

Deciding When to Use “Risk-Based” Vaccines

Vaccination is one of the most practical and cost-effective means for reducing infectious disease incidence in horses. There are dozens of equine vaccines made by various pharmaceutical companies and for a variety of equine diseases. Vaccine types and availability change frequently. These factors and many others make the question of how to vaccinate horses a confusing one. One might be tempted to just vaccinate for every disease, but vaccination does have a cost which must be balanced with predicted benefit. How should a horse owner or manager decide which vaccines to give their horses, and on what schedule?

In the case of the four “core vaccines” recommended by the AAEP, the decision is easy. All horses in North America should receive the vaccine once annually, in the spring. Deciding whether or not to use the other, so called “risk-based vaccines” is not as easy. The decisions should be based on a balance between the benefits and costs of vaccinating for that particular disease, versus the risk in not vaccinating. This balance depends upon a host of factors specific to your region, your horses, the vaccine in question, and your management. Your veterinarian is the one equipped to help you determine the factors to consider in your specific situation, and to formulate an effective and reasonable vaccination plan for all your horses.

FUNDAMENTALS

Infectious disease in horses is caused mostly by bacterial and viral organisms. These organisms, called “infectious agents” are transmitted to horses in many different ways, specific to the agent. Examples of modes of transmission for an agent include direct contact between horses, transmission by biting flies, contact with contaminated equipment, and many others.

Whether or not a horse becomes infected in a given situation depends on a balance of several factors including the horse's susceptibility to the disease, the characteristics of the infectious agent, and the dose that it receives of the infecting organism. Vaccination causes the body to produce antibodies against a specific infectious agent. Antibodies are proteins, which bind directly to the agent and help the body rid itself of it. Vaccination is an effective and convenient way to boost immunity against a specific agent. That said, prevention of infectious disease involves far more than just vaccination. It involves keeping horses in excellent general health and reducing exposure to infectious disease agents.

THE AAEP'S "CORE" VACCINES

The American Association of Equine Practitioners (AAEP) regularly publishes updated equine vaccination guidelines for use by horse owners and veterinarians. The AAEP's "Core Vaccines" are recommended for every horse in North America.

Vaccines selected as "core" possess one or more of the following attributes:

- They should protect from diseases with potential public health significance. (The disease has potential to infect humans or other animals.)
- They should protect from diseases that are established in a region.
- They are required by law.
- They should protect against diseases which are virulent/highly infectious and/or pose a risk of severe disease.

The core vaccines must also have proven effectiveness. The AAEP Vaccination Guidelines refer to core vaccines as "having clearly demonstrated effectiveness and safety, and thus exhibiting a high enough level of patient benefit and low enough level of risk to justify their use in the majority of patients." The core vaccines on this list currently include West Nile Virus, Eastern and Western Equine Encephalitis,

Tetanus and more recently, Rabies.²

“RISK-BASED” VACCINES

Risk-Based Vaccines are those recommended in specific circumstances, when the risk of acquiring the disease in question is great enough that it exceeds any disadvantage of using the vaccine. The use of risk-based vaccinations may vary regionally, from population to population within an area, or between individual horses within a given population.² The choice for when to use these vaccines should be made jointly, by you and your local veterinarian. Your veterinarian knows the status of regional diseases of concern. They know about new vaccines and pertinent state and federal regulations. When provided with information about the history, management, and goals for each of your horses, they can help you formulate a customized vaccination plan.

So why not just vaccinate every horse with every vaccine? Vaccines are usually not very expensive, but cost can still be a factor for many of today's horse owners, especially those with larger numbers of horses to vaccinate. In addition, and however small the risk, there is always a possibility of adverse vaccination reaction. The risk may increase as more vaccines are used simultaneously. While most of these reactions are minor, they occasionally can be life threatening.

For the purposes of this article, the Risk-Based Vaccines include vaccines for Strangles, Influenza EHV-4/1, Potomac Horse Fever, Rotavirus, Botulism, and Anthrax.

STRANGLES

Strangles is a respiratory disease caused by an abscess forming bacteria, *Streptococcus equi*. The classic sign of strangles is abscess formation behind and under the jaw. The name “Strangles” comes from these large swellings around the throat, which rarely are severe enough to cause difficulty in swallowing and breathing. Affected horses are often depressed

and lose their appetites. The disease classically starts with throat or under-jaw swelling, nasal discharge, fever and cough. The swellings abscess, and ultimately break open and drain yellow pus. Strangles is common and is highly contagious to at-risk horses. It is easily transmitted by contact with nasal secretions and abscess drainage containing the organism. Infectious material can be transmitted on the hands of handlers, on shared tack and equipment, and through shared water sources.

Vaccination has proven difficult for this disease. The problems with all of the Strangles vaccines have been relatively high adverse reaction rates and limited effectiveness. The most commonly used vaccine is a modified-live intranasal vaccine. It is considered a somewhat effective vaccine but has been faulted for having a higher-than-acceptable adverse reaction rate. It can actually cause a form of strangles in a very small percentage of vaccinated horses. The vaccine can be inoculated into the tissues at other vaccination sites, where it can cause abscess formation. It can cause other side effects as well.

Strangles immunization is usually recommended when the risk of infection outweighs the risk of side effects from the vaccine. A critical part of reducing strangles incidence is taking steps to reduce exposure of horses to the organism. Recommended management includes quarantine of any new horse before introduction into a group, and immediate quarantine of any horses showing signs of the disease.

INFLUENZA

Influenza virus is common in horses. Typical clinical signs include high fever, cough and nasal discharge. This virus is highly contagious and spreads rapidly, expelled by coughing horses and able to infect other horses up to 30 feet away. As with all influenza viruses, the equine influenza virus is constantly changing its form, making it difficult to make a vaccine which contains the most current version of the virus.

Horses in contact with others (show and performance horses and horses boarded at stables) are at greater risk for the disease. The usual recommendation is to vaccinate these horses at least twice annually. Vaccination may not be needed for isolated horses. A common recommendation is to vaccinate for this disease using one of several recently developed vaccines which cover the more current virus strains.^{1,2} The intranasal vaccine has shown good effectiveness and is very safe but several of the newer intramuscular vaccines are also considered effective.^{1,2}

BOTULISM

Botulism is a disease caused by potent toxins produced by the soil-living bacteria, *Clostridium botulinum*. In horses, this disease takes several forms, involving different types of toxins; most commonly toxin types B and C. Botulinum toxins block transmission of nerve impulses, resulting in signs of weakness progressing toward complete paralysis and death. There are several syndromes seen in horses which have very different origins. The toxin can be created in the digestive tract of foals that have ingested the organism, be liberated into the bloodstream from wounds where the organism has grown, and be ingested by horses in fermented feed or feed containing animal carcasses.¹

The only approved Botulism vaccine is against the Type B toxin. Type B is associated with the Shaker Foal Syndrome, seen relatively commonly in foals in Kentucky and in the mid-Atlantic states. It makes sense to use this vaccine in this geographic region and otherwise as directed by your veterinarian.

There are no licensed vaccines available for preventing botulism due to *Cl. botulinum* type C or the other toxin types.^{1,2} The Type B Vaccine does not protect against Type C disease. Thus, routine vaccination against *Clostridium botulinum* type C is not currently practiced.²

EQUINE HERPES VIRUS (EHV-4/1)

Also known as rhino or rhinopneumonitis, these are several related viruses that can cause respiratory, neurologic signs, or abortion in horses. The most common of these are EHV-1 and EHV-4. In their chapter on infectious disease in the 4th edition of Smith's Large Animal Internal Medicine, Drs. David Wilson and Nicola Pusterla state: "EHV-1 and EHV-4 are spread by direct and indirect (fomite) contact with nasal secretions, by aerosolized secretions from infected coughing horses, and, in the case of EHV-1, by aborted fetuses, fetal fluids and placentae associated with abortions." One unique characteristic of the EHV's is that they can lay dormant and undetected in infected horses and then can cause signs of disease when immunity decreases due to stress or other factors.^{1,2} This makes control a challenge and explains how the disease can crop up in closed herds of horses.²

Vaccination against EHV's has historically been problematic. In general, vaccination does not prevent infection but may reduce signs of disease and shedding of virus. Certain EHV-4/1 vaccines are considered helpful at reducing signs of respiratory disease.² These should be given at least twice annually to all horses that will be in contact with others, especially show horses and those that travel intensively. Unfortunately, vaccination does not prevent the neurologic form of EHV-1. It may, however, reduce the spread of EHV-1 generally by reducing shedding of the virus by infected horses, thus reducing overall neurologic disease incidence in a group of horses.² Pregnant mares should be vaccinated as directed with a vaccine licensed to protect against the abortive form of the disease. Wilson and Pusterla state that "mares should be vaccinated during the 5th, 7th and 9th months of gestation, although some vets also recommend a dose during the third month." Reduced shedding and spread is enough reason to vaccinate horses against the EHV's, even if direct protection against the signs of disease is questionable. The benefit of giving equine herpes vaccine is generally less for older and more isolated horses. 2

EQUINE VIRAL ARTERITIS (EVA)

This is a viral respiratory disease caused by the Equine Arteritis Virus (EAV). It is transmitted either through breeding or transmission from coughing horses. Importantly, this virus is commonly spread in cooled and even frozen equine semen. While typically not life-threatening to otherwise healthy adult horses, EAV can cause abortion in pregnant mares and rarely death in young foals. It causes a long-term carrier state in breeding stallions in which they show no signs of disease but harbor the virus and transmit it in their semen.²

Signs of active disease are similar to other respiratory viruses, so diagnosis requires laboratory confirmation.

The indications for vaccination against EVA have been:

- To protect stallions against infection and subsequent development of the carrier state.
- To protect mares before they are bred with EAV-infective semen.
- To prevent outbreaks in non-breeding populations of horses.

Using available laboratory methods, it is not possible to differentiate vaccine induced antibodies from those due to natural infection. Thus, vaccination can confuse testing and cause a vaccinated horse to be treated from a regulatory standpoint as though it is infected.^{1,2}

Commercial breeders should familiarize themselves with this disease and their state regulations related to it. In planning a vaccination program against EVA, it is important to consult with state and/or federal animal health officials to ensure that the proposed program is in compliance with the state's control program for EVA, if one exists. ²

ROTAVIRAL DIARRHEA

Equine Rotavirus is a major contagious cause of foal diarrhea and has been documented to cause 50% or more of foal diarrhea cases in some areas.² Mortality usually is low but many

foals can be affected on a premise. Rotavirus is transmitted when foals ingest feces containing the organism.^{1,2} For this reason, strict quarantine of diarrheic foals is important to prevent spread to healthy foals.

Vaccination of pregnant mares several times during pregnancy results in an increase in antibodies to the virus in colostrum (first milk). This immunity is passed on to the foal when it nurses, helping to prevent the disease.² Field trials have demonstrated immunity in foals from vaccinated mares. There is probably less benefit in vaccinating the young foal itself.²

This vaccine is recommended on breeding farms, especially in regions where the disease is more common, and those that have had prior outbreaks of the disease.^{1,2}

POTOMAC HORSE FEVER

The organism that causes Potomac Horse Fever (Equine Monocytic Ehrlichiosis) is called *Neorickettsia risticii*. The disease manifests in horses as life-threatening diarrhea. PHF is more common in specific geographic areas, although it has now been diagnosed in many states and some foreign countries.² Wilson and Pusterla state: "PHF is seasonal, occurring between late spring and early fall in temperate areas, with most cases in July, August and September at the onset of hot weather." The agent is associated with water, and relies on a complex life cycle involving snails and aquatic insects. There is disagreement in the veterinary literature about the effectiveness of the available vaccines.^{1,2} A reasonable approach is to vaccinate in geographic areas where the risk is higher. The vaccine is considered fairly safe, and given frequently (4-6 month intervals), might help protect against disease.²

ANTHRAX

Anthrax is a rapidly fatal blood disease caused by the organism *Bacillus anthracis*. Anthrax is typically only found in certain geographic areas with moist alkaline soil, which

favours the organism. The vaccine is thought to be effective but can cause mild to severe vaccination reaction.² Because of this, the vaccine is recommended only in the regions where risk of infection outweighs the risk of vaccination.^{1,2}

CONCLUSION

There is detailed information available on the web today concerning the science behind the mentioned diseases and the “risk based vaccines” that protect against them. There are many conflicting opinions, and even conflicting scientific research. While it is a good thing for horse owners to educate themselves about equine health topics, the factors involved here are complicated and can be confusing. This is a prime example of an equine health question that is best discussed with your own veterinarian, who is trained to interpret the scientific research and apply that interpretation to your individual horses and your specific needs.

REFERENCES

1. Wilson WD, Pusterla N. Equine Vaccination and Infectious Disease Control, in Smith, B.P., ed, Large Animal Internal Medicine, 4th edition, pp. 1557-1587, 2009.
2. AAEP Vaccination Guidelines for Risk-Based Vaccines.
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