



Cattle Producer's Handbook

Animal Health Section

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Chemical Disinfection: A Guide for the Cow-Calf Operation

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Disinfection is the *reduction* in number of infectious microorganisms on inanimate objects. This is compared to *sterilization*, which is the destruction or removal of all microorganisms from inanimate objects.

It is clear from the outset that disinfection is a key component in biosecurity, for that matter in any and all management schemes, for the cow-calf operator to further limit exposure and spread of infectious agents within the operation. Disinfection can be achieved by the use of chemical agents (disinfectants), such as hypochlorites, quaternary ammonium compounds, and tamed iodines.

Innumerable chemical disinfectants are available and, unfortunately, every one has limitations in range of activity as well as other advantages and disadvantages. Factors to be considered when selecting a chemical disinfectant are:

- Organism(s) to be controlled.
- Type (cleanability/porosity—wood, metal, etc.) and condition (amount of organic matter present) of material to be disinfected.
- Length of time material can be treated (contact time).
- Ambient temperatures.
- Quality of water (pH and hardness).

It is important to follow manufacturer's directions when preparing chemical disinfectants. With chemical disinfectants, "more is better" does not apply; in fact, many of the listed disinfectants are less active when used in more concentrated solutions!

THE key factor to achieving the desired reduction in infectious organisms is thorough cleaning *BEFORE* the application of the disinfectant. Disinfectants are active against their designated organisms *if and only if* they come into direct contact with the organism; organic matter (blood, manure, foodstuffs, bedding). The organic matter must be removed to allow the disinfectant to interact with the organism(s).

Cleaning, therefore, requires the removal of all gross contamination and organic material. High pressure washers or "brush and bucket" scrubbing with a detergent are effective means to clean surfaces before disinfection. This serves two important functions in the disinfection process:

1. Destruction of organic matter so that it can be removed by the rinsing process, and
2. Dilution (reducing the number) of the organisms remaining on the object's surface.

Detergents may also have activity against many organisms by disrupting the organisms' outer layers and further enhancing the ability of the disinfectant to destroy the organisms.

Suggested Chemical Disinfectants for Ranch Use*

Disinfectant	Activity; uses	Working dilution; Uses	Advantages	Disadvantages	Precautions
Bleach Clorox® Purex®	Most bacteria and viruses inactivated within 5 to 15 min.	120 ml/gal (4 oz or 8 tbs); most surfaces, handling equipment, vehicles, hutches	Fast acting, no toxic residues, inexpensive	Must be made up fresh, corrosive to surfaces/metals, can remove paint at high concentrations, bleaches fabrics	Fumes may predispose to respiratory problems in closed spaces—allow to dry before returning animals to area
Nolsavan® (Ft. Dodge)	<i>E. coli</i> , salmonella, IBR, BVD, BRSV, most viruses	Baths—90 ml/gal (3 oz or 6 tbs), 10 min. contact, foot baths or instruments. Premises and equipment—30 ml/gal (1 oz or 2 tbs)	Good soaking agent, readily available, moderately priced; also available as a hand scrub; residual activity	Leaves residues on equipment and instruments	Do not mix with other disinfectants; not effective against pseudomonas
Zep Micronex® (Zep Mfg. Co.) Lifeguard® (Drummond America)	<i>E. coli</i> , <i>S. aureus</i> , salmonella, some viruses and ringworm fungi	Zep: 15 ml/gal (1/2 oz or 1 tbs); LG: 60 ml/gal (2 oz or 4 tbs). Make fresh! 10 min. contact time, good for most surfaces	Has residual and both detergent and disinfectant activities; aids in removal of organic matter—blood	Skin irritation/allergic dermatitis, corrosive; less activity at higher concentrations. Do not mix with soaps or other detergents.	Use goggles and gloves when applying; thoroughly rinse disinfected surfaces before use
Virkon S (DuPont)	Very broad spectrum against viruses (FMD), bacteria, and fungi	1% working solution. Very short acting time: 60 sec. against parvoviruses	Effective in presence of organic material—better if clean. Stable powder.	Expensive	
Iofec-20® (Hess & Clark) Tamed iodine	<i>S. aureus</i> , some salmonella, fungi, TB organism	15 ml/gal (1/2 oz or 1 tbs), 10 min. contact time; most surfaces, baths for instruments and boots	Non-food surfaces need not be rinsed	Fumes may be irritating, skin irritation	Use goggles and gloves when handling
Tek-Trol® (Bio-tek Ind., Inc.)	Broad spectrum activity, most salmonella, TB. Fungicidal, virucidal.	15 ml/gal (1/2 oz or 1 tbs), 10 min. contact time; general disinfectant, tack, equipment, instruments, most surfaces	Relatively inexpensive, non-staining	Tends to dry on tact, difficult to keep moist	Drying to skin, corrodes some metals, hardens plastics and rubber

*Apply disinfection only after thorough cleaning and rinsing; organic matter (manure, blood) reduces effectiveness!

Classes of Chemical Disinfectants

Class	Commonly used agents	Mechanism of action	Spectrum of activity
Hypochlorites (chlorine-releasing compounds)	Bleach: Clorox [®] , Purex [®]	Oxidizes enzymes and cellular components, alters cell membranes	Most bacteria and fungi (spores and acid fast bacteria); most rickettsia, chlamydia, and viruses
Quaternary ammonium compounds	Roccal-D [®] , Lifeguard [®] , Zep Micronex [®]	Alters cell membrane phospholipids and proteins	Vegetative (primarily G+) bacteria, molds, yeasts, and enveloped viruses
Iodophores (Tamed iodines)	Betadine [®] , Provadine [®] , Iofec-20 [®]	Alters cell membrane proteins and lipids	Vegetative and acid fast bacteria, fungi, yeasts, rickettsia, chlamydia; not sporicidal
Biguanides (Chlorhexidines)	Nolvasan [®] , Virosan [®]	Reacts with negative ion proteins or lipo-poly-saccharides and acidic phospholipids of cell membrane	Vegetative bacteria (mainly G-), fungi, yeasts, enveloped viruses; not sporicidal
Alcohols	Isopropanol, ethanol, methanol	Precipitates proteins and denatures lipids of cell membranes; must be diluted with water to be active	More commonly used as a preservative or a cleanser than a disinfectant
Phenols	Phenol	Denatures proteins of cell wall, membranes and enzymes	Vegetative (+/- acid fast) bacteria, some enveloped viruses
Aldehydes	Formaldehyde CidexPlus [®]	Denatures proteins and nucleic acid	Vegetative and acid fast bacteria, most spores, rickettsia, chlamydia, and viruses
Potassium Peroxymonosulfate plus sodium chloride	Virkon and Virkon S	Denatures proteins	Very broad spectrum



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