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Prophylactic effectiveness of phytobiotic feed additive for non-contagious diseases of the gastrointestinal tract in suckling piglets

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Abstract. The article presents the results of prophylactic effectiveness feed additive XTRACT™ 6930 for non-contagious diseases of the gastrointestinal tract in the composition of the basic diet of suckling pigs on modern pig farm. It was established that the use XTRACT™ 6930 has positive effect on biochemical blood parameters of piglets, decreases their morbidity and mortality before weaning and increases growth parameters.

Keywords: pigs, prophylactic, phytobiotic feed additive, diseases, gastrointestinal tract

Introduction. It is hard for Ukrainian producers of pork to compete with European, using outdated technology and animals with low genetic potential. Therefore, the development of swine breeding in Ukraine is through the introduction of technological innovations that define efficiency and should be adapted to the conditions of the farm property [1].

Brief summary of relevant publications. As a result of the intensification and transition pig industry on an industrial scale significantly increased morbidity and mortality of young pigs from non-contagious diseases. In particular, this applies to diseases of the gastrointestinal tract, which make up from 40 to 60% of internal pathology [2]. Gastrointestinal diseases of non-contagious etiology in piglets during suckling period, lead to low weight at weaning, which negatively affects their further development and survival [3]. Their effective prevention can decrease mortality of animals and improve quality of their products.

Known methods of preventing diseases of the digestive system, involve use of antibiotics, sulfonamides and nitrofurans, which violate microbial ecosystem of the digestive tract and have a number of other negative consequences [4, 5]. Following the adoption of the ban for use of feed antibiotics in the European Union, the interest has been growing to natural and safe drugs [6, 7].

Among them are phytobiotics – drugs or feed additives containing incorporates essential oils, plant extracts, natural alkaloids or alcohols. They have antibacterial properties, create favorable conditions for the growth of Lactobacillus gut and inhibit the growth of pathogenic organisms, stimulate appetite, improve digestion and feed [8–11]. Several authors [6, 9], which studied the use of phytobiotics for piglets, also point out increasing growth parameters and preservation.

Research objective – determine prophylactic effectiveness of phytobiotic feed additive XTRACT™ 6930 as part of the basic diet for non-contagious diseases of the gastrointestinal tract in suckling piglets on modern pig farm.

Materials and methods. The studies were performed on pig farm (9000 main sows). The object of the research were clinically healthy piglets (Landrace; n = 40) aged 10 days, selected on the basis of analogues (age, sex, weight).

Experimental group of piglets from the age of 10 to 28 days received additionally to feed made fodder additive XTRACT™ 6930 (Pancosma S.A., Switzerland) provided by "UkrFeed" Ltd. (Ukraine) at dose of 150 g/t in accordance with the recommendations in the guideline to use.

The material for the study was blood, obtained from the vena cava cranialis on the 10th (before feeding XTRACT™ 6930), 20th and 28 days of age (before weaning from the sow). Serum samples were tested for total protein (TP), albumin (Alb), urea (Urea), creatinine (Crea), glucose (Glu), total bilirubin (TB); activity of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), gamaglutamiltransferase (GGT); content of calcium (Ca) and phosphorus (P). Biochemical blood tests were performed at the laboratory of animal internal diseases and clinical diagnostic at Lviv National University of Veterinary Medicine and Biotechnology named after S.Z. Gzhytskyj using biochemical analyzer BS-120 (Shenzhen Mindray Bio-Medical Electronics Co., Ltd., China) with PZ Cormay S.A. (Poland) reagents.

To determine the effect of XTRACT™ 6930 on the growth parameters of piglets, 2 groups were formed: control (n = 20) and experimental group (n = 20). The weight of piglets was determined in both groups on 10th, 20th and 28 (before weaning from the sow) days of age [12].

To control the preservation we formed control (n = 134) and experimental group (n = 137) of clinically healthy piglets selected on the basis counterparts, who were in the same housing. The piglets were followed up from 10th to 28-day of age (before weaning from the sow), with detection of morbidity and mortality due to non-contagious diseases of gastrointestinal tract.

Clinical status was controlled 24 hour per day, throughout the research period by standard methods of veterinary medicine [13, 14].

All experimental data were processed by standard methods of mathematical statistics using statistical package of Microsoft Excel.

Results and discussion. As a result of XTRACT™ 6930 use in suckling piglets we observed marked decrease (Table 1) of total serum protein on 20th day, but on 28 day of life this parameter was significantly (p<0,01; 0,05) higher compared to 20th and 10th day 5.7 % and 3.8 % respectively. Albumin level was significantly (p<0,01; 0,05) higher on day 28th day compared to 10th and 20th day 12.5 % and 10.0 % respectively. The increase of these indicators was within the physiological normal levels [13–15], which indicates the intensification of many endogenous and exogenous substances transport [16].

The intensity of protein metabolism in piglets was evaluated by the content of serum urea.

Serum urea levels in suckling pigs was significantly (p<0,001) decreased on the 20th and 28th days compared to levels the beginning of the experiment, 24.0 % and

30.6 % respectively. Reduction of urea in the blood serum of experimental piglets is apparently caused by increased protein metabolism during suckling period [17].

Regardless serum creatinine of piglets on 20th day, it was increased ($p < 0,001$) comparing to 10th day to 20.7 %, and on 28th – to 23.6 %. This metabolite positively correlates with the intensity muscle tissue growth, thus suggesting a higher intensity of synthetic processes in muscles during suckling period [18].

Serum glucose was significantly ($p < 0,05$) higher on the 28th day of age comparing to the beginning of the experiment, which indicates increased use of fatty acids in energy metabolism [19].

Level of total bilirubin in serum of suckling piglets was significantly ($p < 0,05$; 0,001) decreased on 20th and 28th day to 7.9 % and 14.3 % respectively compared to 10th day. Reduction of this indicator was not pathological as levels were within physiological norms [13–15].

Table 1. Serum biochemical parameters in experimental group of piglets (M ± m; n = 20)

Parameter	Age, day		
	10	20	28
TP, g/l	65,9±0,79	64,7±0,87	°^68,4±0,69
Alb, g/l	35,1±0,92	35,9±0,44	°^39,5±0,97
Urea, mmol/l	4,9±0,15	***3,7±0,13	°°3,4±0,12
Crea, mkmol/l	96,7±1,59	***116,7±3,04	°°119,5±1,92
Glu, mmol/l	5,4±0,14	5,7±0,16	°5,9±0,13
TB, mkmol/l	6,3±0,12	*5,8±0,15	°°^5,4±0,12
ALT, U/l	39,9±0,84	***30,7±0,88	°°29,7±0,71
AST, U/l	53,6±0,81	***33,2±1,06	°°31,6±0,5
ALP, U/l	163,4±2,67	***146,9±1,77	°°145,2±1,35
GGT, U/l	48,7±0,85	***25,6±0,99	°°24,1±0,87
Ca, mmol/l	2,8±0,05	2,7±0,03	2,7±0,06
P, mmol/l	2,6±0,09	**2,2±0,06	°°2,2±0,04

*– $p < 0,05$; **– $p < 0,01$; ***– $p < 0,001$, 20th day compared to 10th
 °– $p < 0,05$; °°– $p < 0,01$; °°°– $p < 0,001$, 28th day compared to 10th
 ^– $p < 0,05$; ^^– $p < 0,01$; ^^°– $p < 0,001$, 28th day compared to 20th

The use of XTRACT™ 6930 in feeding of piglets decreased serum aminotransferases activity comparing to the beginning of experiment. Thus, the activity of ALT decreased on 20th day to 23.1% and on 28th day to 25.6 % ($p < 0,001$). The activity of AST also decreased on 20th and 28th day to 38.1% and 41.1 % respectively ($p < 0,001$). This indicates a positive impact of feed additive on functional condition of the liver.

High activity of alkaline phosphatase in piglets at the beginning of the experiment is caused by intense synthesis of osteoblasts in bone tissue due to active process of growth [13–15]. The activity of alkaline phosphatase in the serum of piglets significantly ($p < 0,001$) decreased on 20th and 28th day comparing to 10th day 10.1 % and 11.1 % respectively.

At the beginning of the experiment serum GGT activity in piglets was high (Table 1) due to the first portion of colostrum intake, which has a high degree of activity of this enzyme [20]. After feeding XTRACT™ 6930 activity of GGT in serum to decreased to 50.5 % ($p < 0,001$) on 28th day comparing to 10th day, and to 47.4 % on 20th day comparing to 10th day.

Evaluation of serum calcium levels in piglets, fed by phyto-biotic feed additive, did not reveal significant changes. However, the content of inorganic phosphorus was significantly ($p < 0,001$) decreased to 15.4% within physiological norms on 20th day and remained at constant level. The high content of inorganic phosphorus on 10th day confirms its increased content in newborns when fed colostrum and milk [20].

During weighing of the piglets on 28th day of life we found (Figure 1) that the introduction of XTRACT™ 6930 at a dose of 150 g/t of feed into the diet of the experimental group (EG) piglets contributed to significant ($p < 0,01$) increase of weight to 9.2 % and average daily growth ($p < 0,001$) to 12.9 %, compared to control group (CG) animals.

The use of feed additive XTRACT™ 6930 in experimental group (EG) of piglets reduced their morbidity and mortality from non-contagious diseases of the gastrointestinal tract and thus increased their preservation in suckling period to 6.8 % compared to control group (CG) animals (Table 2).

Figure 1. Body weight of suckling piglets (n=40)

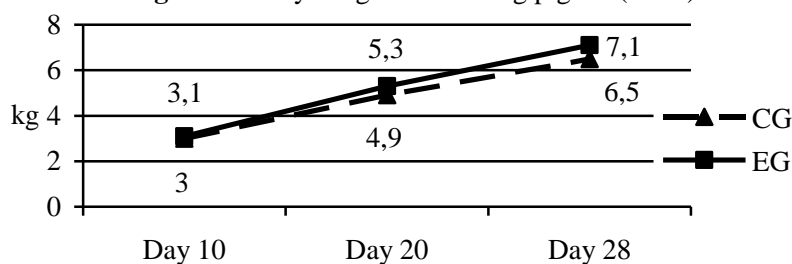


Table 2. Prophylactic effectiveness of XTRACT™ 6930 for non-contagious diseases of the gastrointestinal tract of piglets during the period of experiment

Group	Morbidity		Mortality	
	quantity	%	quantity	%
CG (n=134)	38	28,3	11	8,2
EG (n=137)	26	18,9	2	1,4

Conclusions

1. Application of suckling piglets feed additive XTRACT™ 6930 for 18 days resulted in a positive impact on metabolism: increased levels of total protein, albumin, glucose serum; reduced levels of urea, phosphorus; reduced the activity of ALT, AST, ALP and GGT.

2. The inclusion of XTRACT™ 6930 in the diet of suckling pigs contributed to the increase of body weight

and average daily growth of experimental group piglets compared to control group of animals.

3. Using of feed additive XTRACT™ 6930 for piglets of experimental group increased their preservation in suckling period due to lower morbidity and mortality from non-contagious diseases of the gastrointestinal tract.

REFERENCES (TRANSLATED AND TRANSLITERATED)

1. <http://www.inenbiol.com/ntb/ntb5/pdf/6/4.pdf>
2. Levchenko V.I., Kondrakhin I.P., Vlizlo V.V. and others. Internal diseases of domestic animal // Bila TSerkva, 2012. – Part 1 – 528 p.
3. <http://profisvine.pigua.info/indexukr.php?id=102>
4. Sen'ko A.V., Voronov D.V. Recommendations for the use of alternative methods of prevention of gastrointestinal diseases of pigs without antibiotics // Grodno: GGAU, 2010. – 47 p.
5. Shahov A.G., Sashnina L.Yu., Fedosov D.V., Strebkov A.S. and others. Tool for the diagnosis, prevention and treatment of gastrointestinal diseases of pigs // Voronezh, 2010. – 59 p.
6. Seed S.O., Trotsenko Z.G., Pospelov S.V. Water-soluble concentrate-fitohenyk to stimulate reproductive sows and piglets technological adaptation // Pig breeding. – 2013. – Vol. 63. – P. 63-69.
7. Kommera S. K., Mateo R. D., Neher F. J. and Kim S. W. Phytochemicals and Organic Acids As Potential Alternatives to the Use of Antibiotics in Nursery Pig Diets // Asian-Aust. J. Anim. Sci. – 2006. – Vol. 19. – N 12. – P. 1784-1789.
8. Kucheruk M.D., Zasyekin D.A., Zasyekin M.D. Nutraceutical to correct microflora of the alimentary canal and prevention of gastrointestinal diseases // Modern poultry. – 2011. – №4. – P. 10-13.
9. Podobed L.I., Carpenter A.T., Arkhipov A.A. Natural herbal feed supplement "Extract" in feeding livestock and poultry // Odessa: Printing House, 2007. – 48 p.
10. Costa L.B., Luciano F.B., Miyada V.S., Gois F.D. Herbal extracts and organic acids as natural feed additives in pig diets // South African Journal of Animal Science. – 2013. – Vol. 43. – N 2. – P. 181-193.
11. Vidanarachchi J.K., Mikkelsen L.L., Sims I., Iji P.A. and Choc M. Phytochemicals: alternatives to antibiotic growth promoters in monogastric animal feeds // Recent Advances in Animal Nutrition in Australia. – 2005. – Vol. 15. – P. 131-144.
12. Busenko O.T., Stolyuk V.D., Mohylnyi O.J. and others. Technology of production of livestock products // K.: Higher Education, 2005. – 496 p.
13. Vlizlo V.V., Fedoruk R.S., Ratych I.B. and others. Laboratory methods of research in biology, veterinary medicine // Lviv, SPOLOM, 2012. – 764 p.
14. Levchenko V.I., Vlizlo V.V., Kondrakhin I.P. and others. Clinical diagnosis of internal diseases of animal // White Church, 2004. – 608 p.
15. Vlizlo V.V., Slivinska L.G., Masymovych I.A. and others. Laboratory diagnosis in veterinary medicine // Lviv: Poster, 2014. – 152 p.
16. Shapovalov S.O. The level of metabolic processes pigs under conditions of administration of complex organic compounds esentsinyh trace elements // Bulletin of Dnipropetrovsk University. Biology. Medicine. – 2010 – ISSUE. 1, Vol 2. – P. 96-100.
17. Goat L.S., Sukach V.L., Milosta O.V. Biochemical and haematological parameters in piglets using complex preparation, synbiotics // Agriculture – problems and prospects: collection of scientific papers. Educational Establishment "Grodno State Agrarian University" // Grodno, 2013. – Vol. 20 Veterinary Medicine. – P. 109-115.
18. Efimov V.G., Kostyushkevych K.L., Rakytyansky V.M. Effect of TorVetu on biochemical parameters of blood during weaning of piglets // Scientific and Technical Bulletin of the Institute of Animal Biology and the State Research Institute of veterinary control and feed additives. – 2012 – Vol. 13. – № 1-2. – P. 209-212.
19. Efimov V.G. Biochemical parameters of blood of piglets during weaning after feeding L-carnitine // Scientific and Technical Bulletin of the Institute of Animal Biology and the State Research Institute of veterinary control and feed additives. – 2012 – Vol. 13. – №3-4. – P. 13-17.
20. Goralska L.P., Panikar I.I. Enzymatic activity of blood serum of piglets in the first month of life // Bulletin of Zhytomyr National Agroecological University. – 2014. – № 1 (1). – P. 111-118.

Лукашук Б.А., Сливинская Л.Г. Профилактическая эффективность фитобиотической кормовой добавки при незаразных болезнях желудочно-кишечного тракта в подсосных поросят

Аннотация. В статье представлены данные профилактической эффективности кормовой добавки ЭКСТРАКТ™ 6930 при болезнях желудочно-кишечного тракта незаразной патологии в основе основного рациона подсосных поросят в условиях современного свиного комплекса. Установлено, что применение ЭКСТРАКТ™ 6930 положительно влияет на биохимические показатели крови поросят, уменьшает заболеваемость и гибель поросят до отъема, а также способствует увеличению показателей их производительности.

Ключевые слова: поросята, профилактика, фитобиотическая кормовая добавка, болезни, желудочно-кишечный тракт