

Maximizing Equine Reproductive Performance: The Impact Of Biosecurity And Disinfection



By Alex Austin, B.S.

The goal of any biosecurity protocol should be to reduce the frequency and severity of disease. Equine infectious diseases can cause health and performance issues, increased treatment expense and potential

risks to human health. Horse owners with breeding facilities are encouraged to refer to the American Association of Equine Practitioners' guidelines for in-depth information on equine disease prevention and control. Equine reproductive infections can be costly; resulting in abortions, re-breedings and chronic reproductive issues where mares may not settle or stallions spread disease from farm to farm.

This article will discuss three areas horse owners can focus on to decrease the risk of disease transmission: 1) biosecurity protocol development 2) vaccinations and disease testing options and 3) cleaning and disinfection protocols.

Biosecurity Protocols

Each farm will have its own unique biosecurity protocol. Written protocols should be posted in an area that is visible to all farm employees and visitors. It can be helpful to consult with a local veterinarian to assess the risk of specific conditions and to prioritize control measures. When horses are transported, there is a danger of introducing new pathogens to the home farm environment upon their return. Horses traveling off the farm, or that are new to a facility, should be quarantined for three weeks upon arrival/return (10 days at the very minimum). Stables with high traffic, both equine and human, should consider having a separate barn for breeding horses to create a more controlled environment.

People can act as vectors in spreading pathogens from horse-to-horse or farm-to-farm. Three simple measures that can be implemented are:

- 1) Provide handwashing stations around the facility and alcohol-based hand sanitizer containers where handwashing is not possible.
- 2) Require employees and boarders to wear dedicated boots and clothing to the stable and have visitors wear boot covers. Limit direct contact between visitors and horses.
- 3) Keep each horse's equipment separate. This includes water and feed containers, tack, and grooming equipment. Clean and disinfect any shared stall cleaning equipment such as forks and shovels.

Understanding Reproductive Diseases: Vaccinations And Testing

Most discussion regarding pathogens involved in equine reproduction is centered around venereal transmitted diseases. Many of these diseases have diagnostic tests that can be performed on mares and stallions prior to breeding. Pathogens can have multiple negative impacts on a horse; beyond reproductive repercussions. Each horse may react differently to an exposure. For example, equine herpesvirus (EHV) can cause respiratory, neurological, and/or reproductive issues. EHV comes in many different forms and can be spread by direct contact with nasal secretions (horse to horse) or indirect contact (contaminated water buckets, trailers, tack and even human hands and clothing). The incidence of EHV transmission can be reduced with good biosecurity and disinfection practices.

When dealing with equine venereal diseases, some diseases require direct contact, others can



be transmitted via contaminated semen, collection/storage equipment, pastures/stalls and the personnel involved in the breeding process. Standard protocols during breeding practices include wrapping of the mare's tail, thoroughly cleansing the stallion and mare's reproductive areas, using disposable gloves that are changed between animals and complete cleaning and disinfecting of all equipment involved in the procedure. The economic impact of a venereal disease spreading in a breeding facility can be devastating.

Preventative measures such as testing, vaccinating and physical exams can help prevent the spread of many equine diseases. Utilizing diagnostic testing for viruses and bacterial infections in mares and stallions

can significantly decrease exposure and transmission rates. Requiring a Certificate of Veterinary Inspection (CVI), a negative Coggins Test (EIA) and completion of core equine vaccines are common requests from most breeding facilities. Core vaccine programs can vary based off location, risk of disease and the anticipated effectiveness of vaccine. Core vaccines usually include a Rabies, Tetanus, Eastern/Western/Venezuelan Encephalitis and West Nile vaccine. Facilities may have additional requirements such as negative bacterial cultures from the mare and/or stallion within 48 hours prior to breeding and proof of tests for *T. equigenitalis/asinigenitali* (the causative agents of contagious equine metritis).

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Cleaning And Disinfection Protocols

Even with the best biosecurity protocols and vaccination plans, harmful pathogens can still exist in the horse's environment. This is where a good cleaning and disinfection protocol comes into play. Just because a surface looks visibly clean does not mean it is biologically clean. Removing the gross debris from an area only cleans the surface, it does not disinfect. Without disinfection, the potential threat of exposure to bacteria, viruses and other organisms is still present to the horse. Over time, pathogens will build into self-protective layers known as biofilms.

Biofilms are defined as thin, slimy films of bacteria, protozoa and viruses adhered to a surface in a resistant matrix of cellular material. As the biofilm grows, it will begin to secrete an extracellular layer of proteins and polysaccharides, which protect the pathogens within the layers from harsh environments and shield them from the action of most cleaners and disinfectants. Destroying the biofilm layer is the most important part of any cleaning and disinfection protocol.

Chlorinated Alkaline Detergents And Chlorine Dioxide: The Best Combination For Complete Disinfection

The first step in any disinfection protocol is choosing the correct disinfectant agents. They must be safe, effective and economical. If the chosen disinfectant does not affect biofilms, it will not be able to truly disinfect the environment. For many years, bleach was thought to be the best disinfectant of choice. Unfortunately, bleach has several major downfalls, with the most important point being that it does not attack biofilm layers.

New research has shown chlorine dioxide to be a more effective option than bleach as it has shorter contact times, lower corrosion potential and a



broader spectrum of efficacy against pathogens. Figure 1 shows chlorine dioxide as the product of choice when dealing with a variety of pathogens. To learn more about chlorine dioxide and biofilms, see the article "Understanding Biofilms In Agriculture" in the April 2019, Crystal Creek® newsletter.

Disinfection Of Surfaces

A widely adopted cleaning protocol generally consists of three main steps:

- 1) Clean the surface of gross visible debris.
- 2) Apply a foaming chlorinated alkaline detergent to the surface, allowing for 10-15 minutes of contact time to dissolve the biofilm layer and then rinse.
- 3) Apply a 50 to 100 ppm chlorine dioxide spray to disinfect the surface, allowing the surface to dry.

Figure 1

COMPARISON COMPONENT	OZONE (O ₃)	HYDROGEN PEROXIDE (H ₂ O ₂)	PERACETIC ACID (POA)	HYPOCHLOROUS ACID (HOCl)	SODIUM HYPOCHLORITE (NaClO)	CHLORINE (Cl ₂)	CHLORINE DIOXIDE (ClO ₂)	QUARTERNARY AMMONIA	PHENOLS	IODOPHOR
E. COLI	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
GIARDIA	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
CRYPTOSPORIDIUM SPP	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
ROTAVIRUS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CORONAVIRUS	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO
PEDv	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO
BIOFILM REMOVAL	YES	VARIES	VARIES	NO	NO	NO	YES	NO	NO	NO
AFFECTED BY pH	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES
CORROSIVE	YES	YES	YES	YES	YES	YES	NO	VARIES	YES	YES
INACTIVATED BY ORGANICS	NO	YES	YES	YES	YES	YES	NO	NO	NO	YES
WATER SANITIZER / DISINFECTANT	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO
EPA APPROVED WATER SANITIZER	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO
USED WITH DETERGENTS	NO	NO	YES	NO	YES	NO	YES	YES	YES	YES
PRODUCED ON-SITE	YES	RARELY	RARELY	RARELY	YES	NO	YES	NO	NO	NO

The combination of chlorinated alkaline detergent foam spray followed by a chlorine dioxide surface treatment creates a highly effective disinfection protocol; even against pathogens that are hard to kill. It can be used for disinfectant purposes all around the farm such as housing/stalls, feeding equipment, trailers and as a disinfectant rinse or spray for commonly touched surfaces. For more detailed instructions on disinfection protocols, see the article “*Hygiene Protocol For Successful Calf Raising*” in the April 2017, Crystal Creek® newsletter.

Disinfection Of Waterers

Keeping water sources clean is a challenge on many farms. Studies have shown that the continual use of chlorine dioxide can be an effective method of not only sanitizing the water, but in breaking down the biofilm layers that attach to water container surfaces and preventing the re-growth of those biofilms. The

World Health Organization gives guidelines on the use and safety of chlorine dioxide in drinking water. Taste and odor threshold for chlorine dioxide are listed at approximately 0.2-0.4 ppm. Continual use of chlorine dioxide in equine water sources maintained at 0.4 ppm will help to prevent biofilm growth. It can be used for both stock tanks and water cups.

Implementing a successful and easy to follow biosecurity protocol can help keep your equine breeding facility secure. Biosecurity and disinfection measures have a direct impact on horse health, performance and facility profitability. Contact Crystal Creek® to learn more about using chlorine dioxide in equine water sources and how a biosecurity and equine disinfection program can help keep your equine facility safe.

References available upon request.