ARE YOUR HORSE'S VACCINATIONS UP TO DATE?

PHOTO BY L.J.M.

Review the recommendations of the experts and consult your veterinarian to make sure your horse is adequately protected against common equine diseases.

By Laurie Prinz

Vaccines are among our most potent weapons against disease. In fact, over the past 100 years, they have saved thousands of horses' lives and helped to render many terrible equine diseases exceedingly rare.

Vaccinations work by introducing weakened or killed microorganisms into the body to "train" the immune system to recognize and destroy the specific disease-causing pathogens. In the vast majority of cases, this process results in long-lasting immunity and nothing more. Occasionally, however, vaccination produces local swelling or soreness or, in the worst cases, an allergic

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response that is itself a threat to health.

So, when it comes to vaccines, more is not necessarily better. Ideally, a horse's vaccine regimen will be based on his age, occupation and social arrangements. For example, a backyard horse who doesn't have much contact with other animals has different requirements than does an elite athlete who travels the world.

The prevalence of particular diseases in a region is also an important consideration. If strangles is rarely seen in your area, your horse probably doesn't need to be inoculated against it. On the other hand, while horse owners in the westernmost states may once have felt that they need not worry about West Nile virus, the organism's rapid spread across the country has made it clear that virtually all U.S. horses run the risk of that infection.

Which raises a final point about equine vaccination regimens: They need to be periodically reevaluated and adjusted based on new threats, changes in local/regional conditions and any modifications that have occurred in a horse's activity level or surroundings.

True or False?

Test your knowledge

1. If your horse seems a little sluggish and has a fever, he may be coming down with influenza, so it's a good time to vaccinate him against the disease.

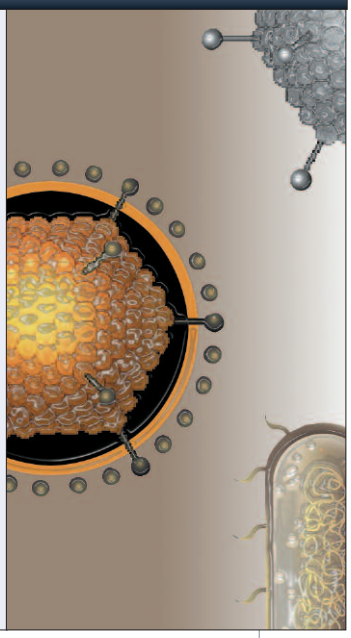
2. Even if your horse was vaccinated against tetanus nine months ago, he should receive a tetanus booster if he sustains a deep injury.

3. Modified-live virus vaccines confer stronger and longer-term immunity than do killed virus products.

4. Because a foal receives antibodies from his dam, a young horse doesn't need an influenza vaccination until he is 12 months old.

5. Although combined-vaccine products, which protect against more than one disease, are suspected to cause a higher number of adverse reactions in people, in horses this does not seem to be the case.

For the answers, turn to page 5



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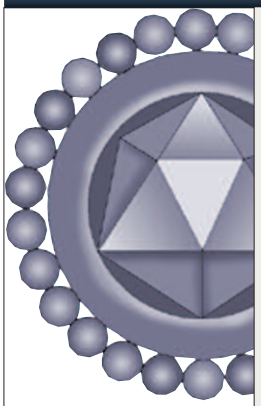
Techniques



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Modes of delivery

The vast majority of vaccines for horses are administered via *intramuscular injection,* which delivers the preparation directly into muscle tissue. This route places the vaccine in direct contact with the cells and capillaries where an immune response can be mounted, yet keeps the stress localized so that if there is an adverse reaction, it is more likely to be "contained," manifesting as localized swelling or potentially an abscess.

In contrast, *intravenous injections,* which deliver the vaccine straight into the bloodstream, where it is dispersed rapidly throughout the body, increase the risk of a huge, systemic adverse reaction. Some intravenous vaccines are available for human medicine, but none are used in horses.

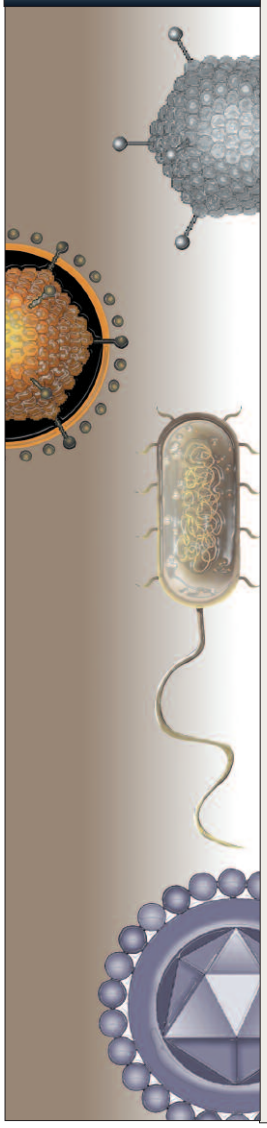
Intranasal vaccines are delivered via a spray into the horse's nostrils, where they induce a strong immune response on the surface of the lining of the respiratory tract—a tactic that can be useful against diseases that attack the body at that site, such as equine influenza and strangles.—*Laurie Bonner*

EXPERT ADVICE:

The American Association of Equine Practitioners has produced a suggested vaccination schedule for horses of varying ages and activity levels. However, the organization recommends that you consult with your veterinarian regarding the specific needs of your horse. (SEE NEXT PAGE)

Disease/ Vaccine	Foals/Weanlings	Yearlings	Performance Horses	Pleasure Horses	Broodmares	Comments
Botulism	Foal from vaccinated mare: 3-dose series of toxoid at 30-day intervals starting at 2 to 3 months of age Foal from nonvaccinated mare: see comments	Consult your veterinarian	Consult your veterinarian	Consult your veterinarian	Initial 3-dose series at 30-day intervals with last dose 4 to 6 weeks prepartum Annually thereafter, 4 to 6 weeks prepartum	Only in endemic areas. A third dose administered 4 to 6 weeks after the second dose may improve the response of foals to primary immunization. Foal from nonvaccinated mare may benefit from 1) toxoid at 2, 4 and 8 weeks of age; 2) transfusion of plasma from vaccinated horse; or 3) antitoxin. Efficacy needs further study.
Encephalomyelitis (EEE, WEE, VEE)	**EEE (in high-risk areas):** *First dose:* 3 to 4 months; *Second dose:* 4 to 5 months; *Third dose:* 5 to 6 months	Annual, spring	Annual, spring	Annual, spring	Annual, 4 to 6 weeks prepartum	In endemic areas booster EEE and WEE every 6 months; VEE only needed when threat of exposure; VEE may only be available as a combination vaccine with EEE and WEE.
	WEE, EEE (in low-risk areas) and VEE: From nonvaccinated mare: *First dose:* 3 to 4 months; *Second dose:* 4 to 5 months; *Third dose:* 5 to 6 months From vaccinated mare: *First dose:* 6 months; *Second dose:* 7 months; *Third dose:* 8 months	Annual, spring	Annual, spring	Annual, spring	Annual, 4 to 6 weeks prepartum	
Equine viral arteritis	Intact colts intended to be breeding stallions: One dose at 6 to 12 months of age	Annual for colts intended to be breeding stallions	Annual for colts intended to be breeding stallions	Annual for colts intended to be breeding stallions	Annual for seronegative open mares before breeding to carrier stallions; isolate mares for 21 days after breeding to carrier stallion	Annual for breeding stallions and teasers, 28 days before start of breeding season; virus may be shed in semen for up to 21 days. Vaccinated mares do not develop clinical signs even though they become transiently infected and may shed virus for a short time.
Influenza	**Inactivated injectable:** From nonvaccinated mare: *First dose:* 6 months; *Second dose:* 7 months; *Third dose:* 8 months; thereafter at 3-month intervals From vaccinated mare: *First dose:* 9 months; *Second dose:* 10 months; *Third dose:* 11 to 12 months; thereafter at 3-month intervals	Every 3 to 4 months	Every 3 to 4 months	Annual with added boosters prior to likely exposure	At least semiannual, with 1 booster 4 to 6 weeks prepartum	A series of at least 3 doses is recommended for primary immunization of foals. Not recommended for pregnant mares until data are available. Use inactivated vaccine for prepartum booster. If first dose is administered to foals less than 11 months of age, administer 2nd dose at or after 11 months of age.
	Intranasal modified-live virus: *First dose:* 11 months; has been safely administered to foals less than 11 months, see comments	Every 6 months	Every 6 months	Every 6 months	Annual, before breeding; see comments	
Potomac horse fever	*First dose:* 5 to 6 months; *Second dose:* 6 to 7 months	Semiannual	Semiannual	Semiannual	Semiannual, with 1 dose 4 to 6 weeks prepartum	Booster during May to June in endemic areas
Rabies	Foals born to nonvaccinated mares: *First dose:* 3 to 4 months; *Second dose:* 12 months Foals born to vaccinated mares: *First dose:* 6 months; *Second dose:* 7 months; *Third dose:* 12 months	Annual	Annual	Annual	Annual, before breeding	Vaccination recommended in endemic areas. Do not use modified-live virus vaccines in horses.
Rhinopneumonitis (EHV-1 and EHV-4)	*First dose:* 4 to 6 months; *Second dose:* 5 to 7 months; *Third dose:* 6 to 8 months; thereafter at 3-month intervals	Booster every 3 to 4 months up to annually	Booster every 3 to 4 months up to annually	Optional: Semiannual if elected	Fifth, seventh and ninth month of gestation (inactivated EHV-1 vaccine); optional dose at third month of gestation	Vaccination of mares before breeding and 4 to 6 weeks prepartum is suggested. Breeding stallions should be vaccinated before the breeding season and semiannually.
Rotavirus A	Little value to vaccinate foal because insufficient time to develop antibodies to protect during susceptible age.	Not applicable	Not applicable	Not applicable	Vaccinate mares at 8, 9 and 10 months of gestation, each pregnancy; passive transfer of colostral antibodies aids in prevention of rotaviral diarrhea in foals.	Check concentrations of immunoglobulins in foal to be assured that there is no failure of passive transfer.
Strangles	**Injectable:** *First dose:* 4 to 6 months; *Second dose:* 5 to 7 months; *Third dose:* 7 to 8 months (depending on the product used); *Fourth dose:* 12 months **Intranasal:** *First dose:* 6 to 9 months; *Second dose:* 3 weeks later	Semiannual	Optional: Semiannual if risk is high	Optional: Semiannual if risk is high	Semiannual with 1 dose of inactivated M-protein vaccine 4 to 6 weeks prepartum	Vaccines containing M-protein extract may be less reactive than whole-cell vaccines. Use when endemic conditions exist or risk is high. Foals as young as 6 weeks of age may safely receive the intranasal product. A third dose should be administered 2 to 4 weeks prior to weaning.
Tetanus toxoid	From nonvaccinated mare: *First dose:* 3 to 4 months; *Second dose:* 4 to 5 months From vaccinated mare: *First dose:* 6 months; *Second dose:* 7 months; *Third dose:* 8 to 9 months	Annual	Annual	Annual	Annual, 4 to 6 weeks prepartum	Booster at time of penetrating injury or surgery if last dose not administered within 6 months
West Nile virus	*First dose:* 3 to 4 months *Second dose:* 1 month later (plus 3rd dose at 6 months in endemic areas)	Annual booster, prior to expected risk. Vaccinate semiannually or more frequently (every 4 months), depending on risk.	Annual booster, prior to expected risk. Vaccinate semiannually or more frequently (every 4 months), depending on risk.	Annual booster, prior to expected risk. Vaccinate semiannually or more frequently (every 4 months), depending on risk.	Annual, 4 to 6 weeks prepartum	Annual booster is after primary series. In endemic areas, booster as required or warranted due to local conditions conducive to disease risk. Vaccinate semiannually or more frequently (every 4 months), depending on risk.

Prevention



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Disease threats

Fully licensed vaccines are available to protect horses against the following diseases:

• **botulism**—food poisoning caused by the toxin secreted by *Clostridium botulinum* bacteria, which can contaminate feed or water; characterized by paralysis, beginning with the muscles of swallowing; usually fatal.

• **equine viral encephalomyelitis**—contagious brain and spinal-cord inflammation caused by several species of alphaviruses in the *Togaviridae* family that are usually transmitted by mosquitoes. The disease is characterized by fever, erratic behavior and/or stupor and is almost always fatal. Eastern equine encephalomyelitis (EEE) and Western equine encephalomyelitis (WEE) are present in North America; Venezuelan equine encephalomyelitis (VEE) has not occurred in the United States for some time but outbreaks still occur in South America.

• **equine viral arteritis**—respiratory and venereal disease that can cause abortion.

• **influenza**—acute viral infection involving the respiratory tract. Influenza is marked by inflammation of the nasal mucosa, the pharynx, the conjunctiva, the lungs and sometimes the heart muscle.

• **Potomac horse fever** (monocytic ehrlichiosis)—disease caused by a rickettsial organism, *Ehrlichia risticii*. Named after the Potomac River Valley where it was first recognized in 1979, the disease is characterized by fever, diarrhea and laminitis.

• **rabies**—acute fatal infectious viral disease of the central nervous system.

• **rhinopneumonitis**—contagious disease caused by herpesviruses (EHV-1, EHV-4); characterized by fever, mild respiratory infection and, in mares, abortion.

• **Rotavirus A**—a type of virus that causes profuse diarrhea in foals younger than 3 months old. In addition to diarrhea, signs of rotavirus A infection include depression, failure to nurse and recumbency.

• **strangles** (distemper)—highly contagious infection of the lymph nodes, usually of the head, caused by *Streptococcus equi* bacteria. The abscesses may become so large as to obstruct the airway (hence the term "strangles") and may break internally, draining a thick, yellow pus through the nose, or externally, draining through a spontaneous or surgical opening in the skin.

• **tetanus**—rigid paralytic disease caused by the toxin of *Clostridium tetani,* an anaerobic bacterium that lives in soil and feces but can infect wounds.

• **West Nile virus**—a flavivirus transmitted by mosquitoes. West Nile virus can infect horses, humans, birds and other mammals. In horses, as in people, infection with the virus usually causes little or no illness. For reasons not yet determined, however, West Nile infection sometimes triggers swelling of the brain (encephalitis) that produces limb weakness, muscle fasciculation (twitching), incoordination, behavioral changes, paralysis and recumbency. In severe cases, West Nile encephalitis can lead to coma and death.

Review

Three "generations" of vaccines

First-generation vaccines. The earliest vaccines included whole organisms or toxins altered in some fundamental way to neutralize their ability to sicken the host.

• *Attenuated live microbes* are grown under laboratory conditions that diminish their disease-causing capabilities when reintroduced into their natural hosts during vaccination. Live vaccines are highly effective because they generate an immune response that closely resembles the body's response to a real infection. They are also the most risky, since live organisms mutate, and their full effects can be unpredictable.

• *Killed or inactivated microbes* can still confer immunity but cannot cause disease. However, the immune response these vaccines provoke can be relatively short-lived.

• *Inactivated toxins* are used to immunize animals against tetanus, botulism and other diseases in which the poisonous by-products of invading bacteria do the damage. Inoculation with attenuated forms of these toxins, rendered nontoxic by chemical processes, is highly effective in preparing the immune system to deal with a real-life exposure.

Second-generation vaccines. Using cutting-edge technology, researchers found new ways to make vaccines safer and more effective by further altering pathogen structures.

• *Subunit vaccines* are made with fragments of the pathogens—the pieces that will stimulate immunity while eliminating the harmful inflammatory responses roused by the whole organism.

(continued)

Review *(continued)*

• *Conjugate vaccines* are made by combining two organisms into one vaccine. Some pathogenic bacteria have outer layers that disguise themselves so that underdeveloped immune systems, such as in youngsters, cannot recognize them as foreign. In conjugate vaccines, proteins or toxins from a second type of organism, one the young immune system will recognize, are linked to the pathogen so that the lymphocytes will learn to respond to both disease agents.

Third-generation vaccines. Recent advances in genome sequencing and genetic engineering are giving scientists the tools to develop several types of highly specialized and tightly targeted vaccines.

• *DNA vaccines* are created by isolating the fragment of a pathogen's DNA that encodes for the production of its antigenic protein; when those alien DNA fragments are inserted into an animal's tissues, some cells will absorb them and begin generating the antigens, which in turn stimulate the production of antibodies. The immune response closely mimics natural exposure without any of the risks of using whole pathogens.

• *Recombinant vector vaccines* are similar to DNA vaccines, except that the pathogen's DNA fragment is inserted into a harmless viral or bacterial "carrier," which then delivers it into the cells of the body.

• *Edible vaccines* are created when plants are genetically modified to produce antigenic proteins in their edible parts; when consumed, they create an immune response. Research suggests that edible vaccines can induce immunity, but it will be many years before this method is ready for widespread use.

For more information, see "Vaccines Enter a New Era," EQUUS 292.

True or False?

Quiz answers

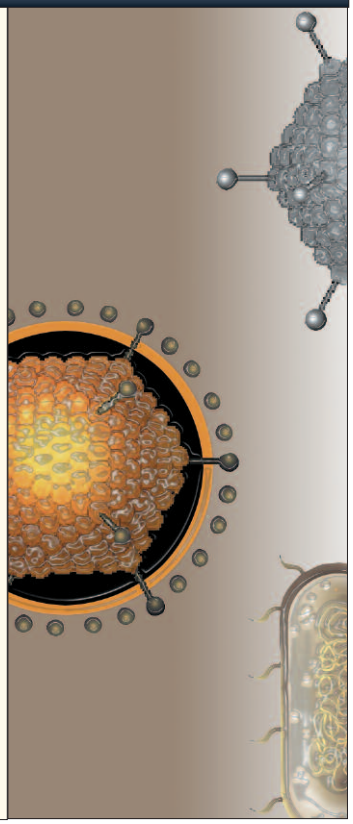
1. False. To achieve an optimal immune response to a vaccine, a horse must be healthy and not subjected to unusual stresses. Vaccinating a horse who is showing signs of becoming ill will at best have no effect on his immune status and at worst put him at increased risk of experiencing side effects.

2. True. Although the immunity conferred by modern tetanus vaccines is believed to last for years under normal conditions, the potential for the introduction of a high dose of tetanus organisms posed by a deep puncture or another significant wound makes it wise to administer a booster shot against this deadly disease.

3. True. Because modified-live virus vaccines stimulate both antibody response and cell-mediated response they tend to confer stronger and longer term immunity. Killed virus vaccines stimulate only antibody-based immunity.

4. False. For the first few months of life, a newborn foal is protected by antibodies he receives from his mother's colostrum. However, this immunity diminishes over time and is usually gone by the time a horse is a year old.

5. True. Testing and applications in the field over the past two decades indicate that commonly used combination products are effective in producing immunity but do not seem to carry an increased risk of side effects.



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