



THE UNIVERSITY OF ARIZONA

Cooperative Extension

az2073

December 2023

## The Informed Arizona Equestrian HORSE HEALTH SERIES

# Best Practices for Healthy Horsekeeping

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*Longtime friends Mary and Alice planned to meet after they arrived at the fairgrounds and got their horses settled in. They hadn't seen each other since Alice moved to a new barn a few months prior. After Mary got her horse bedded down and fed, she went to find Alice to go get some decadent fair food. Unfortunately, she found Alice scrubbing stall walls, and she still had to unpack their barn's hoses, muck baskets, rakes, and manure forks before she could break away to go eat... Later that week, Mary's horse stopped eating, was feverish and had some swelling under his jaw. The vet examined the horse, suspected strangles, and mentioned that several horses in this set of barns had developed signs. Mary wondered why Alice's horse seemed fine in spite of being in the same barn.*

## Biosecurity Basics: A New Perspective Post Pandemic

Whoever imagined that a worldwide pandemic would help highlight the value and importance of horse disease prevention processes/practices and biosecurity? Some have compared our covid pandemic experience to "The Great Epizootic", an equine disease outbreak that brought our nation to its horse-drawn knees in 1872 (Moates, 2020). Previously, biosecurity education in the horse world was often met with the "teenage eye roll" reaction, or comments, such as "It will never happen to me", but since COVID-19, knowledge and understanding of disease prevention has improved. Many people have been directly or indirectly affected/impacted by illness, loss of loved ones, canceled events, and quarantines. Regardless of personal views on the response to the pandemic, very few people would not be able to rattle off "wash your hands, don't touch your face, and social distance". One key difference between humans and horses is that horses don't have the ability to make their own decisions about biosecurity. Human caretakers can help set horses up for success or failure.

### Prevention is the Best Protection

#### Core principles of biosecurity plans:

1. Maintain clean living conditions
2. Provide recommended vaccinations on schedule
3. Limit exposure to sick horses or those with unknown health histories
4. Have plans to prevent or control the spread of disease if the site becomes contaminated

### Definitions

With a better understanding of the concepts of biosecurity, you can maximize your horse's immunity, provide rapid relief from disease, and reduce risk of illness.

**Biosecurity:** the ability to reduce or eliminate the spread of disease through proactive management practices.

**Pathogen:** disease causing organism, such as a virus, bacteria, protozoa, or fungus.

**Fomite:** inanimate object that can transfer pathogens from one animal to another. (e.g., boots or a shirt worn to multiple stables, shared brush used on a horse with ringworm).

**Vector:** an organism that carries pathogens from one animal to another (e.g., biting flies, mosquitos, ticks, rabid animals, etc.).

Many horse owners don't realize they can decrease exposure or spread of infectious diseases. Biosecurity is a term that encompasses several ways to limit exposure and maximize immunity. By understanding and applying the principles of biosecurity, owners can protect their horses from diseases that are prevalent (common) in their area. Knowledge is power; and informed owners will know the potential for exposure to pathogens through interactions with other animals. Pathogens describe any microorganisms: bacteria, viruses, fungus, protozoa, or parasites that can cause disease. Consider signing up for Equine Disease Communication Center (EDCC) (<https://www.equinediseasecc.org/>) alerts for your area. Animals of unknown health status or that travel are of

particular concern. Familiarity with diseases, their symptoms, and the prevention methods are the root of developing and maintaining a comprehensive health plan. Biosecurity includes any act or procedure taken to aid in preventing the spread of any infectious disease or other harmful element. This article introduces readers to the concepts of biosecurity and ways to make simple, yet positive changes in horse management and facilities to protect them. Through applying this knowledge, risks to your horses can be reduced.

## Understanding Disease Spread

Horses can be exposed to disease and other illnesses in various ways, the most obvious being from horse to horse. Horses can spread pathogens from direct contact, (e.g., sniffing noses) and indirectly, (e.g., leaving saliva in a water bucket). Other horses are not the only spreaders of disease. Diseases are passed from one animal to the next by means of vectors and fomites. Humans can easily carry and pass pathogens to horses via skin, clothing, and other surfaces.

**Table 1. There are similarities between infectious disease transmission within human populations and horse populations.**

Practices for Minimizing Disease Spread	Human COVID-19 Pandemic Examples	Horse Biosecurity Examples
Sanitization/disinfection	Wiping down desks between groups of students	Scrubbing water buckets, clean and disinfect stalls/clothing/equipment that has been exposed to sick horse(s)
Hygiene	Hand washing	Regular grooming to spot signs of disease or infection
Separate materials/supplies	Do not share masks, straws, or utensils	Avoid sharing equipment, such as pitchforks, grooming tools, bits, tack, feed tubs, water buckets.
Temperature monitoring	Screening for fever before reporting to work	Screening for fever after arriving at a competition or back home
Keep populations separate	Social distancing	No shared fence lines or water sources between traveling and home herds. Avoid nose to nose contact.
Reduce the number of contacts	Cancellation of gatherings during outbreak	Cancellation of events where horses from various locations come together (i.e. shows, races, sales).
Quarantine	5-14 days in isolation	At least 14 days without horse to horse interaction or as recommended by a veterinarian.
Protecting the immunocompromised	Avoid visiting immunocompromised people after attending a large gathering	Avoid mixing traveling herds with potentially immunocompromised horses (e.g., senior horses or young foals)
Testing	Proof of a negative covid test before travel or event entry	Proof of negative Coggins and health certificate (for out of state travel) before travel or event entry.
Vaccination	Provide proof of vaccination to attend an event	Provide proof of vaccination to attend a horse show
Ventilation	Open windows to improve airflow	Open barn doors or install ventilation systems to increase air circulation
Preventative health care	Annual regular checkups by a primary care physician	Annual regular checkups by a veterinarian
The “Public Service Announcement” message	<ul style="list-style-type: none"> <li>Wash your hands</li> <li>Don’t touch your face</li> <li>Keep social distance (6’)</li> </ul>	<ul style="list-style-type: none"> <li>Don’t share water tubs/buckets</li> <li>Don’t share equipment</li> <li>Isolate sick horses</li> </ul>

Vectors are any biologic agents that aid in the spreading of disease. Ticks and mosquitoes are vectors for many equine diseases. Fomites are inanimate objects that can transfer pathogens, usually by moving organic matter such as saliva, nasal secretions, blood, or feces. For example, a curry comb is a fomite if it transfers ringworm from one horse to another. Other simple tools we use around the barn on a daily basis have the potential to become fomites. Hose nozzles that are submerged in multiple water containers (e.g., buckets, troughs), pitch forks, and shoes/boots can spread disease. Vectors and fomites aid in spreading numerous diseases. Enteric diseases, or diseases pertaining to the intestine, are commonly transmitted among animals via the fecal-oral route (Songer, 1996). Getting manure in the mouth or mucous membranes either directly or indirectly by use of equipment or dirty work clothes, followed by hand-to-mouth contact, can make people sick. Animals can be asymptomatic carriers of disease-causing organisms, shedding pathogens without ever showing symptoms. Cleanliness in a biosecurity plan decreases the spread of disease. Reducing disease vectors and cross contamination via fomites are both important ways to maintain health in any barn or environment.



Figure 1: If possible, know the health status of other species that your horses comes into contact with, such as cattle. Zoonotic diseases that can infect horses, cattle, and humans include ringworm, leptospirosis, vesicular stomatitis, and rabies. Vaccination is important, in part, because you cannot control wildlife in your pastures. Photo credits Sara L. Mastellar.

## Zoonosis

Some diseases have the ability not only to infect horses, but also humans. The transmission of diseases from animals to humans is known as zoonosis. Zoonotic diseases include Dermatophytosis (ringworm), Salmonella, Brucellosis, Anthrax, *Clostridium difficile*, Giardiasis, and several others. A full list can be found through the American Association of Equine Practitioners (AAEP). To prevent zoonotic diseases from spreading, clean facilities regularly and practice proper personal sanitation.

## The Role of Vaccination

Not all diseases can be vaccinated against, but for diseases for which vaccines exist, they are a powerful tool in disease prevention. Properly vaccinated horses are at less risk for contracting and spreading disease. The AAEP breaks vaccines into two categories: core and risk based. Core vaccines are recommended broadly, while risk-based are recommended to only some horses, based on their level of potential of exposure. Discuss vaccine selection and timing with your veterinarian. Be prepared to answer questions about the following to help your veterinarian determine which vaccines are appropriate and when to administer them:

1. Equine travel, especially to regions where tick or mosquito populations exist.
2. Frequency of exposure to new or traveling horses (e.g., other boarded horses traveling to competitions).
3. Proximity of pasture or stabling to rivers or streams.
4. Feeding management, particularly if round bales or haylage are fed.
5. Likelihood of interaction with other species, such as cattle or wildlife.
6. Breeding or foaling plans.
7. Vaccination history, if known.
8. Vaccination requirements for competition venues, state lands, private facilities, or commercial shippers you plan to use.

## Knowledge of Risk

What is normal? To decrease the potential of your horses contracting a disease, it is imperative to know their normal vital signs (Greene & Mastellar, 2022), maintain proper records, and follow biosecurity principles. Knowing what is normal enables owners to notice the first signs of disease such as abnormal behavior, appetite, excretion, and movement. The main vital signs include pulse, respiratory rate, gum color, capillary refill time, temperature, hydration level, and gut sounds. More information on how to evaluate vital signs is clearly described in [“Knowing What is Normal for Your Horse”](#). It is prudent to record these periodically while your horse is healthy to establish a baseline for comparison. An example record is shown on the next page (Table 2). If illness is suspected, the vital signs should be checked and compared to the horse’s normal ranges to confirm the presence of a health problem and help determine its cause.

## Maintaining Healthy Living Conditions It Begins with You: Don’t Be a Super Spreader!

People who interact with several horses can themselves become fomite/vectors carrying pathogens on their clothes,

## Pathogens

Different diseases are caused by different pathogens. Some examples include:

**Bacteria:** Strangles, Tetanus, Pigeon Fever, Potomac Horse Fever, Lyme

**Virus:** Herpes Virus (EHV), Equine Infectious Anemia, Influenza, Vesicular Stomatitis

**Fungus:** Ringworm

**Protozoa:** Equine Protozoal Encephalomyelitis, Piroplasmiasis

**Parasites:** Large strongyles, small strongyles, ascarids, tapeworms, pinworms, bots, and threadworms



**Table 2. Example record sheet. A fillable version can be accessed in Appendix 3.**

Horse Name: <u>Roper</u>							
Date	Time	Temp °F	Pulse (beats per min)	Respiration (breaths per min)	Gum Color	Capillary Refill Time	Notes
4/22/22	9pm	102.5	80	40	red	3 secs	Diarrhea, lethargic, not eating, back from Riverside Horse Show the previous day. Vet called.
4/23/22	8am	103	83	38	red	4 sec	Vet visit, concern about Salmonella infection, gave fluids and antibiotics, watch and quarantine.
4/30/22	4pm	101	40	16	pink	<2 sec	Vet follow up visit, horse recovered, wait at least 2 weeks to return to herd

hands, boots, etc. from one horse or facility to the next. One of the simplest steps in a biosecurity plan includes intentional cleanliness practices by human caretakers and visitors. Some simple examples can include wearing clean clothes and/or footwear, changing them between different equine establishments, washing hands before and especially between contact with different horse populations. Additionally, if you end up with a disease outbreak on your farm, you must immediately stop animal/human traffic. To the best of your ability quarantine or separate sick from healthy animals. Care for healthy animals first and use separate people, or at least clothes and tools to care for ill horses.

## Facility Management with Biosecurity in Mind

### Working with the Barn you Have

Most people don't have a choice of facility layout or construction materials, however, there are effective steps that you can take to make your facility more biosecure. Additionally, you can choose how to manage different horse populations (e.g., traveling show horses away from young or geriatric populations) and placement of common storage areas. Think through how their locations impact horse and human traffic patterns that could lead to exposure and cross-contamination. For example, having an open stall

between new, transient, or sick horses and the rest of the herd decreases the risk of infection spreading by direct contact. You can also keep different populations in different wings of the barn to minimize cross contamination risk. Keep in mind that horse breath (Figure 2) and sneezes can travel quite far (approximately 90 feet) in the air (FAQ, 2023).



Figure 2: A horse's breath, a snort, or a sneeze can float in the air for some distance. Cold air can help us visualize how far a horse's breath can travel through the air. Photo credit Sara L. Mastellar.

## Common Routes of Transmission for Equine Diseases

Diseases can be transmitted by various routes. Some examples include:

**Vectors (e.g., biting insects, animal bites):** EIA, West Nile, EEE, WEE, Rabies

**Fomite (e.g., shared brushes):** Ringworm, Strangles

**Shared Water Source:** Glanders

**Aerosol (e.g., sneeze or cough):** Influenza, Rhinopneumonitis

### Choosing Surfaces

When building or remodeling a facility, selection of materials (and their maintenance) can contribute to how well pathogens can survive on surfaces. You can choose to make simple changes to existing facilities at lower costs which can significantly increase your ability to effectively clean/disinfect areas in your barn (Figure 3). For example, choosing less porous surfaces will make it easier to remove pathogens, or sealing porous wood surfaces with paint to make cleaning and disinfection easier.



Figure 3: Different stall wall materials have biosecurity implications. The grate style shown here (left) promotes healthy airflow and allows horses to see out easily. However, any pathogens can be easily transferred from one horse to another in a neighboring stall making this style a poor choice for a quarantine stall. Polycarbonate has been installed as a nonporous surface in a foaling stall (right) to make the disinfection process between mares more effective. Photo credits Sara L. Mastellar.

## Use of Signage

Signage can help to reduce or reroute human and animal traffic to mitigate disease exposure potential (Figure 4). Having "biosecure" areas on the farm is helpful when quarantining a horse or to protect potentially immunocompromised populations (e.g., weanlings or horses recovering from surgery). Additionally, signs can discourage practices that are not biosecure. For example "no petting" signs at shows/ events can reduce the chance visitors will pet or let your horse smell or lick their hand after doing the same to other horses from other facilities. Finally, you can post reminders of biosecurity practices such as, to wash hands, not to share brushes between horses, or to care for certain horses last. One very simple resource is available for free at: <https://extension.arizona.edu/pubs/barn-smarts-biosecurity-tips-keeping-your-horse-safe-healthy>.



Figure 4: Signage can help to reduce or reroute human and animal traffic to mitigate disease exposure potential. Photo credit Sara L. Mastellar.

## Feed Hygiene

Oral ingestion of pathogens can cause disease, so making sure that the feed we give our horses is contamination free is important. For all feed storage, potential vectors, such as mice, raccoons, or possums, should be discouraged from interacting with feed. Inspect feedstuffs as you feed to look for foreign matter, such as dead animals (Figure 5). Decaying matter can harbor anaerobic bacteria, such as *Clostridium botulinum* (which can cause botulism). Never feed any feedstuffs to horses that look or smell moldy.

For hay, be sure to have appropriate ventilation and cover for your storage area (Figure 6). Moisture can contribute to mold. In many areas of the country, round bales are commonly used for horses. Large round bales can be more of a risk for feed-borne illness. Precautions should be taken when possible to



Figure 5: Inspect feed for foreign material or spoilage as you feed. Photo credits Betsy Greene.



Figure 6: Store hay in well ventilated and protected areas. Photo credits Betsy Greene.

store properly and/or feed with a cover preventing them from being rained on. Check round bales regularly for spoilage. In properly made haylage, the pH drops below 4.5 and inhibits some pathogenic bacteria (Ministry of Agriculture, 2022). Monitoring bale pH is one way owners / managers can mitigate the risks of feeding haylage to horses. While all horse owners should talk with their veterinarians about risk-based vaccines, this is especially true for horses fed large round bales or haylage because of the botulism risk associated with these form factors.

For bagged feeds, check the date of manufacture to ensure freshness before purchase. Most commercially available complementary feeds, such as concentrates or ration balancers, are about 90% dry matter (Monsanty et al., currently unpublished data) meaning that there is little moisture available to microbes that could cause spoilage. Most feed bags are also breathable, so they can dissipate moisture under the right conditions. However, in humid conditions, or if feed is kept near a water source, moisture can enter the bags and speed spoilage. Store any feed or supplements in rodent proof containers and consider keeping them in climate controlled areas, especially if conditions are hot and humid. Supplements high in fat can go rancid if kept in hot conditions. Do not feed supplements if they smell rancid or their smell changes over time because that could indicate spoilage.



## Historic Sidebar: The Great Epizootic

An outbreak of a particularly virulent strain of equine influenza spread throughout the North American equine population in 1872. A week after the first cases were reported in Canada, 600 horses were affected in the Toronto area (Tillman, 2023). While records from that time are not complete, it is estimated that a quarter of the horses in the US died equating to 4 million horses (Moates, 2020). It was reported to Congress that 80-99% of North American horses had been infected (Commissioner of Agriculture, 1872). For context there are 7.2 million horses in the present day US (American Horse Council, 2018).

Horses that survived the disease still needed time to recover and some suffered permanent respiratory damage. The disruption this disease outbreak caused was absolute. The entirety of the US transportation system ground to a halt. Trains could not move for lack of coal hauled by horses from mines. Fires raged as horse drawn fire engines were unable to respond quickly, if at all. The outbreak was in part credited with contributing to the financial panic of 1873, which was known as the “Great Depression” until the Great Depression of the 1930s (Armstrong, 2020).

In retrospect, the spread of the disease from east to west and more quickly between closely connected urban centers, was related to travel patterns of horses and humans at the time (Judson, 1874). While a similar outbreak of equine influenza occurred in Australia in 2007, the outbreak was curtailed by modern biosecurity practices, including travel restriction. Only 47,000 horses were infected at the peak of that outbreak (NSW, 2008).

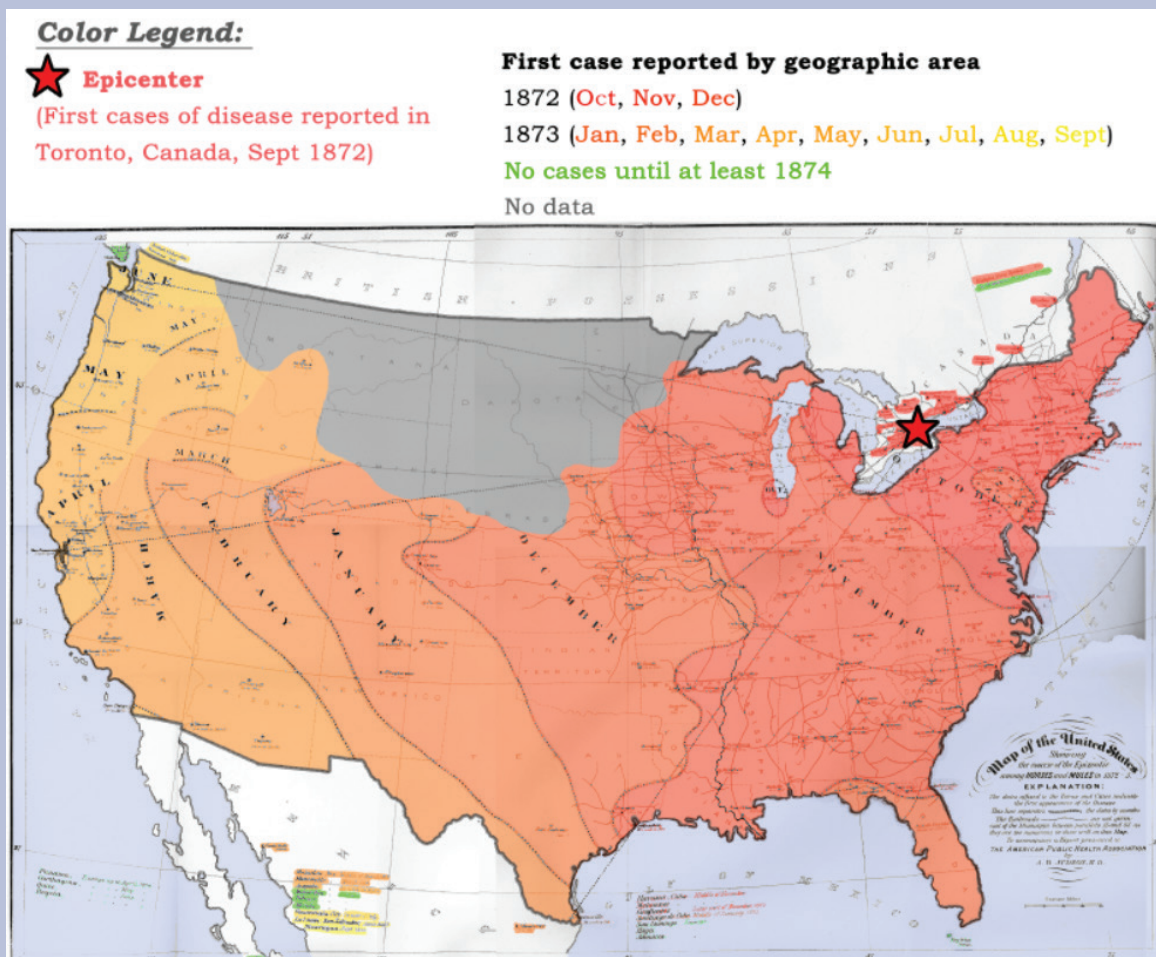


Figure 7: Map of the progression of The Great Epizootic constructed through newspaper reports by Judson (1874). Colorized for modern audiences by Sara L. Mastellar. The first reported cases were in Toronto, Canada (star) at the end of September 1872. Areas affected in October of that year are shown in the darkest color of red with each successive month shown in a yellowish shade. Areas noted in green, mostly islands and peninsulas, did not have any cases reported until at least 1874. There was a lack of newspaper reports from the section of the US shown in gray.

While the livestock feed supply in the US is one of the safest in the world, it is possible for feed products to become contaminated. Once the US Food and Drug Administration (FDA) becomes aware of a problem, a recall alert is issued. There was only one equine feed product recall in 2022, but it was associated with 45 horse deaths (Manzanola Feeds, 2022). Consider signing up for FDA recall alerts (<https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts>) to be in the know. However, supplement companies are not regulated in the same way that feed companies are and therefore, in some cases don't have the same oversight for quality control.

## Limiting Exposure Discouraging Vectors

Facility design and layout should discourage potential vectors. For example, mosquitoes have the ability to carry West Nile Virus and infect both horses and people. Therefore facilities that reduce mosquito habitat are more biosecure. Rodents, such as mice, can also act as vectors and are attracted to horse feeds, cats can be helpful in controlling mice (Figure 8). Keep cat food out of reach as it can attract skunks, raccoons, or possums (which carry Equine Protozoal Myeloencephalitis).



Figure 8: (left) Keep feed rooms clean and well ventilated to deter rodents and mold growth. Photo credit Betsy Greene. (right) Cats can be helpful in controlling mice, which can carry pathogens, such as Leptospirosis. Photo credits Sara L. Mastellar.

## Insect Control

Insects can be vectors of disease spread, so addressing control of insect populations can help to minimize disease. West Nile Virus, Western/Eastern/Venezuelan encephalitis virus (WEE, EEE, VEE), Vesicular Stomatitis Virus (VSV), Pigeon Fever, and Potomac horse fever (PHF) are examples of diseases that are spread directly by insects. Removing organic material (e.g., feces) from the barn and limiting standing water can reduce breeding areas for flies and mosquitoes. Remove water left in old tires, buckets, and elsewhere to minimize breeding grounds for pests, such as mosquitoes.

Pest control aids such as fly sheets/boots, traps, fly predators, and feed-through products will help to control insect vectors. Fly predators are parasitoid wasps that do not bother the horses, but drive down certain fly populations when released on horse properties (Machtinger et al., 2015). Feed-through fly control products contain insect growth regulators that impact the insects, but not the horses (Edwards & Spier, undated). While insect repellents are a short term solution, over time insect populations become resistant to their effects. In some cases, physical barriers, such as fly boots were more effective than sprays (Mottet et al., 2018).

## The Disinfectant Breakdown

Good sanitation conditions can minimize the level of exposure a horse has to disease causing organisms. Practice a systematic and diligent approach to sanitizing equipment such as water buckets, feed pans, feeders, shovels, pitchforks, and other barn equipment to reduce exposure risk. Tack, riding, and grooming equipment should also be cleaned on a regular basis. Regular cleaning both at the barn and competitions will decrease organic matter that can harbor disease organisms and limit cross contamination between animals (Figure 9). Clean facilities and equipment also reduce insect vectors, such as flies.



Figure 9: Removal of organic matter is an essential first step to disinfection. Photo credit Sara L. Mastellar.

Make a habit of regular cleaning with effective disinfectants to successfully prevent cross contamination and exposure. Cleaning a dirty facility can be challenging. Several important factors that must be accounted for include:

1. The material / surface being cleaned.
2. The amount of contact animals have with it.
3. What cleaning solutions are most appropriate.
4. How well prepared (i.e., removal of dirt or manure) the area is before a disinfectant is applied (Figure 10).



Figure 10: Example of organic matter on stall wall. Removal of organic matter first, improves the effectiveness of the disinfectant. Photo credits Sara L. Mastellar.



Equine housing facilities are made of several types of materials. Floors often consist of dirt rubber mats, and/or concrete. In addition, wood also serves many purposes in horse barns. Sealing wood products used in a barn will make cleaning easier, preventing possible absorption/trapping of unwanted pathogens. Regardless, different cleaning solutions should be considered for the variety of surfaces and pathogens of concern.

There are many types of cleaning products available. Appendix 1 describes various commercially available products, their uses, and limitations. A thorough stall cleaning process starts by removing all organic material (feces, bedding, etc.) with shovel and broom. Next, the remaining material should be removed from walls and non-dirt floors with water (+/- soap) and brushes. As much organic material as possible should be removed before applying disinfectant (Figure 10).

Bleach is a common and relatively available disinfectant, but it rapidly loses its effect when it interacts with organic material such as feces. However, if proper cleaning steps are taken, bleach can combat clostridial spores and enveloped viruses such as influenza, herpesvirus, equine arteritis, and many others (AAEP, 2017). To combat other non-enveloped viruses, the AAEP recommends using products with a phenolic or peroxigen base. However, there are additional cleaning agents available (Appendix 1).

## Traveling Horses

### Before Travel: Know Before You Go

Facilities should require health documentation from incoming horses. This includes an up to date vaccination record, proof of a negative Coggins test, and possibly a health certificate or Certificate of Veterinary Inspection. Vaccination records should be current and document the vaccines given to that specific horse (Kirby, 2010). Knowing what the horses at a facility have been vaccinated for may help determine what diseases are most likely to be acquired and spread. A negative Coggins test is evidence that a horse did not have Equine Infectious Anemia (EIA) at the time blood was drawn. This test is a snapshot of time, even though, conceivably, a horse could be exposed to EIA after the blood draw. While not ideal, it allows “EIA positive horses” to be identified and dealt with at the time of testing. A negative Coggins is required for most traveling and showing, and is strongly recommended as a requirement for horses at boarding facilities, including overnight stabling. Health certificates are issued by veterinarians, usually good for 30 days, and signify that the animal was apparently healthy (no evidence of disease, normal temperature, normal pulse and respiration rate, normal feces, etc.) at the time of examination. Coggins tests and some vaccinations are required to be administered by veterinarians, and this also ensures that horses are thoroughly examined by a veterinarian at least once a year, which may catch any arising health issues earlier.

Check with the venue (e.g., show, sale, racetrack, state/national park, etc.) where you are traveling to see if there are any additional requirements. For example, some state parks

require proof of rabies vaccination, specifically. Additional steps are required for international travel, so be sure to review USDA rules and regulations of other countries involved. Plan ahead and schedule veterinary appointments well in advance of travel. If health certificates are required, note that health certificates are only valid for a limited period of time, typically 30 days.

Be aware of diseases and potential outbreaks in your area. The EDCC (<https://equinediseasecc.org/>) is a clearinghouse for this type of information. Being familiar with the symptoms of diseases that your horse is most at risk for may help you catch disease in early onset.

Make stall cards for your horse(s) at their temporary and home locations and list their normal vital sign measurements (Appendix 2). An example stall card can be found on the [United States Pony Club site](#). Be sure to include other identifying information about the horse, if they are insured, and accurate contact information of responsible parties. That way anyone noticing something “off” about a horse can quickly get into contact with the relevant people. Pack your stall cards along with relevant health paperwork in your tow vehicle.

### Trailing

It is important to disinfect the trailer regularly, especially if it is used to transport different populations of horses or sick horses to the veterinary clinic. Clean out all bedding and manure before disinfecting. For the most thorough disinfection you should also clean/disinfect the truck and trailer tires.

If your horse shows signs of disease, avoid travel. To limit disease spread, only healthy horses should be traveling to public venues. The stress of travel decreases the horse’s ability to fight disease (Stull and Rodiek 2000) and this can increase the potential of spreading disease to other horses. Ideally, trailer your horse by itself or with others from the same facility (APHIS, 2006). If you are “trailer pooling” with others traveling in the same direction, dividers can limit direct contact and therefore spread of disease.

### Tips for the Show/Competition/Trailhead/etc.

Before unloading your horse, prepare the space you will be using. Different facilities vary greatly in how much cleaning/



Figure 11: Sniffing noses is a natural greeting between horses. It is also one way horses can directly transfer disease to one another, especially if they are from different herds. Photo credit Sara L. Mastellar.



disinfecting is done between groups. Clean (especially organic matter) and disinfect stalls/spaces before moving your horse in. Consider putting up “no petting” signs to decrease the chance that members of the public will spread disease between horses. Plan your space to reduce contact between your animals and those from other facilities. For example, you can put your tack/feed stall between your horses and your neighbors' horses.

The main route of spreading equine disease is through direct contact with other horses, therefore owners should be mindful of direct horse-to-horse interaction (Figure 11). Unnecessary contact with unfamiliar horses should be limited at any public facility for the safety of all horses.

Also be mindful of spaces shared with other horses. For example, don't hand graze in places that other horses frequent. Parasite larvae travel throughout plants near manure piles (Figure 12). Don't let your horse rub on or lick fencing, etc. Avoid shared water sources since you don't know the health status of other horses using them. There used to be many



Figure 12: A horse grazing near manure is at increased risk of exposure to internal parasite larvae. Photo credit Sara L. Mastellar.

public fountains and water troughs for horses working in urban areas, but these fell out of favor as our understanding of disease spread grew (see Historic Sidebar: Public Water Troughs).

Finally, while competing or participating in public events monitor your horse, particularly their temperature and respiration. If your horse is showing abnormal signs, take steps to isolate and contact your veterinarian. If you see any horses exhibiting signs of disease, follow the saying “if you see something, say something” and alert show/event officials. They will be able to evaluate the situation and help adjust human/animal traffic and potentially alert others to the need to monitor or test their animals. Not every diseased horse presents with symptoms (Wilcox et al., 2022), so it is important to test to best contain outbreaks.

### Upon Return and New Horses

For new horses, ask the owners or sellers to provide health documentation (e.g., vaccination records). Any new horse, or horses returning home after exposure to other animals, ideally should be quarantined. Not all facilities were designed with quarantine areas, but work with the facility you have to minimize contact between new or returning horses and resident herds. Horses most at risk for disease include geriatric horses and young horses (e.g., weanlings), so new and returning horses should not be mixed with these populations if at all possible.

Failure to adhere to quarantine procedures was cited as a major contributing factor in the Australian outbreak of equine influenza in 2007 (Watson et al., 2011). The length of quarantine time varies with the types of diseases in your area. Quarantine times should be longer than incubation periods, or the time it takes for symptoms to develop for diseases of concern. While new or returning horses are in quarantine, care for them last and monitor them for signs of disease. Learn more about disease incubation periods and symptoms from the AAEP, the Equine Disease Communications Center, or your veterinarian.

### Quarantine

The most effective biosecurity measure to prevent disease is to maintain a stable population of individuals on a farm

## Barn Smarts for Biosecurity

Biosecurity changes may seem small, but they can make a big difference in protecting the health of your horse. For more biosecurity tips, accompanied by easy to remember cartoon memes, check out the Tips for Keeping Your Horse Safe and Healthy series.

Publications and printable posters available in English, Spanish, Apache, and Navajo (Diné).

<https://extension.arizona.edu/pubs/barn-smarts-biosecurity-tips-keeping-your-horse-safe-healthy>

(Greene & Wright, 2020)



### Sharing Snot 'sNOT Cool!

While away at a show, don't allow your horse to make nose to nose contact with other horses. If possible, use your tack stall as a barrier between your horse and their neighbor. Always provide your own water buckets, don't allow your horses to drink from the community water tub. Disinfect tools and equipment (including your trailer and tires!) during your stay and after you return home.

## Historic Sidebar: Public Water Troughs

In the early 1900s public water troughs abounded in urban streets. Many were commissioned by humane societies or dedicated to animal lovers, much in the same way that park benches sometimes have dedication plaques for nature lovers. These waterworks often had drinking fountains for people, a basin for horses, and smaller bowls closer to the ground for dogs and cats.

In 1909 veterinarians called for the closure of public water troughs due to the fact that glanders could be spread between animal species, including between horses and humans (Jurga, 2017). Glanders was a deadly disease and was a leading cause of death in horses during times of war. Horses with glanders were often euthanized as a common disease control method of the time. As many as 11,000 horses died of the disease at a single Union army depot during the Civil War (Sharrer, 1995). In response to this disease threat, Boston dismantled its public troughs and replaced them with hydrants. Other cities, such as Buffalo, ensured their public troughs had continuously running water (Jurga, 2017).

While the beautiful waterworks were largely a casualty of biosecurity mandates, some still exist as decorative fountains today (Figure 13). No naturally occurring cases of glanders have occurred in the US since the 1940s (CDC, 2017).



Probasco Fountain  
Cincinnati, OH  
photo by Greg Hume



Annie L. Lowry Memorial Horse Trough  
Philadelphia, PA  
photo by BoringHistoryGuy



Horse Show Fountain  
Chicago, IL  
photo by IvoShandor



Thompson Fountain  
Portland, OR  
photo by Another Believer



National Humane Alliance Fountain  
Derby, CT  
photo by Jack Walsh



Burnside Fountain  
Worcester, MA  
photo by Modemac

Figure 13: Some public water troughs are still on display as decorative fountains.



with limited or no exposure to new animals. However, one of the joys of horse ownership is camaraderie and competition, which means we often gather groups of horses from different environments together for shows, trail rides, etc. There are effective and necessary steps which can be taken to reduce the likelihood of spreading disease among the participants. The concept of quarantine is important anytime that new animals are brought onto a farm or into a barn. Additionally, quarantine can be an important tool to limit the spread of disease if an outbreak occurs on a farm. Quarantine involves separating individuals or populations for a predetermined amount of time to watch for signs of disease before mixing the groups.

- **Maximize biosecurity by quarantining new or returning horses for up to 3 weeks.** Signs of most diseases will be apparent within this amount of time. Animals that travel and come into contact with unfamiliar horses should also be quarantined upon return to the barn.
- **Group horses according to risk level.** Horses that go to shows together all have equal risk of exposure and can be kept together. Quarantine serves to protect the population that was not exposed (i.e., horses that didn't go to the show). Stall separation will ensure that water or feed buckets are not shared between quarantined and non-quarantined horses.
- **Limit exposure when complete separation from other resident horses isn't possible.** Quarantine areas are designated locations that aid in separating an animal from others on the property. Ideally, these areas are located in a separate barn, or a paddock from other groups to help prevent direct contact and transmission. If limited space makes this practice difficult you can still limit direct exposure and sharing of equipment. In this case, extra cleaning precautions should be taken.
- **Contact and care for healthy horses first and end with those in quarantine when staffing is limited.** Begin with healthy horses and then move to those animals that have a potential to be ill, then finally finish with those in quarantine to help eliminate the risk of diseases spreading. Complete all interactions (feeding, grooming, cleaning) within one group or barn area before moving to the next.
- **Monitor all horses for signs of illness or deviations in their normal vital signs.** This is a good practice for all horses, even when risk of disease is low. For horses that travel, it is wise to monitor their vital signs in the days leading up to, during and for two weeks upon return from travel (see Tips for the Show/competition/trailhead/etc.).
- **Designated quarantine stalls and paddocks should be separated from other stalling areas.** Assign separate equipment for the cleaning of individual quarantine stalls. If quarantine stalls are not available, alternate methods for maintaining separation with other horses on the property are warranted.

If paddock quarantine is preferred over the use of stalls, similar precautions must be taken. Any shared use of feeding or watering devices for other paddocks should be prevented. Quarantined animals should be kept as far away as possible from the resident animals to prevent nose-to-nose contact. Solid walls should be used if space is tight to prevent fecal contamination, and ideally the air should not be allowed to mix between groups. If the animals are in the same building and the air mixes or becomes stagnant, the animals are no longer in quarantine. Outdoor pens should be as far away from other horse paddocks and natural barriers such as bushes or trees in between fence lines can aid in preventing contact. However, remember to plant species safe for equids. Most diseases will cause clinical signs within 30 days. If a horse in quarantine becomes ill, proper precautions can be utilized to care for this horse while protecting the remainder of the herd from the disease. As horses may not show outward signs of a disease for a period of time, it is wise to take extra precautions when handling quarantined horses. These include washing your hands before and after handling the new horse, changing shoes, maintaining separate equipment for cleaning and handling the horse, and handling the horse last. Once you have been with the quarantined horse do not do anything with the rest of your resident horse herd afterward. These precautions will help to prevent potential spread (Kirby, 2010).

## Summary

If you and your horse participate in group activities or board at a public barn, biosecurity risks are simply part of daily life. As owners, it is our responsibility to keep our animals as healthy as possible. Be aware of diseases and how they are transmitted. Organize a plan in order to promote overall health by way of cleanliness. By managing biosecurity on individual properties, protecting all horses is made easier. At times, isolation is the best option. Knowing the reasons and steps to quarantine helps health management become effective. Keeping our horses healthy not only improves the lives of the others they come into contact with, but also the lives of the people they touch.

An early quarantine can help prevent transmission to other horses (or people, if zoonotic). Additionally, you can take proactive steps to isolate new, visiting, or returning horses to your facility, take their temperature twice a day, and monitor health status (Eating/Drinking/Urinating/Defecating, nasal secretions, etc.) a minimum of 7 days or more depending on the situation.

## Acknowledgements

This article was originally peer reviewed and published through South Dakota State University Extension (iGrow) in 2016. It was extensively expanded, updated, and peer reviewed in 2023. The authors would like to thank Danielle Busselman, Natalie Mook, and Rebecca Bott-Knutson for their contributions to the original 2016 publication.

## Appendix

### Appendix 1. Commonly Used Disinfectants for Decontamination of Equine Facilities and Equipment

Uses*	What They Kill	Chemical Class	Common Products	Limitations
Sanitizing skin, surfaces, and equipment	Vegetative bacteria <sup>1</sup> , fungi, enveloped viruses	Alcohol	Ethanol, rubbing alcohol surfaces and equipment	Non-enveloped virus variable effect, not effective against spores <sup>2</sup> , evaporates rapidly.
Environmental and surface decontamination	Vegetative bacteria <sup>1</sup> , Mycobacteria, enveloped viruses, non-enveloped viruses, fungi	Halogens -Hypochlorite	Bleach	Variable effect against spores <sup>2</sup> , inactivated by sunlight and organic matter, corrodes metals.
Environmental and surface decontamination, sanitizing equipment	Vegetative bacteria <sup>1</sup> , Mycobacteria, enveloped viruses, non-enveloped viruses	Oxidizing Agents	Hydrogen peroxide, Peracetic acid, Virkon™ S, Oxysept®	Variable effect against spores <sup>2</sup> and fungi.
Environmental decontamination	Vegetative bacteria <sup>1</sup> , enveloped viruses	Phenols	1-Stroke Environ®, Pheno-Tek II®, Tek-Trol®	Variable against Mycobacteria, nonenveloped virus and fungi. Not effective against spores <sup>2</sup> .
Environmental and surface decontamination	Gram positive bacteria	Quats (Quaternary Ammonium compounds)	Roccal®-D Plus, Diquat, D-256 Disinfectant	Limited effect on Gram negative bacteria. Variable against Mycobacteria, enveloped virus, and fungi. Not effective against non-enveloped viruses or spores <sup>2</sup> .
Benefit of moveable structures/shade, equipment can be taken outside	bacteria, viruses, fungi	UV Light (sunlight)	Not applicable	Cannot be used indoors

\*Always follow label directions, all disinfectants can be toxic, contact your veterinarian with any specific questions.

<sup>1</sup> Vegetative bacteria – Bacteria that are actively growing. Gram Positive (e. g. *Staphylococcus aureus*, *Streptococcus equi*, *Rhodococcus equi*, etc) and Gram Negative (*Salmonella*, *E.coli*, *Actinobacillus equuli*).

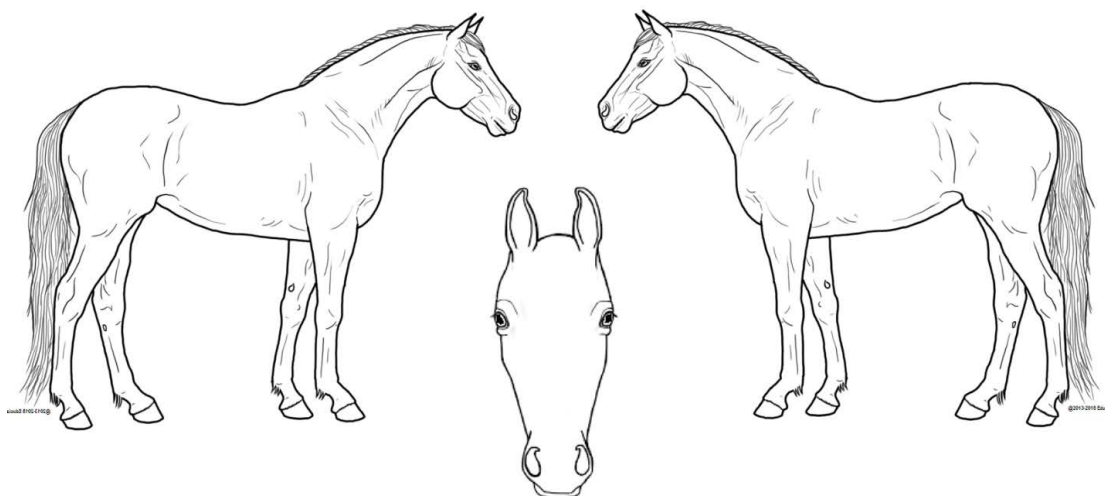
<sup>2</sup> Spores – Bacteria that are dormant and can survive for a long time in soils and organic matter. They are very tough and difficult to kill. *Clostridium difficile* is a common disease organism in horses that can form spores. Tetanus and Botulism are both spore formers as well.

\*\*Information adapted from the Center for Food Security and Public Health (Dvorak, 2008), <http://www.cfsph.iastate.edu/Disinfection/Assets/Disinfection101.pdf>.



# Hello, my name is \_\_\_\_\_!

Images showing color, markings, and hair whorls



## Descriptions & behavior

Breed: \_\_\_\_\_

Year born: \_\_\_\_\_

Height: \_\_\_\_\_

Stereotypes or other behaviors:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Vital signs

Directions on how to take vital signs:



<https://extension.arizona.edu/pubs/knowning-what-normal-your-horse>

Date/time: \_\_\_\_\_

Temperature at rest: \_\_\_\_\_

Pulse at rest: \_\_\_\_\_

Respiration at rest: \_\_\_\_\_

## People

Owner(s)

\_\_\_\_\_  
• Cell # \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

\_\_\_\_\_  
• Cell # \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Trainer: \_\_\_\_\_

Veterinarian: \_\_\_\_\_

Farrier: \_\_\_\_\_

Insurance: \_\_\_\_\_

## Notes

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Appendix 3. Know Your Horse - Signs Check

**Horse Name:**



Directions on how to take vital signs

<https://extension.arizona.edu/pubs/knowning-what-normal-your-horse>

Date	Time	Temp °F	Pulse (beats per min)	Respiration (breaths per min)	Gum Color	Capillary Refill Time	Notes

Diseases can cause many signs in horses. Some of the following signs are good to watch for to detect any issues early: cough, nasal discharge, depression, loss of appetite, difficulty breathing, lameness, abnormal stool (loose, discolored, foul smelling), changes in eating habits, and fever. Not all diseases will be dangerous to your animal, but if you are concerned you should consult with your veterinarian. For further information consult the "Knowing What is Normal for Your Horse" publication <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/AZ1986-2022.pdf>. Use this table to record your horses vital signs and any issues of note on a regular basis so that you will recognize what is normal for your horse and be able to spot problem signs early.



## Horse and Facilities Checklists

The check sheets in Appendix 4 and 5 give you a place to identify the positives that you already incorporate into your barn management protocols, and provide next steps to increase your level of biosecurity practices. Depending upon your

role in the barn or facility, you may create separate “check off sheets” for yourself, your employees, horse owners, or your club members. Consider including pieces on a “chore sheet” for daily/weekly tasks and have a place for either assignment or check off (date/person) to ensure completion.

Appendix 4. Barn Health Checklist			
	YES	NO	Notes
Are horses receiving vaccinations recommended by your local veterinarian?			
Are health records updated and accurate?			
Are fresh needles and syringes being used for each horse when vaccinating or giving medicines?			
Are multi use medical devices such as stethoscopes and thermometers sanitized after every use?			
Are you using gloves when performing an exam?			

Use this table to assess the health of your barn and management practices. If you answered no to any of the questions use the notes section to list how and when the protocol will be implemented. Include the name of the person responsible for implementing. If a protocol will not be implemented list why. Complete this checklist at regular intervals (at least yearly) to ensure your facility continues to follow best management practices.

## Facility Checklist

### Daily Tasks (Minimum)

- ☐ Ensure all employees/visitors/horse owners are wearing clean clothing
- ☐ Ensure all boots are cleaned/disinfected (provide boot wash)
- ☐ Pick Stalls (remove feces and wet bedding)
- ☐ Pick multi use areas (remove feces)
- ☐ Assess all horses for signs of disease (Table 3. Know Your Horse - Signs Check)

### Weekly Tasks

- ☐ Wash and disinfect indoor feed pans
- ☐ Wash and disinfect indoor water buckets
- ☐ Wash and disinfect pitchforks/manure picking equipment

### Monthly Tasks

- ☐ Wash and disinfect outdoor waterers and feed areas (if applicable)
- ☐ Assess the need for health certificates in the coming weeks

### Annual Tasks

- ☐ Provide annual health checks and vaccinations (consult with your veterinarian)
- ☐ Thoroughly clean and disinfect stall areas (walls and floors)

### Continuous Tasks (As Needed)

- ☐ Clean grooming equipment (brushes, combs) after each use if used on multiple animals
- ☐ Clean rasps, nippers, and hoof picks after use
- ☐ Clean and disinfect horse trailers after use, especially after show attendance
- ☐ Clean and disinfect veterinary treatment area after use
- ☐ Wash hands after working with horses and between individual horses

## Additional Resources

Animal Biosecurity - Colorado State University  
<https://animalbiosecurity.colostate.edu/>

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Stall Card - United States Pony Club  
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Transporting Horses and Other Equids - AVMA  
<https://www.avma.org/resources/pet-owners/petcare/cvi/transporting-horses-and-other-equids>

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