

Vaccines

For Saturday March 13, 2010 by Jennifer L. Smith, DVM

**IMMUNE SYSTEM, SIGNS OF
COMMON DISEASES WE WANT TO
PREVENT W/VACCINES**



WHAT TO EXPECT

- There is a lag period of 1-2 weeks after a full series of vaccinations are completed until the horse is fully protected.
- After immunizations are completed, protective antibodies in the blood and other specialized immune system components stand guard against the invasion of specific diseases.
- Over time, these antibodies gradually decline.



WHAT TO EXPECT

- A booster is needed at regular intervals to maintain adequate protection.
- Boosters can accomplish protection against some diseases, such as tetanus and rabies, if only given once a year.
- Most other diseases require more frequent booster intervals to provide adequate protection.



HORSE HEALTH EDUCATION: IMMUNIZATION

VACCINATIONS NEEDED

The specific immunizations needed by a particular horse or horses depend upon several factors:

- age
- use
- breed
- sex
- general management
- exposure risk
- geographic location

Your local equine veterinarian can help you determine the vaccination program best suited to your horse's individual needs.



Vaccines

How they relate to the immune system



Types of Vaccines

- Dead vaccines
 - Inject remnant of agent that is now dead
 - Body recognizes the invader because it has “seen the skeleton” before
- Modified Live vaccines
 - Inject a live organism that no longer has the ability to cause disease
 - This vaccine strain is viable inside the body of the host, and stimulates a greater immune response

- Levels of expected protection from vaccines varies greatly
 - Adjuvant
 - Route of administration
 - Efficacy
 - None are 100% effective
 - Heat damage (caution if over-the counter)
 - Injection failure (unruly horses)
- Complications
 - Local reactions
 - Allergic reactions
 - Immune system stimulation



Rabies



Rabies

- Neurologic Disease
- Viral
- Reservoir in wild animals
 - Raccoon's role in current epidemic
 - Fox in the last epidemic
 - Bats (urine)
 - Many other animals (not rats!)



Rabies: Disease Spread

- An infected animal's saliva (or bat urine) enters the new animal through a bite, or break in the skin, or mucous membrane
- A local viremia is established
- The virus attaches to a nerve, and moves up the nerve to the spinal cord
- The virus moves up the spinal cord to the brain
- Once in the brain, the virus create signs of encephalitis
- Then and only then, the virus in greater concentration leaves the brain by the very short nerve going to the salivary gland
- Cycle repeats

Rabies

- Animals cannot spread the disease before they begin to show clinical signs
- The virus is present in very low concentration in tissue other than brains, and hence poses little or no threat for spread (its OK to eat a deer that has Rabies “on the way” to the brain)
- The incubation period (from the time of the bite until signs are seen) varies with the distance the virus must travel before reaching the brain
- This is generally said to take 1-6 months, but in a horse bitten on the rear heel bulb it may take as long as a year

Rabies: Signs

■ Furious Form

- Aggressive behavior
- Photophobia
- Hydrophobia
- Extreme sensitivity to touch
- Straining
- Muscle Tremors
- Convulsions
- Death

■ Dumb Form

- Depression, Anorexia
- Head Tilt, Circling
- Incoordination
- Salivation
- Facial & Tail Paralysis
- Blindness
- Urinary incontinence
- Self mutilation
- Death

Rabies: Signs

- Paralytic Form
 - Paralysis starting at the rear end and moving forward
 - Incoordination
 - Inability to rise
 - Death

Horses can also present as atypical colics or obscure lameness problems. Currently all horses that die without a known cause that have obscure signs are considered to have Rabies until proven otherwise.

Rabies: Vaccination

- Vaccine Efficacy is fairly good. There are, however records of vaccinated horses that developed the disease.
- Killed vaccine (MLV Vaccine caused disease-like signs in horses)
- OK to give in neck (not so with MLV)
- Must be given by a Veterinarian
- Foals from vaccinated mares are vaccinated at 6 and 7 months of age
- Foals from unvaccinated mares are vaccinated at 3 and 4 months of age
- Broodmares
 - Pre-foaling?
 - Post-foaling?
- Annually in adult horses
- Booster post exposure



TETANUS



Tetanus: A Bacterial Disease

- Clostridium tetani
 - Neurotoxin producer
- Inhabitant of GI tract of many animals
- Therefore also found in the soil on farms
- Spores survive in the soil for years
- Anaerobic
 - Grows where there is no oxygen
- Deep wounds are a greater risk



Tetanus: Mechanism of Action

- Bacteria enters body through wounds
 - Punctures
 - Surgery
 - Castrations
 - Tail docking
 - Foal umbilicus
 - Injections
 - Banamine
 - Rhino vaccine



Tetanus: Clinical Signs

- Stiff stilted gait
- Rigid muscles, sawhorse stance, raised tail
- Opisthotonus (raised head, star-gazing)
- Lips pulled back in a grimace (hence Lockjaw)
- PROLAPSED THIRD EYELID
- Hyperesthesia (over-react to stimuli such as light, noise, touch)
- Fever and sweating due to muscle tetany
- Inability to swallow
 - Drooling
 - Inhalation pneumonia
- Flared Nostrils
- Recumbency
- Respiratory arrest

Tetanus: Clinical Signs



Tetanus: Vaccination

- Tetanus Toxoid
- Efficacy is good if given properly
- Initially (adults) receive 2 injections 3-4 weeks apart
- Annual booster
- Booster if there is a puncture wound and it has been over six months since the last booster
- Booster mares 4-6 weeks before foaling
 - Passive immunity to foal
- Newborn foals from vaccinated mares
 - Vaccinate at 6,7,and 8 months of age
- Newborn foals from unvaccinated mares
 - TAT at birth
 - Vaccinate at 3,4,and 5 months of age



West Nile Virus



Signs

- Stumbling or Tripping
- Muscle Weakness or Twitching
- Partial Paralysis
- Loss of Appetite
- Depression or Lethargy
- Head Pressing or Head Tilt
- Impaired Vision

Signs (con't.)

- Wandering or Circling
- Inability to Swallow
- Inability to Stand Up
- Fever
- Convulsions
- Coma
- Death

Transmission Cycle

Typical transmission cycle of the West Nile virus

Infected mosquitoes transmit the virus to birds. WNV can be carried by many avian species, including those that migrate great distances (ducks, geese).



Typical WNV transmission cycle: bird to mosquito. Mosquitoes become infected when they bite birds infected with WNV.

"Dead-end" hosts: The virus level in mammals' blood generally is not sufficient to be transmitted back to the mosquito, thereby ending the cycle. Mammals bitten by infected mosquitoes may test positive for WNV, although some mammals will not get ill.

Mosquito, Copyright Dennis Kurkel Microscopy, Inc.

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Vaccination

- Initial Immunity Requires 2 Injections 3-6 Weeks Apart
- Peak Immunity 2-3 weeks post vaccine
- Immunity Lasts 6 Months
- Vaccinate in NY Late Spring
- Vaccinate 2-3 X/yr in the South
- Foals: Unknown, do as with EEE/WEE
- Vaccine Efficacy: Studies estimate 95% protection if given appropriately



Encephalidities

Eastern Encephalitis

Western Encephalitis

Venezuelan Encephalitis



- Viral
- Reservoir in birds and small animals
- Mosquito / swamps / Mohawk River Valley
- Birds, horse, man
- Eastern (EEE) is predominant on East Coast and in Midwest. EEE is generally more serious than WEE
- Western (WEE) is predominant in the West and Midwest
- VEE has not been seen in the United States for many years

Eastern, Western, Venezuelan Equine Encephalomyelitis

- Early mild signs of EEE and WEE
 - Fever, Anorexia, Stiffness
- EEE is more likely to progress
 - Excessive walking
 - Depression
 - Extreme sensitivity to stimuli
 - Recumbency
 - Death in 1-7 days



Vaccination

- Efficacy is good if given properly
- Protection for at least six months
- Initially (adults) receive 2 injections 3-4 weeks apart
- Annual booster generally given in the spring before the mosquito season
- Booster every 6 months in the South
- VEE vaccine not required at this time
- Booster mares 4-6 weeks before foaling
 - Passive immunity to foal
- Newborn foals from vaccinated mares
 - Vaccinate at 6,7, and 8 months of age
- Newborn foals from unvaccinated mares are at greater risk
 - Vaccinate at 3,4 and 5 months of age
 - there is no anti-toxin available as with tetanus



Influenza (Flu)



Influenza

- Highly contagious respiratory virus specific to horses w/ variations within the “strains”
 - Variations result in the immune system not recognizing it as rapidly or effectively, which is why the vaccine & previous exposure do not lead to 100% immunity.
- Contacted by inhalation of virus particles
- Virus infects the epithelial cells lining the upper and lower airways
- May also cause muscle soreness
- May also cause vasculitis and myocarditis

Influenza

- Usually 1-3 years old, but can affect older animals as well
- Sudden Onset
- Short incubation (1-3 days)
- Disease usually lasts 7-10 days
- Horses remain infective for 3-6 days after they have recovered
- 100% morbidity rate in unprotected populations
- Mortality rate is low except for FPT foals

Influenza Risk Factors

- Horses with mild or absent clinical signs may shed the virus
- Shipping itself is a stress that may lower an animal's immune response and allow virus held "in check" to create disease
- Congregations of younger horses have the greatest risks (tracks, training centers, sales)
- Winter is the worst time for the disease
 - Closed barns, poor ventilation that leads to epithelial damage and virus concentration
 - Virus survives better in cold environment with higher humidity

Influenza Signs



- Cough
 - Dry hacking cough
 - May persist for 2-3 weeks
- Nasal discharge
 - Starts as serous
 - Becomes mucopurulent as bacteria invade damaged mucosa
- Fever (up to 106 ° F)
 - Biphasic

Enlarged lymph nodes
Depression
Lethargy
Off-feed
Stiffness
Lower limb swelling
Cardiac Arrhythmia
Milder signs with some immunity

Influenza Vaccination

- May not be needed for older isolated horses, BUT they become naïve
- Adults
 - IM initial and booster
 - IN single dose from the start
- Performance horses
 - IN every 6 months
 - IM every 3-6 months
- Broodmares
 - 4 to 6 weeks pre-foaling
 - Booster in fall if at risk
- Foals from vaccinated mares
 - IM at 9,10 & 11 months
 - IN at 11 months
- Foals from unvaccinated mares
 - IM at 6, 7 & 8 months
- Young horses in training may be vaccinated more frequently



Equine Herpes Virus

Rhinopneumonitis



Equine Herpesvirus

- There are three common herpes virus infections in horses
 - **EHV 1** creates disease of the respiratory, reproductive and central nervous systems
 - **EHV 2** creates corneal ocular disease
 - **EHV 3** creates coital exanthema (venereal disease)
 - **EHV 4** creates respiratory disease
- “Rhinopneumonitis” usually refers to EHV 1 & 4
- Like all other herpes viruses, EHV can become latent and clinical signs can recur in times of stress
- Young horses are often a reservoir for virus

EHV & Respiratory Disease

- Occurs worldwide
- “Rhinopneumonitis”
- EHV 1 and EHV 2
- Virus can remain dormant for long times, only to reappear in times of stress
 - Weaning
 - Shipping
 - Training
 - Competition
- EHV 1 can spread from cell to cell, thereby “hiding” from circulating antibodies

Respiratory Signs of EHV

- Cough
- Fever
 - Less than influenza
 - 102° to 106° F
- Mucopurulent nasal discharge (snotty nose)
- Depression
- Abnormal Lung sounds
- Can affect any age of horse, but respiratory disease due to EHV 4 is very common in young horses
- Disease generally lasts 2-4 weeks
- May progress to pneumonia if stressed or not rested

Neurologic EHV

- “Rhinopneumonitis”
- EHV 1
- Affects the spinal cord
- EHV 1 can spread from cell to cell, thereby “hiding” from circulating antibodies
- Virus may infect WBC’s that are called into the CNS to fight disease!
- Like other herpes virus, EHV like to live in nerve tissue (Ex: Shingles in people)
- No sex or breed predilection
- More common in adult horses
- Often no history of respiratory disease

Clinical Signs of Neurologic EHV

- Disease may or may not be preceded by mild respiratory disease and fever
- Rear limb ataxia and weakness
 - Rapid onset
 - Horse is usually “BAR”
- Extended penis
- Relaxed tail and anal tone
- Atonic Bladder
 - Drip urine
 - Secondary urinary tract disease
- Bottom Line: Rear End of the Horse is affected

Prevention of Neurologic EHV

- Vaccination is of limited help
 - There is a natural barrier that keeps many circulating antibodies outside of the CNS
 - Virus hides inside nerve cells
- If the disease is actually immune-mediated (and this is open for debate), vaccinating during an outbreak may actually be harmful as it could create more antibodies to attack nerve cells infected with surface virus.
- Best Bet:
 - Vaccinate as with respiratory disease, but not in an outbreak
 - Keep reservoirs of virus away from the rest of the horse population (i.e., separate the young stock)

Reproductive EHV

- “Rhinopneumonitis”
- EHV 1
- May or may not be preceded by respiratory disease
- Virus attacks the endometrium (lining of the uterus) and fetal tissue
- Abortion in late term (7-11 months)
- Infection may precede abortion by a significant time period
- Mares generally do not make an udder or give other warning signs

Reproductive EHV

- Abortion may be sporadic, but generally come as an “Abortion Storm”
- Foals born alive have a poor prognosis
 - Severe respiratory and liver disease
- Mare often retains her placenta (must be treated)
- Fetus, placenta and birth fluids are LOADED with infective virus....isolate them
- Luckily, the virus does not survive long outside the body

Reproductive EHV

- The mare usually recovers without any decrease in her subsequent fertility
- Young horses housed near pregnant mares are often the source of the infection
- *Keep Them Separated*
- Vaccination does not guarantee absence of disease, but may help
- A booster may be given in the face of an outbreak

EHV Vaccination

- Killed and Modified Live Vaccines are available
- Only one product is labeled for the prevention of abortion, but the others probably have similar effectiveness
- Vaccine may not be protective for the neurological form
- Often combined with Influenza vaccine
- IN formulation of a combo vaccine is available
- One brand gives more severe local reactions that would not be acceptable in performance horses

EHV Vaccination

Respiratory Disease

- May not be needed for older isolated horses, BUT they become naïve
- Adults
 - IM initial and booster
 - IN single dose from the start
- Performance horses
 - IN every 6 months
 - IM every 3-6 months

Reproductive Disease

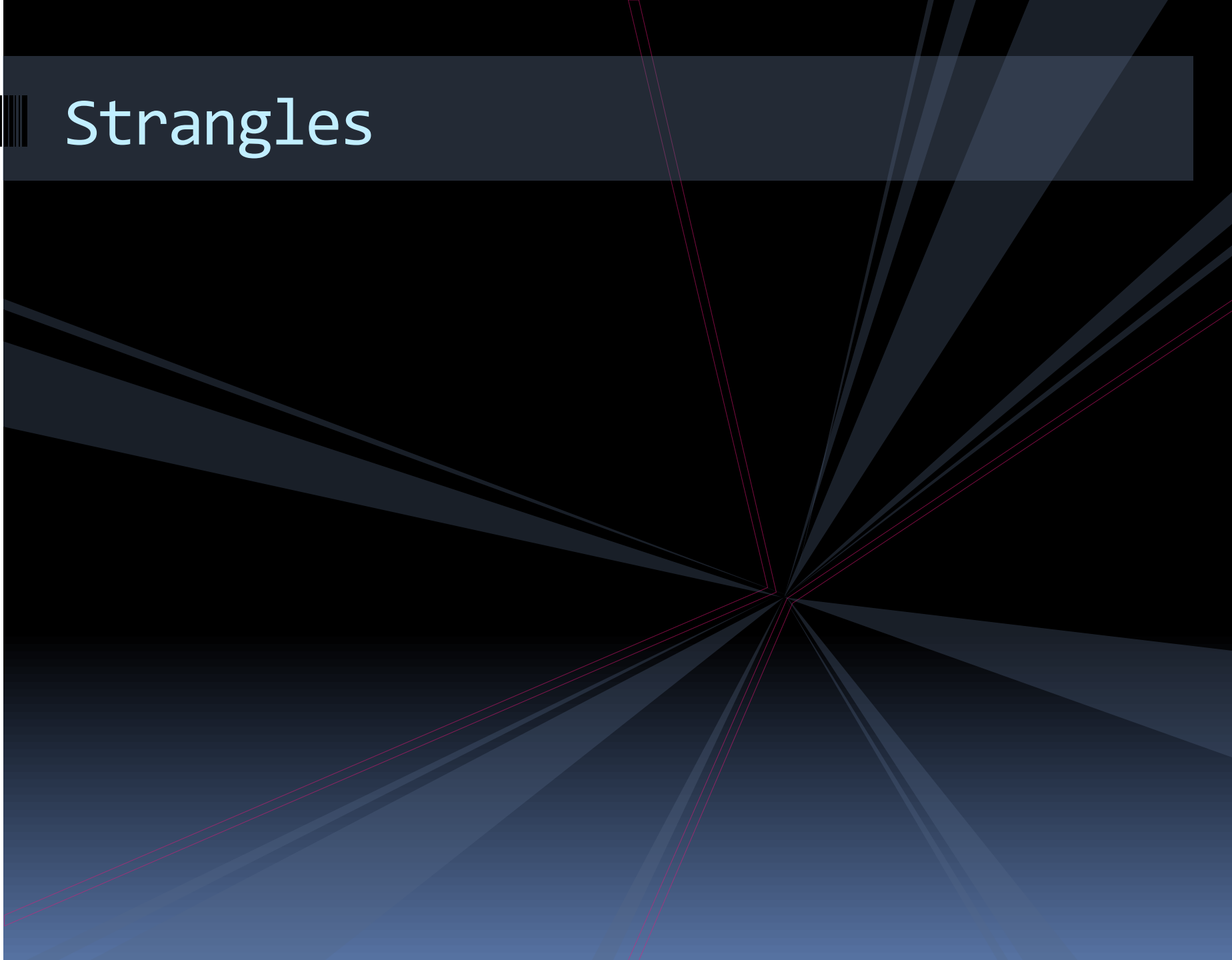
- Broodmares should be vaccinated at (3), 5, 7 and 9 months of gestation

Foals

- IM at 4-6, 5-7, and 6-8 months of age
- Young horses in training may be vaccinated more frequently



Strangles



Strangles

- Bacterial infection of the upper respiratory tract and lymph nodes
- *Streptococcus equi*
- The disease is spread when a horse inhales or ingests discharge from another horse
- Bacteria can survive outside the horse and be spread by people or equipment contaminated with the bacteria can introduce it to other horses.

Clinical Signs of Strangles

- Any breed, age, sex
- More common in 1-5 year olds
- Depression
- Fever (less than flu)
- Off Feed
- Nasal Discharge
 - Purulent
- Cough
- Lymph node enlargement
 - Submandibular
 - Retropharyngeal
- Lymph nodes may rupture and drain infectious fluid
- Difficulty breathing
- Difficulty swallowing
- Extended head and neck
- *Bastard Strangles!*

Purpura Hemorrhagica

- The strangles bacteria has a very distinctive “footprint” that it can leave on other cells in the body
- If the horse receives an IM booster for strangles it can mount an immune response to that footprint, destroying the cells it is found on as well (auto-immune disease)
- The IN vaccine does not seem to carry the same risk
- **DO NOT VACCINATE WITH THE IM VACCINE IN THE FACE OF AN OUTBREAK!!!!**
- Treatment consists of antibiotics in high doses and corticosteroids to reduce the inflammatory response
- Prognosis is guarded to poor

Preventing Strangles

- Isolate all new arrivals for 2 weeks before letting them into your herd
- Do not buy horses from known Strangles facilities
- Select shippers based on cleanliness
- Vaccinate if you are in an at risk position
 - High traffic
 - Endemic areas (broodmares, sales)
- The disease will “pop up” unexpectedly in the fanciest of barns due to a lack of vaccination

Preventing Strangles

- Do not use the older IM vaccine
 - Not very effective
 - Lots of local reactions
 - Purpura
- The IN vaccine is more effective and safer
 - This vaccine is modified live, and if injected inadvertently into a horse it will cause an abscess
 - Be careful about cross contamination (do it last)

Strangles Vaccination

- Adults should be vaccinated every 6-12 months depending on exposure risk
- Use the IN vaccine only (administration concerns)
- Naïve horse need a booster in 2-3 weeks
- Broodmares
 - Booster 4-6 weeks before foaling
- Foals
 - Vaccinate at 6-9 months followed in 3 weeks with a booster
 - On endemic farms foals are vaccinated from an earlier age and more frequently

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Potomac Horse Fever



- Acute, fulminating colitis of horses
- Causative Agent--*Neorickettsia risticii* (*N. risticii*)
- *N. risticii* spread to horses includes:
 - Fresh water snails
 - Fluke that infect the snails
 - Biting insects
- Risk Factors
 - Proximity to ponds
 - Time outside
 - Reduced insecticide use
 - Mid to late summer
 - Snails
 - Caddisflies

PHF Clinical Signs

- Mortality rates of >30% are common
 - Laminitis
- Biphasic Fever (70%)
- Depression (90%)
- Anorexia (80%)
- Diarrhea (<60%)
 - Mild to profuse
- Ileus (70%)
- Colic (30%)
- Dehydration (70%+)
- Laminitis (20-25%)
- Abortions (rare)

PHF Prevention

- Keep away from fresh water ponds
- Vaccination
 - Vaccine has limited value
 - May lower the incidence and severity of the disease
 - Give in late spring to maximize effectiveness
- Foals at 5 and 6 months of age
- Broodmares 1 month before foaling
- Adults need 2 shot initially, followed by an annual booster
- May booster in late summer

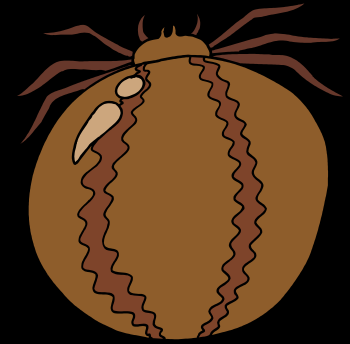


Lyme Disease



Lyme Disease

- Caused by the spirochete *Borrelia burgdorferi*
- Tick-borne
 - Ixodes ticks
- Disease in man, horses, dogs and cats
- Regional
 - Depends on the number of infected ticks
 - Depends on the exposure to ticks



Signs of Lyme Disease

- “Sore Horse”
- ADR “Ain’t Doin’ Right”
- Shifting leg Lameness
 - Joint pain
- Behavior change
 - Sullen, grumpy, lethargic
 - Unwilling to work, ears back, wring tail
- +/- Fever
- +/- Limb edema
- Laminitis (possible)
- Anterior Uveitis
- Neurological signs
 - Rare
- Multi-organ involvement
 - Kidney, liver, brain
- Transplacental spread is possible

Testing for Lyme Disease

- Blood Testing is offered, but the tests are difficult to interpret.
- Standards for horses and other animals are not the same
- Recovered horses will maintain a high titer for months.
- Recovery may be best based on improvement, not reduced titers



Preventing Lyme Disease

- Clear Brush Piles
- Mow Pastures
- Topical Permethrins
 - Absorbed into fat tissue and lasts 2 weeks
 - Use judiciously on older and thin horses
 - Sprays on legs, lower neck and jawlines
- Vaccine—Not one available that is licensed to use in the horse

