

CLEANING AND DISINFECTION OF COMPANION ANIMAL FACILITIES

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Cleaning and disinfection is an important step to the well being of animals in captivity, this is especially true in modern animal housing, **including kennels**, where continuous use and high concentration of animals may result in a condition known as “**disease build up**”.

As disease producing bacteria, virus, fungi, and parasite eggs accumulate in the environment, and can possibly become immune to disinfectants, disease problems can be transmitted to each group of animals housed. In certain instances where the facilities are never vacated, and have animals coming in and out almost daily, as in most **kennels and animal shelters**, the problem is compounded.

Thorough cleaning and disinfection provide the only successful solution to breaking the disease cycle and controlling the problem.

PRINCIPLES OF CLEANING AND DISINFECTION

Because organic matter, dirt and manure, for the most part, inactivate most disinfectants and protects infective microorganisms from germicidal activity, a **good and thorough** cleaning is a necessary prerequisite for proper disinfection.

There are many ways to properly clean a building and it depends on many factors, some are:

- ? Size of the building
- ? Building construction
- ? Populated or unpopulated
- ? Time available
- ? Available equipment
- ? Type of operation

Large buildings present different problems than smaller buildings, while “**elbow grease**” a brush and detergent are the ideal cleaning methods it is impossible to clean a large building this way, but may have to, when on all other factors are considered.

The materials used in constructing the building must be taken into consideration. Is the building made of brick, mortar and cement? Do we have impervious surfaces such as aluminum, stainless steel or plastics? Do we have an attic crawl space or do we have an open ceiling? All of these factors must be taken into consideration before deciding on how to clean the building.

Can the building be emptied and kept empty for a certain period of time, or do we have to clean the building or parts thereof while being populated as in most **kennels and shelters**, if this is the case certain pieces of equipment such as high pressure guns and “steam jennies” become impractical as they will **atomize** many of the solids and deposit them all over the building, which is not being disinfected, and one must resort to the time tested “**elbow grease**” method.

Your cleaning procedure will also depend on the time you have available to do the job, if the building is empty, and not going to be populated for say 5 to 10 days, then you have time for a thorough wash and disinfect job of the entire building, as compared to a building which is being used to full capacity, where animals have to be moved from cage to cage or run to run and you only have time to clean and disinfect that particular area.

The available equipment at your disposal, the time to do the job, the type of building, the type of surface, populated or not populated are going to determine what you can and can not use. Do not make the mistake of using the wrong piece of equipment because that is **what you have**, sit down and examine what each piece of equipment can and can not do and what the end result will be. Can you use a high pressure gun and atomize particles all over the building so that you have to disinfect the whole building?

Kennels and shelters whether public or private need to be treated as major animal facilities. The animal care industry has become so big in size and numbers that it can no longer be treated as a sideline or hobby, **it must incorporate the knowledge and methods used by large commercial animal facilities, you must make the change or you will not survive.**

DISINFECTION

Care must be used in choosing your disinfectants, not all disinfectants work the same way, they all have drawbacks, some are better than others, some cost more than others, being expensive do not make it better, read all labels, ask questions, remember you are not disinfecting kitchen counters or toilets, **you are disinfecting large animal facilities, do not use household disinfectants and expect to have good results**, ask for technical data preferably not published by the manufacturer, and above all make sure that the products are **EPA registered** for the intended use. Ask for MSDS sheets, you must have those in your establishment for all to see. (**Federal Law**) remember that **EPA does not approve products.**

Ask for ingredient list., is it QAC base, chlorine base, acid base or phenol based, know what it is made from and mode of action. Do not take somebody's word ask for scientific literature.

There are many ways to properly disinfect a facility and as in cleaning, it depends on the same factors mentioned before in the cleaning section.

The size of the building will have an effect on what disinfectant and how this disinfectant will be applied, large building are better disinfected by copious amounts of a disinfectant solution usually applied by a high volume medium pressure pump, smaller buildings need less volumes and less pressure. Common city water pressure and volumes are ideal for most facilities

The building construction will also dictate what disinfectant you can use. Are the surfaces nonporous, such as tile or fiberglass, or are they brick, mortar and cement? Can they be wetted and kept wet for long periods of time, will the surfaces react with the chemicals used, such as acid or caustic solutions? How much time you have to do the job, days, hours or just minutes? What kind of equipment do you have to disperse the disinfectant? You do not want to apply some disinfectants with high pressure, or aerosol equipment

Whether the building is populated or empty will also have an effect on what chemical to use, will it release poisonous gases, such as bleach? Are they poisonous to humans and animals such as phenols? Again read the labels, ask for data. **What works in the laboratory may not work in the**

field.

TYPES OF DISINFECTANTS

ALKALIS

Alkalis have been used as germicidal agents since ancient times. A pH greater than 9 will inhibit most bacteria, and some viruses, but **long wet contact times are required.**

Lye is a very caustic chemical (pH of 11 or more) and must be handled with care; it will burn human and animal flesh as well as textiles, will ruin galvanized fences and corrode metals especially steel.

Lime (calcium oxide or quick lime) a very inexpensive disinfectant and is reasonably good around livestock. Powdered lime can be scattered around yards and lots with good results.

SURFACTANTS

Surfactants (surface-active agents) a chemical compound that lowers the surface tension of an aqueous solution, promoting wetting.

Soaps in general are mild disinfectants, but of low value when disinfecting animal facilities. Their primary value is in aiding the mechanical removal of contaminated organic material.

Quaternary ammonium compounds (QUATS) generally used to disinfect non porous surfaces such as laminates, plastics and stainless steel in meat and dairy plants. They do not possess substantial virucidal, fungicidal or sporicidal action and are generally used in final rinses for eating, drinking and dairy equipment after mechanical cleaning.^{3,7}

These compounds are not suitable for disinfection of premises since they are readily inactivated by organic matter, can form a film under which microorganisms will flourish, are neutralized by soaps, anionic detergents and hard water.

Many are sold as a combination detergent/disinfectant, in which case they serve mainly as surfactants. **QUATS are poor disinfectants against viruses.**^{3,7}

HALOGENS

Halogens such as iodine, bromine and chlorine have potent antibacterial effects. In the presence of organic matter iodine is more active than chlorine.

Iodine is a good disinfectant but expensive for every day use in animal facilities. The most common form of iodine is a combination of iodine and solubilizing compounds, usually non ionic, used primarily for the disinfecting of dairy equipment

Chlorine, is a most unusual a versatile chemical, since its properties differ so widely in the gaseous, liquid and solid states, each phase will be treated separately. It is by far the most controversial, misunderstood, and misused of the common disinfectants. It is essential that we understand five simple chemical facts of chlorine when used as a disinfectant.⁴

- ? **1- , That the active compound in chlorine that is a powerful disinfectant is HOCl (hypochlorous acid)**^{1,2,3,4,5,6,7,}
- ? **2- , That for HOCl to be able to exist in that solution to be a strong disinfectant, the solution must not have a pH not over 8.**^{1,2,3,4,5,6,7,}
- ? **3- , That ample time is given to the solution, or that the solution has enough HOCl (ppm) to oxidize all organic matter rapidly.**^{1,2,3,4,5,6,7,}
- ? **4- , That an ample amount of the solution be used in order to overcome the organic load, bacteria and viruses we are trying to oxidize (destroy).**^{1,2,3,4,5,6,7,}
- 5- , That the stock solution being used to prepare the working chlorine solution be FRESH, i.e. " household bleach" will loose most of its chlorine content in 60 to 120 days from day of manufacture even in a closed plastic container. That is not a FRESH STOCK SOLUTION solution.**^{1, 2, 6.}

Chlorine acts rapidly against bacteria, spores, fungi, and viruses. It's activity, however, is substantially reduced by organic matter, so it is essential that **one**, a good preliminary cleaning job be done, and **second**, that an ample amount of the solution at the right concentration and pH be used to achieve the task in the least amount of time possible.

We can obtain chlorine from different sources:

Gas chlorine, very dangerous and will not be discussed further, primarily used to disinfect large volumes of water used for human consumption.

Sodium Hypochlorite, a source of chlorine, but a weak disinfectant since it does not contain much free available chlorine. It is usually manufactured by the electrolysis of brine water and must be used immediately, extremely unstable, will not hold chlorine in solution for a long time. Primarily used to disinfect water on ships and oil platforms.⁶

Liquid Bleach, a sodium hypochlorite, also know as household bleach, usually containing 5.25% sodium hypochlorite **at the time of manufacture, but as any hypochlorite solution it starts to loose its potency the minute its manufactured**^{1,2,6}, it is over rated and overused⁴, made by adding gas chlorine to water, it is very unstable so **lye** must be added to be able to store and transport, this raises the pH to levels to where **HOCl** is not present, making it very poor disinfectant,^{1,4,5,6} requiring a long wet time because of the high pH and the **-OCl** ion it produces is between 80 and 120 time less effective than **HOCl**.^{2,5,6} **It produces dangerous chloramine gas because of its low Free Available Chlorine content. Most manufacturers recommended it to bleach laundry, deodorize and kill household germs only...**^{4, 5, 6}

Bleach is not chlorine, A CLOROX website states, "CLOROX BLEACH IS NOT CHLORINE, EVEN THOUGH SOME CALL IT CHLORINE BLEACH, IT HAS NO MORE CHLORINE THAN COMMON TABLE SALT" copyright 1988, the Clorox Co. All rights reserved.

Bleach is very corrosive, damaging metals, concrete, cloth, human and animal flesh. Liquid bleach can lose **one half** of its chlorine potency in less than 60 days^{2,4,6}. **from date of manufacture**, so equipment and knowledge on to how to test it must be available.

It is very hard to apply ample amounts of a bleach solution on the areas being disinfected; just wetting the surface and expecting a good kill will not accomplish the task. **There are recent reports of bleach having failures against HIV and Parvo virus**⁴.

Calcium hypochlorite, some times called dry chlorine bleach usually containing 65 to 70% chlorine, a strong chlorine releasing compound usually maintaining a pH of below 8, a strong producer of **HOCl**.^{4,5,6} A strong organic matter oxidizer, not very corrosive because of the lower pH levels of the solutions, unstable in solutions, its **HOCl** content dissipates quickly so a strong solution 20 to 500 (ppm) FAC^{1,2,3,4,5,6} and ample amounts of the solution should be used, **usual recommendations are one to two gallons per square yard**.²

There are now in the market cal-hypo **dispensers** that can deliver with the proper tablets an ample supply of super chlorinated water to do an excellent disinfecting job. They can produce 20 to 100 ppm FAC (free available chlorine) @ 17+ gpm)⁴. Wishy Wash, KLORMAN and Buccaneer are some.

The solutions from these systems are always fresh as they are benign produced as used, are not corrosive to animal, human or plant tissue, do not corrode metals, and under proper use will not release chloramine gases.

RECOMMENDED PROCEDURES

Whenever possible remove the animal from the enclosure, pick up or flush large organic material, wet and apply a detergent, scrub all surfaces with a stiff brush, **rinse with copious amount of a disinfectant solution**, **USING A PUMP SPRAYER TO DISPENSE DISINFECTANT IS NOT RECOMMENDED, ALL AREAS SHOULD BE THOROUGHLY WETTED**. Pick a disinfectant that you do not have to rinse, it saves time. **This procedure should be done daily**.

Small areas where the application of a disinfectant by water hose is impractical should be thoroughly cleaned with a neutral detergent, rinsed and then apply the disinfectant with a small (1 gal) pump up sprayer, dry with paper towel and throw away, do not use a cloth towel as you will cross contaminate all surfaces. Do not mix more disinfectant than you will use in the next four hours, any disinfectant left after four hours should be discarded. **Do not mix other chemicals with the chlorine solution**.

Avoid the use of mops and "squeegees" it is a good way to cross contaminate your premises, if you must use a mop or squeegee disinfect it every time you change locations and change the disinfecting solution often, REMEMBER ORGANIC MATTER EATS UP DISINFECTANTS AND YOU CAN NOT TELL WHEN THE DISINFECTANT IS USED UP.

Special care should be given to ledges, air ducts, cabinets and other places where dust and hair can accumulate. Organisms thrive in these places. They must be cleaned and disinfected regularly.

NEW DISINFECTANTS IN THE MARKETPLACE

Potassium peroxymonosulfate, Hydrogen peroxide, Chlorine dioxide, Peracetic acids
Sodium orthophenyphenate, Chlorohexidine

Most of these disinfectants are very expensive, have to be manufactured on site, are corrosive, must be dosed manually and have a long dwell time, must be rinsed off, increasing cleaning time and labor costs making it necessary to have highly trained personnel on site.

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