

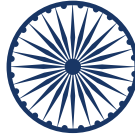
INTERNATIONAL SCIENCE CONFERENCE

अंतर्राष्ट्रीय विज्ञान सम्मेलन

विज्ञान
शिक्षा
अभ्यास

SE
P

SCIENCE
EDUCATION
PRACTICE



दिल्ली, भारत 2024 / Delhi, India 2024

International Science Conference

**SCIENCE
EDUCATION
PRACTICE**

Part 1

November 20, 2024. Delhi, India

VETERINARY SCIENCES

The efficacy of the drug ExpressTabs® in case of sarcoptosis of dogs

Engashev Sergey Vladimirovich, Engasheva Ekaterina Sergeevna, Novikov Denis Dmitrievich133

Clinical study of the medicinal product Amoxiyantar granules: choice of dosing regimen in respiratory and gastrointestinal infections in pigs

Engashev Sergey Vladimirovich, Filimonov Denis Nikolaevich, Engasheva Ekaterina Sergeevna, Komarov Alexander Anatolevich142

**CLINICAL STUDY OF THE DRUG AMOXIYANTAR GRANULES:
CHOICE OF DOSAGE REGIMEN FOR RESPIRATORY AND
GASTROINTESTINAL INFECTIONS IN PIGS**

Engashev Sergey Vladimirovich

Doctor of Veterinary Sciences, Academician of the Russian Academy of Sciences, Professor

Moscow State Academy of Veterinary Medicine and Biotechnology – MBA named after K. I. Skryabin, Moscow, Russia

Filimonov Denis Nikolaevich

Candidate Biological Sciences, Deputy Director

Scientific Department for Registration of Drugs Abroad, "NVC AVZ Ltd, Moscow, Russia

Engasheva Ekaterina Sergeevna

Doctor of Biological Sciences, Senior Research Officer

All-Russian Research Institute of Veterinary Sanitation, Hygiene and Ecology - branch of the Federal Scientific Center of All-Russian Research Institute of Veterinary Sanitation, Hygiene and Ecology of the Russian Academy of Sciences, Moscow, Russia

Komarov Alexander Anatolevich

Doctor of Biological Sciences, Professor of the Russian Academy of Sciences, Professor

Russian Biotechnological University (ROSBIOTECH), Moscow, Russia

Abstract. *The article discusses the therapeutic efficacy of the innovative antibacterial drug Amoxiyantar granules, developed for the treatment of bacterial diseases in pigs. The study was conducted on 60 piglets aged 30-35 days, weighing 7.5-8.5 kg, of the Large White-Landrace-Duroc breed, with mixed respiratory and gastrointestinal infections of bacterial etiology. The animals were divided into four groups (n=15), each of which received the test drug at doses of 100 and 200 mg/kg of live body weight for 5 and 10 days. The drug was used once a day in the form of a feed-drug mixture in a group manner. The results of the study showed that in experimental groups 1 and 2, which received the drug at a dose of 100 mg / kg for 5 and 10 days, respectively, there was a significant improvement in the clinical condition of animals and a decrease in the bacterial load, when*

the livestock has only isolated clinical manifestations of the disease, while in the initial period of the disease, the appetite of animals is preserved, which ensures the consumption of a full dose of the drug with feed. This dose is intended for the prevention and treatment of mild forms of diseases, with a specified range of the minimum inhibitory concentration of the drug (MIC) from 0.004 to 0.006 $\mu\text{g} / \text{ml}$. In experimental groups 3 and 4, which received the drug at a dose of 200 mg / kg for 5 and 10 days, respectively, a more rapid decrease in the bacterial load was observed, which, in turn, reduced the likelihood of complications. This dose is intended for the treatment of moderate to severe forms of the disease, with the specified range of the minimum inhibitory concentration of the drug (MIC) from 0.008 to 0.032 $\mu\text{g}/\text{ml}$.

In the case of treating severe and moderate forms of diseases (to eliminate or minimize the expected outbreak of the disease), the choice of a higher dose and duration of dosing of the drug leads to a significant increase in the time during which the concentration of the antibiotic in the plasma exceeds the minimum inhibitory concentration (MIC) by 4-10 times, which is especially important for combating microorganisms with low sensitivity.

Thus, Amoxiyantar granules (manufactured by AVZ S-P LLC) in the recommended dosage regimens have a pronounced therapeutic efficacy in diseases of the respiratory system and gastrointestinal tract of pigs of bacterial etiology, including: *Streptococcus suis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Haemophilus parasuis*, *Bordetella bronchiseptica*

Keywords: Amoxiyantar granules, amoxicillin, efficiency, dosage regimen, pigs.

Introduction

Pig-breeding complexes and farms are unique ecological systems where there is a possibility of circulation of pathogens of infectious etiology [3; 6].

Among infectious diseases of pigs, respiratory diseases and diseases of the gastrointestinal tract are leading. Often, their occurrence is facilitated by a combination of primary and opportunistic bacterial microorganisms. In conditions of progression of complications of primary infection with opportunistic microorganisms, chronic diseases occur, which leads to significant economic losses in pig farming [5; 7-8].

Treatment programs involve long-term etiotropic therapy with different dosing regimens, which helps to prevent or reduce the likelihood of an expected outbreak of the disease and reduce the selection of antibiotic-resistant strains of microorganisms.

Thus, the key aspect of the dosing regimen is to achieve the maximum concentration of the drug, exceeding the upper limit of the "mutation selection window".

According to available data, the concentration capable of preventing mutations is 4-10 times higher than the minimum inhibitory concentration (MIC) for a given microorganism [4].

In order to effectively treat diseases of bacterial etiology in veterinary medicine, an innovative drug from the penicillin group has been developed - Amoxiyantar granules.

Amoxicillin, which is part of the drug, is a pharmacologically active beta-lactam antibiotic with a broad spectrum of action, effective against gram-positive and gram-negative bacteria, including *Staphylococcus* spp., *Streptococcus* spp., *Corynebacterium* spp., *Clostridium* spp., *Bacillus anthracis* spp., *Actinomyces bovis* spp., *Peptostreptococcus* spp., *Escherichia coli*, *Salmonella* spp., *Bordetella bronchiseptica*, *Campylobacter* spp., *Klebsiella* spp., *Proteus* spp., *Pasteurella* spp., *Fusobacterium necrophorum*, *Bacteroides*, *Haemophilus* spp., *Moraxella* spp., *Actinobacillus pleuropneumoniae* and *Actinobacillus lignieresii*.

Amoxicillin is stable in the gastrointestinal tract and has a higher absorption rate than natural penicillins when administered orally. Amoxicillin is a widely used antibiotic in veterinary medicine for the treatment and prevention of respiratory, gastrointestinal, urinary and skin bacterial infections due to its pharmacological and pharmacokinetic properties.

Amoxicillin's action is based on the inhibition of the activity of bacterial transpeptidase enzymes, which are involved in the binding of the main component of the cell wall of microorganisms - peptidoglycan, which leads to a violation of the osmotic balance and the destruction of the bacterial cell.

Amoxicillin is a first-choice drug used when symptoms of the disease appear based on a preliminary diagnosis [9-10].

Amoxiyantar granules are heat-stable, which allows adding the drug to feeds whose production technology includes short-term heat treatment. Slaughter of pigs for meat is allowed no earlier than 5 days after the last use of the drug. The aim of the study: to study the therapeutic efficacy of the antibacterial drug Amoxiyantar granules against infectious diseases of bacterial etiology in pigs under various dosing regimens.

Materials and methods. The studies were carried out in accordance with the Order of the Ministry of Agriculture of the Russian Federation dated March 6, 2018 N 101 "On approval of the rules for conducting a preclinical study of a medicinal product for veterinary use, a clinical study of a medicinal product for veterinary use, a study of the bioequivalence of a medicinal product for veterinary use". Also in accordance with the rules adopted by the European Convention for the Protection of Vertebrate Animals Used for Experimental and other Scientific Purposes (ETS 123), Strasbourg, 1986) [1; 7-8]. The study was conducted at

the branch of Agropromkomplektatsiya-Kursk LLC - Nucleus (Kursk Region, Zheleznogorsk District, Kopenki village).

The study involved 60 piglets aged 30-35 days, weighing from 7.5 to 8.5 kg, breed - large white-Landrace-Duroc. Piglets from the experimental groups were kept separately in specialized group stalls in the growing sector. Animal feeding complied with the established standards for young pigs of this age.

As a result of laboratory bacteriological studies conducted using seeding methods based on bacterial cultures isolated from the mucous membrane of the nasal cavity and the mucous membrane of the rectum, 4 experimental groups of piglets with 15 animals in each group were formed in piglets with clinical signs of diseases of the respiratory and digestive systems. The experimental groups (No. 1, 2, 3, 4) were formed based on the presence of pathogens of mixed respiratory and gastrointestinal infections of bacterial origin, which were administered the study drug in the form of a feed-drug mixture in a group manner according to the study scheme presented in Table 1.

Table 1.
Study scheme of the drug Amoxiyantar granules

Group	Number of piglets in a group, (n=)	Dose of the drug	Method of administration	Isolated pathogen
No. 1 experiment	n=15	100 mg/kg	With feed in a group way for 5 days	Escherichia coli, Pseudomonas aeruginosa
No. 2 experiment	n=15	100 mg/kg	With feed in a group way for 10 days	Escherichia coli, Pseudomonas aeruginosa; Haemophilus parasuis
No. 3 experiment	n=15	200 mg/kg	With feed in a group way for 5 days	Streptococcus suis, Escherichia coli, Pseudomonas aeruginosa, Haemophilus parasuis
No. 4 experiment	n=15	200 mg/kg	With feed in a group way for 10 days	Streptococcus suis, Escherichia coli, Pseudomonas aeruginosa, Haemophilus parasuis, Bordetella bronchiseptica

Results and discussion

According to the results of laboratory bacteriological studies in piglets with clinical manifestations of respiratory and gastrointestinal diseases before the use of the drug, the following were detected: Streptococcus suis, Escherichia coli, Pseudomonas aeruginosa, Haemophilus parasuis, Bordetella bronchiseptica.

The most significant factor affecting the effectiveness of the drug Amoxiyantar granules is the degree of resistance of microorganisms to its effects [4]. For a quantitative assessment of the resistance of the pathogen, one can use the minimum inhibitory (suppressive) concentration - MIC. The indicators of the minimum inhibitory (suppressive) concentration of amoxicillin are presented in Table 2.

Table 2.
Minimum inhibitory (suppressive) concentration (MIC) of the drug Amoxiyantar granules in relation to the isolated microorganisms

MIC of the drug Amoxiyantar granules, mcg/ml				
E. coli	Streptococcus suis	Pseudomonas aeruginosa	Haemophilus parasuis	Bordetella bronchiseptica
0,004	0,032	0,006	0,008	0,032

According to the data presented in Table 2, it can be concluded that the minimum inhibitory (suppressive) concentration of the drug is from 0.004 to 0.032 µg/ml.

The results of the study showed that in experimental groups 1 and 2, which received the drug at a dose of 100 mg/kg for 5 and 10 days, respectively, there was a significant improvement in the clinical condition of animals and a decrease in the bacterial load, when the livestock showed only isolated clinical manifestations of the disease, while in the initial period of the disease, the appetite of animals is preserved, which ensures the consumption of the full dose of the drug with feed. This dose is intended for the prevention and treatment of mild forms of diseases, with the specified range of the minimum inhibitory concentration of the drug (MIC) from 0.004 to 0.006 µg/ml.

In experimental groups 3 and 4, which received the drug at a dose of 200 mg / kg for 5 and 10 days, respectively, a more rapid decrease in the bacterial load was observed, which, in turn, reduced the likelihood of complications. This dose is intended for the treatment of moderate and severe forms of the disease, with a specified range of the minimum inhibitory concentration of the drug (MIC) from 0.008 to 0.032 µg / ml.

To prevent or minimize the likelihood of a new outbreak of the disease, using a higher dose of the drug and increasing the interval of its use significantly prolongs the period during which the amoxicillin level in the plasma exceeds the minimum inhibitory concentration (MIC) by 4-10 times. This is of particular importance in the fight against microorganisms that have low susceptibility (> 0.006 µg / ml).

Conclusion

Based on the data obtained, it can be stated that the drug Amoxiyantar granules (manufactured by OOO AVZ S-P) in the recommended dosage regimens has a pronounced therapeutic efficacy in diseases of the respiratory system and gastrointestinal tract of pigs of bacterial etiology, including: *Streptococcus suis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Haemophilus parasuis*, *Bordetella bronchiseptica*.

The choice of the optimal dosage regimen for the drug should be based on the degree of resistance of microorganisms to the effects of the drug.

A convenient dosage form allows us to recommend the drug Amoxiyantar granules for therapeutic and prophylactic treatment of pigs in industrial complexes as part of feed-drug mixtures.

References

1. Order of March 6, 2018 No. 101 On approval of the rules for conducting a preclinical study of a medicinal product for veterinary use, a clinical study of a medicinal product for veterinary use, a study of the bioequivalence of a medicinal product for veterinary use <https://www.garant.ru/products/ipo/prime/doc/71802576/?ysclid=ipi26uxscn977807832>

2. MUK 4.2.1890-04 "Determination of the sensitivity of microorganisms to antibacterial drugs. Methodological instructions" <https://files.stroyinf.ru/Data2/1/4293754/4293754463.pdf?ysclid=ltivassxl980788317>

3. Aishpur E. E. Polyetiological structure of bacterial respiratory diseases of pigs E.E. Ayshpur, A.V. Aristov // *Bulletin of the Voronezh State Agrarian University*. – 2014. – No. 1-2. – P. 139-141.

4. Komarov, A.A. The role of studying the pharmacokinetics and pharmacodynamics of drugs in reducing the spread of antibiotic resistance in veterinary medicine / A.A. Komarov // *Veterinary Pharmacological Bulletin*. – 2024. – No. 3. – P. 8-24.

5. Lemish A.P. Prevention of streptococcal infection in piglets / A.P. Lemish, S.S. Ushakov, D.V. Potapchuk, A.A. Buzuma A.A., N.A. Lemish N.A., S.S. Gerasimchuk // *Pig breeding*. – 2019. – No. 3. – P. 65-69.

6. Prudnikov, V. S., Dolzhenkov V. A. Pathomorphology and diagnostics of bacterial diseases of pigs with respiratory syndrome / V. S. Prudnikov, V. A. Dolzhenkov // *Selection on modern populations of domestic dairy cattle as a basis for import substitution of livestock products. Proceedings of the All-Russian scientific and practical conference with international participation*. – 2018. – P. 292-295

7. EMA/CVMP/VICH/463202/2009 VICH topic GL49: Studies to evaluate the metabolism and residues kinetics of veterinary drugs in human food-producing

animals: validation of analytical methods used in residue depletion studies. (https://www.ema.europa.eu/en/documents/scientific-guideline/vich-gl49-studies-evaluate-metabolism-residue-kinetics-veterinary-drugs-food-producing-animals_en.pdf)

8. EMEA. *Guideline in bioanalytical method validation*. European Medicines Agency. Committee for medicinal products for human use: London (2011) (https://www.ema.europa.eu/en/documents/scientific-guideline/guideline-bioanalytical-method-validation_en.pdf)

9. Hansen, M. S. *An investigation of the pathology and pathogens associated with porcine respiratory disease complex in Denmark* / M. S. Hansen, S. E. Pors, H. E. Jensen // *J. of Comparative Pathology*. – 2010. – Vol. 143. – P. 120–131.

10. Lung, O. *Multiplex PCR and Microarray for Detection of Swine Respiratory Pathogens* / O. Lung, S. Ohene-Adjei, C. Buchanan // *Transboundary Emergent Diseases*. – 2017. – Vol. 64 (3). – P. 834–848.

11. *Veterinary Pharmacology and Therapeutics, Tenth Edition*. Edited by Jim E. Riviere and Mark G. Papich. – 2018. - JohnWiley & Sons <https://vetbooks.ir/veterinary-pharmacology-and-therapeutics-10th-edition/>