Vaccinations and the Diseases They Protect Against...

As spring approaches it is time once again to think about preparing our horses for the upcoming events, whether that is breeding or foaling, dressage or western, driving or trail riding or simply hanging out. Spring is the time when a re-evaluation of your vaccination protocol might be in order. Have you ever wondered why your horse is vaccinated for some diseases and not others? Have you ever questioned what exactly your horse is being vaccinated for? Have you ever thought about the diseases that vaccines are meant to protect against? Maybe you are wondering if it is worth the risk of giving the vaccine? Let us take a look at vaccinations and the diseases that we are vaccinating against.

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First off it is very important to realize that a standard vaccination protocol does not exist that fits every horse, each horse or situation is unique. Establishing a good client-veterinary relationship will open the lines of communication and you and your veterinarian can establish a vaccination protocol that protects your horse against the diseases they are most likely to encounter. The American Association of Equine Practitioners (AAEP) website has comprehensive vaccination guidelines broken down for foals/weanling, yearlings, performance horses, pleasure horses, adult horses and broodmares, as well as guidelines for horses with no prior vaccination history.

When deciding which vaccinations to give it is important to take into consideration multiple factors. The first factor is the actual risk of disease that can be influenced by environmental factors, anticipated exposure, age, breed, use and sex of the horse. Geographical location is another consideration when evaluating the risk of disease. Many diseases are only found in certain geographical locations, or have a higher incidence in a particular area, and different vaccinations may be required based upon where you reside and where you will be traveling too. The second factor to consider is evaluation of the consequences of the disease itself. What is the morbidity (rate of sickness), mortality (death rate), and zoonotic (spread to human) potential? A third factor to keep in mind is the anticipated effectiveness of the product and the cost of immunization when compared to the potential cost of the disease. The final factor to consider is the potential adverse reactions to a vaccination.

Adverse reactions don't happen very frequently but they are certainly something that each horse should be monitored for after any vaccination. The most common reaction is localized swelling and heat at the injection site, which can result in a horse not wanting to turn their neck or bend down to eat. Less commonly a horse will break out in hives, display signs of colic, generalized stiffness, fever or lethargy. A severe allergic reaction resulting in anaphylactic shock is extremely rare, but can occur. Signs of anaphylactic shock are anxiousness or agitation, rapid but weak pulse with shallow breathing, sweating profusely, confusion, loss of consciousness and possible death. Purpura Hemorrhagica is a non-contagious syndrome caused by immune-mediated, generalized vasculitis (inflammation of the blood vessels). Purpura typically presents 2-4 weeks following exposure to streptococcal antigens, either from natural exposure or as a consequence of the strangles vaccination. The most characteristic sign of Purpura is swelling of the limbs due to the accumulation of fluid (edema). This condition can be easily identified; when pressure is applied to the edema there is a persistent indentation that remains after the pressure is removed, "pitting edema". There can also be petechial hemorrhage (small blood spots) present on the abdomen and head, as well as, possible sloughing of the skin that is affected. Immediate medical attention should be sought if an anaphylactic reaction occurs or if you suspect your horse has pupura hemmorrhagica.

Horses that have had a history of adverse vaccination reactions

will often be given non-steroidal anti-inflammatory drugs (NSAIDs), such as phenylbutazone or banamine, prior to vaccination. In a recent study published in the 2013 AAEP proceedings researchers concluded, "NSAID administration caused a significant decrease in immune response to influenza vaccine in both previously exposed and naïve horses. Thus concurrent administration of NSAIDs when vaccinating can negatively impact a horse's immune response to the vaccine." Therefore, care should be taken when NSAIDS are administered at time of vaccination, as management steps may be needed to decrease these horse's exposure to infectious diseases. Because these same horses may not potentially have mounted an adequate immune response, it may be necessary to vaccinate more frequently.

The AAEP has categorized vaccinations into core versus risk based vaccines. Core vaccines, as stated by the AAEP, "are vaccinations that protect against disease that are endemic to a region, are virulent/highly contagious, pose a risk of severe disease, those having potential public health significance, and/or are required by law. Core vaccines have clearly demonstrable efficacy and safety, with a high enough level of patient benefit and low enough level of risk to justify their use in all equids." Core vaccinations recommended by the AAEP include: Tetanus, Eastern equine encephalomyelitis (EEE), Western equine encephalomyelitis (WEE), West Nile Virus (WNV), and Rabies.

Tetanus. Clostrididium tetani produces a neurotoxin that causes the clinical symptoms of Tetanus. Clostridium tetani can be found in the intestinal tract and the feces of horses, other animals and human beings, as well as in the soil. Horses become infected through puncture wounds of the muscle or the hoof, open lacerations, surgical incisions and exposed tissue (such as the umbilicus in foals). Typical clinical symptoms are a prolapsed third eyelid, lockjaw, painful muscle tightening, and the characteristic saw horse stance. Tetanus is often a fatal disease. A tetanus antitoxin is available for horses exposed to the neurotoxin without prior vaccinations. Initially a two dose series of the tetanus vaccine is administered (3-6 weeks apart) followed by yearly boosters.

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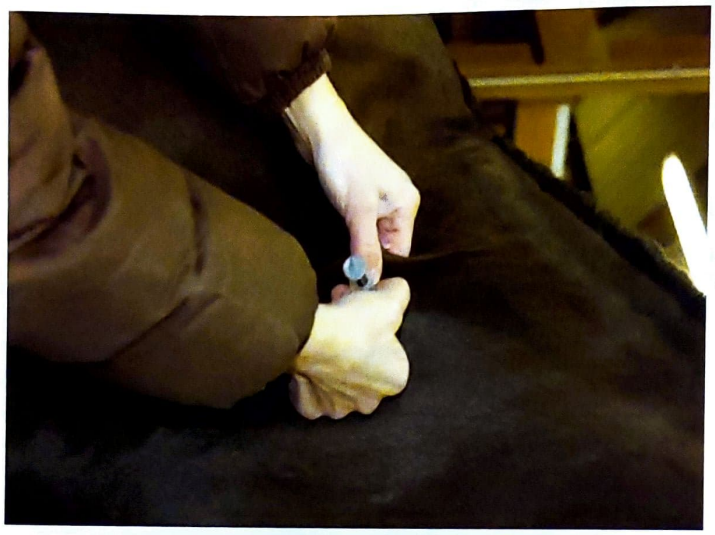
Equine Encephalomyelitis (sleeping sickness). The virus that causes encephalomyelitis is transmitted from birds and rodents to horses or humans via the mosquito. As the name suggests, Eastern Equine Encephalomyelitis (EEE) has historically been restricted to the eastern, southeastern and southern states. EEE caries the highest mortality rate of 90%. Western Equine Encephalomyelitis (WEE) on the other hand has a tendency for the western statists and carries a lower mortality rate of 50%. WEE has caused minimal disease in horses in the last two decades; however, the virus continues to be detected in mosquitoes and birds throughout the Western states. Clinical presentation includes fever with nervous system signs, such as sensitivity to sound, periods of excitement, restlessness, and nervousness. Brain lesions result in drowsiness, depression, head pressing, circling, and uncoordinated gate. Unfortunately paralysis and death often follow. The initial vaccination is a two dose series (3-6 weeks apart) followed by annual boosters.

West Nile Virus. West Nile Virus (WNV) was first recognized in the western hemisphere in September 1999, and by 2002, over 15,000 horses were diagnosed with West Nile Virus in 41 states. Due to good vaccination practices there were only 338 cases reported in 2013. WNV is a flavivirus that lives in birds. It is transmitted when a mosquito feeds on an infected bird; it then becomes infected, feeds on a horse and succeeds in transmitting the WVN to the horse. In horses infected with WNV, the virus may breach the blood-brain barrier and damage the brain and spinal cord. While the clinical signs of WNV encephalomyelitis can vary in range and severity some more common signs include: mid-low grade fever, lack of appetite, lethargy, and neurologic symptoms such as ataxia, hyper excitable periods, muscle twitches, facial nerve paralysis, hind limb paralysis, recumbency, coma, and death. The incidence of disease tends to be greater in older horses, where a favorable clinical outcome is less likely. There are several types of WNV vaccinations currently available. Vaccination is a two dose initial series followed by annual revaccination.

Rabies. Although rabies occurs infrequently in the horse, the disease is invariably fatal and has considerable public health

significance. Based on geographical location the reservoir for the rhabdovirus differs, including skunks, raccoons, foxes and bats. Often times the bite to a horse occurs on the muzzle, face or legs. The virus migrates via nerves to the brain causing rapidly progressive, invariably fatal encephalitis. Three vaccines are licensed for rabies prophylaxis in horses. Vaccination is a single dose with annual revaccination.

Risk based vaccinations, as stated by the AAEP, "are selected based on risk assessment preformed by, or in consultation with a licensed veterinarian. Use of these vaccinations may vary between individuals, population, and/or geographical regions." Risk based vaccinations include: Anthrax, botulism, Equine Herpesvirus (EHV), Equine Viral Arteritis (EVA), Influenza, Potomac Horse Fever (PHF), Rotavirus, and Strangles.



Anthrax. Anthrax is a serious and rapidly fatal septicemic disease caused by proliferation and spread of the vegetative form of Bacillus anthracis in the body. Anthrax is acquired through ingestion or contamination of wounds by soil-borne spores of the organism and is encountered only in limited geographic areas where alkaline soil conditions favor survival of the organism. There is no vaccination labeled for horses, however the cattle vaccine can be used with a two dose series followed by annual revaccination.

Botulism. There are three forms of botulisum: toxicoinfectious botulism or "shaker foal syndrome", "forage poisoning", and wound botulism. Potent toxins are produced by the soil-borne, spore-forming bacteria, Clostridium botulinum. Forage poisoning results from ingestion of the toxin form decaying plant material or animal carcasses. Clinical symptoms are a result of the toxins action on nerves that control motor function, resulting in weakness, progressing to paralysis, inability to swallow, and frequently death. Commercial vaccines are not available against all types of botulism. Pregnant mares can be vaccinated against one form, clostridium botulism type B for the "shaker foal syndrome". Mares can be vaccinated during gestation with a series of three doses administered 4 weeks apart, so that the last dose is given 4-6 weeks before foaling.

Equine Herpesvirus (EHV). (Rhinopneumonitis) EHV-1 and EHV-4 can both cause respiratory disease varying in severity from mild to severe and is characterized by fever, lethargy, anorexia, nasal discharge, and cough. Infection of the respiratory tract with EHV-1 and EHV-4 is most common in weanling, yearlings and horses entering training. EHV-1 causes abortion of virus-infected fetuses from infected mares, the birth of weak nonviable foals or a paralytic neurologic disease (myeloencephalopathy) secondary to vasculitis of the spinal cord and brain. The Herpes virus is spread by aerosolized secretions from coughing/sneezing horses, by indirect or direct contact with nasal secretions, and, in the case of EHV-1 from aborted fetus, fluid or placenta. Like herpes viruses in other species, these viruses can lie latent in the majority of horses resulting in no clinical signs yet shedding of the virus can occur in times of stress. Most mature horses do not demonstrate serious clinical respiratory disease but may serve as source for exposure to susceptible horses. Horses are not protected against the abortigentic or neurologic forms of the disease, even after repeated exposure. It is recommended that pregnant mares be vaccinated during the fifth, seventh and ninth month of gestation with a licensed inactivated EHV-1 vaccine. Annual vaccination is recommended for adult horses for protection against the respiratory disease, however a 6-month re vaccination interval might be considered for high risk horses.

The neurologic form of EHV-1 has been seen with increasing frequency over the years. Researchers have identified a genetic mutation within a single EHV-1 gene that is associated with strains that cause neurologic disease. While it is still unclear how this mutation causes the virus to have increased affinity for nervous tissue, further research is ongoing to determine this affect. Unfortunately, to date there is not a vaccination available to prevent the neurologic form of EHV-1. However, Lara Maxwell, DVM, PhD, Dipl.ACVCP presented at the 2013 AAEP convention the results of a recent research project where they found "One EHV-1 vaccine could have at least some protective properties against the neurologic form of the virus." Although this research is very encouraging the study was only done with a small number of horses. Currently there is more research being done in an attempt to recreate these finding using a larger number of horses.

Equine viral arteritis (EVA). EVA is of special concern because it can cause abortion in pregnant mares, death of young foals and has the potential to establish a carrier state in stallions. Clinical signs are very similar to several other diseases, making it difficult to diagnosis during outbreaks. Aerosolized droplets from respiratory secretions containing the virus during acute clinical disease serves to transmit the disease, but of greater concern is the transmission of the virus to mares from sub-clinically infected stallion during

breeding (natural or AI). EVA has international significance. There are two vaccinations currently available for EVA. Prior to vaccination horses must be tested to confirm that they are seronegative (they have not developed antibodies against EVA). A horse with EVA and a horse that has been vaccinated for EVA will both test seropositive. It is imperative to carefully document the vaccination of horses with the EVA vaccine; this becomes especially important when talking about import/export of both live animals and semen.

Equine Influenza. One of the most common and endemic infectious diseases of the respiratory tract of horses. Equine influenza is caused by the orthomyxovirus equine influenz A type 2. Influenza is highly contagious and spreads rapidly through groups of horses via aerosolized droplets from coughing. It can also be spread by fomites, such as contaminated buckets, grooming supplies and feeding equipment. Young horses (1-5 years) and horses in large groups are most susceptible. Clinical signs of influenza include nasal discharge, fever, lethargy, cough and anorexia. There are currently three vaccinations available for the prevention of equine influenza and the initial dosing schedule will vary depending upon the vaccine form that is chosen. Revaccination is either annual or semi-annual depending upon exposure.

Potomac Horse Fever (PHF). PHF is caused by Ehrlichia risticii, the bacterium has been identified in flukes (flatworms) that develop in aquatic snails and are released into bodies of water. The life cycle is complicated, but it does not appear to be directly contagious and the disease is seasonal. Clinical signs vary greatly among horses but include, fever, lethargy, anorexia, diarrhea, colic, dehydration, laminitis, and often death. There is a vaccination available, however its efficacy has been questioned.

Rotavirus. Equine rotavirus is transmitted via fecal-oral contamination, and damages the tips of the villi in the small intestine resulting in cellular destruction, maldigestion, malabsorption and diarrhea in foals. A three doses series is administered to pregnant mares at 8,9 and 10 months of gestation.

Strangles. A highly contagious and dangerous bacterial disease, caused by the Streptococcus equi organism. Strangles is transmitted via direct or indirect contact. Strangles most classic clinical presentation is swelling and abscessing of the submandibular lymph nodes. Other clinical symptoms include, fever, anorexia, stridor, and large amounts of thick nasal discharge. As stated above there is the potential for Purpura Hemorragica associated with the vaccination; therefore, it is important to discuss the risks versus benefits of vaccine with your veterinarian. Strep equi vaccines are available in both an intramuscular and an intranasal form.

Vaccinations can come in multiple varieties and combinations. Often people will refer to a 3-way vaccine as having EEE, WEE and tetanus. A 4-way vaccination has the previous three as well as influenza. A 5-way vaccine typically contains EEE-WEE-tetanus-influenza and Rhinopneumonitis. There are several combination vaccinations that also include WNV. Kevin G.Hankins, DVM, MBA with Zoetis presented research at the 2013 AAEP conference suggesting that not all WNV vaccines render the same immune response. "Researchers found significant differences in horses' immune responses when vaccinated (for WVN) with a combination vaccine versus one administered separately but at the same time as other vaccines." Although all the WNV vaccines elicited an immune response, giving the WNV vaccine separately to horses demonstrated higher levels of immune response.

It is important to maintain realistic expectations and to realize that vaccinations serve to minimize the risk of infection but will not prevent disease in all instances. When attempting to control infectious diseases, a program should be designed toward 1) enhancing resistance to the disease through vaccinations, 2) minimizing factors that decrease resistance, and 3) diminishing the exposure to infectious diseases in the horse's environment. The primary series of vaccines and boosters should be appropriately administered before likely exposure. Two to three weeks are required to produce adequate concentrations of antibodies and before booster vaccines can be protective.

I encourage you to contact your veterinarian to formulate an appropriate vaccination schedule and hope that everyone has a successful year with their equines. I am always available to address any questions you might have and send out a special thanks to the members of the health committee and to Kathy Fox, DVM of the Fenway Foundation for their assistance in writing this article.

Scientific Articles:

Zoll, WM, et al. "Effect of Non-Steroidal Anti-Inflammatory Treatment at the Time of Vaccination". AAEP Proceedings, vol. 59, 2013, p. 53.

Maxwell, et al. "Prevention of Equine Herpies Myeloencephalopathy by Vaccination, A Pilot Study." AAEP Proceedings, Vol 59, 1013, p.59.

Hankins, Kevin. "Serologic Responses of West Nile Virus Sero-Negative Mature Horses to West Nile Virus Vaccines." AAEP Proceedings, Vol 59, 2013, p. 509.