



Equine Viral Arteritis

Equine viral arteritis (EVA) is a contagious disease of equids caused by equine arteritis virus (EAV), an RNA virus that is found in horse populations in many countries. While typically not life-threatening to otherwise healthy adult horses, EAV can cause abortion in pregnant mares; uncommonly, death in young foals; and establish a long-term carrier state in breeding stallions. While various horse breeds appear equally susceptible to EAV, the prevalence of infection can vary widely, with higher seropositivity rates occurring in Standardbreds and Warmbloods.

Historically, outbreaks of EVA have been relatively infrequent. However, the number of confirmed occurrences appears to be increasing, likely attributable to increases in:

- 1) global movement of horses
- 2) accessibility of carrier stallions
- 3) utilization of shipped cooled or frozen virus-infective semen

Transmission most frequently occurs through direct contact with virus-infective respiratory secretions leading to widespread dissemination of the virus among susceptible horses in close proximity. Venereal transmission by infected stallions has a significant role in virus spread on or between breeding farms. Equine arteritis virus can be very efficiently spread through artificial insemination and the use of fresh-cooled or frozen semen. There is limited evidence that virus can also be transmitted via embryo transfer where the donor mare is bred with infective semen from a carrier stallion. The virus has been shown to remain viable for considerable periods of time in raw, extended or frozen semen held at temperatures equal to or less than 4°C. Indirect transmission, though less significant, can occur through contact with virus-contaminated fomites.

The majority of primary EAV infections are subclinical or asymptomatic. EVA can vary in clinical severity both between and within outbreaks. EVA cannot be diagnosed based on clinical signs alone, as case presentation is similar to various other infectious and non-infectious equine diseases. Laboratory confirmation is required for diagnosis.

Clinical signs, if they occur, typically develop 3 to 7 days post-infection and are variable but may include any combination or all of the following: fever; depression; anorexia; dependent edema (lower limbs, scrotum and prepuce or mammary glands); localized or generalized urticaria; supra or periorbital edema; conjunctivitis; lacrimal discharge and serous to mucoid nasal discharge. Abortion is a frequent sequel to infection in the unprotected, pregnant mare. When pregnant mares are exposed to the virus very close to term, they may not abort but give birth to a congenitally infected foal, affected with a rapidly progressive and fulminant interstitial pneumonia. Foals within a few months of age, if exposed to EAV can develop a life-threatening pneumonia or pneumoenteritis.

A carrier state can develop following EAV infection in the post-pubertal colt or stallion. The virus can persist in the reproductive tract of stallions for many years and may result in lifelong infection. The carrier stallion is widely accepted as the natural reservoir of EAV and the source of diversity among naturally occurring strains of the virus.

Vaccine:

The current licensed vaccine in N. America is a highly attenuated, modified live virus product. It has been shown to be safe and effective in stallions and non-pregnant mares. Mild post-vaccinal febrile reactions with transient lymphopenia have been observed in a small percentage of first-time vaccinated horses. Primary vaccination provides clinical protection against EVA but does not prevent re-infection and limited replication of challenge virus. However, in first-time vaccinates, the frequency, duration, and amount of vaccine virus that is shed via the respiratory tract is significantly less than that observed with natural infection.

Vaccination in the face of an EVA outbreak has been successful in controlling further spread of the virus within 7 to 10 days. Immunization with the MLV vaccine stimulates a rapid protective response which in turn restricts development of the cell-associated viremia and viral shedding via the respiratory tract in horses naturally exposed to infection. As a consequence, the amount of EAV in circulation is greatly decreased, limiting further spread of the virus.

Vaccination Schedules:

In planning a vaccination program against EVA, it is important to consult with state and/or federal animal health officials to ensure that any such program is in compliance with the state's control program for EVA, if one exists.

The indications for vaccination against EVA have been:

- 1) To protect stallions against infection and subsequent development of the carrier state.
- 2) To immunize seronegative mares before being bred with EAV-infective semen.
- 3) To curtail outbreaks in non-breeding populations.

Note: It is not possible to differentiate vaccine-induced antibody response from that due to natural infection. It is strongly recommended that prior to vaccination, serum from all first-time vaccinates be tested and confirmed negative for antibodies to EAV by a USDA-approved laboratory. Mares intended for export should be similarly tested.

Stallions

Breeding stallions, previously vaccinated: Should receive an annual booster vaccination against EVA every 12 months and no earlier than 4 weeks before the start of each breeding season.

Breeding stallions, first-time vaccinates: Prior to initial vaccination, all stallions shall undergo serologic testing and are confirmed to be negative for antibodies to EAV. Testing should be performed shortly prior to, or preferably at, the time of vaccination. Negative certification is of importance should a vaccinated stallion be considered for export at a later date. All first-time vaccinated stallions should be isolated for 3 weeks following vaccination before being used for breeding.

Teasers can play a role in the introduction and dissemination of EAV within a breeding population. Vaccination against EVA is recommended on an annual basis.

Mares to be bred to carrier stallions or to be bred with virus-infective semen should first be tested to determine their serological status for EAV antibodies.

Seronegative mares should be vaccinated against EVA and isolated from any other seronegative horses for 3 weeks. The purpose of the isolation period is twofold:

- 1) To enable the vaccinated mare adequate time to develop immunity against the disease before being exposed to EAV infection during breeding.
- 2) To afford ample opportunity for cessation of possible post-vaccinal viral shedding via the respiratory tract.

Following insemination, first-time vaccinated mares must be isolated for an additional 3-week period as they are likely to experience a limited re-infection cycle with the strain of EAV present in the semen. Should such mares fail to become pregnant, they can be bred back to a carrier stallion or with infective semen without the need for revaccination or an additional 3-week isolation period post-insemination.

In the case of embryo transfer, it is recommended that both donor and recipient mare, if seronegative, be vaccinated against EVA where the donor mare is to be bred with virus infective semen.

Seropositive mares, having tested serologically positive for antibodies to EAV, can be bred to a carrier stallion or with infective semen for the first time without the need for prior vaccination against EVA. After breeding, such mares should be physically separated from unvaccinated or unprotected horses for 24 hours to avoid possible risk of mechanical transmission of virus from voided semen.

Pregnant mares: The manufacturer does not recommend use of this vaccine in pregnant mares, especially in the last two months of pregnancy. Under circumstances of high risk of natural exposure to infection, the vaccine has been administered to pregnant mares in order to control outbreaks of the disease. Based on early experimental studies and field experiences using this vaccine, the last 1-2 months of pregnancy represent the time of greatest risk for a possible adverse effect on pregnancy. This was most recently illustrated in the aftermath of the 2006 multi-state occurrence of EVA when a very limited number of abortions associated with the vaccine virus were confirmed in mares vaccinated within the final 2 months of gestation.

Nurse mares can play a role in the introduction and spread of EAV among resident equine populations and should be vaccinated annually according to recommended protocols.

Foals The manufacturer does not recommend use of this vaccine in foals less than 6 weeks of age unless under circumstances of high risk of natural exposure to infection.

Colt (male) foals Especially in EAV endemic breeds, colt foals should be vaccinated between 6 and 12 months of age to protect against the risk of their becoming carriers later in life. Colts should be confirmed seronegative for antibodies to EAV prior to vaccination as described above and kept isolated for 3 weeks following vaccination. As foals of EAV-seropositive mares can carry colostral derived antibodies for up to 6 months, testing and vaccination should not be performed prior to 6 months of age.

Outbreak Mitigation

Non-breeding population: Vaccination is an effective strategy in containing outbreaks, particularly in congregated groups of horses where isolation may be problematic. Serologic testing, as described above, should be performed on intact males and females that may be intended for future breeding purposes and/or export.

Breeding population: Outbreaks of EVA can be complex and can have far reaching implications. Vaccination is a component of outbreak management but should be performed only under the direct supervision of a veterinarian. ([Link to AAEP infectious disease guidelines](#))

Vaccination and Exporting of Horses

In instances where there is uncertainty or concern over whether vaccination against EVA could prevent the export of a horse to a particular country, it is advisable to consult the federal area veterinarian in charge in the state to determine the specific import requirements of that country. There are a number of countries which bar entry of any equid that is serologically positive for antibodies to EAV, regardless of vaccination history.

Countries which do accept EVA vaccinated horses, regardless of gender, typically require stallions or colts to have a certified vaccination history and confirmation of pre-vaccination negative serological status.