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## Use Of A New Phytosorption Complex For Diarrhea In Animals.

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### ABSTRACT

This article presents the results of a comprehensive study of the effectiveness of a new phytosorption drug on different types of animals suffering from diarrhea. Studies have shown a significant efficacy of a new phytosorption complex in diseases of the gastrointestinal tract in animals. To study the therapeutic effect of the new phytosorption complex, two experimental groups of calves, aged 2-3 months, of the black-and-white breed were formed. The average weight of the experimental group at the start of the experiment was  $79.2 \pm 8.53$  kg, while the control one was  $81.6 \pm 9.42$  kg. The experimental group of calves was injected with a phytosorption complex in a therapeutic dose of 120 g / head, which corresponds to 1.5 g / kg. The preparation was prepared daily, dissolved in 1.5-2 liters of warm water and given orally to the animals for 1 day. The control group was asked drugs, according to the scheme adopted in the economy. This drug was the antidiareiko complex drug. A study of the morphobiochemical composition confirmed the efficacy of the drug for calf diarrhea. Thus, the increase in erythrocytes was observed in the experimental group and amounted to 12.97%, hemoglobin by 22.55%, glucose by 15.18%. The increase in these indicators may indicate the restoration of energy metabolism. The number of leukocytes in the blood of calves of the experimental group decreased by 14.81% compared with the control group. The amount of total protein increased by 2.63%. The data obtained indicates a decrease in intoxication and elimination of inflammatory processes in the body. This drug has a high therapeutic effect in the diarrhea of calves (recovery is 90%). At the clinical examination already on the second day there were no signs of intoxication in the animals of the experimental group. Recovery occurred earlier in 4 days than in the control group. In pigs as a result of coprological studies conducted after the use of the drug "Butofan OR" against the background of the use of a new phytosorption complex, a sharp decrease in the number of balantids was established (average AI = 5-7). The average weight gain per week, receiving the drug in a dose of 2.5 ml per liter of water, was more than 400 g. The condition of the animals in the control group remained unchanged. The combined treatment of minks infected with coccidiosis by a phytosorbic preparation against the background of animal treatment with coccidiostatic (1st experimental group) contributed to a pronounced activation of the bactericidal activity of the mink blood serum, which allowed the animals to recover faster from this protozoan disease, 10 days after the start of the experiment ceased animals isolate oocysts, and by the end of the experiment, the animals had a body weight of  $89 \pm 11$  g more than that of the control group animals. Summarizing the studies carried out It can be concluded that further studies of the new phytosorption complex are promising for diseases of the gastrointestinal tract in farm animals.

**Keywords:** calves, pigs, fur animals, diarrhea, natural resistance, phytobiotic, drug, parasites.

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## INTRODUCTION

Today, the veterinarian's arsenal has a large set of medicines, such as antibiotics, sulfonamides, hormonal drugs, etc. [6, 7]. To ensure high productivity and decrease the loss of productive animals with intensive rearing, manufacturers are forced to add synthetic antibiotics to the diet [8]. Long-term unsystematic use leads to the development of antibiotic resistance of bacteria, the effectiveness of the use of these drugs is sharply reduced [5].

The problem of increasing the resistance of microorganisms and reducing the effectiveness of antibiotics is forcing specialists all over the world to look for new remedies for the treatment and prevention of animal diseases. Such a solution, according to many researchers, is the introduction of biologically active substances into practice, namely phytobiotics [4]. Phytobiotics with active ingredients that enrich the diet with vitamins and trace elements. The essential oils contained in plants have antimicrobial and antioxidant effects. Phytobiotic complexes improve the taste of the basic diet, increase its palatability and nutrient digestibility [1, 2].

Parasitosis in animals affect the microflora in the gastrointestinal tract, which negatively affects the general condition of animals, therefore one of the most important and still unsolved problems is finding means and methods for nonspecific immunization in parasitic diseases [9, 10]. Successful work in this direction will significantly reduce the cost of therapeutic measures and save lives of animals.

## MATERIAL AND METHODS

Research scientists conducted in several stages. A study on the antimicrobial activity of the new drug was performed in vitro by diffusion into agar, with respect to the following reference microorganism strains - Enterococcus faecalis, Escherichia coli, Proteus mirabilis, Pseudomonas aeruginosa, Salmonella typhimurium, Staphylococcus aureus and Candida albicans. For the study, a suspension was prepared containing a standard number of microorganisms, which were sown on a layer of nutrient agar in Petri dishes. Accounting for antimicrobial activity was performed by measuring the zone of inhibition of the growth of microorganisms.

The study of the therapeutic effect of the new phytosorption complex, was carried out on different species of animals, in parallel, the experiment was conducted on calves, pigs, and also mink.

During the experiment, 2 groups of calves of the black-and-white breed were formed, 30 animals in each group, the age of which was 2-3 months. The experiment was carried out in the spring and autumn period, in the economy of the Leningrad region, which has a dairy direction. The average weight of the experimental group at the start of the experiment was  $79.2 \pm 8.53$  kg, while the control one was  $81.6 \pm 9.42$  kg.

The experimental group of calves was injected with a phytosorption complex in a therapeutic dose of 120 g / head, which corresponds to 1.5 g / kg. The preparation was prepared daily, dissolved in 1.5-2 liters of warm water and given orally to the animals for 1 day. The control group was asked drugs, according to the scheme adopted in the economy. This drug was the antidiareiko complex drug. The composition of this powder contains antimicrobial and vitamin complexes. It was dissolved in 1.5-2 liters of warm water and fed to animals. The drug was prepared daily and asked orally at a dose of 100 g / head.

In the pig-breeding complex in animals that mark metabolic disturbances, diarrhea caused by balantidia was observed, a new phytosorption complex was also used in a therapeutic dose of 1.5 g / kg. To do this, select 2 experimental and control groups, which included 30 animals each. The preparation was prepared daily, dissolved in warm water and set orally. The control group was asked drugs, according to the scheme adopted in the economy.

The first group of animals was treated with the "Butofan OR" complex of drugs at a dose of 2.5 ml per liter of water and 1.5 g / kg of the new phytosorption complex. The 2nd experimental group also asked the "Butofan OR" complex of drugs, only at a dose of 2.0 ml per liter of water and 1.5 g / kg of the new phytosorption complex.

The next stage of our research was carried out in fur farming, located in the Leningrad region. For the study, 120 spontaneously infected minks aged a year to two were selected.

According to the results of koproskopicheskikh research animals were divided into 3 groups of control and two experimental 40 heads in each. All animals had chronic diarrhea. The 1st experimental group of minks on the background of a single application of specific drug therapy Stop-coccid, at a dose of 0.4 ml per 1 kg of animal body weight, was also introduced a new phytosorption complex at a therapeutic dose of 1.5 g / kg, which was asked along with the feed patients with ameriosis and izosporomnomkam. 2 experimental group, asked only the anti-coccid drug "Stop coccid", at a dose of 0.4 ml per 1 kg of body weight of the animal. The 3rd group served as a control and did not receive any specific treatment.

## RESULTS AND DISCUSSION

Due to the fact that, due to the plant components that are part of it, the new phytosorption complex contains such substances as thymol and corvacrol, the primary task in evaluating the effectiveness of invitro was the evaluation of antimicrobial activity. Some substances, such as thymol, have antioxidant activity. This is especially important in veterinary practice, in particular housekeeping, when the large density of animals, technological stresses play a negative role in achieving high productivity. The main mechanism of the antimicrobial action of the components is the reduction of the adhesive ability of microorganisms, the main determining factor of bacterial and fungal virulence. The results of the experiment are reflected in the table 1.

**Table 1: Antimicrobial activity of the new phytosorption complex**

Microorganisms	Zone of growth inhibition, mm
Escherichia coli	18,2±0,45
Staphylococcus aureus	13,0±0,25
Enterococcus faecalis	11,4±0,31
Pseudomonas aeruginosa	10,3±0,21
Salmonella typhimurium	19,2±0,24
Proteus mirabilis	9,1±0,32
Candida albicans	11,6±0,30

According to the data obtained, the new phytobiotic complex has a pronounced antimicrobial action against Escherichia coli and Salmonella typhimurium,  $18.2 \pm 0.45$  mm and  $19.2 \pm 0.24$  mm, respectively. The delay zone for Staphylococcus aureus was  $13.0 \pm 0.25$  mm, for Pseudomonas aeruginosa  $10.3 \pm 0.21$  mm.

Studies have shown that the new phytosorption complex has a pronounced antimicrobial effect. This drug may be of interest to veterinary specialists in the treatment of diseases of the gastrointestinal tract and increase animal productivity.

In spite of modern achievements of science, one of the factors hindering the development of animal husbandry is a large percentage of young animals morbidity and mortality. Intensive production implies a greater concentration of livestock, which undoubtedly leads to animal stress [1, 3]. Flaws in feeding and housing that arise during intensive livestock breeding lead to an increase in the number of diseases, especially for young stock. When growing calves, the main damage is caused by a large number of diseases of the gastrointestinal tract with diarrhea symptoms. The polyetiologic nature of diseases of the gastrointestinal tract, as well as the polyetiology of diarrhea, does not always make it possible to prescribe adequate treatment in a timely manner, and this is the reason for the request for the creation of composite preparations that have a diverse effect on the body [4, 7].

In modern veterinary practice, the question of the use in feeding animals of drugs that have antimicrobial and immunostimulating actions is becoming increasingly common. Conventional methods of prevention and treatment with antibiotics in many cases do not give the expected result, and may even be the cause of diseases of various organs and systems, for example, from the gastrointestinal tract. Equally important is the high price of modern chemicals. At the same time, the effectiveness of adaptogenic properties significantly increases with their use in transitional periods of the functional state of the body. In addition,

most feed antibiotics used in the treatment of dyspepsia are not safe for humans. Thus, their ban on use, in the EU countries, has led to the development of environmentally friendly and safe drugs that can be used not only as prevention, but also as a treatment for disorders of the gastrointestinal tract.

During a clinical examination of calves in the experimental and control group, a violation of electrolyte-water balance and signs of increasing intoxication were noted: the animals were depressed, the coat was ruffled, dull in color. The mucous membranes are pale in color, the nasal mirror is dry, covered with crusts, the fecal mass of liquid consistency.

In the experimental group for treatment, a new phytosorption drug was used at a dose of 1.5 g / kg, in the control group, the scheme adopted in the household was used as treatment: Antidiareiko at a dose of 100 g / head. Pre-dissolved in 1.5-2 liters of warm water. The result of treatment was evaluated, taking into account the clinical condition of the animals, the indicators of morphological and immunological blood tests. The data of the studies are presented in tables number 2, 3, 4.

**Table 2: Indicators recovery of calves when treated with a phytosorption complex and the drug "Antidiareiko" (M ± m, n = 30)**

Indicators / Preparations	Number of animals diagnosed with diarrhea, head	Duration of treatment day	Number of recovered animals, heads	Number of recovered animals, %
Phytosorption complex	30	5	27	90
«Antidiareiko»	30	9	25	83,3

Conducted clinical studies have shown that the therapeutic effect of the phytosorption complex was - 90%, which is correspondingly higher compared to the control by 6.7%. The effect of calf diarrhea therapy in the control group with Antidiareiko was 83.3%. The duration of diarrhea treatment in calves with the phytosorption complex was 5 days, which is 4 days less than in the group where Antidiareiko was used for treatment.

The animals of the experimental group on the second day were significantly more active compared to the calves of the control group, and they developed well. At clinical examination there were no signs of intoxication.

When studying the morphobiochemical composition, an increase in the basic blood parameters in the calves of the experimental group can be noted, compared with the control group (Table 3). So the increase in erythrocytes composition 12.97%, hemoglobin by 22.55%, glucose by 15.18%. The increase in these indicators may indicate the restoration of energy metabolism.

**Table 3: Morphobiochemical parameters of blood of calves when using drugs "Antidiareiko" and phytosorption complex (M ± m, n = 30)**

Group / Indicators	Diet with phytosorption complex, at a dose of 1.5 g / kg	Control group
Hemoglobin, g / l	108,36±0,72	88,42±0,47
Erythrocytes, 10 <sup>12</sup> / l	6,18±0,14	5,47,5±0,39
Leukocytes, 10 <sup>9</sup> / l	6,67±0,48	7,83±0,61
Glucose, mmol / l	8,27±0,34	7,18±0,27
Inorganic phosphorus, mg / 100 ml	6,2±0,67	6,78±0,46
Calcium, g / l	9,1±0,13	8,5±0,28
Total protein, g / l	48,34±2,4	47,10±1,33

Number of leukocytes in the blood of calves of the experimental group decreased by 14.81% compared with the control group. The amount of total protein increased by 2.63%. The data obtained indicates a decrease in intoxication and elimination of inflammatory processes in the body.

**Table 4: Indicators of natural resistance in calves when using drugs "Antidiareiko" and phytosorption complex (M ± m, n = 30)**

Indicators	Experimental group	Control group
Phagocytic activity,%	38,12±0,25	34,52±0,35
Lysozyme activity,%	4,36±0,12	3,25±0,24
Bactericidal activity,%	98,27±0,42	95,34±0,18

Thus, the study of immunological parameters confirmed the effectiveness of the new phytosorption complex in the treatment of diarrhea of young cattle. Thus, phagocytic activity increased by 10.42%, bactericidal by 3.07%, and lysozyme by 34.15%, compared with calves of the control group.

The next stage of our research was the study of the effectiveness of a new drug in the pig-breeding complex. Pigs with pronounced clinical signs of dysfunction of the digestive system, having liquid brown or gray-green faeces with mucus that have balantidiasis (average intensity of invasion (II) = 21-27), were divided into 3 groups of 30 animals each and placed in separate blocks. All piglets were between 27 and 34 days old and were kept in the same conditions as the main herd. The third group, which was the control, the method of analogue.

When using the compound of the drug "Butofan OR" in a dose of 2.5 ml and a new phytosorption complex in balantidiasis, the condition in the animals of the first experimental improved by 3 days, activity was noted, the animals readily ate food. In animals of the experimental group, the total protein and albumin content gradually recovered, approaching normal, and the IgG content gradually increased in the blood serum of animals. At the same time, the IgA content remained at a low level by the 7th day. Upon receipt of the drug in a dose of 2.0 ml per 1 voda and a new phytosorption complex, these same parameters were close to normal on day 14. The condition of the animals in the control group remained unchanged.

As a result of coprological studies conducted after the use of the drug "Butofan OR" against the background of the use of a new phytosorption complex, a sharp decrease in the amount of balantidia was found (average II = 5-7). The average weight gain per week, receiving the drug in a dose of 2.5 ml per liter of water, was more than 400 g. The condition of the animals in the control group remained unchanged.

The study of the effectiveness of the use of the drug Stop-coccid against the background of a new phytosorption complex in minks in a fur farm, was determined by studying the natural resistance, and the bactericidal activity was determined in animals from different experimental groups. So in the 3rd control group bactericidal activity over the study period changed slightly and was at the level of 39.8 ± 0.5 to 43.1 ± 0.2%. In their blood, the background level of bactericidal activity was significantly lower than in animals of the other groups (Table 5).

**Table 5: Indicators of bactericidal activity of the blood serum of patients with eimeridoses of minks and on the background of specific therapy, as well as with the use of a phytosorption preparation,%**

Groups of experimental animals and used drugs	Blood counts	Research period in days from the beginning of the experiments				
		5	10	15	20	30
First group - patients with eimeridoses mink treated with Stop coccide and phytosorption complex, n = 40	44,8±0,4	48,9±0,8	55,0±0,2	60,8±0,3	61,1±0,4	62,2±0,8
Second group - patients with eimeridoses mink treated with Stop coccide, n = 40	43,4±0,3	47,4±0,6	49,8±0,8	52,2±0,4	54,6±0,3	56,4±0,2
Third group of patients with eimeridoses mink, (control) n = 40	42,2±0,4	43,1±0,2	42,0±0,4	41,2±0,8	40,4±0,7	39,8±0,5

Anti-coccidic treatment of minks Stop coccide (group 2) contributed to an increase in the bactericidal activity of blood serum. On the 10th day after treatment, this indicator in animals fluctuated around 49.8%. This indicator was lower than the background indicator (healthy animals) by 12.32%, we determined it for another experiment. In the future, as the recovery rate increased. The maximum level of bactericidal activity of the blood serum of mink treated with Stop-coccid was registered on the 30th day of the experiment -  $56.4 \pm 0.2$ .

The therapy with a complex phytosorption preparation against the background of animal treatment with a coccidiostatic (1st experimental group) contributed to a pronounced activation of the bactericidal activity of mink blood serum, in which it maximally approached the control values of healthy animals, by the 30th day this indicator was 10.2 higher % than in the group that received only specific therapy with the drug Stop-coccide, without a phytosorption drug. Already 10 days after the start of the experiment, all the animals in this experimental group ceased to emit oocysts, the animals gained body weight by the end of the experiment and had a body weight more than in animals of the control group by  $89 \pm 11$  g.

### CONCLUSION

Studies have shown a significant efficacy of a new phytosorption complex in diseases of the gastrointestinal tract in animals. Thus, this drug has a high therapeutic effect in the diarrhea of calves (recovery is 90%). At the clinical examination already on the second day there were no signs of intoxication in the animals of the experimental group. Recovery occurred earlier in 4 days than in the control group.

The study of the morphobiochemical composition of the blood, confirmed the effectiveness of the drug for diarrhea in calves. So, it was noted an increase in red blood cells by 12.97%, hemoglobin by 22.55%, glucose by 15.18%. The increase in these indicators may indicate the restoration of energy metabolism. The number of leukocytes in the blood of calves of the experimental group decreased by 14.81% compared with the control group. The amount of total protein increased by 2.63%. It is also possible to note an increase in phagocytic activity by 10.42%, bactericidal by 3.07%, and lysozyme by 34.15%. The data obtained indicates a decrease in intoxication and elimination of inflammatory processes in the body.

When using a complex of drugs consisting of drugs "Butofan OR" and a new phytosorption complex for parasitic diseases, in particular, with balantidiasis, recovery is faster, which contributes to the weight gain of animals.

The combined treatment of minks infected with coccidiosis by a phytosorbic preparation against the background of animal treatment with coccidiostatic (1st experimental group) contributed to a pronounced activation of the bactericidal activity of the mink blood serum, which allowed the animals to recover faster from this protozoan disease, 10 days after the start of the experiment ceased animals isolate oocysts, and by the end of the experiment, the animals had a body weight of  $89 \pm 11$  g more than in the control group.

Anti-coccidic treatment of minks Stop coccide (group 2) contributed to an increase in the bactericidal activity of blood serum. On the 10th day after treatment, this indicator in animals fluctuated around 49.8%. This indicator was lower than the background indicator (healthy animals) by 12.32%; in animals in the 3rd control group, the bactericidal activity over the study period changed slightly and was at the level from  $39.8 \pm 0.5$  to  $43.1 \pm 0.2$  % In their blood, the background level of bactericidal activity was significantly lower than in animals of the other groups.

Summarizing the conducted studies, it can be concluded that further studies of the new phytosorption complex in case of gastrointestinal diseases in farm animals are promising.

### REFERENCES

- [1] Goryacheva M.M. An alternative to antibiotics // Bird and bird products. - 2013. - №1. - P. 16-19.
- [2] Kuznetsov Yu.E. Study of the effectiveness of coccidiostatism stop coccid in eimeriosis and mink isosporosis /Y.E. Kuznetsov // Theory and practice of combating parasitic diseases. Ed. All-Russian Research Institute of Fundamental and Applied Parasitology of Animals and Plants. K.I. Scriabin - M. №16, 2015. P. 199-200.



- [3] Mamedov A.T., Abdullaev M.G. Treatment of gastrointestinal diseases of calves using medicinal plants // Free radicals, antioxidants and animal health: Mat. International scientific-practical conference September 21-23, 2004. - Voronezh, 2004. P. 388-390.
- [4] Mishchenko V.A., Yaremenko N.A., Pavlov D.K., Getmansky O.I., Savvin A.V. Measures to combat diarrhea of newborn calves // Veterinary medicine of farm animals. 2008. No. 3. P. 18-21.
- [5] Oleynik A.V. Disorders of the gastrointestinal tract in calves of an early age // Veterinary science. 2009. №1. P. 6-8.
- [6] Popova, O.S. Determination of the immunostimulating action of the drug Marimix 5: 0 / O.C. Popova, V.D. Sokolov // New veterinary drugs and feed additives St. Petersburg, vol. 21. - 2010. - P. 26-27.
- [7] Popova, O.S. Effect of phytobiotic complex on laboratory animals / O.S. Popova, V.A. Baryshev // International Journal of Veterinary Medicine. - 2018. №2. - P. 60-64.
- [8] Berk, A. Influence of source and level of supplemented copper and zinc on the trace element content of pig carcasses [Text] / A. Berk, G. Flachowsky, M. Spolders // J. Pig Progress. – 2011. – V. 65. – №12. – P. 76-77.
- [9] Kuznetsov Y.E. Microbial community studying of the dogs' gastrointestinal tract by the T-RFLP molecular genetic method and assessing the natural resistance of animals /Y.E. Kuznetsov, S.V. Engashev, E.S. Engasheva, I.N. Nikonov, N.V. Kuznetsova // Research journal of pharmaceutical, biological and chemical sciences, 2018 V 9, No 5. P. 1652-1660/
- [10] Mahmood K. Non-antibiotic strategies for the control of necrotic enteritis in poultry / K. Mahmood, S.U. Rahman, I. Hussain, R.Z. Abbas, T. Khalig, J. Arif, F. Mahmood // W. Poultry Sc. J. 2014. V. 70. No 4. P. 865-879