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Modern Veterinary Disinfectants.

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ABSTRACT

The article presents information about the disinfectants and the requirements for them when studying their effectiveness and toxicity.

Keywords: disinfection, safety, drug, prophylaxis, regimens, technology, efficiency.

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SHORT REVIEW

The search for new highly effective means for disinfection, prevention and treatment is currently particularly relevant against the background of environmental changes in the environment, as well as the frequent outbreaks of highly dangerous infectious animal diseases such as bird flu, African swine fever (ASF), foot and mouth disease, etc.

The current difficult epizootic situation justifies increased attention to the prevention of infectious animal diseases and the increasing quality requirements for disinfection measures aimed at the destruction of infectious agents at environmental objects that are factors of their transmission.

The most promising is the development of disinfectants based on quaternary ammonium compounds (QAC), glutaraldehyde, peroxide compounds in combination with various stabilizers and surfactants, fumigation aerosols, high foams, UV radiation and ultrasound, ozone [1, 2].

According to international rules, new highly efficient, environmentally friendly veterinary drugs and rational disinfection technologies must meet the requirements below, i.e. to be effective, safe, and the quality of drugs to meet generally accepted standards. The drug must have a constant composition, with the stability of all components, and its physicochemical and biokinetic properties are unchanged in the conditions of use.

In recent years, special requirements have been placed on disinfectants to prevent environmental pollution and safety for humans and animals. Not unimportant and such quality as convenience and ease of use.

Each of the disinfectants has a specific spectrum of antimicrobial activity, which determines the effectiveness of the disinfectant made on the basis of this compound. In some cases, the combination of several chemical agents allows you to extend the antimicrobial spectrum of the drug (the effect of synergism or potentiation), however, the decisive effect is provided by the main chemical substance included in this drug [3, 4].

A modern disinfectant must meet several basic requirements, without the implementation of which no drug can be recommended for use:

1. Microbiological efficacy.
2. Safety for use for both personal and animals.
3. Compatibility with the materials being processed (the “gold standard” here is taken as the effect that glutaraldehyde has on materials).
4. Efficiency.
5. The degree of resistance to organic stress.
6. The speed of action (required exposure).
7. Presence of smell.
8. Lack of flammability and explosiveness.
9. Easy to prepare, apply, remove.

When screening the properties of disinfectants, it is easy to verify that none of the drugs used have all of the listed properties.

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Table 1: The spectrum of antimicrobial activity of substances included in the composition of disinfectants*

Active ingredient\Causative agent	Gram (+) / Gram (-) Bacteria	Fungus	Mycobacteria	Hedge/nonstopviruses	
Glutarical dehyde					
Phenols					
Quaternary ammonium compounds (QAC)					
Guanidine					
Peroxide compounds					
Alcohols					
Iodine					

	-total efficiency		-limited effectiveness		-limited effectiveness

*the table is based on information [3]

Currently offered for registration in the Russian Federation disinfectants are original recipes, including one or more active ingredients in the ratios, allowing to achieve maximum synergy or potentiation of the effect on the most resistant microorganisms, as well as auxiliary components, purposefully alter their properties.

The main groups of modern disinfectants are presented below.

Chlorine-containing drugs. Possess a wide antimicrobial spectrum of action. This group includes both classic drugs (bleach, calcium hypochlorite), and new products developed on the basis of dichloramine - Sulfohlorantin-D, the sodium salt of dichlorozocaruric acid - Chlorapin, D-Chlor-vet, etc. All preparations containing chlorine, they have a regularity: the faster the drug acts and the wider the spectrum of its antimicrobial activity, the more it causes corrosion of materials since these processes are based on similar processes [4].

Iodine-containing drugs. Have a wide range of antimicrobial activity. Preparations of this group are used both for disinfection of premises and for the treatment of respiratory diseases of animals and air sanation (monochloride iodine, Dixam, Jodotriethylene glycol, Fumiyod, Yoder). They are mainly applied by spraying or fumigation. A significant drawback is a high corrosivity with respect to expensive materials and equipment of the premises; low stability of aerosols, resulting in a decrease in processing efficiency and high consumption of the drug.

Alcohols. The most common components of antiseptics. In veterinary medicine, ethyl alcohol is used - Antiseptic solution of 95 and 70%, as well as in the composition of disinfectants as solvents. All alcohols have a broad antimicrobial spectrum (except spores), evaporate quickly, and do not leave traces upon evaporation [5].

Phenols. One of the first disinfectants, but currently in its pure form is not used because of their toxicity. A feature of phenols is their ability to create a residual film on disinfected surfaces. No means have been registered for disinfecting veterinary surveillance facilities in the Russian Federation over the past 5 years.

Quaternary ammonium compounds (QAC). The widest group of registered disinfectants in Russia, numbering about a dozen varieties of active ingredients. They are used both individually, as mixtures of QAS, and in combination with glutaraldehyde, guanidines, peroxides. They have a wide spectrum of action on bacteria, viruses, and mycobacteria.

Guanidines. Preparations based on guanidine derivatives today are considered the most promising for surface treatment, as they are low-toxic compounds with prolonged action (assuming a favorable epizootic situation). An example is the drug Biopag, Phosphopag, Polisept, Bior-1; on the basis of polyhexamethylene

guanidine hydrochloride and QAS, Demos, Line, Nizamed, etc. After processing, leave a bactericidal film on the surface that lasts up to several days.

Aldehydes. Among aldehydes in the production of disinfectants, formaldehyde and glutaric aldehyde have been found to have a wide spectrum of activity, including spores.

Formaldehyde in its pure form is not registered. Registered 2 drugs, having in the composition of formaldehyde 7.5% - Desoline-C and BFG-BET.

Preparations containing glutaraldehyde (Gluteks, Virocid, Triasept-vet, Septol, Smeyk-surfactant, Lizafin-especial, etc.) do not cause corrosion of the materials of the instruments, do not damage the fabrics and surfaces, are stable (which allows using solutions repeatedly), have good penetrating power, fast destructible in wastewater. Cannot be used in food processing industries.

Hydrogen peroxide, peracid. The preparations of this group have a wide spectrum of action, including the spore forms of bacteria, which allows their use for prophylactic and forced disinfection in most infectious diseases. Available in the form of solutions (contain 20-50% hydrogen peroxide - Sanosil, Ecobiocide-M, Desinbak grade A, Bioperite, etc.) or in the form of powders containing peroxide compounds (for example, potassium peroxomonosulfate - Ecocide, Vircon-C, Absolycide hydroxy) Vet and others.). Oxygen disinfectants have low toxicity in working solutions, quickly decompose, have no specific smell, and are effective in a wide range of positive and negative temperatures. The lack of funds in the form of solutions is the unstable content of hydrogen peroxide, the need to use special containers with a device for the free release of gases generated during the decomposition of hydrogen peroxide, the danger of getting personnel burns.

A promising direction in the development of disinfectants is compositions based on hydrogen peroxide solutions with the addition of organic acid. The peracid formed in such a composition (for example, peracetic acid) significantly increases the disinfecting activity of the preparation, since even spore forms of microorganisms are inactivated within a few minutes.

Tertiary amines. A new type of disinfectants, the interest in which is due to their high microbiological reliability - they are active against bacteria (including mycobacteria), fungi and viruses, have low toxicity.

Currently, when selecting active compounds for disinfectants, there are trends in the development of complex preparations based on glutaraldehyde, QAC and alcohols, polyhexamethyleneguanidine and QAC, hydrogen peroxide and QAC, active chlorine and oxygen. As new developments, preparations based on stabilized hydrogen peroxide, peracids, and tertiary amines appear. Formulations based on formaldehyde and phenols are gradually coming out of use, alkali is used less and less in its pure form.

The majority of domestic disinfectants come to the market in veterinary medicine already, being registered by the Rospotrebnadzor. At the same time, the desire of the authors to use in practice the same concentration of means that work effectively in hospitals and everyday life is understandable. But, as a rule, at veterinary inspection facilities, we have a significantly greater microbial and organic load, a variety of surfaces that are complex in terms of topography and structure (cement, concrete, wood). Therefore, the recommended concentration, consumption rate, and exposure need to be significantly corrected. Thus, when testing disinfectants under practical conditions (premises for keeping animals, auxiliary premises and equipment for animal care, sanitary slaughterhouses, pre-slaughter facilities, etc.), it turns out that the concentration of the means for effective disinfection has to be increased by 2-3 times, and also increase the consumption rate per unit area and exposure. That, of course, causes a negative reaction of the authors in terms of competitive relations with other manufacturers.

But an understanding of the need to work out and adhere to disinfection regimes at veterinary inspection sites will have a positive effect on the epizootic situation, raising healthy livestock and producing safe food products.

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