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RESULTS OF THE EFFICACY OF VACCINATION WITH THE "CLOSTBOVAC-8" VACCINE IN THE CONTROL OF CLOSTRIDIOSIS

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Abstract — This scientific research studied the efficacy of the associated "Clostbovac-8" vaccine for the specific prevention of clostridiosis in laboratory animals and sheep in natural stationary foci located in a number of farms in our country. The vaccine has not previously been used in veterinary practice in our country.

Relevance of the topic. Clostridioses are a group of highly dangerous infectious diseases that are widespread throughout the world. Their causative agents are obligate anaerobic bacilli. These diseases cause considerable economic damage to cattle and sheep farming, contaminate the environment and ecosystem, and, most importantly, can remain active in the external environment for a long time. The mortality rate of the disease is 90–100%.

Keywords: Clostridium, clostridioses, bacillus, spore, antigen, antibody, associated, monovalent, polyvalent, toxoid, toxigenicity, virulence, pathogenicity, contamination, amplification, serum, plasma, synergism, exotoxin, endotoxin, intoxication.

Research object: sheep farms in Nurabad, Payarik and Qo'shrabot districts of Samarkand Region; "Zomin Agro" and sheep farms in Bakhmal and G'allaorol districts of Jizzakh Region; sheep in the private sector; reports of epizootologists from natural stationary foci; and data obtained from epizootic maps. Sheep in the selected farms were vaccinated twice with the "Clostbovac-8" vaccine in strict accordance with the instructions, with an interval of 26–30 days.

No adverse complications were observed after vaccination. Bacilli of all Clostridium species are highly resistant; therefore, they can remain active in the external environment for a long time, and this property contributes to the persistence of natural stationary foci. Clostridia can multiply in the external environment when humidity, temperature, pH and other microclimatic conditions are optimal. Bacilli are inactivated after boiling for several minutes. (2, 4, 5, 7, 9, 18.)

Against clostridia, 0.5% chloramine, 6% hydrogen peroxide and 0.5% formalin have a bactericidal effect within 30–60 minutes. The same disinfectants are also used at higher concentrations and with longer exposure times for disinfecting bacillary forms. (2, 3, 6, 11, 17, 19) Brief reference information on Clostridium:

1. All species produce specific toxins.
2. Each species produces its own specific enzyme.
3. The toxins cause pathological changes, necrobiosis and necrosis in tissues and cells and have a cytopathic effect.
4. They disrupt metabolism and catabolism, as well as assimilation and dissimilation, in cells.
5. They cause severe intoxication and destructive changes in cells, resulting in cardiac paralysis and death.

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6. They are constantly found in associations, which leads to a multiple increase in the pathological process.

7. The disease may have an extremely acute, acute, severe or hyperacute course.

8. Metabolic toxins produced as a result of dystrophic and destructive changes make identification of Clostridium difficult.

9. Spontaneous occurrence, stationary foci and natural focality are characteristic.

Modern Diagnosis of Clostridioses

At present, diagnosis of clostridioses is based on analysis of the comprehensive results of examinations: epizootiological, clinical, pathological-anatomical, bacteriological and serological diagnoses.

The golden rule of infectology is that a diagnosis of any infectious disease is considered reliable when laboratory examination is available; therefore, bacteriological examination must also be performed in clostridioses.

— Preparation, fixation and staining of smears, followed by microscopy to detect the causative agent;

— Inoculation onto culture media, cultivation of the causative agent, isolation of a pure culture and identification;

— Determination of the pathogenicity, virulence and toxigenicity of Clostridium grown in cultures;

— Determination of the morphophysiological, tinctorial and biochemical properties of cultures;

— Identification of lentogenic, mesogenic and velogenic strains;

— Determination of strain sensitivity to therapeutic agents and their amplification;

— Conducting biological tests;

— Determination of LD50 and LD100 doses;

— Conducting modern serological tests, including RNA, DNA, ELISA and PCR examinations;

— Determination of antitoxin titers.

“Clostbovac-8” is a polyvalent vaccine used against clostridioses. It was developed in the Russian Federation and is approved for use in veterinary practice. Cattle and sheep are vaccinated twice with an interval of 26–30 days. It is used for the specific prevention of anaerobic infectious diseases caused by Cl. perfringens types A, B, C and D, Cl. chauvoei, Cl. tetani, Cl. oedematiens, Cl. septicum and Cl. novyi. Immunity lasts for 12 months. (3, 4, 6, 9, 11, 17, 19, 20.)

The immunogenicity of the vaccine was studied separately for each component; the optimal dose was compared with the instructions, and the development and duration of immunity were studied. The quantities of the components capable of ensuring survival of 80–100% of vaccinated animals were determined, and these quantities were included in the vaccine formulation. A high titer of antitoxic antibodies was ensured. The immunogenicity of polyvalent vaccines was compared with that of monovalent vaccines, and the absence of antigen interference was demonstrated. In some cases, a synergistic phenomenon was observed, for example, among Cl. perfringens types A, B, C and D.

The polyvalent associated vaccine against clostridia prepared using the above method and technology is multicomponent; the proportion and optimal balance of bacterial and antitoxic antigens were ensured, resulting in strong and stable immunity after vaccination. (3, 4, 7, 11, 14, 17, 20). It effectively provided specific prevention of clostridioses with pronounced clinical signs, such as malignant edema, blackleg, tetanus, anaerobic enterotoxemia, bradzot, necrotic hepatitis and necrotic enteritis. (3, 5, 7, 11, 12, 16, 18, 20).

Advantages of the “Clostbovac-8” vaccine:

— Formation of long-lasting, stable immunity;

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— Persistent antigenicity, immunogenicity and virulence characteristics;
— Formation of strong immunity lasting 12 months;
— No post-vaccination adverse reactions even when the vaccination dose is increased 1.5–2 times;
— Stability of colostral immunity;
— High efficacy.

Conclusion

1. When the multicomponent polyvalent "Clostbovac-8" vaccine developed in the Russian Federation was administered twice in stationary foci at an interval of 26–30 days for the specific prevention of necrotic hepatitis, bradzot, infectious enterotoxemia, tetanus, malignant edema, anaerobic dysentery and blackleg, strong immunity lasting 12 months was developed.
2. No adverse or negative post-vaccination changes were observed.
3. The absence of component interference in the "Clostbovac-8" vaccine was demonstrated. When the antigens of Cl. perfringens types A, B, C and D, Cl. novyi B-mun, Cl. septicum, Cl. chauvoei, Cl. tetani and Cl. oedematiens were combined in balanced amounts, synergistic effects were observed.
4. No adverse effects were observed when sheep of different ages were vaccinated with 3 ml or even 6 ml of the "Clostbovac-8" vaccine; survival of 80–100% of vaccinated animals was ensured, and stability did not change over 18 months.
5. The high titers of the "Clostbovac-8" vaccine ensured the development of colostral immunity; at least 2.10 IU/ml against α-toxin of Cl. perfringens, 7.80 IU/ml against β-toxin of Cl. perfringens, 3.10 IU/ml against B-mun and 1.50 IU/ml against Cl. tetani were reported when milk from sheep vaccinated twice was fed to newborn lambs.
6. For practical use, quantitative evaluation of the antigenic activity of the "Clostbovac-8" vaccine showed that, even when lethal doses of clostridia were used, 20 DEM/ml for the α, β and ε toxins of Cl. perfringens and Cl. novyi, and 200 DEM/ml for Cl. tetani, 80–100% survival was observed.

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