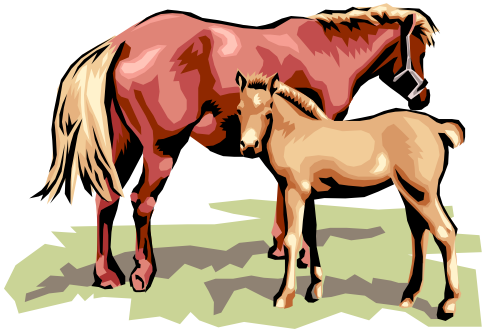

Tools for Promoting Biosecurity in Vermont's Equine Community

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What Biosecurity Can Do For Your Horse

In 2003, an outbreak of Equine Herpes Virus at Findlay University cost the lives of 14 horses. Spread was sudden and swift. Within a week of the first clinical signs, all 140 horses at the facility showed symptoms of infection, ranging from fever to severe neurological signs. It is unknown just how the virus was first introduced to the Findlay horses, or where else it might have spread from there. The question is, could it have been prevented?

The bottom line of biosecurity is prevention; simple routines and conscientious practices can guard your horse against a potentially fatal disease. Designing a biosecurity plan to fit your equine operation will save money, help ensure the health of your animals, and the safety of your clients

This binder was created to collect the best tools and resources available for checking and changing equine farm practices. You will find information on how to assess your current routines and where and how to make changes, how diseases are commonly introduced to equine farms, infectious disease fact sheets, emergency contact information, and more. Each section includes a “Quick View” summary, in-depth information, a summary survey, and details on further resources.

Evaluating Your Current Practices

	(1) Low Risk	(3) Medium Risk	(5) High Risk
Visitation & Client Movement	My equine are companion animals for personal use that live on my property. Visitors do not come to my farm, and I do not have any clients.	Visitors are limited to people I know and/or people coming to buy equine at my farm.	I encourage all types of visitors to come to my farm, and regularly host field trips, tours, and classes.
Boarding	I do not board my horses. They live on my property year round.	There are no visitors to the farm besides other boarding clients.	My equine are boarded with many other animals. There are many other clients and workers on the premises. The farm encourages visitors, tour groups, field trips, etc.
Number & Use of Equine	I have one or two equine for personal use. I do not show them or breed them.	I have a few horses that are used for giving lessons.	I own many equine, among them lesson horses, brood mares, and stud stallions.
Shows & Events Attended	My equine are for personal use only, and do not travel to shows and events.	My equine attend shows/events, but are **always** kept isolated from other attending equine. They **never** share food or water with other attending equine.	My equine regularly attend shows/events. They are boarded/turned out with other attending equine and often share food or water sources.
Type of Business	I do not consider my equine part of a "business". They are for personal use only.	I board equine at my farm and also give lessons. (Small operation – less than 10 equine).	I board, breed, and buy and sell equine at my farm. (Large operation – more than 20 equine)
International Involvement	Neither I nor my equine travel out of the country. I do not ship semen or breed with semen from outside the country.	I have bought or sold equine internationally, however I rarely travel outside the country.	I make regular trips out of the country. My breeding operation involves shipping semen or receiving shipped semen. I buy and sell equine internationally.
Care of Equine	I alone care for my equine.	I have a few hired workers who care for my equine.	Many different people care for my equine, or I don't know how they are cared for.
Equipment	I own and maintain all of my own equipment. Equipment is not shared between individual equine.	I own and maintain all of my own equipment. Equipment is shared between individual equine, but is disinfected between each use.	I do not own or maintain my own equipment. Equipment is shared between individual equine at the facility. I do not know how it is cleaned between uses.
Vaccination/ De-worming Schedule	All of my equine are one a strict vaccination/ de-worming routine that has been approved or recommended by my veterinarian.	I vaccinate/ de-worm intermittently, but not on a regular schedule.	I don't vaccinate or de-worm my equine.

Evaluation Scoring

1 point = low risk
2 points = falls between low risk and medium risk
3 points = medium risk
4 points = falls between medium and high risk
5 points = high risk

If you scored:

9-18 points	Your equine facility generally falls into the low risk category
19-32 points	Your equine facility generally falls into the medium risk category
33-45 points	Your equine facility generally falls into the high risk category. You should carefully evaluate your protocols and procedures and identify where improvements can be made.

Protocol for Equine: Quick View

Biosecurity begins with the animals; how they are handled, cared for, housed, and monitored. In the **Protocol for Equine** section you will find:

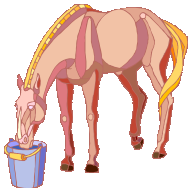
Section	Main Points
Day-to-Day Routine	❖ Food and water: all sources should be tightly contained, freshened daily, and if feed/water equipment is shared between horses, always clean between each use. ❖ Establish a cleaning routine: clean facilities on a regular basis, and also when there is a change in the horses' status.
Manure Handling	❖ Stock piling: Follow the Vermont Accepted Agriculture practices for storing manure on your property. ❖ Spreading: Prohibited from Dec. 15th to April 1st, and less desirable the closer you are to residential areas. Only feasible with adequate land area. ❖ Composting: Low maintenance process that reduces manure volume, kills pathogens, and produces a product that can be sold for profit. ❖ Selling: Only cost-effective with a large amount of manure.
Medical Care	❖ Ensure effective areas for quarantine. ❖ Follow a proper vaccination plan.
Air Quality and Ventilation	❖ Monitor for temperature, humidity, and gas levels. ❖ Ensure adequate air flow through the barn.
New Additions	❖ Quarantine new additions for at least three weeks. ❖ Know the history of the new animal. ❖ Have your vet examine the new animal at the first sign of a problem.
On the Road …	❖ Pre-show check. Never transport a sick or injured horse. ❖ Do not mingle with other horses. ❖ Bring your own equipment.
Transportation	❖ Disinfect your trailer between uses. ❖ Avoid conditions that promote "shipping fever".
Disinfecting Your Farm	❖ Clean before you disinfect. ❖ Never mix chemicals.
The Disinfecting Process	❖ An example step-by-step process on proper disinfection of a stall.
Disinfectant Guide	❖ A breakdown of the major classes of disinfectants and their capabilities.
The Horse Owner's Guide to Composting	❖ Steven Wisbaum's in-depth guide to composting on horse farms.

Protocol for Equine

A routine based on sanitation, conscientious horse care, and common sense can keep your horse healthy and reduce their risk of catching an infectious disease.

Your day-to-day routine

- Establish sanitation standards. Ensure that the day-to-day chores of feed and water handling/storage, stall cleaning, grooming, and equipment use are carried out in a sanitary manner. Make sure employees and clients are aware of (and compliant with) your standards.
  - Feed storage bins should be checked regularly for signs of mold, dust, dirt, bird and rodent feces, and decay.
  - Feed buckets should be routinely cleaned each day or every other day.
  - Water should not be allowed to stand for more than 24 hours. Empty water buckets every day; don't forget water buckets out in the pasture!
  - If equipment (buckets, brushes, pitchforks) is shared between different horses, it should be thoroughly cleaned between each use.



- Establish a cleaning routine. Stalls should be cleaned and disinfected on a regular basis (about once a month). Disinfection is also recommended if there is a change in the horse's status.
  - It is important to note that disinfectants can only penetrate surfaces to kill microorganisms if the surfaces are clean beforehand. Make sure to remove all dirt, debris, and visible stains before applying the disinfectant.[1]
  - Different disinfectants eliminate different kinds of bacteria, killing some but not others. (See **Disinfectant Guide** for more information).

Manure Handling

- Stock Piling: field stacking of manure is permitted provided that there are adequate assurances against pollution. Vermont law requires that[2]:
  - Storage areas must be 100 feet from shallow wells and springs.
  - Storage areas must be out of flood ways and areas that flood annually.
  - Direct discharge through pipes, ditches, or other conduits is prohibited.

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[1] Wright, B. and Kenney, D. *Preventing Disease Spread"*. http://www.completerider.com/horsecomdec02.htm. Dec. 2002.

[2] Vermont Accepted Agriculture Practices website. http://www.vermontagriculture.com/pidnonpointsource.htm.

- Runoff must be filtered by grass filter strips or similar methods.
- Divert clean runoff water away from areas where manure is stored or spread.
- Create a buffer zone (at least 25 feet wide) of perennial vegetation between row crop land and the bank of adjoining waters (streams, lakes, and ponds).
- *For more complete information on Vermont's Accepted Agriculture Practices for manure storage, go to http://www.vermontagriculture.com/pidnonpointsource.htm*

- Spreading: spreading is only feasible with the proper amount of land area. Vermont's Accepted Agriculture Practices also prohibit the spreading of manure from December 15th to April 1st. Spreading is also less desirable the closer your barn lies to residential areas.

- Composting: composting is a low-maintenance process that reduces manure volume by 40-60%, and the product can be sold as a gardening asset for profit[3]. See *The Horse Owner's Guide to Composting* included in this binder.

- Selling: An option that is most feasible if you have a large amount of manure. Paying someone to haul away your manure may cost more than you'll get back for a small volume.

Air Quality and Ventilation

Improper ventilation and poor air quality can cause or aggravate respiratory ailments in horses. Moisture accumulation can help breed bacteria and create an ideal environment for insects.[4]

- Monitoring: the barn environment should be monitored for temperature, humidity level, and gas levels such as ammonia and carbon dioxide. Monitoring devices are available through scientific supply companies.
- Dust and mold from hay, grain, and bedding can irritate lungs, especially in horses with allergies. Do not keep shaving storage close to the stall, as your horse will be continually inhaling irritants.
- Barns should have vents under the eaves to allow cool air to enter. (In colder climates, use screened vents with adjustable openings to prevent drafts).
- Outlets: warm air rises, so outlets should be closer to the roof. In hotter climates, fans may be a necessary addition to the outlets in order to move air through[5].

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[3] Wisbaum, Steven. *The Horse Owner's Guide to Composting*. January 2002.
[4] *Horse Barn Ventilation*. Ontario Ministry of Agriculture and Food Fact Sheet. http://www.gov.on.ca/OMAFRA/english/engineer/facts/96-031.htm.
[5] Briggs, Karen. *How to Improve Air Quality in Your Barn*. http://petplace.netscape.com/articles/artShow.asp?artID=1339.

Medical Care

- House/group horses together by needs and physiological state (young, lactating, gestating, etc.). Ensure that you can effectively isolate sick, pregnant, or new animals from the rest of the herd.

- Establish a vaccination routine. Beyond a rabies shot (which is required for all shows, events, fairs, and field days)[6] and the other generally accepted vaccines, discuss with your vet what diseases are problematic in your area and at what time of year. For more information, see **The Facts on Vaccs** sheet included in this binder. Vaccination guidelines from the American Association of Equine Practitioners can be found at http://www.xcodesign.com/aaep/displayArticles.cfm?=ID=171.

New Additions to the Barn

When inducting a new horse into the herd, certain precautions should be taken to protect your other horses.

- **Quarantine:** New animals should **ALWAYS** be quarantined from the rest of the herd for at least three weeks[7]. During that time, keep a close watch on the animal for any signs of health problems or distress.

- **History:** Know the new animal's history. It's best to buy from a reliable seller who can provide documentation of the animal's history. Ideally, the horse should have a current negative Coggins test, proof of vaccination, and a certificate of veterinary inspection (CVI).

- **Exam:** Have a vet check the new horse at any sign of a problem. An exam can catch problems that are just developing with the new animal, or problems that the former owner might not have been aware of.

On the Road…and Back Again

Shows and events are prime places for your horse to catch an infectious disease. The following recommendations can help reduce that risk, and make certain the only thing your horse brings back from the show is a ribbon.

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[6] *Uniform Animal Health Standards Recommended for Vermont Fairs, Field Days, and Festivals.* Vermont Agency of Agriculture. http://www.vermontagriculture.com/healthstd.PDF.

[7] *An Introduction to Infectious Disease Control on Farms*. Bovine Alliance on Management and Nutrition. http://www.aphis.usda.gov/vs/ceah/cahm/Dairy_Cattle/BAHMBiosecur.pdf. 2001.

- **Pre-travel:** When attending shows or events, always check your horse thoroughly beforehand. It is never wise to transport a sick animal unnecessarily, and it is risky to bring one into the presence of other horses. Make sure your vaccinations are current for diseases that could be transmitted at shows, such as Equine Influenza and Equine Infectious Anemia.

- **Stay Separate:** When at the show, it is best if your horse is not housed too closely with other strange animals, or housed in unsanitary conditions.

- **Don't Share Germs:** If at all possible, do not allow your horse to drink from shared water buckets or eat from shared feed bins. Bring your own.

- **Bring Your Own Equipment:** If at all possible, do not borrow equipment from other attending horse owners, or from show/event facilities.

Transportation

- **Keep Your Trailer Clean:** Horse trailers should be cleaned and disinfected between each use, both inside and outside. Don't forget to disinfect the wheels as well.

- **"Shipping Fever":** Horses traveling long distances run the risk of "shipping fever" if the trailer is unsanitary or the horse cannot properly lower its head[8]. (See disease fact sheet for **Pleuropnuemonia**).

Disinfecting Your Farm

There are several important points to remember about disinfectants. First and most importantly, they are less effective on a dirty surface. Surfaces must be cleaned, and all organic matter removed, in order for the disinfectant to penetrate and kill microorganisms. Secondly, always check to make sure that the disinfectant you are using is safe to use in horse facilities. Heavy duty broad-range disinfectants are often unsafe to use in areas occupied by horses and other animals or people. (The **Disinfectant Guide** can help you decide which agent to use. You can also discuss this with your veterinarian if you have concerns.) Finally, always use disinfectants with caution. Follow the labeled instructions, and take all recommended precautions[9].

WARNING: NEVER MIX CHEMICALS! Mixing disinfectant chemicals can create toxic gases, cause fires, and become even more toxic to people.

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[8] *Preventing Shipping Fever*. http://www.sporthorsemedicine.com/shipping_fever.htm.
[9] Bowman, G. and Shulaw, W. *Disinfection in On-Farm Biosecurity Procedures*. Ohio State University Fact Sheet. http://www.ohioline.osu.edu/vme-fact/0008.html.

The Disinfecting Procedure

Step One: Remove everything from the stall; bedding, feed buckets, water buckets, salt blocks, etc. Equipment must be disinfected separately.

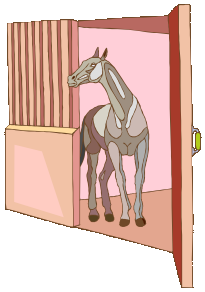
Step Two: Sweep out as much from the floor and walls as possible.

Step Three: Wash the walls and floor with a detergent or other cleaning agent. All stains (such as caked-in manure) must be removed. Rinse and allow time for the surfaces to dry.

Step Four: Before using the disinfectant, take the proper precautions. Wear gloves, goggles, and protective clothing, and carefully read the directions for use. Dilute the disinfectant according to the directions on the label and apply to all cleaned surfaces (a sprayer works best). Allow the disinfectant to dry. Do not rinse!

*Additional sprayings and dryings are required if you are currently dealing with an infectious disease outbreak.

Disinfect water and feed buckets in the same manner, making certain to clean before disinfecting. Then rinse thoroughly with potable water. Soak equipment and tools for ten minutes, then rinse. (Parts of equipment, such as leather, that may be harmed by the disinfectant can be wrapped in plastic wrap or tinfoil to protect it while soaking. Use disinfectants approved for that material to finish the disinfection process.)



A final note on surfaces; not all of them can be disinfected. Clay, sand, dirt, and other porous types of flooring cannot be adequately cleaned. Adding lye to dry areas can help, and bedding thickly can help separate the horse from the soil[10].

[10] Dwyer, R. *Farm Disinfection*. http://www.thehorse.com/viewarticle.asp?fid=910&dpt=6. July 2002.

Disinfectant Guide

When choosing a disinfectant for your barn, be aware that not all disinfectants are the same. They vary in their ability to kill certain organisms (viruses, bacteria, protozoa, etc.), to function in the presence of organic material, and their optimal conditions. Always be sure to follow labeled instructions.

Disinfectant	Capabilities
Phenols and Cresols: *Prosovet®, Osyl®, Amphyl®*	▪ Work well in the presence of organic material – often used in footbaths ▪ Best at higher temperatures ▪ Best at pH < 7 ▪ Inhibited by hard water ▪ Effective against many types of bacteria, viruses, and fungi.
Chlorines/ Hypochlorites *Bleach, Chlorox (1:10 dilution), Halazone®*	▪ Inactivated by organic material ▪ Lose some activity above 80 degrees C ▪ Best at pH < 7 ▪ Lose activity over time. Mix a new solution every 24 hours ▪ Can be irritating to skin, clothing, rubber, and some metals ▪ Never mix chlorine with acids
Quaternary Ammonium *Clinicide®, Quatsyl®-D, Roccal DT*	▪ Best at pH > 7 ▪ Inhibited by hard water ▪ Active against many types of bacteria and virus, but not active against spore-forming bacteria
Iodophors/ Iodine compounds *Betadine®, Bridine®, Weladol®*	▪ Inactivated by organic matter ▪ Lose some activity above 80 degrees C ▪ Work best at pH < 7 ▪ Do not mix with quaternary ammonium ▪ Do not leave in direct sunlight
Chlorhexidines *Savlon®, Hibitane®, Nolvasan®-S*	▪ Use after thorough cleaning and rinsing ▪ Effective against many types of bacteria and viruses, but not effective against spore-forming bacteria.
Formaldehydes/Gluteraldehydes	▪ VERY TOXIC! ▪ Used mainly for cold sterilization of instruments. ▪ Work well in the presence of organic materials
Sulphates *Virkon®-S, Oxy-Sept®333*	▪ Works well under all circumstances and is enhanced by detergent properties ▪ Effective against many types of germs

Sodium Hydroxides *Lye*	▪ Use a 2% dilution (2.7 ounces of lye plus 1 gallon of water ▪ **Always add lye to water; do NOT pour water over lye!** ▪ As this solution is highly caustic, use protective clothing, gloves, and safety glasses
Alcohols *Isopropyl Alcohol*	▪ Used mainly as a surface disinfectant ▪ Usually used at 70% concentration

References

Bowman, G. and Shulaw, W. *Disinfection in On-Farm Biosecurity Procedures*. Ohio State University Fact Sheet. http://www.ohioline.osu.edu/vme-fact/0008.html.

Wright, Robert. *Preventing Disease Spread: Personal Hygiene and Disinfectants Around Horse Barns.* http://www.gov.on.ca/OMAFRA/english/livestock/horses/facts/info_preventing_disease_spread.htm. July 2002.

Protocol for Equine: Summary Survey

Check the appropriate column and see what areas of your equine protocol need attention.

Questions on biosecurity operations	Yes	No	Not Applicable
Is all feed stored in rodent-proof, tightly closed containers?			
Are feed storage bins checked regularly for signs of dust, mold, bird and rodent feces, and decay?			
Is drinking water allowed to stand for more than 24 hours?			
Is equipment shared between horses cleaned after each use?			
Do you clean surfaces before disinfecting?			
Is manure stored/spread in accordance with all state laws?			
Can you effectively isolate sick/pregnant/new animals?			
Are all of your horses regularly vaccinated?			
Do you check your horses prior to travel?			
Are your horses housed with unfamiliar animals during shows/events?			
Do your horses share feed and water buckets with other horses at shows/events?			

Protocol for Visitors: Quick View

Human traffic on and off the barn is a prime source for transmitting infectious disease. In this section, you will find:

Section	Main Points
General Guidelines	❖ Maintain a single entrance/exit. ❖ Keep a visitor log. ❖ Make sure off-limits areas are marked and that signs are enforced. ❖ Maintain a proper parking area. ❖ Recommend hand washing for all visitors.
Visitor Levels	❖ Low risk visitors ❖ Medium risk visitors ❖ High risk visitors
Hosting a Tour of Your Barn	❖ Keep tour groups small. ❖ Prepare visiting groups ahead of time. ❖ Provide an eating area away from animals. ❖ Visit in the order of young to old. ❖ Do not allow visitors into off-limits areas.

Protocol for Visitors

Visitors to equine facilities come in many forms, from clients coming for lessons or boarding, to tour groups and school field trips, to people who drop by just to see horses. Unfortunately, human movement on and off the farm can play a role in the transmission of infectious disease. Knowing how to handle visitors and the general traffic around the barn can greatly reduce the risk of an outbreak.

Other agricultural operations, such as dairy or beef farms, have the choice of running a farm that is closed to visitors and unauthorized personnel. However, as equine businesses depend on visitors (clients for boarding and lessons, buyers for horses, etc.) keeping the barn off-limits is often not an option. Therefore, steps must be taken to ensure the safety of the animals, the handlers, and the visitors alike.

General Guidelines

- **Controlled Entry**: Have a clearly marked central entrance/exit, to keep all visitors entering and leaving in the same area. Not only does this control traffic into the barn, but it allows for convenient placement of hand/boot wash stations and visitor logs.
- **Visitor Log**: Keep a visitor log and require guests to sign in. If an outbreak does occur, not only can you then contact those who may have been exposed, but also track where the disease may have come from.
- **Signs**: Use clear and appropriate signs throughout the barn. Make sure that areas which are off-limits to visitors (i.e. quarantine for sick animals) are clearly posted and enforced.
- **Parking**: Maintain a parking area. If you expect regular traffic onto your farm, make sure parking is in one spot, and that drivers do not have to cross manure or feed lanes to get to it. For vehicles that make many visits to equine facilities (i.e. feed delivery trucks) see further information in the ***Medium Risk Visitors*** section below.
- **Hand/Boot Washing**: Hand/boot wash stations should be located near to the entrance/exit. Alternatively, non-water disinfectant gel or wipes can be provided for hands. Recommend that all visitors wash their hands, especially if they have contact with the animals or will be consuming food on the premises.
- **Staff**: If possible, have staff present, nearby, or available for questions at all times that visitors are at the farm.
- **Dogs**: Some people may have dogs (or other pets) that travel with them. Either disallow other animals on your farm, or have specific guidelines for their behavior.

***Visitor Levels*:** Certain types of visitors present more risk than others and therefore require further consideration.

Visitor Level	Examples	Precautions
Low Risk	▪ Do not own equine themselves ▪ Do not regularly visit equine facilities ▪ School field trips	▪ Clean outerwear and footwear ▪ Advise as to what areas are off-limits ▪ Hand washing

Medium Risk	▪ Make regular visits to equine facilities ▪ Rarely have contact with animals ▪ Feed/Hay delivery personnel ▪ Maintenance and repair workers ▪ Farm equipment salespeople	▪ Same precautions for low-risk ▪ Maintain specific parking and traffic lanes that do not cross manure or feed tracks
High Risk	▪ Make regular trips to equine facilities ▪ Have close contact with animals ▪ International visitors ▪ Veterinarians, Farriers, Inseminators, Trainers	▪ Same as low and medium risk ▪ Know proper health and biosecurity procedures. ▪ One horse, one needle ▪ Use your own equipment whenever possible.

Low Risk Visitors: In general, low risk visitors are people who do not own equine themselves, and do not regularly visit equine facilities. It is unlikely that they will have direct contact with horses outside of your barn, and may only visit on special occasions (i.e. school field trips). Precautions for low risk visitors are simple: ask them to wear clean footwear and outerwear. In situations where it is possible to contact visitors beforehand (such as for planned visits) appraise them of your biosecurity procedures. Advise them of what areas are off-limits and what precautions they should take around the animals. Recommend hand washing upon entry and exit of the facility, especially if visitors are allowed to touch the animals.

Medium Risk Visitors: These visitors do make regular visits to equine facilities, but rarely come in contact with the animals. This group includes feed/hay delivery personnel, maintenance and repair workers, and farm/equipment salespeople. The same precautions for the low risk visitors are recommended for this group. In addition, vehicle disinfection must be taken into account. Many feed companies have specific protocol for the care of their vehicles, but some may not. Maintaining specific parking and traffic lanes for these types of vehicles can ensure that they do not drive over manure or feed tracks, or cross areas where equine are ridden or led.

High Risk Visitors: Into this group fall those visitors who make regular trips to equine facilities and have close contact with the animals, as well as visitors who travel internationally or are visiting from another country. Veterinarians, farriers, inseminators, and trainers deal with horses from many different farms. While most vets are trained in proper health and biosecurity procedures, and inseminators operate under sterile conditions, the ultimate responsibility for the conduct of visitors on the farm lies with the horse owner. By being educated as to proper biosecurity handling of your horse, you can ensure your standards are being met.

All equipment used on a horse should be sterilized. Certain tools, such as needles, should be sterilized and disposable, used only on one horse for one purpose. Always provide your own equipment (halters, water buckets, blankets, etc.) when possible.

Hosting a Tour of Your Barn

As tour groups can often include young children or large numbers of people, follow these steps to minimize the risk of spreading infectious disease and maximize the safety of animals and people alike.

- **Keep groups small:** If other employees are available to help you give tours, divide larger parties into smaller groups. The smaller the group, the easier it is keep track of what everyone is doing and where they are going. In crowded conditions, you may not notice if a child wanders off from the groups, or if a horse is becoming stressed.
- **Preparation:** If possible, contact the group organizers ahead of time (i.e. the teacher of a school field trip) and advise them of your safety procedures. Remind them that everyone should wear clean footwear and outerwear.
- **Food on the Farm**: If the field trip or tour is very long, the group may wish to break for lunch. Food should be consumed in a clean area that is separate from the animals. Stress the importance of hand washing before eating. Make sure to take care of any spills or crumbs that could attract pests to your barn.
- **Young to Old**: Always follow the rule of "young to old", especially if visitors are allowed to touch the animals. Younger animals are less resistant to viruses and bacteria, and can be badly affected by diseases that either don't occur or quietly run their course in older animals.
- **Off-limits areas:** Tour groups and visitors should not be admitted to quarantine areas or have any contact with sick animals.

Further Resources

Smith, Julie. **Healthy Farms: Healthy Agriculture**. University of Vermont. 2003.

Protocol for Visitors: Summary Survey

Check the appropriate column and see what areas of your visitor protocol need attention.

Questions on biosecurity operations	**Yes**	**No**	**Not Applicable**
Do you have a single, clearly marked entrance/exit?			
Do you keep a visitor log?			
Are off-limits areas clearly marked?			
Do you have one area designated for parking?			
Do you maintain hand washing stations or an acceptable alternative?			
Do low risk visitors come to your barn?			
Do medium risk visitors come to your barn?			
Do high risk visitors come to your barn?			
Are regular visitors to your barn aware of your biosecurity policies/regulations?			
Are visitors allowed to eat at your barn?			
Do visitors at your barn follow the “young to old” rule?			

Wildlife Control: Quick View

Wildlife species act as hosts for infectious disease and can also cause damage to your barn. In this section you will find:

Section	Main Points
General	❖ Store feed, water, garbage, manure/compost in such a way that animals cannot get into them. ❖ Feed other pets (i.e. barn cats) indoors. ❖ Don't allow weeds or brush to grow along foundations. ❖ Keep work and storage areas clean. ❖ Regularly check for signs of an infestation.
Welcome Wildlife	❖ Encourage birds of prey to help cut down on pest birds. ❖ Snakes – help or harm? ❖ Keep fish and frogs in your ponds to cut down on the insect population.
When is it safe to have wildlife around?	❖ Behavioral guidelines for: raccoons, foxes, bears, coyotes, and deer/moose.
Rodent Control	❖ Preventative measures: proper storage of food and garbage, plugging holes, remove decaying wood and broken equipment. Sanitation is key! ❖ Responding to an infestation: cats, poisons, traps, and fumigation.
Bird Control	❖ Preventative Measures: proper storage of food and garbage, covering manure/compost. ❖ Responding to an infestation: netting, noisemakers, visual repellents, poison, and natural enemies.
Insect Control	❖ Cleanliness is key. ❖ Dry is best; eliminate standing water. ❖ Handling insects: additives, screens, insect tape, sprays, natural sprays, landscaping solutions, and ponds.
Poisonous Plants Index	❖ An index of plants poisonous to equine. How to recognize them, signs of toxicity, and how to treat poisonings.

Wildlife Control

Many wildlife species can act as hosts for disease, and play a role in spreading them to farms. Most problematic are the common pests such as rodents, birds, and insects. It takes a well-considered plan of action to rid a horse barn of these pests. For further information, see the included sections on Rodent Control, Bird Control, and Insect Control.

Other species, such as bats, raccoons, opossums, and foxes can carry the threat of rabies, while ungulates such as deer and elk pose their own unique threats. The general rule should be to make your facility as unattractive to wildlife as possible.

1. **Store feed and hay in tightly closed, durable containers**: Do not provide a food supply for animals other than your horses. If you keep barn cats, feed them indoors.
2. **Protect your water source**: Do not permit any areas of stagnant water to accumulate on your property. Stagnant water can be a breeding ground for insects such as mosquitoes, which transmit many different diseases.
3. **Proper garbage disposal**: Make sure all garbage is properly disposed of and sealed tightly in durable cans.
4. **Proper compost storage:** Make sure all compost areas/bins are covered and protected from invading wildlife, especially if they contain discarded food (vegetable peels, etc.)
5. **Feed pets indoors:** If you have other pets on the premises (cats, dogs) do not leave their food or water lying out in the open for other animals to eat. Also, make certain your other pets are properly vaccinated and monitored for health issues.
6. **Keep work and storage areas clean**: Clutter invites rodents and makes it more difficult to spot a potential problem.
7. **Cut down on weeds:** Do not allow areas of overgrown plants or underbrush, especially next to foundations. Animals can den or hide in areas of dense growth.

Regularly check your facility, especially all feed, bedding, and equipment storage rooms, for signs of wildlife presence: denning, feces, evidence of chewed material, etc. The sooner you spot and address a problem, the less chance of a disease spreading to your horses.

Welcome Wildlife?

Not all local wildlife species are detrimental. Some can coexist outside of your barn and even help with controlling pests. Birds of prey such as hawks and owls can be encouraged to live around pasture areas by the addition of specific birdhouses. These raptors will hunt pest birds, such as pigeons. Their mere presence will discourage smaller birds from taking up residence.

Snakes are also expert rodent hunters. However, it should be noted that most horses object to their presence (and often so do people). If it is possible to let them live in areas off-limits to horses, and they do not bother anyone else, they can help in keeping the rodent population down.

If you have decorative ponds on your property, consider stocking them with hardy native fish or frog species. These creatures prey on insects and insect larvae, and could help keep your pond cleaner. Many lawn and garden stores sell frog and toad houses, which encourage these helpful amphibians to take up residence.

When is it safe to have wildlife around?

Though some species *can* present a danger to your barn or carry infectious disease, this is not always the case. How do you know if a resident wild animal is a threat or not? Knowing the common behavior of these species can help you decide if an animal is behaving normally or "acting strange". Animals will change their behavior if they are injured or sick, and it is during these times that they should be avoided.

Raccoons

Raccoons are known for their boldness. If garbage, compost, or pet food is left where a raccoon can get it, the raccoon will gladly invite itself over. They have even been known to come in through doggie doors to get at pet food. It is less likely that they will come around if there is nothing to attract them; no uncovered trash or compost bins, no spilled feed, etc.

Raccoons are nocturnal animals. If you see a raccoon wandering around during the day, that can be a sign that something is "wrong". Trapping and removal of problem animals must be approved by the state.

Foxes

Foxes are generally shy creatures, quick to run and hide at the first sign of people. However, over time they can become accustomed to the presence of humans and livestock. Even so, they are commonly seen to keep their distance. Their presence around pastureland can help cut down on other pest species, for they commonly prey on rodents, bird eggs, and insects.

Foxes are crepuscular animals, meaning that they are most active at dusk and dawn. You should be concerned if foxes show overt behavior, such as coming into the barn or other facilities and showing no fear of people.

Bears

Vermont's resident species, the Black Bear, is well known to be a shy animal. They prefer deep, wooded areas and places away from humans, and generally do not show aggression except when injured, protecting their young, or protecting themselves. Black bears feed most commonly at dusk and dawn, seeking shade during the warmer parts of the day. Fall is a heavy feeding season, as they are bulking up for their winter hibernation.

Black bears are opportunistic feeders, and can be attracted to open garbage cans or compost bins, pet food left outside, and even birdfeeders.

Coyotes

The Eastern Coyote is most active at night. However, during the pup-rearing season (from April to June) they can be seen during the day. Foraging for their pups often accounts for their reported "boldness" around people.

Though coyotes prefer territory away from humans, they can be drawn by open garbage or food left out for pets. They may even be drawn to hunt smaller animals, so people with outdoor cats or small dogs should take precautions.

Deer/Moose

White-tailed deer are the common species in Vermont. The are strictly vegetarian, feeding on leaves from maple, ash, and birch trees, as well as apples, acorns, and beech nuts. They prefer to live on forest edge territory, which accounts for numerous sightings. Gardens can be tempting targets for deer.

Moose, though more rare in Vermont than deer, can pose a threat due to sheer size. They have been reported to break pasture and property fencing. They prefer wetland areas in the summer, as they like to browse on semi-aquatic and aquatic vegetation. Their breeding season is in the fall, and males in rut can become extremely aggressive.

<u>References</u>

Vermont Fish and Wildlife Department website. http://www.vtfishandwildlife.com.

Rodent Control

The Danger: Mice and rat colonies can eat over a ton of horse feed per year, and can spoil ten times that amount with droppings, urine, and hair. The USDA reports that more than $2 billion in feed is destroyed by rodents every year. They cause damage to buildings, and can cause fire by chewing through wires. Worst of all, rodents are notorious carriers of bacteria and other disease agents such as lice, mites, ticks, fleas, and intestinal parasites.

Preventative Measures: Simple biosecurity measures that prevent rodent infestations are far easier and cheaper than having to eradicate an out of control population.

Recommendations

- Store feed in strong, rodent-proof containers with tight-fitting lids, and keep them closed at all times.
- Keep garbage covered and stored in strong containers.
- Eliminate any external entrances for rodents in buildings larger than ¼ inch. Steel wool makes a good temporary plug.
- Keep areas close to buildings trimmed, free of weeds and long grass.
- Removing decaying wood from your property.
- Cut back limbs, shrubs, and vines that overhang your property.
- Stack firewood off the ground (in racks, on pallets, etc) and frequently inspect for signs of denning. It's best to have wood piles away from house or barn areas.
- Drawer and cabinet liners, paper bags, and wallpaper can be a source of food for pests.
- Keep gutters clean and clear of debris.
- In areas of food preparation and consumption, do not allow crumbs or grease to accumulate.

Sanitation is the best defense. It's easiest to spot a rodent problem if storage areas are clean and uncluttered.

Responding to an Infestation: In the case of a rodent infestation, there are several options to eliminating them.

- Are cats all they're cracked up to be? Though many people opt to use the "natural" enemies of rodents to get rid of them, keeping dogs and cats around the stable can actually draw rodents, since food is often left out for pets. The presence of a predator can also teach rodents to be quicker and stealthier, making it seem as though numbers have decreased, or concealing the problem altogether.

- Poisons: Though poisons can be effective, they pose a risk when placed in areas frequented by companion animals and children. Wax block poisons, commonly used to eliminate rodents, are unfortunately appetizing to dogs. Further, it can be dangerous to use pesticides in a boarding or lesson barn, where clients may not be

aware of the danger. If you opt to use poisons, always follow the labeled directions and warn facility users of the danger. Never eat, drink, or smoke when using pesticides, and either use them in areas that are off-limits to clients and visitors, or make certain they know about them.

- Traps: Traps can be very effective, and pose less of a hazard to clients, visitors, and pets. They also give you an idea of how many rodents there are on your barn, allowing you to keep track of how many have been eliminated. Be sure to check them on a regular basis.

- Fumigation: Used as a "last resort," fumigation is very effective. However, it should only be carried out by a professional, as the chemicals used in this process are **HIGHLY TOXIC** to people and other animals.

The best way to avoid rodent problems is to ensure that your stable is an unattractive environment for their habitat. Sanitation, repair, and regular cleaning practices can prevent disease, loss of feed, and structural damage.

References

Do-it-Yourself Pest Control website. http://www.doyourownpestcontrol.com/tips.htm.

Rietveld, G. and Wright, R. *Rodent Control in Horse Stables*. http://www.gov.on.ca/OMAFRA/english/livestock/horses/facts/info_rodent_control.htm. February 2000.

Bird Control

The Danger: Birds are carriers of West Nile Virus and can also transmit bacteria, such as Salmonella, which can be dropped into feed during foraging. Not only do they contaminate feed and water, but they also consume it. Furthermore, they pose a safety hazard, as nests built too close to lights or wiring can cause a fire.

Preventative Measures: It is much more difficult to deal with an over-population of birds than it is to discourage their presence in the first place.

Recommendations

- Store feed in strong containers with tight-fitting lids, and keep them closed at all times.
- Keep garbage covered and stored in strong containers.
- Manure storage areas and compost piles should be covered.

Birds are drawn to an easy food source. Uncovered feed bins, spilled hay and grain, and open garbage containers are all prime feasting places for birds.

Responding to an Infestation: As most barn owners know, it is difficult to deal with pest bird populations. There are several options, but their level of success will vary.

- Netting: For netting to be safe and effective, it should have a mesh size of 25 mm or less. Larger sizes increase the chances that birds will become tangled in the net.

- Noisemakers: System where noise is released at frequent, random intervals have had some success in driving off birds. However, keep in mind that sounds which are designed to startle or irritate birds can have the same effect on people. Generally, noisemakers should not be used at night or too early in the morning, or if you have nearby neighbors who object to the noise.

- Visual Repellents: scarecrows, fake owls, and other visual repellents are the most humane, environmentally safe method of bird control. However, they are not always effective. Reportedly, birds often become accustomed to these scare devices and learn to ignore them.

- Poison: Poisons used on birds should be handled and distributed by professionals, as the poisons used are generally harmful and highly toxic to all animals. This can be an expensive service, and depending on how fast-acting the toxin is, there's no guarantee that the birds will die in a convenient place.

- Natural Enemies: Encouraging owls, hawks, and other raptor species of birds to live around pasture and barn areas has been found to be useful. Raptor houses can be used

to invite these species in. Not only will they hunt smaller bird species, but their mere presence is enough to frighten pest birds.

References

Environmental Guidelines for Berry Producers. http:www/agf.gov.bc.ca/resmgt/fppa/environ/berry/berry10.htm.

Ingels, Chuck. *Birds of Prey Assist Farmers.* University of California, Sustainable Agriculture Research and Education Program. http://www.sarep.ucdavis.edu/NEWSLTR/v5n1/sa-6.htm. 1992.

Insect Control

Insects are the main culprits for such diseases as West Nile, Equine Infectious Anemia, and others. Steps should be taken to reduce their presence on the farm. The following recommendations can make it easier to deal with these tiny invaders.

Cleanliness is Key

- **Sanitize:** Flies and other insects thrive in unsanitary conditions. Manure should be removed daily and stored properly. Barn aisles and storage rooms should be swept clean of debris.

- **Manure storage:** Manure and compost piles should be covered to keep flies from laying eggs.

- **Clean up spills:** Clean up spilled hay and grain and dispose of in tightly closed trash containers. All garbage should be stored in tight containers.

- **Keep it dry:** Avoid stagnant water collection. Insects like mosquitoes lay their eggs in ponds and deep puddles, while other species feed on algae. Do not allow water to collect in wheelbarrows, old tires, or clogged gutters.

- **Clean feed buckets:** Scrub feed residue from buckets daily to keep flies from feeding on it.

- **Feed storage:** Feed storage bins should be tightly covered.

- **Landscape planning:** Locate new barns or other equine facilities in dry areas. Avoid building in wet, low-lying areas, as these are generally insect breeding grounds.

Handling an Insect Problem

If you already have an insect problem on your farm, there are a few things you can do to cut down on the population and keep them away from your horses.

- **Additives**: there are food additives that harmlessly travel through the horse's digestive system and kill larvae in manure.

- **Screens**: install screens on barn doors, and generally keep doors closed.

- **Insect tape**: Line windows and doors with sticky tape, and refresh frequently. Non-sticky repellent strips can be braided into manes and tails to keep insects away from horses.

- **Sprays**: Overhead or central repellent systems are popular to install in barns. The systems are usually activated during problem months (summer-fall) and release spray 4 to 6 times per day, to help drive off hovering insects. Commercial sprays (Endure®, Fly-X®, Repel-X®) generally rely on a pyrethrin-based formula. Always follow directions when using insect repellents, especially those sprayed directly onto the horse. It should also be noted that **pyrethrins are very toxic to cats** and can also affect humans. Do not use pyrethrin sprays on people or other pets.

- **Natural Sprays:** Common natural sprays include citronella (an extract from lemon grass) which is relatively safe, though it can irritate eyes and should not be used where foals can ingest it. There are other plant-based sprays, but you should check to make sure they don't cause skin irritation or increase the chance of sunburn.

- **Landscaping solutions**: some plants discourage insects. Flies and mosquitoes dislike the pungent scent of pine trees. Tansy bushes have the reputation of discouraging ants. Flowers attract wasps and larger insects that feed on flies and mosquitoes.

- **Ponds**: If there is a pond on your property, encourage frogs to take up residence. They'll feed on insects and insect larvae. Frog and toad houses can be purchased at local lawn and garden stores. You can also stock your pond with hardy fish species that feed on insects and their eggs.

References

Personal communication. Patricia Erickson, D.V.M. 2004.

Pomeroy, L. *Shoo Fly! Win the Battle Against Stable Flies*. EquiSearch website. http://www.equisearch.com/farm/stable/eqflies384/index.html

Pomeroy, L. *The Scoop on Sprays*. EquiSearch website. http://www.equisearch.com/farm/flies/eqsprays620/index.html.

Poisonous Plants Index

Larkspur (Delphinium species)

Larkspur is an early spring plant that begins to bloom in pastures and wooded areas in late April. Because of its head start on the growing season, it's often the only available browse for hungry animals. Though horses generally avoid it, they will eat it if nothing else is available to graze on.

Toxicity: All parts of the plant are toxic to horses. It only takes a single day's consumption of as little as 1% body weight for the poisoning to be fatal.

Symptoms: In mild cases of larkspur poisoning, horses can exhibit loss of appetite, excitability, staggering, and constipation. In more severe cases, horses can suffer from slobbers, nausea, colic, bloating, and convulsive movements. Eventually, paralysis of the windpipe will occur, which leads to death. Necropsy shows inflammation of the windpipe and small intestine, and dark, congested kidneys.

Treatment: There is no specific antidote for larkspur poisoning. A veterinarian may be able to empty the contents of the stomach if consumption was recent. Treatment is primarily supportive, and the animal should not be handled anymore than necessary, as stress can worsen the condition.

Lupine (Lupinus species)

There are many different types of lupine, and therefore different toxicity syndromes. The symptoms of poisoning will depend upon the exact lupine species consumed.

Toxicity: The seeds and foliage are toxic to horses, containing high concentrations of alkaloids, which have an effect similar to nicotine.

Symptoms: Signs of poisoning can occur as quickly as one hour after consumption, and include labored breathing, depression, salivation, ataxia, tremors, seizures, coma, abortion and frequently death due to respiratory paralysis. Do not disturb sick animals.

Treatment: There is no effective treatment for lupine poisoning, but survivors generally recover completely.

Buttercup (Ranunculus spp.)

Buttercup grows in damp areas. Animals grazing in woods or near water meadows, streams, or ditches tend to browse buttercup mixed in with other favored plants.

Toxicity: Dried buttercup is NOT toxic, and can therefore be present in feed. The plant is most toxic in flowering stage.

Symptoms: Signs of buttercup toxicity include blisters of the mouth, colic, diarrhea, nervousness, twitching of the ears and lips, difficulty breathing, and convulsions in advanced stages.

Treatment: Call your veterinarian.

Oleander (Nerium oleander)

Oleander can grow to the size of a shrub or small tree, and is often used as a decorative plant. It tends to grow in warm regions and has thick, leathery, lance-shaped leaves and attractive flowers that can be white, pink, or red.

Toxicity: The entire plant is HIGHLY TOXIC. Ingestion of even small amounts can be fatal. Reportedly, ¼ of a pound of leaves (30-40 leaves) is a fatal dose for horses. (Purdue)

Symptoms: early signs include cardiac irregularities, depression, diarrhea, and abdominal pain. Pale mucous membranes and cold extremities will become evident as toxicity progresses. The cardiac irregularities will lead to collapse, coma, and death.

The toxins in oleander act extremely quickly. If your horse is observed eating oleander, call your vet immediately.

Red Maple (Acer rubrum)

Red maple trees are common for the Vermont area. Poisonings occur generally in late summer and fall, when leaves fall and drift onto pasture area.

Toxicity: Red maple leaves are HIGHLY TOXIC to horses. Ingestion of 1.5 pounds is toxic, ingestion of 3 pounds or more is fatal.

Symptoms: Death is common in cases of red maple poisoning, due to massive destruction of red blood cells. Signs include breathing difficulty, jaundice, urine that is dark brown in appearance, increased heart and respiratory rates, and lethargy.

50-75% of affected horses will die or be euthanized. Do not put leaves in hay and make sure there are none within reach of pasture area. In case of ingestion, call your vet immediately.

Black Walnut (Juglans nigra)

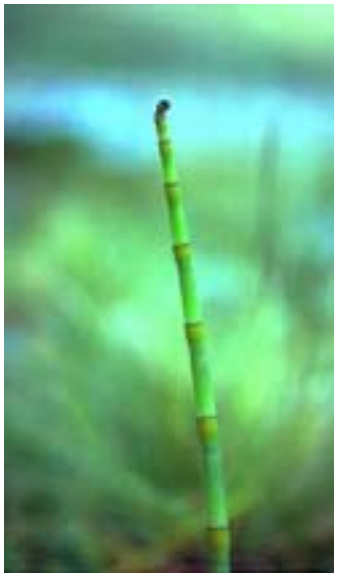
Black walnut can be introduced to horses through trees that grow around pasture land or, more commonly, as shavings used in stall bedding.

Toxicity: Shavings with less than 20% black walnut content are toxic within 24 hours of exposure, but are usually non-fatal with proper treatment.

Symptoms: Signs of black walnut toxicity include laminitis (which will worsen with continued exposure) reluctance to move, increased temperature and heart rate, difficulty breathing, digital pulse, limb edema, and increased gut sounds.

Treatment: Remove stall shavings immediately. Cooling the legs and hooves with a hose can help make the horse more comfortable. If caught relatively soon, recovery should be complete. In cases of severe laminitis and edema, consult your veterinarian.

Horsetail (Equestrum arvense)



Horsetail is a green, thick-stemmed plant that is not common in Vermont. However, if your horse travels to the midwestern or northwestern U.S., it could possibly introduced through local hay.

Toxicity: All parts of the plant, both fresh and dried, are toxic to horses. Horsetail contains thiaminase, an enzyme that degrades vitamin B6 (thiamin) in horses. (Similar to Bracken Fern).

Symptoms: The initial sign of horse tail poisoning is weight loss, followed by weakness, gait abnormalities, front legs crossed and back legs spread apart, increased heart rate, inability to rise, and potentially death.

Treatment: Thiamin deficiency must be treated by a veterinarian.

St. Johnswort (Hypericum perforatum)

St. Johnswort is a perennial herb that grows commonly along roadsides, pastures and ranges, and prefers dry soils. Horses don't generally eat St. Johnswort unless it is the only forage available.

Toxicity: All parts of the plant are poisonous to horses. St. Johnswort contains the toxin hypericin, which is absorbed in the intestine and circulates in the blood, where it converts sunlight into heat. This causes cellular damage and sunburn. Horses must consume the plant in large amounts for 4 or 5 days before symptoms appear.

Symptoms: Signs of toxicity include sunburn (especially on the head and in horses with lighter coat colors) eye irritations, and sloughing of the skin.

Treatment: Remove horse to a shaded area or barn, and do not turn out during the day. Horse must not be ridden for 1 to 2 weeks. For severe burns and skin sloughing, call your veterinarian. Preventing further ingestion of the plant, combined with supportive care and shade usually results in complete recovery.

Foxglove (Digitalis purpurea)

Though foxglove was not originally native to the United States, its use as a favored garden plant has led to its naturalization here, where it commonly "escapes" decorative gardens to grow wild.

Toxicity: The flowers, leaves, and seeds of the plant are **HIGHLY TOXIC** to horses (as well as most other animals, including humans.) Only a small amount is needed (plant trimmings) for symptoms to appear.

Symptoms: Signs of toxicity are often severe and include nervous signs, cardiac damage, and sudden death.

Treatment: If you suspect (or know) that your horses has consumed foxglove, alert your vet immediately. Treatment is symptomatic only, as there is no specific cure for poisoning.

Red Clover, Alsike Clover

(Trifolium species)

Red clover is a common pasture plant, and recognizable as the Vermont state flower.

Toxicity: When **WET**, all parts of the plant are poisonous to horses, and symptoms will appear 1 to 3 hours after consumption.

Symptoms: Signs of toxicity include intestinal tract irritation (mild colic and diarrhea) and photosensitivity (sunburn).

Treatment: Notify your vet if signs of toxicity become severe. Horses affected by sunburn should be kept out of the sun until healed. Alsike clover is safe when dry, and can be consumed in feed.

If clover is present in your pasture, avoid turning out your horse until morning dew has evaporated.

Nightshade (Solanum species)

Nightshade species are present throughout the United States, and are commonly found around fence rows, waste areas, and grain and hay fields.

Toxicity: The leaves and immature fruit of the plant are poisonous to all animals. Though animals rarely consume enough of the raw plant to cause harm, there is a risk if the amount is high in processed feed.

Symptoms: Signs of toxicity include abdominal problems as well as neurological complications such as lack of coordination, excessive salivation, depression, apparent hallucinations, convulsions, progressive paralysis, and death.

Treatment: Call your veterinarian. Administration of gastrointestinal protecting drugs can help.

Bracken Fern (Pteridium aquilinum)

Bracken fern is common throughout the United States, and can be found in dry, poor soil, open woods, and sandy ridges.

Toxicity: All parts of Bracken Fern are toxic to horses. The plant contains thiaminase, an enzyme that breaks down vitamin B1 (thiamin) and causes a deficiency in the horse.

Symptoms: The initial sign of thiamin deficiency is weight loss, followed by incoordination, front legs crossed and hind legs spread apart, increased heart rate, inability to rise, possibly death.

Treatment: Thiamin deficiency must be treated by a veterinarian.

Fescue (Festuca arundinacea)

Fescue is a cool-season perennial grass that is found in a wide range of soils and climates.

Toxicity: Toxicity is a result of a fungus that resides within the plant and all parts of the plant are considered toxic to horses.

Symptoms: Signs of Fescue toxicity include reproductive problems, lameness, gangrene, fever, and possibly death. High alkaloid content inhibits prolactin release in pregnant mares, leading to prolonged gestation, abortion, dystocia, lack of milk production, and mare death due to retained placenta.

Treatment: Pregnant mares will require help with foaling, and foals that survive will require supplemental colostrums. Your veterinarian can advise you on treatment for afflicted animals.

References

Cornell University Poisonous Plants Informational Database. http://www.ansci.cornell.edu/plants/index.html. 2003.

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.

Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

Wildlife Control: Summary Survey

Check the appropriate column and see what areas of your wildlife control need attention.

Questions on biosecurity operations	Yes	No	Not Applicable
Is feed stored in rodent-proof, tightly closed containers?			
Are there any areas of stagnant water on your property?			
Is garbage kept in rodent-proof, tightly-closed containers?			
Are compost bins covered and protected from wildlife?			
Are all other pets fed indoors or in enclosed areas?			
Are work and storage areas kept clean?			
Are weeds and plants overgrown around buildings?			
Have you checked for external openings around your buildings larger than ¼ inch?			
Is there any decaying wood on your property?			
Is firewood stacked off the ground, stored indoors, or stacked away from house and barn areas?			
Are gutters regularly cleaned and kept free of debris?			
Are visitors/clients aware of your pest control methods (i.e. traps, poisons, etc.)?			
Do you encourage natural enemies (i.e. hawks and owls) of pest birds to live around your property?			
Are manure spills promptly cleaned to prevent insects laying eggs?			
Do you use pyrethrin repellents around barn cats?			
If you have a pond, can you stock it with frogs or fish species that consume insects?			

Reference of Infectious Diseases: Quick View

This section provides fact sheets on equine infectious diseases and on vaccination. Each disease fact sheet discusses the agent, cause, symptoms, treatment, responsibilities, and keys to prevention for the disease. All vaccination recommendations were taken from the current guidelines of the American Association of Equine Practitioners.

Certain infectious diseases are required by law to be reported to the state veterinarian in the event of an outbreak. These diseases include:

- Equine Encephalomyelitis (EEE, WEE, VEE)
- Pleuropneumonia (Shipping Fever)
- Equine Infectious Anemia
- Rabies
- Vesicular Stomatitis

Fact Sheet	Main Points
The Facts on Vaccs	❖ What is a vaccine? ❖ Choices for vaccines must be made according to region and physiological state of the horse. ❖ Live, Live-Modified, Killed, and Recombinant vaccines. ❖ Vaccinations can fail if they are given too late, administered improperly, or if the horse's immune system is depressed.
Tetanus	❖ Caused by bacteria and present in the environment. ❖ "Sawhorse" stance, stiffness, lockjaw, muscle spasms. ❖ Give anti-toxin with deep puncture wounds. ❖ Vaccinate with toxoid annually. ❖ Bacteria killed by iodine or chlorine.
Pleuropneumonia (Shipping Fever)	❖ Bacterial infection that occurs secondary to other respiratory diseases. ❖ Colic signs, nasal discharge, coughing, fever, elevated HR, RR ❖ Treat with antibiotics and thoracic drainage. ❖ Outbreak must be reported to state vet. ❖ Ensure good air circulation in trailers and barns, do not transport horses with respiratory infections, vaccinate for primary respiratory infections.
Potomac Horse Fever	❖ Bacteria, transmitted by water insects, flukes, snails. ❖ Colic signs, lethargy, anorexia, fever, ileus, laminitis ❖ Treat with antibiotics, fluids, and electrolytes. ❖ Vaccinate in high-risk areas, and vaccinate pregnant mares. ❖ Control water insects, flukes, snails.
West Nile Virus	❖ Virus, spread by mosquitoes that bite infected birds. ❖ Neurological signs, death, weakness of limbs, ataxia. ❖ No specific treatment – supportive care only. ❖ Vaccinate before beginning of mosquito season.

Vesicular Stomatitis	❖ Rhabdovirus spread by insect and wildlife host species. ❖ Excessive salivation, mouth lesions, foot lesions, fever. ❖ Supportive care only. ❖ Alert state authorities of an outbreak and quarantine facilities.
Rhinopneumonitis (EHV-1,4)	❖ Virus spread by contact with contaminated secretions. ❖ Abortion, cough, nasal discharge, neurological signs, fever. ❖ Supportive care only. ❖ After an outbreak, no horse should leave the premises for three weeks. ❖ Vaccinate every 2-3 months. Vaccinate pregnant mares at 3,5,7, and 9 months of gestation.
Strangles	❖ Bacteria, spread by nose-to-nose contact and fomites. ❖ Enlarged lymph nodes, difficulty swallowing, abscesses in lower jaw, acute fever, appetite loss, cough. ❖ Supportive care, drain abscesses, soft/moist feed, antibiotics. ❖ Vaccinate annually; does not prevent disease, but reduces severity of infection.
Equine Encephalomyelitis (EEE, WEE, VEE)	❖ Virus, spread by mosquitoes. ❖ Neurological signs, colic signs, fever, lethargy. ❖ VEE causes abortion, oral ulcers, pulmonary hemorrhage. ❖ EEE is most fatal (75-100% mortality rate). ❖ Supportive care only. Survivors retain neurological dysfunction. ❖ Vaccinate annually before mosquito season. Booster for pregnant mares.
Rabies	❖ Virus, spread by the bites of infected animals. ❖ Neurological signs, excessive salivation, unexplained paralysis, behavioral changes, photophobia, rapid progression. ❖ Euthanize infected animals. ❖ Notify state vet. ❖ Vaccinate annually – required by Vermont law.
Equine Infectious Anemia	❖ Virus, spread by biting insects and contaminated materials. ❖ Carriers may not show symptoms, but spread disease to others. ❖ Red spots on mucous membranes, fever, weight loss, edema. ❖ Euthanize or permanently quarantine infected animals. Quarantined animals must have shoulder/neck brand. ❖ Annual Coggins test, one horse-one needle rule, control insect population.
Lyme Disease (Borreliosis)	❖ Bacteria, spread by tick bites. ❖ Lameness, laminitis, swollen joints, fever, weight loss. ❖ Antibiotic treatment. ❖ Daily grooming, tick control and prompt removal.
Equine Protozoal Myoencephalitis	❖ Parasite, spread in the feces of opossums. ❖ Lameness, stumbling, head tilt, paralysis of tongue/larynx. ❖ Less than 25% make full recovery. ❖ Keep opossums away from barn.

Equine Viral Arteritis	❖ Virus, spread by direct contact, nasal secretions, and semen. ❖ 50% chance of abortion, nasal discharge, swollen mucous membranes, fever, permanent arterial damage. ❖ Supportive care only. Antibiotics in case of nasal discharge. ❖ Vaccinate breeding stallions.
Equine Influenza	❖ Virus, spread through inhalation of infected droplets. ❖ Hacking cough, nasal discharge, stiffness, fever, lack of appetite, depression. ❖ Supportive care. Possibly antibiotics and antipyretics. ❖ Isolate infected animal and allow sufficient rest. ❖ Vaccinate annually ❖ Ensure good ventilation in stalls, arenas, and trailers.

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The Facts on Vaccs

What is a vaccine?

A vaccine is a specific antigen which, when administered to your horse, stimulates the production of antibodies against a certain disease, making a horse resistant for a defined period of time.

How do I choose vaccines for my horses?

Vermont law requires that all horses are kept current on their annual rabies vaccination. It's up to you what else to vaccinate your horse for, a decision which depends on the physiological state of the horse (young, pregnant, etc.) and what diseases are commonly found in your area. Your vet can usually recommend an appropriate vaccination routine.

Live, Modified-Live, and Killed Vaccines

Live: Contains residual virulence from the disease antigen, and can possibly spread the actual disease to other unvaccinated animals. It is also more dangerous to be handled and harder to store.
Modified-Live: More rapidly acting and a wider array of protection than killed vaccines. There is a slight risk of the vaccine reverting to virulent form.
Killed: The antigen has been "killed" by heat, chemical, or antimicrobial means. No risk of reverting to virulent form, or spreading disease to other unvaccinated animals. Less protection and slower acting than modified-live vaccine.
Recombinant: (gene-deleted, sub-unit, vectored, etc.) Genetic alterations made to viruses can reduce their pathogenicity and virulence and at times allow for easy recognition between vaccinated and infected animals.

Why might a vaccination fail?

No vaccine is 100% effective, and there are several reasons why one might fail to protect your horse.

- Too late – if the horse is already incubating the disease, vaccination will not protect them.
- Depressed immune system – sick or malnourished horses will not be able to mount the proper immune response that is normally stimulated by a vaccine.
- Improper Administration – some vaccines can be inactivated if given in conjunction with antibiotics. An incomplete dosage can also cause a vaccine to fail.

Complications: Anaphylactic Shock

This is a case of a horse being hypersensitive to a vaccine. When inoculated, the immune system overreacts (much like an allergic reaction), and the antigen binds to specific antibodies (IgE) that cause the release of chemicals such as histamine. These chemicals cause contraction of smooth muscle and vasodilation of blood vessels surrounding vital organs, most commonly the respiratory system. Signs of anaphylactic shock include blue mucous membranes, facial edema, salivation, colic, shock, lack of coordination, collapse, and death. Always contact your vet at the first signs of a vaccine reaction. Treatment with epinephrine can counter the symptoms if administered in a timely manner.

References

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.

Tetanus

AGENT

Bacteria, specifically the neurotoxin produced by *Clostridium tetani.*

CAUSE

Introduced to tissues through wounds.
Clostridium tetani is present in soil and intestinal tracts. Puncture wounds are particularly susceptible due to anaerobic environment (no oxygen). Almost all mammals are susceptible to this disease, especially horses and humans.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ "Sawhorse" stance	▪ Elevated heart rate	▪ Stiff, extended tail
▪ Muscle spasms	▪ Elevated respiration	▪ Erect ears
▪ Lockjaw	▪ Perspiration	▪ Localized stiffness
▪ Walking, turning difficult		▪ Third eyelid exposed

*Tetanus is fatal in more than 80% of infected horses

TREATMENT

Give a tetanus shot with any puncture wound. In early stages of the disease, some tranquilizers and sedatives can help, in conjunction with the tetanus anti-toxin. Keep the horse in a quiet, darkened stall with feed and water bins high enough that the horse does not have to bend its head to reach them.

RESPONSIBILITIES

Vaccination: administration of toxoid annually. Pregnant mares should be vaccinated one month before foaling.
Wound management: monitor wounds carefully and give anti-toxin shot. After any surgery, horses should be turned out on clean ground (grass pasture is best). As a precaution, their stall should be disinfected. Only oxidizing agents such as iodine and chlorine can kill all tetanus spores.

KEYS TO PREVENTION

- **Vaccination**
  -Tetanus toxoid (annual shot)
  -Tetanus anti-toxin (treatment for wounds)
- **Disinfection**
  -Iodine or chlorine (oxidizing agents)

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Pleuropneumonia (Shipping Fever)

AGENT

Bacteria (many types)

CAUSE

Shipping Fever is often a consequence of stress (such as long travel, racing, surgery) and occurs secondary to a respiratory infection such as Equine Influenza, Equine Herpes Virus (type 1 and 4), and Strangles.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ colic signs ▪ nasal discharge coughing	▪ fever (102-104) ▪ Elevated heart rate Elevated respiratory rate	▪ Disinterest in food ▪ Depression

TREATMENT

Thoracic drainage will be necessary to remove fluid and dead tissue from the chest cavity. Antibiotic treatment will also be required. Though broad spectrum antibiotics can be used at first, a bacterial culture is recommended as there may be anaerobic strains of bacteria present. With early recognition and treatment, 50% of horses will recover completely. Supportive care will be required in infected horses.

RESPONSIBILITIES

By state law, incidence of pleuropneumonia must be reported to the state veterinarian. Generally, this report will be made by your vet.

KEYS TO PREVENTION

- **Traveling care: Do not keep a horse's head elevated for several hours at a time, as this prevents the horse from clearing bacteria from its airways.**
- **If your trailer does not allow your horse to lower its head, make sure to take breaks to allow the horse to do so.**
- **Avoid transporting horses with respiratory problems.**
- **Do not use loose, dusty bedding in trailers.**
- **Ensure good air circulation in trailers and stables.**
- **Vaccinate for primary causes: Equine Influenza, Equine Herpes Virus, Strangles, etc.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Preventing Shipping Fever. http://www.sporthorsemedicine.com/shipping_fever.htm.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Potomac Horse Fever

AGENT

Bacteria, *Neorickettsia risticii*

CAUSE

Transmitted by water insects (caddis flies, dragonflies), flukes, and freshwater snails. This disease has a seasonal occurrence, with a higher incidence in summer and autumn.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Anorexia	▪ Fever	▪ Laminitis
▪ Lethargy	▪ Increased heart rate	▪ Diarrhea
▪ Colic signs	▪ Increased respiratory rate	▪ Ileus

TREATMENT

Oxytetracycline for up to 5 days, IV fluid and electrolytes. Death can occur from toxemia (generally in cases where no treatment is given). Laminitis can result in a need for euthanasia.

RESPONSIBILITIES

Isolate infected horses.
The available vaccine is given in a two dose primary series at 5-6 months and 6-7 months. From then on, the vaccine is given semi-annually, with a recommended booster in May/June in endemic areas. Pregnant mares should be vaccinated twice a year with one dose timed 4-6 weeks before foaling.

KEYS TO PREVENTION

- **Follow a proper vaccination protocol in high-risk areas, or at certain times of the year if PHF is known to be a problem.**
- **Limit access to ponds and streams.**
- **Maintain good insect control.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

West Nile Virus

AGENT

Virus

CAUSE

West Nile virus has a host system. Mosquitoes bite birds infected with the virus, and transmit it to the horses they bite.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Ataxia	▪ Fever not common	▪ Depression
▪ Partial paralysis		▪ Weakness of limbs
▪ Muscle twitching		
▪ Death (35%)		

Note: Horses can become infected without showing any clinical signs

TREATMENT

There is no specific treatment for West Nile other than supportive care. Two out of three infected horses survive and generally recover completely.

RESPONSIBILITIES

Contact your veterinarian for all neurological signs. Quarantine the infected animals until certain diagnosis is made and assess your insect control methods. Horses are end hosts for the virus.
Vaccination: The available vaccine is given in two doses, 3-6 weeks apart, followed by an annual booster.

KEYS TO PREVENTION

- Good insect control.
- Eliminate standing water (in wheelbarrows, clogged gutters, old tires, etc.)
- Permethrin repellents.
- Install screens in problem areas.
- Vaccinate in problem areas.

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Vesicular Stomatitis

AGENT

Rhabdovirus that affects horses, cattle, pigs, sheep, and goats.

CAUSE

The virus is spread by insect and wildlife host species including deer, bobcats, rodents, raccoons, and monkeys. The primary route of infection is believed to be through the skin or respiratory tract (Merck).

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Excessive salivation	▪ Fever	▪ Reluctance to eat
▪ Lesions in mouth		
▪ Foot lesions		

TREATMENT

Supportive care only. The disease is considered non-lethal, with death occurring usually due to secondary infections. Bacterially infected lesions should be cleaned with a mild antiseptic.

RESPONSIBILITIES

Immediately alert state and federal authorities of an outbreak! This disease can affect many other species and cause flu-like symptoms in people. Restrict animal movement on and off your farm. Disinfect vehicles, equipment, and housing.

KEYS TO PREVENTION

- **Discourage the presence of wildlife.**
- **Implement an insect control program.**
- **Maintain proper disinfection and quarantine protocol when introducing new animals to your farm.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Rhinopneumonitis (EHV-1,4)

AGENT

Virus. One of two common forms of the Equine Herpes virus.

CAUSE

EHV-1 is spread through direct contact with contaminated secretions, or from contaminated equipment, feed, and water.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Abortion	▪ Fever (up to 7 days)	▪ Diarrhea
▪ Cough		▪ Secondary infections
▪ Nasal discharge		▪ Lack of appetite
▪ Neurological signs		

TREATMENT

Supportive only. Antibiotics can be used on horses that have nasal discharge.

RESPONSIBILITIES

Quarantine infected animals. Quarantine new horses and returning horses for 3-4 weeks. For animals that carry the virus, care should be taken to reduce stress (which can cause a relapse). After an outbreak, **no horse should leave the premises for three weeks after recovery of all cases on the farm.**

Vaccination: First dose is given at 4-6 months, second dose at 5-7, third

KEYS TO PREVENTION

- **Quarantine all new/returning horses**
- **Vaccination of pregnant mares at 3,5,7, and 9 months with killed virus (i.e. PneumoBort)**
- **Proper vaccination program according to performance level.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Strangles

AGENT

Bacteria, *Streptococcus equi.*

CAUSE

The bacteria survives in a cool, moist environment, and is spread by nose to nose contact, draining abscesses, flies, contaminated equipment, clothing, and boots. Inhaled or ingested, it manifests in the jaw and neck.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Enlarged lymph nodes	▪ Abscesses in lower jaw	▪ Appetite loss
▪ Difficulty swallowing	▪ Acute fever	▪ Depression
▪ Cough		
▪ Lethargy		

Morbidity: 100%, mortality: 8-10%

TREATMENT

Rest and supportive care. Abscesses should be drained. Give soft, moist feed. Anti-inflammatory drugs can be given, and the horse may require antibiotic treatment.

RESPONSIBILITIES

Quarantine infected animals. They will be most contagious 2 to 3 weeks after the onset of symptoms. (Merck) Disinfect all materials/equipment that have come in contact with the infected animal.
Vaccinations: Annual booster recommended by the American Association of Equine Practitioners (AAEP). Limited efficacy; clinical infection rate reduced by 50% in vaccinated vs. unvaccinated horses. Severity and duration of infection will be significantly reduced in vaccinated horses.

KEYS TO PREVENTION

- **Quarantine new horses**
- **Avoid mingling with other horses at shows and events**
- **Avoid sharing water buckets and equipment between horses**
- **Provide clean, dry housing**
- **There is a vaccine available, but it should only be used to reduce the severity and spread of the disease. It will not prevent the disease itself.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

Equine Encephalomyelitis

(Eastern, Western, Venezuelan)

AGENT

Virus

CAUSE

Birds, rodents, and reptiles act as reservoir hosts for the virus. It is transmitted to horses by mosquito bites. Eastern occurs in eastern U.S., Western in western U.S., and Venezuelan in far southern regions of the U.S.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Neurological signs	▪ Fever	▪ Blindness
▪ Colic signs		
▪ Lethargy		

*Neurological signs may not be present in VEE (death can precede them). Symptoms for VEE include abortion, oral ulcerations, and pulmonary hemorrhage.

*Mortality: WEE(<50%), EEE(75-100%), VEE(<80%)

TREATMENT

Supportive only. Recovery is not usually complete, with a high chance of remaining neurological dysfunction.

RESPONSIBILITIES

Isolate infected animal and minimize human contact. All forms of the disease can cause symptoms in humans (fever, headache, stupor, seizures. Mortality rate for humans is highest with EEE, and neurological dysfunction is often permanent.) By state law, outbreaks of these diseases must be reported to the state veterinarian. Generally, this report will be made by your vet.

Vaccination: annual booster, given in the spring before mosquito season. Pregnant mares should be given a booster 4-6 weeks before foaling.

KEYS TO PREVENTION

- **Vaccinate in problem areas.**
- **Maintain a good insect control program.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Rabies

AGENT

Virus

CAUSE

The rabies virus affects all mammals. It is most often spread to horses by bites from other infected animals (dogs, cats, raccoons, bats, foxes, etc.) In rare cases it can be transmitted by droplet inhalation, orally, or via the placenta of pregnant mares.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Neurological signs		▪ Depression
▪ Excessive salivation		▪ Behavior change
▪ Recumbency		▪ Photophobia
▪ Unexplained paralysis		

Rabies progression is rapid. Death from cardiac or respiratory arrest usually occurs 5-10 days after the onset of clinical signs.

TREATMENT

Euthanasia. In suspect cases, the animal should be revaccinated and isolated for 45 days with close monitoring.

RESPONSIBILITIES

Notify your veterinarian for all neurological signs. Isolate the animal if you suspect disease. Minimize human contact and ensure treatment for human employees/clients that have been exposed to the infected animal.
Vaccination: annual booster, recommended for all domestic animals.

KEYS TO PREVENTION

- **Vaccination is recommended for all domestic animals for which there is a licensed vaccine. May be required by boarding facilities and certain shows/events.**
- **Keep wildlife away from your farm.**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Equine Infectious Anemia

AGENT

Virus. Has the ability to replicate itself, and will do so throughout the infected horse's life.

CAUSE

The EIA virus is a blood borne infection, often spread by using contaminated materials on multiple horses. Large, biting insects (such as horse flies and deer flies) also play a role in transmission. Carriers of the disease do not show symptoms themselves, but can spread the disease to others.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Red spots on mucous membranes ▪ Weight loss ▪ Swelling under skin	▪ Fever (in acutely infected animals)	▪ Anemia ▪ Depression

TREATMENT

There is no specific treatment for horses with EIA. Supportive care only. Euthanize or quarantine infected animals. Quarantined animals must be marked with a permanent brand on shoulder or neck and spend the rest of their lives in isolation from other horses.

RESPONSIBILITIES

If you have a horse diagnosed with EIA, it is your responsibility to quarantine the infected animal, and assume that all animals on your farm are carriers until tested.

KEYS TO PREVENTION

- **Control insect population**
- **Keep Coggins Test current (annual)**
- **Do not breed EIA positive horses**
- **Use disposable syringes and needles; one horse, one needle**
- **Keep barn and facilities sanitary**
- **Isolate new animals until they have been tested for EIA**

REFERENCES

Animal and Plant Health Inspection Service Fact Sheet. Equine Infectious Anemia. April 2003.
Indiana State Board of Animal Health Fact Sheet. Equine Infectious Anemia. http://www.in.gov/boah/biosecurity/equine.html
Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Lyme Disease (Borreliosis)

AGENT

Bacteria, *Borelia burgdorferi.*

CAUSE

Borelia burgdorferi is carried by several species of tick. Rodents and white-tailed deer often act as reservoir hosts. The bacteria is passed to horses by the bite of the tick.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Lameness	▪ Fever (possibly)	▪ Chronic weight loss
▪ Laminitis		
▪ Swollen joints		

TREATMENT

Antibiotic treatment over a period of several weeks. Horses usually respond to therapy within 2-5 days of treatment.

RESPONSIBILITIES

Lyme disease is transmissible to other animals and humans, and the safety of staff and visitors must be taken into consideration.

KEYS TO PREVENTION

- Daily grooming.
- Tick control (permethrin repellents). Eliminate brush and high grass that ticks can reside in around barns/pastures.
- Prompt removal of ticks
    - Ticks must feed for 12 to 24 hours to infect a horse. Remove ticks by squeezing near the mouth parts with a pair of tweezers. Clean and disinfect the bite area.

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Equine Protozoal Myoencephalitis

AGENT

Parasite, *Sarcocystis neurona.*

CAUSE

The parasite lives in the feces of opossums and affects the central nervous system. It is spread by contaminated feed, bedding, hay, and water that contain the parasite.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Lameness ▪ Stumbling ▪ Head tilt ▪ Any neurological signs		▪ Paralysis of tongue & larynx ▪ Atrophy

TREATMENT

EPM can be positively diagnosed by a blood test, and 60% of horses respond to treatment within the first month. However, less than 25% will make a complete recovery. Antiprotozoal drugs can be used.

RESPONSIBILITIES

Isolate the infected horse. Notify your vet for all neurological signs.

KEYS TO PREVENTION

- **Keep opossums out of barns and away from feed/hay storage**
- **Keep feed supplies tightly covered**
- **Dispose of dead animals (birds, opossums, rodents) promptly and properly**
- **Limit bird populations in the barn**

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Equine Viral Arteritis

AGENT

Virus; targets blood vessels. Replicates in the lung, intestine, kidney, reproductive tract, and sometimes the placenta.

CAUSE

The EVA virus is transmitted between horses through contact, nasal secretions, and infected semen.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Nasal discharge ▪ Labored breathing ▪ Coughing ▪ 50% chance of abortion	▪ Fever ▪ Swollen mucous membranes	▪ Permanent arterial damage

*Many infected horses show no symptoms.

TREATMENT

Supportive care only. Antibiotics can be given in cases of nasal discharge.

RESPONSIBILITIES

If your horse tests positive for EVA, or if you are shipping semen from an EVA-positive stallion, it may be barred from entering a foreign country. There is no way to eliminate carrier status. EVA positive animals should be isolated from the rest of the herd.
Vaccination: There is an annual vaccine available, but it is not approved for pregnant mares.

KEYS TO PREVENTION

- **It is debatable whether EVA-positive stallions should be bred. Some sources say never to breed them, others suggest breeding only to EVA-positive or EVA vaccinated mares. If the mare is bred, she should be isolated for at least 20 days post-breeding.**
- **Collect blood samples for EVA testing before breeding.**
- **Vaccinate breeding stallions annually, 28 days before the start of the breeding season; virus may be shed in semen for up to 21 days.**

REFERENCES

Animal and Plant Health Inspection Service Fact Sheet. Equine Viral Arteritis. 2002.
Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Equine Influenza

AGENT

Virus

CAUSE

Equine Influenza is spread through inhalation of infective droplets.

SYMPTOMS

VISUAL	TPR/CRT	OTHER
▪ Dry, hacking cough	▪ Fever (103-106)	▪ Loss of appetite
▪ Nasal discharge		▪ Depression
▪ weakness/stiffness		

*Though the disease is rarely fatal, it can result in secondary conditions such as emphysema and bronchitis.

TREATMENT

Supportive care for horses with mild symptoms. Horses with a fever above 105 degrees may require antipyretics. Antibiotics may be needed if the fever persists for more than 4 days, or if nasal discharge is present.

RESPONSIBILITIES

Isolate infected animal from the rest of the herd, and allow sufficient rest. Stressing or working an infected animal may result in long-term lung or myocardial damage.
Vaccination: pleasure horses (annual), performance horses (every 3-4 months), broodmares (semi-annual with a booster 4-6 weeks prepartum). A series of at least three doses is recommended for primary immunization of foals.

KEYS TO PREVENTION

- Vaccinate according to performance level (especially important for boarding).
- Quarantine news horses for up to six weeks.
- Ensure good ventilation in stalls, arenas, and trailers.

REFERENCES

Merck Veterinary Manual (Online). http://www.merckvetmanual.com. Dec 2003.
Robinson, N.E. Current Therapy in Equine Medicine. Philidelphia, PA: W. B. Saunders. 2002.
Rose, R. J., and Hodgson, D.R. Manual of Equine Practice. Philidelphia, PA: W.B. Saunders. 2000.

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Glossary

ANAEROBIC	Refers to bacteria that lives in environments lacking oxygen. Such bacteria will thrive in deep tissue wounds, rather than surface cuts.
ANTIBODIES	Compounds produced by the immune system that recognize and fight germs.
ANTIGEN	Component of bacteria or viruses that stimulate an immune response. Vaccines utilize this component to trick the body's immune system into responding as if it is infected, causing production of appropriate antibodies.
ATAXIA	Loss of coordination in muscular movement.
CRT	Capillary Refill Time. Refers to the condition of the mucous membranes, specifically how long it takes for blood to refill a depressed area of the membrane.
FOMITES	Inanimate objects that can carry disease (clothing, boots, equipment, vehicles, etc.)
ILEUS	Lack of sounds from the intestinal area (indicates lack of feed movement through intestinal tract).
MORBIDITY	The rate of incidence of a disease.
MORTALITY	The rate of incidence of death from a disease.
PHOTOPHOBIA	Intolerance of light.
RECUMBENCY	Lying down; often unable to stand.
TPR	Temperature, Pulse rate, and Respiratory rate.

Emergency Contact Information

The following contacts can help you determine the proper course of action in the event of an emergency.

Your Veterinarian

Name:_____

Phone #:_____

Local Police Department

Name:_____

Phone #:_____

To report an infectious disease, contact:

Vermont State Veterinarian
(802) 828-2421

APHIS (Animal and Plant Health Inspection Service)
Federal Veterinarian, Vermont
Todd Johnson, DVM
(802) 223-5071

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(For best results, keep this sheet near a phone and advise all employees of its existence.)