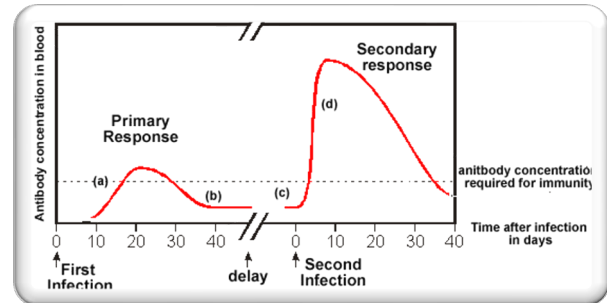


# VACCINES

## HOW VACCINES WORK

When a vaccine is given it stimulates the immune system to mount a response; it sends immune cells to the site of vaccination that carry the vaccine particles (antigens) back to the immune organs (bone marrow, spleen and lymph nodes). When these cells present the antigen to the organs, the body produces proteins (antibodies) to fight off those antigens. This is the exact same process that happens when the immune system is challenged with a disease of any sort. The way vaccines work is by providing a booster series (usually two doses separated by a certain amount of time and then at regular intervals), which “boosts” this initial response and creates a memory for those specific pathogens. That memory can last for varying amounts of times, but it allows the body to respond in a larger fashion and for a longer period of time. This is why animals that are vaccinated don’t get sick, or if they do, their duration of illness and their symptoms are decreased.



## WHO, WHAT, WHEN, WHY, WHERE AND HOW

### WHY

There are many reasons to vaccinate your horse. Sometimes it is enforced because of travel to an arena, competition or meeting of horses. Other times it is based on a requirement of the horse’s insurance company. The most important reason to vaccinate your horse though is the cost and potential risk of the vaccine is much less than that of contracting the disease. All of the core vaccines on our list have high fatality rates and unknown consequences if they are survived. The cost to attempt treatment on these diseases is 100-200x that of the vaccine.

### WHEN

Foals should start their vaccine series at approximately 4 months of age. If the vaccine status of your horse is unknown, it is preferential to treat it as an unvaccinated animal and perform the vaccine boosters as you would for a foal. Once an animal has received 2 vaccines 4 weeks apart (see individual vaccines for exact booster schedule) then an annual vaccine can occur. There are some situations where repeating the vaccines at a closer interval is ideal (times of high stress, contact with known diseased animals, high levels of exposure). No animal should be vaccinated more than 2 weeks away from travel sale, or competition, or 3 weeks away from international travel. All horses should have received their full vaccinations at least 4 weeks (ideally 6 weeks) before peak disease season. In Alberta, peak disease season begins in late May, making prime vaccination time March and early April. Broodmares should have their final vaccine 6 weeks before foaling to ensure good colostrum antibody production.

### WHO

When considering who to vaccinate and what to vaccinate with many things need to be taken into consideration such as the horses job and their expected travel throughout the year.

Broodmares have an important job in the horse world. They need to be bred, stay pregnant, foal out safely and raise a healthy, vibrant foal to become the next generation of competitors and companions. Ideally broodmares will have had vaccines long before they became pregnant. They should receive, at minimum, the core set of vaccines at least 6 weeks before breeding season. This includes west Nile virus, tetanus, rabies and eastern and western encephalomalacia. Ideally, they would also have been vaccinated against equine herpes virus and equine influenza virus. They should be vaccinated again 6-8 weeks before foaling with that same vaccine. Herpes virus, is a common cause of abortion in mares. It is prudent to vaccinate them at 5 and 7 months of gestation with an appropriate herpes vaccine in addition to their regular schedule. Stallions should be vaccinated at least 4 weeks prior to the start of breeding season. Otherwise they have no special requirements for vaccination.

Foals are born with the ability to respond to vaccines, but the colostrum (first milk) they take in from their dam contains a high concentration of antibodies that help protect the foal until they are approximately 4 months old. Vaccines administered while maternal antibodies are still high are blocked by the antibodies. This is why we do not vaccinate foals prior to 4 months of age. However, if the dam has an unknown vaccine history, or there is a high incidence of disease, we may choose to vaccinate at an earlier age, and more often.

The remainder of the horse population can be essentially separated out into two categories: travelers and pasture horses. Pasture horses are those that never leave the farm, or if they do, they are not in contact with a large population of horses. They need to be protected against the diseases that can travel to them- those diseases that are carried by wildlife and insects. These diseases are west Nile virus, tetanus, rabies and eastern and western encephalomalacia. Travelers are those horses that go to competitions, public

arenas, large trail rides or any other area where a large congregation of horses occurs. They need to be vaccinated against the diseases that come to them in the environment, but they also need to be protected against diseases that are spread from horse to horse. These include equine herpes virus, equine influenza virus and strangles.

## WHAT

Owners need to understand the difference between core and risk-based inoculations. Core vaccines include eastern and western equine encephalomyelitis (EEE/WEE), west Nile virus (WNV), tetanus and rabies and should be administered to all horses at least annually following an initial two-to-three-dose series. The initial dosing series frequency is based on the horse's age at the time of the initial vaccine series. Ideally, the veterinarian administers core vaccine boosters in the early months of the year so horses will have mounted a robust immune response by the time exposure to the pathogen is likely to occur. Transmission of insect-vector-borne diseases is linked to climate and season. This is why we want to vaccinate early in the year to allow the horse to produce antibodies that will provide protection later in the year when potential virus-carrying mosquitoes are in highest numbers. In geographic regions where mosquito populations persist well into the fall months, additional booster vaccinations against EEE/WEE and WNV are sometimes indicated in mid-to late summer. These later boosters will help the horse sustain high levels of protective immunity later in the year, helping ward off infection.

Risk-based vaccines protect against a variety of diseases that can affect certain horses but are not necessarily a risk for all horses. Horses that compete, travel and are exposed to horses from other farms are at a higher risk of coming into contact with these pathogens - this is why they are classified among the risk-based vaccines. Horses might need additional risk-based vaccines in the fall months, depending on location and activities, which is why it is always important to work with your veterinarian to determine optimal vaccine protocol. They know your horse's routine and is best suited to provide accurate information on what products to use.

Core	Optional
West Nile Virus	Equine Herpes Virus
Tetanus	Equine Influenza Virus
Eastern Encephalomyelitis	<i>Streptococcus equi equi</i>
Western Encephalomyelitis	Potomac Horse Fever
Rabies	

*\*\*All vaccine recommendations listed here are general guidelines. Always consult your veterinarian and the brand of vaccine before administering to ensure adherence to a proper vaccination schedule\*\**

### EASTERN AND WESTERN EQUINE ENCEPHALOMYELITIS (EEE or WEE)

This disease is also known as sleeping sickness. It is transmitted by mosquitoes and causes a severe neurological disease. Of the horses that contract EEE 90% die. Of those that contract WEE 50% die. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter.

### WEST NILE VIRUS (WNV)

This is one of the most prominent diseases in western Canada. In 2018 we saw 73 confirmed cases of WNV. It is transmitted by mosquitoes and causes a severe neurological disease. Horses can survive a West Nile Infection, in fact only about 33% of horses that are treated appropriately pass away, however the treatment for it is intensive (and therefore expensive). Unfortunately, there is no guarantee that they will be able to return to full function after their recovery. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter.

### TETANUS

This is caused by the bacterium *Clostridium tetani*. The spores are found in the soil in all environments on almost every continent in the world. *C. tetani* produces spores which lay dormant in the soil for extended periods of time. When they enter an animal through a surgical site, wound or puncture, the spores become active and produce the bacteria, which multiplies at the site of infection. The bacteria produces a toxin (called tetanospasmin) which induces the muscles of the body to spasm and contract. Once the disease process has begun it is almost impossible to stop it. The most common cause of death is suffocation secondary to the muscles of respiration failing. Horses should have 3 initial doses 3-4 weeks apart as a foal, then annually thereafter. If a horse is injured or has surgery and their vaccine has not been done within the last 6 months, it should be repeated. Horses are much more susceptible to tetanus than any other species.

### RABIES

Rabies is caused by a virus that spreads via the nerves of the body from the site of infection and eventually causes an infection in the brain. This viral infection can cause many different symptoms, but often in horses it begins as a lameness. Rabies is always fatal once an animal is infected. Any mammal can be infected and transmit the virus. It is transmitted through saliva to blood contact (usually

through a bite wound or small wounds on the hands). In Canada there were 183 positive cases in 2018; of those 10 were in Alberta. The Alberta cases were comprised of 9 bats and one cat (which bit two people). This disease poses a significant human health risk. Horses should have an initial vaccine, which only needs to be boosted after one year.

#### EQUINE INFLUENZA VIRUS (EIV)

This is also known as the flu. This virus is common in young horses (1-5 years old) and we often see “outbreaks” in training barns or in groups of young horses that have been taken to shows. It is the most commonly diagnosed respiratory disease. It causes upper respiratory disease, abortions and rarely can cause neurologic disease. It is transmitted by sneezing and coughing, however it can be transmitted by people, buckets, brushes and blankets. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter. Special consideration should be given to those animals that will be exposed to high levels of virus (show horses and those in training barns). These horses may need to be boosted after 6 months due to their high exposure rate.

#### EQUINE HERPES VIRUS (EHV)

This is most commonly known as rhinopneumonitis or rhino in the horse world. Most commonly it causes upper respiratory disease, but one strain can cause a very severe neurological disease. It is transmitted horse to horse by sneezing or coughing and often shows up in times of stress (training, showing, travel, etc). Individual horses can be latent carriers of the disease meaning horses that appear healthy can still transmit the disease to others. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter. Special consideration should be given to those animals that will be exposed to high levels of virus (show horses and those in training barns). These horses may need to be boosted after 6 months due to their high exposure rate.

#### POTOMAC HORSE FEVER (PHF)

Occurs sporadically in Alberta, but is common enough to warrant discussion. It is caused by a parasite that develops in freshwater snails. The parasite is then released into the water where insects like damselflies, dragonflies and caddisflies become infected. Horses that graze near fresh water, or eat hay that was baled near fresh water are at risk for developing the disease. PHF causes severe diarrhea and fever. Consequences of PHF include severe dehydration, limb swelling, laminitis and death. Treatment is possible and can be quite successful if the syndrome is caught and diagnosed early enough. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter.

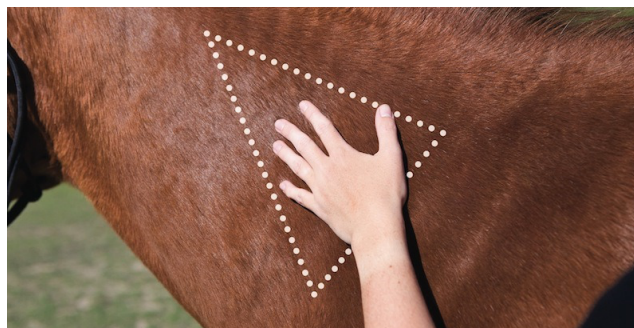
#### STREPTOCOCCUS EQUI EQUI

The common name for this disease is Strangles. It got this name because the severe submandibular lymph node swelling it causes could actually cut off the airway and “strangle” a horse. Strangles is a bacterial infection that causes an upper respiratory disease. This disease is characterized by nasal discharge and lymph node abscesses (usually in the submandibular and retropharyngeal nodes, but they can be anywhere in the body). It is carried by other horses (often asymptomatic) and is transmitted by sneezing and coughing. It can also be transmitted by people, tack and grooming equipment, and unfortunately it lives for a very long time in the soil, so it can show up out of nowhere. Most often the very young and very old horses contract it. Vaccination with the strangles vaccine can cause some severe side effects in horses with unknown exposure or vaccine status, so it is important to talk to your veterinarian about who should be vaccinated. Horses should have 2 initial doses 3-4 weeks apart, then annually thereafter.

See: <https://aaep.org/guidelines/vaccination-guidelines> for more information

#### WHERE AND HOW

Almost all of the vaccines that we use in horses are given in the muscle. There are many spots that you can give the vaccine, but the easiest and safest is to use the neck of the horse. There are few vital structures here and, if an abscess should form, it is relatively easily drained from the neck. Caution should always be used though- if a vaccine that is meant to go in the nose or under the skin is given in the muscle, very large, and costly, abscesses can form.



#### ADVERSE REACTIONS

There are many possible side effects after giving a vaccine. Some of these are considered a normal side effect of any vaccine in any species. Normal reactions include local swelling that is often warm to the touch, lethargy and a decreased appetite. These effects should go away within 24 hours. More severe side effects include abscesses at the site of infection, severe inappetence, hives and a fever. If at any time you have questions about what is happening after a vaccination, do not hesitate to contact your veterinarian. If your vet has given the vaccine, they should have written down the serial number and lot number of the vaccine. If you have given it at home, please remember to track this information. Should a severe side effect occur, the company that produces the vaccine will want to know this information so they can track it and potentially pull that lot number. All side effects associated with the vaccine should be reported to your vet so that companies can continuously improve their products.

### **HOW VACCINES WORK**

Modern, commercially produced, government-approved vaccines are safe and effective, but occasionally a vaccinated horse still develops the disease we are trying to prevent. To understand why a vaccine may fail to protect, it's important to first understand how vaccines work. When germs—bacterial or viral—invade the horse's body, they attack and multiply. This invasion is what causes the horse to become sick. Vaccines work with the horse's natural defenses to safely develop immunity against specific diseases by imitating an infection. This infection doesn't cause illness; rather, it causes the horse's immune system to react.

### **The Natural Response to Bacterial and Viral Invasions**

The horse's immune system uses several tools to fight infection. Like humans', a horse's blood contains red blood cells, which carry oxygen to tissues and organs; and white blood cells, which fight infection.

White blood cells are primarily comprised of three infection-fighting tools:

- > Macrophages – swallow and digest germs and dead or dying cells, leaving behind antigens
- > B-lymphocytes – respond to the antigens by producing antibodies that attack and kill the disease-causing germs
- > T-lymphocytes – stimulated by the antigens to attack and destroy cells that have been attacked by the invading bacteria or virus

The first time the horse's body encounters a germ, it can take several days to make and use all the infection-fighting tools needed to overcome the infection. However, after the infection, the immune system creates and keeps a few unique T-lymphocytes, called memory cells, that stimulate a much quicker response if that same germ attempts to infect the horse again.

### **The Role of Vaccines in Immunity**

Vaccines imitate an infection that doesn't cause the disease but does stimulate the horse's body to produce T-lymphocytes and antibodies against bacteria or viruses that produce that infection. This leads to the body's production of memory cells (T-lymphocytes) that will remember the infectious agent introduced by the vaccine and be prepared to recruit B- and T-lymphocytes to fight that agent if it infects the horse in the future.

It's important to remember that the immune system takes several days or weeks after vaccination against an infectious agent to produce enough white blood cells to fight off the infection. Therefore, it's possible that a horse infected with the disease just prior to, or immediately after, vaccination can still develop symptoms of the disease because the vaccine has not had adequate time to provide protection. This is often seen when horses are vaccinated only a few days before leaving for an event where they encounter horses that are shedding germs.

### **Storage & Damage**

Commercially available vaccines are regulated by the government and must meet rigid standards for stability, effectiveness and safety. If handled and administered properly, they are seldom the reason for vaccine failure. Proper storage of vaccines is one of the most critical aspects in assuring they will provide the desired disease protection. Read the label of the vaccine to determine what the storage and administration instructions are. Lack of adherence to the label directions can result in lack of vaccine effectiveness, vaccine failure and an increased rate of local reactions after vaccine administration.

### **Preexisting Conditions**

Heavily parasitized or malnourished horses may not be able to mount a good immune response when vaccinated. Stress, including extreme cold or heat, can also decrease a horse's response to vaccination. In addition, geriatric horses, especially those suffering Cushing's Disease, may have a decreased ability to respond to vaccination. It is important to note that vaccination alone, in the absence of good nutrition and management practices directed at infection control, are not sufficient in preventing infectious disease. Your veterinarian will be able to assess the horse's condition and determine a proper care plan for overall wellness, including a timely vaccination schedule. In cases where the horse's immunity, gained through vaccination, doesn't completely protect the animal, the vaccine reduces the severity of the clinical signs and duration of illness.