

Equine

Vaccinations

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Vaccinations have been a hot button issue across the globe over the last few years. They've been the favoured topic of media organisations, political policy, and dinner time conversations everywhere. But what are they? How do they work? Why do we use them in the first place? This article aims to provide you with these basics of vaccination, and then take a look at how, when and why we might use them in our equine companions.



What are vaccinations?

Vaccinations are a product designed to stimulate the immune system. They aim to present an infectious disease to the body and allow an immune response, without rampant infection with the disease.

There are 4 main types of vaccination:

- **Modified live**
- **Inactivated/killed**
- **Toxoid (inactivated toxin)**
- **Subunit**

Modified live vaccines have a live strain of the organism that cannot replicate in body cells. By presenting the organism to the body and recognise and remember it for any future presentations (i.e. encountering a diseased individual). There is a small risk of a manufacturing breakdown resulting in reversion of the vaccine to its infective type, although this is incredibly rare.

Inactivated, or killed, vaccines contain a version of the organism that is dead, or near dead. The organism is usually killed either via heat or chemicals. This type of vaccine presents the whole organism without the risk of infection. Similar to modified live vaccines, there is a minute risk of a manufacturing breakdown resulting in incomplete death of the organism, but again, this is incredibly rare.

Some diseases are caused by a toxin, rather than the organism itself. Toxoid vaccines contain inactivated toxin, like a killed vaccine, allowing the immune system to recognise and neutralise the toxin in future.

The final type of vaccination is a subunit vaccine. These contain no whole organism and/or toxin. What they do have is a 'piece' of the infectious disease. This is usually created or harvested in the laboratory, and isolated from the original organism. As such there is no risk of infection from a subunit vaccine.

What's in a vaccine?

Vaccines are usually made up of two things: the infectious agent and adjuvant. The infectious agent, as described above, is either inactivated, killed, a toxoid, or reduced to a subunit. As such, the body doesn't necessarily recognise it as dangerous, or even recognise it as an infectious agent at all. Hence adjuvants are often added.

Adjuvants are small amounts of a chemical(s) that stimulate the immune system to pick up the infectious agent and commit it to memory. Many of these adjuvants are touted by naysayers as toxic or dangerous to the body. There's usually less of these chemicals than what you might drink in tap water or consume in processed foods. They're there in a tiny amount, to stimulate the microscopic cells to create an immune response to the miniscule infectious agent.

What to expect?

So what can you expect from vaccinations? Well first and foremost is fantastic protection against infectious diseases! They should be considered essential to the health management of our equine companions, but they should never be considered a complete silver bullet. Biosecurity, hygiene and management practices are still important in prevention and control of infectious diseases. This is because, just like us, some horses may not be able to be vaccinated. Their immune system may not have generated a memory of the disease, or they simply haven't been vaccinated.

Vaccines usually involve two or more injections in the primary course. This is because the immune system usually needs to have repeated presentations of a disease before it goes to the effort of committing it to memory. Initial presentation is often cleaned up by white blood cells, with a few tasked with 'taking note' of the abnormal substance. On repeat presentation, the body begins to recognise this as a common threat, and stores defence cells against that specific disease.

Once the primary course is complete, the body then stands guard against any future challenge by the infectious agent. Over time though, this protection begins to fade, as the body prioritises more common threats. Therefore, booster vaccinations are used to 'remind' the body that this disease is important, and to have defences ready. Each vaccine will stimulate the immune system memory for different lengths of time; hence they often have different booster periods.

Vaccination appointment

You may want to consider booking a vaccination appointment with your local veterinarian. This is an excellent opportunity for an annual physical examination. This important component of your horse's preventative care allows for a range of benefits. It's important to evaluate your horse's health prior to vaccination to ensure their body will generate an effective immune response. It also gives an opportunity to tailor the vaccination schedule to the patient's specific needs.

Routine health checks (rather than waiting until the proverbial hits the fan) facilitates early detection of any medical conditions and means treatment can be instigated before conditions become established. They're also a great opportunity to evaluate your nutrition and husbandry practices with your veterinary professional.

The specific vaccinations needed by a particular horse depend on several factors, such as; age, breed, sex, use, value, exposure risk, geographic location, pregnancy status, environment.

Common equine diseases covered

There is a huge range of infectious diseases with important physical and economic detriments, that have had vaccinations developed against them. Below is a list of common equine diseases vaccinated against:

- Tetanus
- Strangles
- Hendra virus
- Herpes virus
- Rotavirus & Salmonella
- West Nile virus
- Influenza virus
- and many more

Tetanus & strangles are two of the most ubiquitous diseases in the equine industry, and hence the most commonly vaccinated against bugs. Hendra virus has been identified in recent decades, and due to its devastating mortality rates in both horses and humans, is becoming and ever-increasing consideration in equine vaccination schedules.

Herpes virus has a range of subtypes that can create neurological, respiratory and reproductive diseases, but are commonly vaccinated against in large breeding situations to try and prevent abortion storms. Rotavirus and salmonella are common causes of diarrhoea, especially in younger horses, and are often used together in breeding facilities.

Other diseases such as influenza and west nile virus are less common or eradicated here in Australia, but are common in other countries around the world, and hence are important to acknowledge in our global society.

Tetanus

Tetanus disease is caused by the *Clostridium tetani* bacteria. These bacteria produce the tetanus neurotoxin in the body. The bacteria can live in a spore form in the soil for many years, and commonly enters the body through wounds. It loves puncture wounds as it's an anaerobic bacteria; meaning it doesn't like oxygen.



Tetanus spores commonly enter the body through puncture wounds, such as this nail in the hoof.

The tetanus neurotoxin binds to the nerves in the spinal column preventing relaxation of the muscles. Sign of tetanus infection include: colic, stiffness progressing to generalised muscle spasticity ('sawhorse' stance), third eyelid prolapse. If left untreated it will inevitably lead to diaphragm paralysis and death via asphyxiation.



Sawhorse stance common in tetanus infection. This is caused by every muscle 'firing' at once, causing rigidity and inability to move or relax.

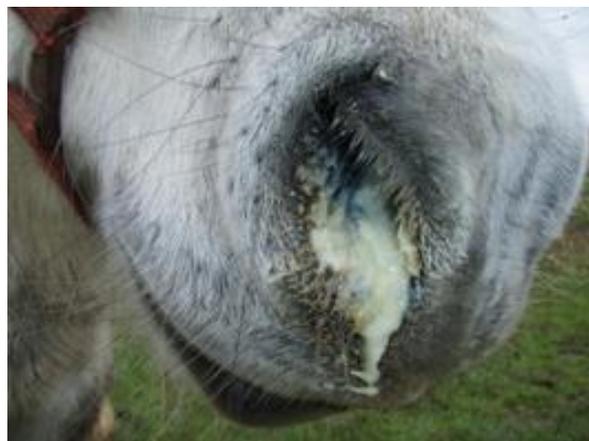
Tetanus can be prevented with the Equivac T vaccine. Produced in Australia by Zoetis, this vaccine contains a small amount of the toxin to stimulate a response. It provides long term coverage up to 4 years. However in unvaccinated/lapsed horses who sustain a wound, the antitoxin (Equivac TAT) needs to be used for short term neutralisation of the toxin.



Equivac T (left) vaccine used to stimulate an immune response to the tetanus toxoid, and Equivac TAT (right) used to neutralise tetanus toxin in unprotected horses.

Strangles

Strangles is caused by the bacteria *Streptococcus equi*, which has a number of different strains. This bacteria localises in the pharynx and lymph nodes under the jaw. It can cause nasal discharge, abscessation, skin necrosis and, in severe cases, asphyxiation. Horses with strangles infection often spike quite a high fever. It is highly contagious and spread by nasal pus.



Thick nasal discharge in association with a high temperature may be an indicator of a strangles outbreak.

Biosecurity and quarantine are vitally important in preventing the spread of infection. It is important not to let horses share food or water with horses or unknown vaccination status. Infected horses should be separated and all handling and feeding done last after other horses have been attended to. Keep separate equipment, or clean equipment, between infected and clear horses.

Equivac S, produced by Zoetis, is an inactivated vaccine against strangles. It doesn't include all of the strains of *Streptococcus equi*, but there is some cross-reactivity between them. The vaccine doesn't prevent the condition, but it makes the clinical signs less severe if your horses does contract the disease. Ideally rather than the face falling off, they simply have some nasal discharge and a fever. The vaccine also comes as the Equivac 2in1 which contains tetanus & strangles.



Equivac S (top) is an inactivated vaccine to stimulate an immune response against the strangles bacteria. It also comes as a combination Equivac 2in1 (bottom) with tetanus for coverage against both common conditions.



Hendra virus

Hendra virus (HeV) is a serious, potentially fatal virus that is spread from flying foxes to horses, and from infected horses to humans. 4 out of 7 people (57%) who have contracted Hendra virus have died, while the survivors experience ongoing debilitation. 100% of horses infected with Hendra virus have died (any ‘survivors’ are euthanised due to human health risks). Hendra outbreaks have been confirmed in Queensland and northern NSW and this is considered the endemic region (where Hendra infection naturally occurs).

The clinical signs of Hendra virus in horses are varied and may include the following; fever, increased heart and respiratory rates, nasal discharge, colic, ataxia, muscle twitching, recumbency, blindness and sudden death. Due to these varied signs, diagnosis of Hendra virus is impossible without laboratory confirmation which may take 2-4 days for a result.

The HeV vaccine has been developed and shown to provide complete protection from Hendra infection. There is no virus present in the vaccination, it is made using a protein unique to the virus, and contains the same adjuvants as those found in common tetanus and strangles vaccines. The confirmed adverse reactions are also the same rate and type as those of the other common vaccines.



Equivac HeV vaccination against Hendra virus.

There are a number of considerations for horse owners entering the endemic region with an unvaccinated horse. Treatment access may be restricted. A sick horse (i.e. travel sickness, colic, etc.) will have to be treated as a suspect Hendra case, due to Hendra’s varied clinical signs. Veterinarians reserve the right to refuse treatment to unvaccinated suspected Hendra patients, as confirmed by the recent Queensland parliamentary enquiry. This may mean that your horse may not be able to get veterinary attention on the way to, during, or on the way home from the region.

Hendra testing takes 2-4 days for a result to be returned, which means in the case of a sick horse, treatment may be sub-optimal or delayed altogether for 48 hours or more. This is in order to comply with the workplace health and safety laws, and may result in suffering that could be avoided by prior vaccination.

In the devastating event of an actual Hendra outbreak, exposure to the lethal virus may have occurred to both horses and humans before the full magnitude of the situation is known. Horses can shed HeV for 3-5 days before showing any signs of illness. This may place your child’s horse, your child, or yourself at risk.

In the event of an outbreak, regardless of human exposure or risk, the entire area will be placed on lockdown for a minimum of 30 days. Any humans exposed to infected horses will have to undergo monoclonal antibody treatments, while sick horses may be euthanised. However unexposed people, with vaccinated horses who were also not exposed, may be able to leave the quarantine zone earlier.

Vaccination	Age	Disease	Vaccine
1 st	12 weeks	Tetanus & Strangles	Equivac 2in1
2 nd	14 weeks (2 weeks later)	Strangles	Equivac S
3 rd	16 weeks (2 weeks later)	Tetanus & Strangles	Equivac 2in1
12 month booster	16 months (12 months later)	Tetanus & Strangles	Equivac 2in1
Ongoing protection	Annually	Tetanus & Strangles	Equivac 2in1

Primary Industries and Resources South Australia (PIRSA) do not allow any horses showing signs of a notifiable disease (i.e. Strangles, Hendra, etc.) back into the state while the horse is showing clinical signs or until it has had a negative laboratory test. This means simple cases like colic, or mild respiratory infections, may not be allowed back into the state for a period of time. These risks can all be mitigated by use of the safe, highly effective, and accessible Hendra vaccine.

Herpes virus

There are multiple strains of the Herpes virus, including ones that cause neurological, respiratory and reproductive disease. Due to the large quantities of foetal materials (i.e. placental fluid, membranes) present at large breeding facilities, spread of Herpes virus is almost guaranteed. As such they commonly use the Duvaxyn EHV 1,4 vaccine, produced by Zoetis. This covers the 1 & 4 strains of equine herpes virus which are the ones that commonly cause reproductive problems.

Rotavirus & Salmonella

Rotavirus and salmonella (a bacteria) are known to cause diarrhoea in younger horses and foals. These can be covered by the Duvaxyn R and Equivac EST vaccines, both produced by Zoetis. Again, these are mainly used in large breeding facilities where outbreaks are more common.

West Nile virus

Also called Kunjin virus, the West Nile virus is in the same family as Murray Valley encephalitis and Ross River virus. It causes a neurological disease and we had an outbreak of it in South Australia in 2011. The Duvaxyn WNV, produced by Zoetis, is currently available in America, but they are in the process of bringing it to Australia.

Equine Influenza

Influenza virus is not currently present in Australia but is endemic in many other parts of the world. Some countries require vaccination prior to importing horses from Australia. We had an outbreak in the country in 2007, but

by a massive co-ordinated effort by industry, politicians and veterinarians, equine influenza was able to be eradicated.

Vaccination schedule

The most common, standard, vaccination schedule for horses in South Australia can be found in the table at the top of the page. This would be for most horses travelling and competing, mixing with other horses. Tetanus is ubiquitous in the environment, and hence should be considered a core vaccination for ALL horses. Strangles, being spread via contact with other horses, should be included for any horses travelling or competing.

Other vaccinations are used based on a risk assessment. A risk assessment is based on two factors; the likelihood of something happening, and the consequence (or severity) if it does.

		Severity of Harm (Impact)		
		Low (L)	Medium (M)	High (H)
Likelihood	High (H)	3	4	5
	Medium (M)	2	3	4
	Low (L)	1	2	3

A basic risk assessment table. The risk scoring is as follows: trivial (1), tolerable (2), moderate (3), substantial (4), and intolerable (5). By assessing the likelihood of an event occurring (low to high) and its severity if it does (mild, moderate, severe), you can arrive at a level of risk for that occurrence.

To put this in practice, let's use Hendra virus as an example. Any exposure to Hendra virus can potentially lead to death of a horse and/or human, making it instantly severe/high impact. The likelihood of exposure from feed/water contamination in South Australia is low. Therefore, it's already a moderate risk occurrence. Exposure to unvaccinated horses from, or travel to, QLD/NSW may increase the likelihood of it occurring, moving it to a substantial or even intolerable risk disease.

How to vaccinate

Most vaccines can be administered intramuscularly (IM). There are 4 places you can access a good muscle for injection on the horse:

- **Neck** (trapezius/serratus)
- **Chest** (pectorals)
- **Rump** (gluteal)
- **Hamstring** (semimembranosus/semitendinosus)

Given that the chest, rump and hamstring all put you in close range of either the front or back legs, means that I tend to select the neck as my first port of call for IM injections. There are three landmarks you need to be aware of in the neck; the nuchal ligament, the spine, and the shoulder blade.



The golden 'triangle' demarcating the place for intramuscular injections in the horses' neck. The top of the triangle is bordered by the nuchal ligament – running from the poll to the withers. The bottom of the neck contains the spinal column. At the base of the triangle is the shoulder.

Once you have located these three landmarks you then want to select a location mid-neck, a few centimetres in front of the shoulder. A lot of people end up going halfway between the head & the shoulders. This is too far forward, and movement of the head during placement of the injection may mean you end up too close to an important structure.

Some people do the 'bam-bam-stab' method, theoretically to desensitise the horse to the needle. I almost stab myself every time I try to do that technique. What I do is pinch the skin as hard as I can for 15-20 seconds (sing a song; Happy Little Vegemites, the Wizard of Oz, whatever works for you...). The skin is the most sensory part, and by numbing that first, horses tend to tolerate the needle far more. Once you've pinched the skin, let go, and place the needle through the numbed area into the muscle. Most vaccines don't require a 'draw-back' so can go straight in.

Wrap up

Vaccinations are a highly effective prevention of infectious diseases. They are very safe to your horse and easy to administer. There are some core and some optional vaccinations and should be selected based on an individual risk assessment for your horse. Booking a vaccine appointment with your local veterinarian is a good opportunity to evaluate your horse's overall health.



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