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TESTING THE AEROGENIC METHOD FOR ADMIN-
ISTERING ANTIBIOTICS IN VIRUS PNEUMONIA OF
SWINE

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by

V. I. Afanas'yev



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**TESTING THE AEROGENIC METHOD FOR
ADMINISTERING ANTIBIOTICS IN
VIRUS PNEUMONIA OF SWINE**

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In 1965 we carried out a study to find a means for treating and preventing virus pneumonia in swine. Tetracycline and chlortetracycline were tested for this purpose. These preparations were administered to the animals by the aerogenic method.

As the result of the course of treatment there was an improvement in general condition of the experimental animals. Their weight gains substantially exceeded the weight gains of control animals.

When the same preparations were used for prophylaxis, 72.4-88.9% of the young pigs were protected from infection by virus pneumonia.

Chlortetracycline turned out to be an effective and economical preparation for therapy and prophylaxis of pigs in virus pneumonia. However, it is known that antibiotics introduced into the animal organism will reduce the vitamin balance in it.

In recent years reports have appeared in the literature concerning intensification of antibiotic action by vitamins. In medicine in general practice calcium pantothenate (vitamin B₃) is used for treatment of bronchial pneumonia; this compound possesses high therapeutic properties in this disease.

Considering that vitamin A intensifies the action of antibiotics and that calcium pantothenate has a therapeutic effect in bronchial pneumonia in humans, we used these together with antibiotics in experiments on the treatment and prophylaxis of virus pneumonia in swine by the aerogenic method.

The experiment in treating swine ill with virus pneumonia was carried out at the Ladozh svinosovkhoz in the Ust'-Labinskiy Rayon. Gilts four months of age were taken for the experiment. Diagnosis of virus pneumonia was postulated on the basis of a complex of studies including clinical observation and thermometry with a functional test. A rise in temperature to 40.3-41°, dyspnea, and a frequent and dry cough were considered indicative.

The swine were treated in a closed chamber made of boards. Chamber volume was 28 m³ and the height was 1.3 m. For a better seal the walls of the chamber were covered with two layers of tarpaper, while slots and openings were closed up with gypsum.

The procedure for obtaining an aerogenic cloud of dry antibiotics consisted in the following steps: a determined sample of preparation in the form of a dry powder was placed in a Dzhamrulidze apparatus to which there was attached a hose from a type 830 electrical compressor; air was supplied from the compressor to the apparatus at a pressure of 2-2.5 atm. The action of a strong jet of air scattered the antibiotic in the chamber in the form of a cloud. A treatment session for swine in the chamber lasted 30-40 minutes.

For treatment the experimental swine were separated into seven groups (75 head in each). Hogs in the first group were given chlortetracycline, those in the third terramycin, those in the fifth terramycin, and those in the sixth chlortetracycline at a rate of 20,000 units per kg of weight over the course of six days. In addition, for two weeks the swine in groups five and six were given vitamin A (120 units per kg of weight) and B₃ (0.5 g per animal) in their feed.

Swine in group seven were given only vitamins A and B₃, in the same order and doses as animals of groups five and six. Swine in groups two and four served as controls. They obtained no medication.

Clinical observation was carried out of animals of all groups over the extent of the experiment; 30 days after treatment they were weighed. Prior to the beginning of the experiment and after it blood samples were drawn from three hogs in groups 4, 6, and 7 (leukocyte normalization time, erythrocyte sedimentation reaction, and hemoglobin content were determined).

As a result of treatment there was an improvement in general condition in the young pigs in the experimental group; appetite was improved, mobility was restored, dyspnea disappeared, and on the fifth day of treatment body temperature was reduced. The quantity of erythrocytes in the piglets' blood was increased, along with hemoglobin (from 2 to 8%); the erythrocyte precipitation stood at 2-6 mm/h. Shifts in the direction of a reduction in the quantity of neutrophils to normal and an increase in lymphocytes to 58% also occurred in the leukocytic formula; the number of leukocytes became normal in some animals.

Twenty-nine days after the course of treatment three gilts from the experimental (6th) and control (fourth) groups were sacrificed. Autopsy of these animals showed that the lungs of gilts treated with chlortetracycline in combination with vitamins A and B₃ were affected. In the apex pulmonis and also in the

middle and diaphragmatic portions of the lungs there were small (2 × 3 cm) pneumonic foci, characteristic of virus pneumonia.

The control pigs showed lesions of greater size (4 × 5 cm) localized in all parts of the lungs. On the basis of these results we arrived at the conclusion that the antibiotic facilitated suppression of conditionally pathogenic microflora in the organism of the animals, prevented complications, and mitigated the course of the disease. At the same time the animals showed an improved general condition, reflected in a substantial weight gain.

Young pigs in the first group, as compared with the control, showed a weight gain improvement of 4.3 kg; for the third group, 3 kg, 4.4 for the fifth group, 4.7 for the sixth group, and 2.1 kg for the seventh group.

In addition there was a sharp reduction in the number of swine which perished or which had to be killed.

In the experimental groups, as compared with the control groups, there was eight times less necessary slaughter (in groups 3, 6) and more than four times fewer natural deaths.

To prevent infection of young pigs with virus pneumonia we tested chlortetracycline in the form of a dry aerogen calculated as 15,000 units per kg of weight in combination with vitamin A (120 units per kg) and B₃ (calcium pantothenate, 0.05-0.1 g per animal).

The experiment was carried out with suckling pigs from a farm which was not safe from virus pneumonia.

For this purpose we took two groups of sows (20 head in each) with 10-day suckling pigs which were held in integrated stalls. The piglets (183 head) were treated once a week until weaning.

The young pigs in the control group (193 head) did not receive any medication.

In order to determine the effectiveness of this prophylaxis the experimental and control pigs were examined clinically and blood test were made (for six head in each group). Subsequently they were sacrificed.

During clinical examination six pigs from the experimental group were found with signs of a cough, while from the control group there were 17 with elevated temperatures, 10 with symptoms of cough, and 16 with a combination of elevated temperature and a cough.

The pigs with symptoms of pneumonia demonstrated a prolonged dry cough and a depressed condition. A reduced content of hemoglobin, accelerated erythrocyte sedimentation reaction and accelerated neutrophilia were detected in the blood of the sick animals.

During the autopsy pathological changes characteristic of virus pneumonia were found in one of the six young pigs from the experimental group. Changes which are not characteristic for this disease were established in the remaining young pigs. The six control pigs showed pathological changes in organs which are typical for virus pneumonia.

On the basis of comparing the results of autopsies of experimental and control animals it was determined that the aerogenic method of administering chlortetracycline in combination with vitamins A and B₃ in virus pneumonia prevents disease in 83.4% of young pigs.

The experimental pigs showed a weight gain by weaning which was 2.5 kg greater than that for the control animals. Such

gains in weight would repay the expenses for obtaining the medication and would give a clear profit on the average of 2 rubles 40 kopeks per piglet. Survivability of pigs in the experimental group comprise 97.5%, while that in the control group was only 9.12%.

Conclusions

1. Chlortetracycline in combination with vitamins A and B₃ is an effective means of treating virus pneumonia in swine.

3. [sic]. Chlortetracycline applied in the form of a dry aerogen calculated at 15,000 units per kg of body weight once a week in combination with vitamins A (120 units per kg) and B₃ (0.03-0.1 g per animal) protects 83.4% of the pigs from infection with virus pneumonia.