Disinfecting equine facilities

R.M. DWYER *

Summary: Disinfection of equine premises provides a challenge to farm managers, in view of the variety of surfaces which may be contaminated and the wide variety of horse pathogens. Of the commonly occurring infectious diseases for which disinfection and disease control are especially important, rotavirus diarrhoea, salmonellosis and strangles are the most difficult to control. Phenolic disinfectants have been scientifically demonstrated to be effective in the presence of organic matter and are also virucidal. When used after thorough cleaning and rinsing of stall surfaces, phenolics have proved effective in controlling outbreaks of disease. In addition, 10% iodophors used for washing hands and cleaning equipment are also virucidal and bactericidal. Quaternary ammonium compounds, chlorhexidine, bleach and pine oil are readily available commercially, but are ineffective disinfectants in the presence of the organic matter encountered on horse farms.


INTRODUCTION

Prevention of infectious diseases in horses involves two main tactics: vaccination and disinfection. Although many adequate vaccines are commercially available, none can be guaranteed to be 100% effective. Even with proper vaccination against herpesvirus, mares are known to abort fetuses due to this pathogen. For a number of disease-causing organisms (e.g. Salmonella, Rhodococcus equi and rotavirus) which can cause major outbreaks of disease, no vaccine is currently available. This is also the case for the bacteria which cause septicaemia in newborn foals (Table I). Given that vaccination is not universally effective for disease prevention, disinfection management practices are essential in providing a healthy environment for horses.

Adequate discussion of the disinfection of equine premises requires examination of the pathogens encountered, the surfaces to be disinfected and the properties of the disinfectants.

EQUINE PATHOGENS

Some of the pathogens commonly known to cause disease in equines are listed in Table I. However, more than 50% of individual cases of diarrhoea and respiratory disease are not diagnosed as being caused by a particular organism. Farm managers need to consider unknown factors present in the environment, and that the presence of
### Table I

**Common pathogens of horses**

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Classification</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Salmonella</em> spp. *</td>
<td>Gram-negative</td>
<td>Salmonellosis, septicaemia, diarrhoea</td>
</tr>
<tr>
<td><em>Streptococcus equi</em> *</td>
<td>Gram-positive</td>
<td>Strangles</td>
</tr>
<tr>
<td><em>Streptococcus</em> spp.</td>
<td>Gram-positive</td>
<td>Respiratory infections, septicaemia</td>
</tr>
<tr>
<td><em>Rhodococcus equi</em> *</td>
<td>Gram-positive</td>
<td>Respiratory infections</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>Gram-negative</td>
<td>Septicaemia</td>
</tr>
<tr>
<td><em>Actinobacillus</em> spp.</td>
<td>Gram-negative</td>
<td>Septicaemia</td>
</tr>
<tr>
<td><em>Pseudomonas</em> spp.</td>
<td>Gram-negative</td>
<td>Septicaemia</td>
</tr>
<tr>
<td><em>Klebsiella</em> spp.</td>
<td>Gram-negative</td>
<td>Septicaemia</td>
</tr>
<tr>
<td><em>Enterobacter</em> spp.</td>
<td>Gram-negative</td>
<td>Septicaemia</td>
</tr>
<tr>
<td><em>Clostridium</em> spp.</td>
<td>Gram positive, spore-forming</td>
<td>Tetanus, botulism, haemorrhagic diarrhoea, sudden death</td>
</tr>
<tr>
<td><strong>Viruses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus *</td>
<td>Non-enveloped</td>
<td>Foal diarrhoea</td>
</tr>
<tr>
<td>Influenza virus *</td>
<td>Enveloped</td>
<td>Respiratory disease</td>
</tr>
<tr>
<td>Equine arteritis virus *</td>
<td>Enveloped</td>
<td>Abortion, systemic disease</td>
</tr>
<tr>
<td>Herpesvirus *</td>
<td>Enveloped</td>
<td>Respiratory disease, abortion, neurological disease</td>
</tr>
</tbody>
</table>

* causes of disease outbreaks potentially involving large numbers of animals

Organic matter such as manure, urine, blood, discharges and dirt can render some disinfectants useless.

Several disease-causing organisms are constantly present in manure, soil and dust. While it is neither desirable nor practical to disinfect pastures or paddocks, vaccination and management can be used to control some of these disease agents.

Of the known equine pathogens, spore-forming *Clostridium* spp. are present in manure and soil, and can withstand adverse environmental conditions for extended periods of time. Routinely used disinfectants are ineffective against this hardy bacteria in the presence of organic matter. However, vaccines are available against the diseases caused by *Clostridium* spp. (e.g. tetanus and botulism). *Rhodococcus equi* can become endemic on farms, and survives in dust, manure and dirt. Foals ingesting or inhaling this bacterium develop abscessing pneumonia and occasionally diarrhoea. *R. equi* can be killed by using disinfectants in barn areas.

Gram-negative bacteria such as *Salmonella* spp. are susceptible to drying conditions, although this organism can easily survive over winter and under extremely cold conditions. *Leptospira interrogans* is a fragile organism which can live only in a moist environment and is easily killed by disinfectants. The other bacteria listed in Table I can be killed using several disinfectants.

Of the disease-causing viruses, enveloped viruses are the most easily killed, even by washing surfaces with a detergent compound. The detergent breaks apart the envelope surrounding the nucleic acid and thus destroys the virus. Rotavirus is non-enveloped and can withstand freezing temperatures. It has also been shown that this virus can...
remain alive for over nine months at room temperature. Even when dried on a surface, rotavirus can be infective to foals for several hours. A disinfectant which can kill rotavirus will also kill the other known equine pathogens listed in Table I (2).

**EQUINE FACILITIES**

Most horse facilities – whether barns, temporary stalls at horse events or horse vans – are made of a combination of the following materials: wood, concrete blocks, asphalt, metal, rubber mats or commercial flooring materials. Floors can also be composed of sand, dirt, compacted clay or other organic materials which cannot be adequately disinfected.

Raw wood is the material most commonly used in constructing stall walls in horse facilities (Fig. 1). As wood is porous and has a rough surface, disinfection is practically impossible. However, wooden stalls can be modified to enable routine disinfection. All organic matter should first be brushed or swept from the wood surface. A ‘plastic wood’ product or caulking should then be used to fill in any knots or holes in the wood. The wood should be painted with two coats of a heavy-duty varnish (such as that used on boats) allowing the varnish to dry between applications. This will result in a smooth surface which is waterproof, and easy to clean and disinfect. It will also lengthen the life of the wood by preventing dry rot.

Concrete blocks are also porous and have a rough surface which can trap organic matter and pathogens. Painting the cleaned walls with several coats of enamel or heavy-duty outdoor paint will also result in a surface which is suitable for cleaning.

Asphalt is used as flooring and can be washed and disinfected easily. In stalls with concrete or asphalt floors, drains are often placed in the centre of the stall. When constructing stalls, the floor should slope towards the drain at an angle of no more than three degrees, to facilitate the run-off of fluids. A greater angle may result in hoof or joint problems, as the horse would have to stand on an uneven surface for long periods.

Sand, dirt or compacted clay floors cannot be adequately cleaned, although as much contaminated material as possible should be removed. Commercial disinfectants are not formulated to disinfect these materials.

Many manufactured stall materials are now available, from rubber ‘bricks’ to interlocking grids in which sand or stone dust is placed. These materials are highly varied, and each needs to be individually scrutinized with regard to its suitability for use in equine facilities. Some floorings might be ideal for shaded sheds in pastures, but inappropriate for foaling stalls. Ease of cleaning and disinfection should be evaluated. In general, a material with many corners and crevices is more likely to allow pathogens to escape disinfection.

**DISINFECTANTS**

Choice of disinfectants is critical, and many factors must be considered, including the following:

- ability of the chemical to be germicidal on the surface to which it is applied
- germicidal activity against relevant pathogens
Of the known equine pathogens, rotavirus is the most difficult to kill. All pathogens are found in some type of organic matter: rotavirus, *Salmonella* spp. and *R. equi* in faeces; *Leptospira* spp. in urine; and *Streptococcus equi*, influenza virus and herpesvirus in nasal secretions. The importance of disinfectant efficacy in the presence of organic matter cannot be overemphasized.
Disinfectant advertising and literature will often claim efficacy in use at medical surgeries, nursing homes and hospitals. The common inference is then that if a product can be used in these areas, it will surely be effective on a farm. Human health care environments are usually constructed of linoleum, stainless steel, glass and plastics; these are hardly the types of surfaces encountered on horse farms. Many products may be useful in sanitizing hospital surfaces but unsuitable for use on farms. Reading the product label closely and evaluating the suitability of the product for use on a horse farm are essential.

Water hardness is caused by the presence of calcium or magnesium ions, and can reduce the efficacy of a disinfectant. Hardness is measured by the amount of calcium carbonate (CaCO₃) in a water sample. Water hardness varies from farm to farm and can be measured by sending a sample to a testing laboratory. If an urban water supply is used, the local water company should be able to provide information on hardness. A disinfectant which is effective in water containing 400 ppm CaCO₃ will be ineffective if the water used to dilute it has a hardness of 650 ppm, and the efforts to disinfect the premises will be unsatisfactory.

The costs of disinfection include labour expenses and chemical products. Disinfectant compounds are usually diluted for use. The ability to compare two equally suitable products with different dilutions and costs can lead to significant savings. For example, two identical products are available in four-litre containers from different companies. **Disinfectant A** costs US$30 per 4 litres, and must be diluted at a rate of 15 ml (0.015 l) per 4 litres of water. **Disinfectant B** costs US$14 per 4 litres and is diluted at 120 ml (0.120 l) per 4 litres of water. Which compound would be most economical?

If 0.015 litre of **disinfectant A** yields 4 litres of final disinfectant solution, then the total amount of solution obtained from a four-litre container of disinfectant A may be calculated as follows:

\[
4 \text{ litres of disinfectant A} \times (4 \text{ l water/0.015 l disinfectant}) = 1066 \text{ litres.}
\]

The cost of one litre of final disinfectant solution from disinfectant A is therefore \( \frac{US$30}{1066} = US$0.03 \).

If 0.120 litre of **disinfectant B** yields 4 litres of final disinfectant solution, then the total amount of solution obtained from a four-litre container of disinfectant B may be calculated as follows:

\[
4 \text{ litres of disinfectant B} \times (4 \text{ l water/0.120 l disinfectant}) = 133 \text{ litres.}
\]

The cost of one litre of final disinfectant solution from disinfectant B is therefore \( \frac{US$14}{133} = US$0.11 \).

Using disinfectant A is over three times as economical as disinfectant B, and over time will produce considerable monetary savings.

With the increased interest in world ecology and environmental safety, the biodegradability of disinfectants has become an important issue. Product labels should indicate whether the chemical is biodegradable; if no information is provided, this should be sought from the manufacturer.

All disinfectant chemicals can potentially cause harm to animals and humans. Phenolic compounds are lethal to cats and are caustic to skin and mucous membranes. Formaldehyde is a noxious, highly toxic chemical which should be used only by experienced personnel, as it is potentially carcinogenic. Farm managers should be taught to read the chemical label, not only for the active ingredients (see below), but also for...
warnings and procedures to follow if the compound is splashed into the eyes or onto mucous membranes, comes into contact with skin or is ingested. Induction of vomiting when a chemical is accidentally ingested is not always the proper procedure, as a compound which is caustic when swallowed will burn the tissues again if vomited. Reading and understanding the safety information on labels is of the utmost importance.

Commercially-available disinfectants generally fall into one of the following groups: phenolics, iodophors, quaternary ammonium compounds (QACs), hypochlorites (bleach), chlorhexidine and formaldehyde. Pine oil is often used on farms for its pleasant odour, but cannot be considered an effective disinfectant.

Phenolic disinfectants can be recognized by the term ‘phenol’ or ‘phenate’ at the end of the chemical name. These compounds will kill rotavirus and are effective in the presence of organic matter. Disinfectants containing o-phenylphenol, o-benzyl-p-chlorophenol, p-tertiary amylphenol or sodium o-phenylphenate are especially germicidal (4). These are the disinfectants of choice for use in horse facilities (1).

Iodophors (10%) will kill rotavirus in the presence of organic matter and are routinely used as skin antiseptics. Compounds with lower concentrations of iodophors are less germicidal (4). Iodophors (10%) are not routinely used in disinfecting equine facilities.

QACs are readily available commercially and can be recognized by the term ‘ammonium chloride’ at the end of the active ingredient name. These disinfectants – in common with hypochlorites and chlorhexidine – do not kill rotavirus and are inactivated in the presence of organic matter (4).

Formaldehyde is commonly used in swine and poultry confinement units. This highly toxic compound will kill pathogens, including the protozoan Cryptosporidium, when fumigated in an enclosed building for at least 18 h (3). Due to the toxic properties of formaldehyde and the need for skilled technicians for application, formaldehyde fumigation is not recommended for use in horse facilities.

**ROUTINE DISINFECTION**

No two horse facilities are alike, and the recommendations presented below will therefore be general; managers may choose to implement those which are suited to individual farms.

Ideally, a separate isolation barn should be available on the farm to enable the isolation of incoming horses and the housing of diseased horses during an outbreak, to minimize exposure of other horses. The interior surfaces of the isolation barn should be easy to clean and well ventilated, and adjacent stalls should be completely separated to prevent nose-to-nose contact between horses (Fig. 2). Fences of paddocks or pastures for these horses should be at a distance of at least 16 ft (5.25 m) from pastures used by other horses, although air-borne spread of respiratory viruses and bacteria cannot be completely prevented. This separation can also be accomplished by planting trees and shrubs between adjoining paddocks to physically prevent contact between horses.

An isolation facility is often a luxury which cannot be afforded by most farms. Where only one barn is available, a stall near an outside door must be designated as the isolation stall. An animal in this stall should be fed and handled last, and the stall should be cleaned last and should be as ‘isolated’ as possible. This is especially important if the
Isolation facility in central Kentucky featuring excellent ventilation, painted concrete walls, and an asphalt floor with a central drain

horse has come from the show or race circuit, from a veterinary hospital or from a farm with a history of poor hygiene or recent disease outbreaks.

When a horse leaves the isolation stall, this should be thoroughly cleaned and disinfected, together with any feeding or grooming equipment used for the horse. The following steps may be used for the disinfection of stall surfaces and equine equipment:

a) Remove all buckets, feed tubs and bedding from the stall.

b) Wash all feed equipment with a detergent or soap and water, and rinse with potable water. Soaking and scrubbing may be necessary to remove all organic matter. Allow equipment to dry thoroughly.
c) Sweep the walls and floor of the stall to remove as much organic matter as possible.

d) 'Steam clean' the walls and floor with an anionic detergent or a phenolic disinfectant-detergent compound. Alternatively, spray the walls using a water hose with a pressure valve and manually scrub the walls and floors to loosen organic matter. Wetting the surfaces and leaving for 30 min will soften 'caked-on' matter and allow for easier cleaning.

e) Rinse all surfaces with water, paying close attention to cracks, corners and crevices.

f) Dilute the phenolic disinfectant in accordance with the instructions of the manufacturer. Wear protective clothing, including eye goggles. Apply the disinfectant to the walls and floors and allow to dry. Repeat this step. Do not rinse!

g) Fill the stall with clean bedding and replace the feed buckets and equipment.

h) All equipment used in the stalls (e.g. pitchforks, rakes, brooms and brushes) should be soaked for 10 min in disinfectant solution, scrubbed clean and then sprayed with the disinfectant and allowed to dry. Brushes and grooming equipment should be cleaned in a similar manner.

i) Towels, contaminated clothing and other machine-washable materials should be soaked for 10 min in a disinfectant solution and then washed in hot water.

j) The stall and equipment are now ready for a new occupant.

This listing can be explained to farm employees and affixed in a convenient place for their use. The same techniques are also employed for disinfecting horse vans and aisles of barns.

Cleaning all organic matter from surfaces prior to disinfection is of the utmost importance. Even the best phenolic disinfectant poured full strength onto a pile of manure will not overcome the amount of organic matter present and kill faecal pathogens. Cleaning is also the most time-consuming and labour-intensive part of the process, requiring at least one hour per stall.

Pressurized steam machines can be used both inside buildings and on removable rubber mats (Fig. 3). Care should be taken that steam cleaning equipment is used in well-ventilated areas and is in proper working order, as carbon monoxide poisoning may occur when machines are used in enclosed spaces. These power steam washers can produce water at high temperatures (99°C [210°F]) and high pressure (700-1,000 psi [0.7-1.0 x 10^5 Pa]). This pressure cleans extremely effectively, but can remove paint from surfaces over time. Another drawback in the use of these machines is their relatively high cost (approximately US$3,000).

Alternatively, a water hose with a pressure nozzle attachment can be used to wet down surfaces which can then be washed with a detergent or detergent-disinfectant solution. A detergent must be used to adequately remove organic matter. If a detergent is not formulated with the phenolic disinfectant, an anionic detergent can be used. Cationic and non-ionic detergents are not compatible with phenols and should not be used in the cleaning step. Detergent labels will often indicate whether the ingredients are anionic, cationic or non-ionic. If this information is not provided, details should be sought from the manufacturer.
Routine cleaning and disinfection of rubber mats

The mats should be removed and routinely cleaned and disinfected. The machine used is a pressurized steam cleaner which can deliver hot water and detergent or disinfectant.

After washing with water and detergent, the walls should be rinsed from the top downwards, starting with the surface which is furthest from the drain or door. Close attention must be paid to corners and wall creases.

Phenolic disinfectants are potent chemicals which can cause chemical burns and eye injuries, and may be fatal if swallowed. The user should first read the entire label of any disinfectant, and ensure that the dilution instructions are thoroughly understood. Wearing protective clothing (including gloves and eye goggles) is an important safety measure. The disinfectant should be diluted in accordance with the instructions of the
manufacturer, and dispensed into a pressurized sprayer or hand-held pressurized applicator. Hand-held sprayers (of the type often used to apply pesticides and herbicides) are available at hardware stores and cost approximately US$75. Disinfectant should be sprayed on all surfaces and left to dry before repeating the operation. Allowing the solution to dry on the surface ensures maximum contact time of the chemical with any pathogens. A common mistake is for personnel to rinse the walls and floors after applying the disinfectant. In a humid environment, drying time can be reduced by using fans.

Inanimate objects can carry pathogens between stalls. Any equipment used in the stall or on the horse should therefore be properly disinfected.

**PREVENTIVE FARM MANAGEMENT PRACTICES**

Horses should be grouped by age and use (Fig. 4). This prevents resident broodmares from being exposed to transient horses, which may be shedding rhinopneumonitis virus, *Streptococcus equi*, *Salmonella* spp.or any of a host of other pathogens. Horses which are grouped together should be moved together to different pastures, rather than mixing groups; this also serves to reduce the risk of exposure to an asymptomatic pathogen shedder.

Horses which are introduced onto the farm should be accompanied by a health certificate, vaccination history and information on their place of origin. For example, a show horse shipped onto a farm from a stable which had just suffered an outbreak of strangles or salmonellosis, should then be isolated for a minimum of thirty days before being allowed contact with resident horses. If the required information is not available or is not revealed, new horses entering a farm should be quarantined for a minimum of seven days and preferably fourteen days. Obviously, the farm management and available facilities play an important role in making these decisions. The cost of this isolation should be compared to the cost of an infectious disease outbreak. For example, on a farm with two horses for recreational use, systematic isolation may be uneconomical, while on a farm with 300 pregnant thoroughbred mares, isolation should certainly be routine policy.

For brood-mare farms, any mares added to the herd should be isolated for at least fourteen days before entering the resident population. During this time, vaccination and de-worming can be performed, as well as monitoring for any infectious diseases. Pregnant mares should arrive at the farm at least thirty days pre-partum. This will allow the mare to become familiar with the environment as well as giving her immune system time to produce antibodies to any bacteria or viruses present on the new farm. These antibodies can then be transmitted to the foal through the colostrum, and thus provide protection against these potential pathogens (1).

The frequency with which facilities should be cleaned also depends on the movement of animals to and from the farm, the use of the horses, and the history of disease on the premises. On brood-mare farms before the foaling season, all stalls should be completely cleaned and disinfected, to prevent the build-up of pathogens in the environment which will be encountered by the newborn foal. For riding academies, show stables and race stables, a thorough cleaning and disinfection in autumn and spring may suffice. If a barn of two-year-old horses is being emptied for occupation by new weanlings, disinfection of all stalls is warranted. This is another instance where grouping horses by age is of practical importance.
Movement of personnel and visitors between barns

Movement should be from areas housing mares and foals to areas of highest risk, namely barns with transient horses and isolation facilities.

Using routine disinfection practices may seem costly, labour-intensive and time-consuming. However, the cost of an outbreak of disease which may lead to loss of life, loss of use of the horses, and large veterinary bills can be much more devastating. Educating the farm employees on the importance of a newly-instituted disinfection programme will contribute greatly to guaranteeing correct implementation of the programme.

DISEASE OUTBREAK ACTION PLAN

Implementation of a disinfection plan will greatly improve the chances of avoiding or minimizing an infectious disease outbreak. However, if a situation arises where more than one horse has clinical signs such as cough, nasal discharge, diarrhoea or abortion, these signs must be treated as indicating a contagious disease until proven otherwise. Often no diagnosis can be made and/or new cases fail to appear, and it therefore remains uncertain whether the disinfection programme was successful or the problem was non-infectious (and would not have affected other horses, regardless of any
disinfection measures). Most cases of respiratory and diarrhoeal disease among animals are not diagnosed as being caused by a specific infectious agent; the presence of a contagious agent is usually discovered by examination of the course of the disease throughout a group of horses.

When an infectious disease outbreak occurs, strict quarantine methods must be employed. Quarantine means isolation of animals which have disease or may potentially become diseased. Quarantine techniques include the following:

- control of movement of horses in the barn
- disinfection of stalls, aisles and equipment
- use of protective clothing and footbaths
- washing of hands.

Figure 5 shows a schematic drawing of a barn containing ten stalls. Three animals (housed in the shaded areas) are suffering from diarrhoea which has developed within 24 h. While treatment and diagnostic tests are being conducted, containment of the disease to these horses alone is paramount. If an isolation barn is available and empty, the horses can be transported there to prevent further contamination of the barn. However, on farms without these facilities, 'layers of isolation' should be implemented to establish quarantine conditions. Under this procedure, each of the three stalls should be isolated; the two halves of the barn should be kept separated, and the entire barn should be kept closed to incoming horses, visitors and any other unnecessary movement. The other horses in the barn must be considered as being exposed and

**FIG. 5**

*Schematic drawing of a ten-stall barn*

Each stall housing a diseased animal (shaded areas), the half of the barn containing the diseased horses, and the barn itself should all be isolated as far as possible to prevent the further spread of disease
potentially incubating the disease. Therefore, these animals should never be moved to barns with other horses: this mistake is frequently made, and ensures dissemination of the disease throughout the farm.

At the time of an outbreak, movement into and out of each isolation area is to be kept to a minimum. Personnel involved with handling the horses in the barn should be assigned to other duties which involve no contact with or proximity to other horses. Necessary movement of veterinarians, farriers and supervisors should follow a pattern similar to that shown in Figure 4. This minimizes the exposure to disease of those animals which are most at risk: pregnant mares and foals. Transient animals and those in the isolation barns should be handled last. If possible, the crew of workers, farm machinery and other equipment employed in the quarantine barn should be different from those used in the other barns on the farm.

Areas where potentially infectious materials (e.g. aborted fetuses, nasal discharges, diarrhoea, urine) are present must be thoroughly cleaned and disinfected. An aborted fetus and the placenta should be examined by a veterinarian for possible diagnosis. Gloves should be worn when handling the fetus. Stalls of any diseased animal must be disinfected when the animal has recovered. During an outbreak, aisles should be swept and cleaned, followed by daily disinfection. In Figure 5, the barn would be cleaned from the right to the left, leaving the stalls of affected horses until last. Surfaces contaminated with infectious materials should be kept as well cleaned and disinfected as possible. The amount of infectious material in one gram of faeces contaminated with rotavirus or Salmonella, or the nasal discharges of a horse with influenza or strangles, would be sufficient to infect an entire farm of horses. The importance of both routine cleanliness and cleanliness during a disease outbreak cannot be overemphasized.

The primary principle used to guide any decisions regarding containment of an outbreak is minimization of spread of the disease through the movement of animals, humans and inanimate objects (e.g. pitchforks, rakes and shovels). Protective clothing (including disposable plastic boots, gloves and gowns, or washable coveralls) is necessary for the following reasons:

a) to prevent a person carrying germs into the stall of a diseased animal

b) to prevent a person transmitting infectious disease from the diseased animal to others.

A fresh set of protective clothing should be used in each stall. Footbaths containing phenolic disinfectants are placed outside stalls, as well as at the entrance/exit of the affected barn (Fig. 6). The solutions in the footbaths become contaminated with organic matter throughout the day and must therefore be changed at least once a day, and more often if necessary. Disposable plastic boots or washable rubber boots can be worn while in the stall and can be left outside the stall door to be worn later.

When disease is discovered in one of a number of horses present on a single pasture, all horses present must be considered as exposed. However, if no barn is available to quarantine the exposed horses, the animals should be separated into smaller groups, with the diseased horses together and the horses without clinical signs segregated into smaller groups which are then kept isolated from each other. This practice is an attempt to contain the outbreak to smaller groups of horses. Even though all the horses have potentially been exposed to the pathogen, differences exist between individual animals in terms of their immune system, vaccination history and level of exposure to the disease-causing agent; these factors determine whether or not disease will develop.
Footbath with phenolic disinfectant outside a stall housing a diseased horse

Equipment used in this stall (pitchfork and broom) is not used in other stalls and is soaked in disinfectant after use.

Therefore, if horses are divided and segregated, there is hope that not all horses will develop the disease.

When infectious materials are present in stalls with raw wood walls and dirt floors, the best procedure is to remove as much organic matter as possible and allow the floor to dry. Lime (calcium carbonate) can be sprinkled on dirt floors to aid in drying; fans can also be used for extremely damp stalls. Alternatively, the top 15-30 cm of flooring can be removed and new material installed.

One simple contribution to containing an infectious outbreak is often overlooked, namely washing hands after handling sick animals. Iodophor scrubs (10%) are effective
in the presence of organic matter, and will kill rotaviruses. For people who are sensitive or allergic to iodophor solutions, hands can be washed with soap and water followed by application of 62-65% ethyl alcohol waterless hand-foam. These foams are available at medical supply stores and are often used in medical surgeries and hospitals.

**CONCLUSION**

Disinfection of equine facilities is critical in preventing equine diseases. Implementation of a routine disinfection protocol for the farm and an action plan for disease outbreaks will greatly limit the cost and spread of disease outbreaks. Phenolic disinfectants, planning and control of horse movements, protective clothing and hand washing are all tools to be routinely used to minimize the chances of devastating outbreaks of equine disease.

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**DÉSINFECTION DES ÉCURIES. – R.M. Dwyer.**

_Résumé :_ La désinfection des locaux abritant des chevaux constitue un défi pour les éleveurs, compte tenu de la grande variété de surfaces pouvant être contaminées et de la diversité des agents pathogènes pour les équidés. De toutes les maladies infectieuses courantes pour lesquelles les mesures de désinfection et de prophylaxie jouent un rôle particulièrement important, les plus difficiles à combattre sont la diarrhée à rotavirus, la salmonellose et la gourme. Il a été démontré scientifiquement que les désinfectants phénoliques se révèlent efficaces, même en présence de matière organique et qu’ils sont virulicides. Lorsqu’on les utilise après avoir méticuleusement nettoyé et rincé les surfaces des stalles, les désinfectants phénoliques s’avèrent efficaces dans la lutte contre les épidémies. En outre, 10 % des iodophores utilisés pour se laver les mains et nettoyer le matériel sont également virulicides et bactéricides. Bien que faciles à trouver dans le commerce, les ammoniums quaternaires, la chlorhexidine, l’eau de Javel et l’huile de pin ne sont pas des désinfectants efficaces en présence des matières organiques rencontrées dans les élevages de chevaux.


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**DESFIECCIÓN DE LAS INSTALACIONES PARA CABALLOS. – R.M. Dwyer.**

_Resumen: _La desinfección de las instalaciones para caballos representa un desafío para los productores, debido a la gran variedad de superficies que pueden ser contaminadas y a la multiplicidad de los agentes patógenos de los equinos. Dentro de las enfermedades infecciosas corrientes respecto de las cuales es importante arbitrar medidas de desinfección y de profilaxis, la diarrea por rotavirus, la salmonelosis y la papera equina son las más difíciles de
controlar. Se ha demostrado científicamente que los desinfectantes fenólicos resultan eficaces aun en presencia de materia orgánica y que son virulicidas. Cuando se los utiliza tras haber limpiado y enjuagado cuidadosamente las superficies de cada compartimiento de las caballerizas, los desinfectantes fenólicos son eficaces en la lucha contra los brotes de enfermedades. Por otra parte, se calcula que un 10% de los yodóforos usados para lavarse las manos y limpiar el material también son virulicidas y bactericidas. En cambio, aunque fáciles de encontrar en el comercio, los amonios cuaternarios, la clorhexidina, los hipocloritos y el aceite de pino no son desinfectantes eficaces en presencia de las materias orgánicas que se encuentran en las caballerizas.


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REFERENCES


