.11
B-lymphocytes						
K	1.93±0.09	1.90±0.08	2.01±0.08	2.13±0.09	2.03±0.08	1.99±0.09
0-1	2.01±0.09	2.16±0.03	1.93±0.01	2.30±0.03*	2.34±0.02*	2.37±0.03*
0-2	1.95±0.04	2.02±0.07	2.08±0.06	2.16±0.01*	2.30±0.05*	2.36±0.07*

opinion, was conditioned by the manifestation of dyspepsia and bronchopneumonia. The animals from group 0-2 exceeded the piglets from the control group on the 20th day by the average daily weight gain by 24.3%, on the 30th day – by 14.4%, from group 0-1 by 9.9 and 10.7%, respectively. It should be noted that the viability of pigs from the experimental groups was higher that can be proved by the morbidity rate: in group 0-2 it was 5%, in group 0-1: 10%, in the control group – 60% with disease duration from 2.0 $\pm$ 0.1 to 3.5 $\pm$ 0.5 and 7.2 $\pm$ 0.5 days, respectively.

The stimulating effect of biological products on the immunological parameters of pigs has been reported (Chumachenko, 1990; Petryankin, 2010; Ogorodnik, 2011). We studied the dynamics of the CEC, T-and-B-lymphocytes in pigs, kept in conditions of uncontrolled microclimate (Table 2).

The studies have shown that the level of the CEC in the animals in the 0-1 group was higher by 4.76% – on the 10th day of the experiment, by 15.20% on the 30th day, by 11.7% on the 60th day as compared with the control ones. In the pigs from the 0-2 group, this indicator

increased by 4.95% on the 5th day, by 6% on the 20th day, by 19.48% on the 30th day, by 11.7% on the 60th day. A significant difference was found out in the increase of T-lymphocytes in the animals from the 0-1 and - 0-2 groups from the 10th day, B-lymphocytes – on the 20th day of the experiment.

In the pigs from the 0-1 group BASK was $56.52 \pm 2.03\%$, which is by 3.11% lower (on the 60th day of the trial). As for the cellular indices of protection FAN fluctuated during the whole period of the studies from 53.10 ± 0.3 to $53.79 \pm 0.4\%$, the frequency of FV – from 4.28 ± 0.09 to 4.49 ± 0.05 (0 -1) and from 4.59 ± 0.20 to 4.93 ± 0.04 (0-2).

Based on the results of the studies, it was found out that the preparations of RBS and imunolac do not cause immunosuppression, they are not dangerous at the doses of 0.05 mL/mg of body weight, they improve the general state of the body and do not cause any changes indicating a pathological condition and growth depression. In the conditions of the above microclimate the adaptation process was faster in the pigs that were given the above drugs and it makes it possible to recommend them as the drugs that increase the natural resistance of the animal body.

CONCLUSIONS

When piglets were grown at the temperature lower than 3.5–8 °C, humidity – by 5–8% higher, the parameters of NH₃ and CO₂ higher by 0.8-1.2%, the contamination microflora was twice as much as recommended by the sanitary norms the genetic productive potential of the animals is not fully realised, while the highest daily average weight gain was in the pigs, which were injected intramuscularly with RBS growth stimulant. They

exceeded the animals from the control group on the 20th and 30th days of the experiment – by 24.3% and 14.4%, live weight – by 15.3% ($P < 0.05$). The growth rate in the animals that were injected with imunolac was less expressed. The diseases with the symptoms of dyspepsia and bronchopneumonia were registered in 5-10% of the pigs from the experimental groups that received RBS and imunolac that is 10–12 times less as compared to the control group. In the pigs from the experimental group 1, the BASK was on the average $56.52 \pm 2.03\%$, in the experimental group 2 – $59.48 \pm 1.80\%$, by 5.2% higher ($P < 0.05$). LASK indices in the animals of the experimental group tended to increase but the differences were not relevant. The cell indices of resistance in the pigs that received RBS were higher: the phagocytic activity of blood serum – by 4.3% ($P < 0.05$), phagocytic number – by 9.7% ($P < 0.05$). The highest concentration of immunoglobulin of class Jg G (21.82 ± 0.3 mg/mL) was revealed in the animals that received RBS preparations, the concentration of the above immunoglobulins was slightly below – 19.86 ± 0.18 mg/mL in the pigs that received Imunolac (0-1). For immunoglobulins of class IgM and IgA, the fluctuations between the experimental groups were within from 2.23 ± 0.01 and 2.36 ± 0.09 mg/mL.

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