



## Equine Herpesvirus (Rhinopneumonitis)

Equine herpesvirus type 1 (EHV-1) and equine herpesvirus type 4 (EHV-4) can each infect the respiratory tract, causing disease that varies in severity from sub-clinical to severe and is characterized by fever, lethargy, anorexia, nasal discharge, and cough. Infection of the respiratory tract with EHV-1 and EHV-4 typically first occurs in foals in the first weeks or months of life, but recurrent or recrudescent clinically apparent infections are seen in weanlings, yearlings, and young horses entering training, especially when horses from different sources are commingled. Equine herpesvirus type 1 causes epidemic abortion in mares, the birth of weak nonviable foals, or a sporadic paralytic neurologic disease (equine herpesvirus myeloencephalopathy-EHM) secondary to vasculitis of the spinal cord and brain.

Both EHV-1 and EHV-4 spread via aerosolized secretions from infected coughing horses, by direct and indirect (fomite) contact with nasal secretions, and, in the case of EHV-1, contact with aborted fetuses, fetal fluids, and placentae associated with abortions. Like herpesviruses in other species, these viruses establish latent infection in the majority of horses, which do not show clinical signs but may experience reactivation of infection and shedding of the virus when stressed. Those epidemiologic factors seriously compromise efforts to control these diseases and explain why outbreaks of EHV-1 or EHV-4 can occur in closed populations of horses.

Because both viruses are endemic in most equine populations, most mature horses have developed some immunity through repeated natural exposure; thus, most mature horses do not develop serious respiratory disease when they become infected but may be a source of exposure for other susceptible horses. In contrast, horses are not protected against the abortigenic or neurologic forms of the disease, even after repeated exposure, and mature horses are in fact more commonly affected by the neurologic form of the disease than are juvenile animals.

Recently, a genetic variant of EHV-1 has been described (defined by a single point mutation in the DNA polymerase [DNApol] gene) that is more commonly associated with neurologic disease. This mutation results in the presence of either aspartic acid (D) or an asparagine (N) residue at position 752. Molecular diagnostic techniques can identify EHV-1 isolates carrying these genetic markers, although currently the implications of this finding for management of EHV-1 outbreaks, or individual horses actively or latently infected with these isolates, are uncertain. It is important to understand that both isolates can and do cause neurological disease, it is just more common for the D<sub>752</sub> isolates to do so (it is estimated that 80-90% of neurological disease is caused by D<sub>752</sub> isolates, and 10-20% by N<sub>752</sub> isolates). Experts do not currently advise any specific management procedures for horses based on which isolate they are latently infected with, and it is possible that 5-10% of all horses normally carry the D<sub>752</sub> form (this estimate is based on limited studies at this time). In the face of an active outbreak of EHV-1 disease, identification of a D<sub>752</sub> isolate may be grounds for some increased concern about the risk of development of neurological disease.

Primary indications for use of equine herpesvirus vaccines include prevention of EHV-1-induced abortion in pregnant mares, and reduction of signs and spread of respiratory tract disease (rhinopneumonitis) in foals, weanlings, yearlings, young performance and show horses that are at high risk for exposure. Many horses do produce post-vaccinal antibodies against EHV, but the presence of those antibodies does not ensure complete protection. Consistent vaccination appears to reduce the frequency and severity of disease and limit the occurrence of abortion storms but unambiguously compelling evidence is lacking. Management of pregnant mares is of primary importance for control of abortion caused by EHV-1.

## **Vaccines:**

### **Inactivated vaccines**

A variety of inactivated vaccines are available, including those licensed only for protection against respiratory disease, which currently all contain a low antigen load, and two that are licensed for protection against both respiratory disease and abortion which contain a high antigen load. Performance of the inactivated low antigen load respiratory vaccines is variable, with some vaccines outperforming others. Performance of the inactivated high antigen load respiratory/abortion vaccines is superior, resulting in higher antibody responses and some evidence of cellular responses to vaccination. This factor may provide good reason to choose the high antigen load respiratory/abortion vaccines when the slightly higher cost is not a decision factor.

### **Modified live vaccine**

A single manufacturer provides a licensed modified live EHV-1 vaccine. It is indicated for the vaccination of healthy horses 3 months of age or older as an aid in preventing respiratory disease caused by equine herpesvirus type 1 (EHV-1).

### **EHM**

All available vaccines make no label claim to prevent the myeloencephalitic form of EHV-1 (EHM) infection. Vaccines may assist in limiting the spread of outbreaks of EHM by limiting nasal shedding EHV-1 and dissemination of infection. For this reason some experts hold the opinion that there may be an advantage to vaccinating in the face of an outbreak, but in advance of EHV-1 infection occurring in the group of horses to be vaccinated. The vaccines with the greatest ability to limit nasal shedding include the 2 high-antigen load, inactivated vaccines licensed for control of abortion (Pneumabort-K<sup>®</sup>: Pfizer; & Prodigy<sup>®</sup> Merck), a MLV vaccine (Rhinomune<sup>®</sup>, Boehringer Ingelheim Vetmedica) and an inactivated vaccine, (Calvenza<sup>®</sup>, Boehringer Ingelheim Vetmedica).

Vaccination against either EHV-1 or EHV-4 can provide partial protection against the heterologous strain; vaccines containing EHV-1 may be superior in this regard.

### **Vaccination schedules:**

Adult, non-breeding, horses previously vaccinated against EHV : Frequent vaccination of non-pregnant mature horses with EHV vaccines is generally not indicated as clinical respiratory disease is infrequent in horses over 4 years of age. In younger/juvenile horses, immunity following vaccination appears to be short-lived. It is recommended that the following horses be revaccinated at 6-month intervals:

- Horses less than 5 years of age.
- Horses on breeding farms or in contact with pregnant mares.
- Horses housed at facilities with frequent equine movement on and off the premises, thus resulting in an increased risk of exposure.
- Performance or show horses in high-risk areas, such as racetracks. More frequent vaccination may be required as a criterion for entry to the facility.

Adult, non-breeding horses unvaccinated or having unknown vaccinal history: Administer a primary series of 3 doses of inactivated EHV-1/EHV-4 vaccine or modified-live EHV-1 vaccine. A 4 to 6 week interval between doses is recommended.

Pregnant mares: Vaccinate during the fifth, seventh, and ninth months of gestation using an inactivated EHV-1 vaccine licensed for prevention of abortion. Many veterinarians also recommend a dose during the third month of gestation and some recommend a dose at the time of breeding.

Vaccination of mares with an inactivated EHV-1/EHV-4 vaccine 4 to 6 weeks before foaling is commonly practiced to enhance concentrations of colostral immunoglobulins for transfer to the foal. Maternal antibody passively transferred to foals from vaccinated mares may decrease the incidence of respiratory disease in foals, but disease can still occur in those foals and infection is common.

Barren mares at breeding facilities: Vaccinate before the start of the breeding season and thereafter based on risk of exposure.

Stallions and teasers: Vaccinate before the start of the breeding season and thereafter based on risk of exposure.

Foals: Administer a primary series of 3 doses of inactivated EHV-1/EHV-4 vaccine or modified-live EHV-1 vaccine, beginning at 4 to 6 months of age and with a 4 to 6 week interval between the first and second doses. Administer the third dose at 10 to 12 months of age.

Immunity following vaccination appears to be short-lived and it is recommended that foals and young horses be revaccinated at 6-month intervals.

The benefit of intensive vaccination programs directed against EHV-1 and EHV-4 in foals and young horses is not clearly defined because, despite frequent vaccination, infection and clinical disease continue to occur.

Outbreak mitigation: In the face of an outbreak, horses at high risk of exposure, and consequent transmission of infection, may be revaccinated. Administration of a booster vaccination is likely to be of some value if there is a history of vaccination. The simplest approach is to vaccinate all horses in the exposure area—independent of their vaccination history. If horses are known to be unvaccinated, the single dose may still produce some protection.

There remain concerns that heavily vaccinated horses may be more susceptible to developing neurological disease caused by EHV-1. This possibility is unsubstantiated and a subject of active investigation. To date, the use of a single vaccine immediately before exposure has not shown any association with an increased incidence of neurological disease.

Horses having been naturally infected and recovered: Horses with a history of EHV infection and disease, including neurological disease, are likely to have immunity consequent to the infection that can be expected to last for 3 to 6 months (longer in older horses). Booster vaccination can be resumed 6 months after the disease occurrence.