EQUINE VIRAL ARTERITIS

Overview

Equine viral arteritis (EVA) is caused by the equine arteritis virus (EAV), a small enveloped RNA virus of the family Arteriviridae (Snijder & Meulenberg, 1998). Although the disease has been reported for centuries, the virus was first isolated from horses in 1953 (Doll et al, 1957). Since that time, the equine industry has experienced several outbreaks of the disease, most recently in the United States Quarter Horse population in 2006 and in the French non-Thoroughbred population in 2007 (Timoney et al, 2006; Newton, 2007). Interruption of transmission and the establishment of effective disease control are imperative as disease outbreaks have direct economic consequences on the equine industry.

Epidemiology and Transmission

Although aerosol transmission during close contact is the primary mode of spread, the virus is also spread via venereal (including via artificial insemination with cooled and frozen-thawed semen), congenital, and indirect-contact routes. There is considerable variation in the severity of clinical signs associated with infection, but the vast majority of cases are subclinical. Clinical pictures that occur in association with the disease include: abortion in pregnant mares, pneumonia and enteritis in neonates, systemic illness in adult horses, and persistent infection in stallions. After initial infection, the virus is found in all bodily secretions for up to four weeks (Chirnside, 1992; Timoney & McCollum, 1993, Guthrie et al, 2003). At this time the virus is cleared from the body with the exception of the accessory sex glands (primarily the bulbourethral glands and the ampullae) in the mature stallion. The length of time a stallion will continue to shed the virus varies and can be categorized as: short term (2-5 weeks), medium term (3-8 months), or long term (years) (Newton, 2007). Shedding of the virus appears to be testosterone dependent as evidenced by the fact that immature stallions will not become long-term shedders and castration of mature stallions will allow for clearance of the virus (Timoney et al, 1987; Wood et al, 1995). Diagnosis of the disease is currently based on a combination of virus isolation, antigen detection, and serology as the clinical disease is similar to several other infectious diseases.

Disease Control and Prevention

Good on-farm management practices including basic preventative hygiene and isolation of new arrivals will go a long way in the prevention of EVA transmission. Vaccination within the breeding horse population is also an important means of control. A modified-live EVA vaccine (Arvac®, Fort Dodge Animal Health) is available in the United States and has been shown to be safe for stallions, non-pregnant mares, and geldings. The vaccine is highly effective as primary vaccination provides for disease protection for several years.

Guidelines for the vaccination have been established by the American Association of Equine Practitioners (www.aaep.org/eva.htm) and are summarized as follows.

**Breeding Stallions**
- Since it is not possible to differentiate between a vaccine-induced antibody response from a natural infection-antibody response, it is recommended that all intact stallions be confirmed sero-negative for EAV prior to vaccination. Documentation of pre-vaccination
negative status is especially important if the stallion should be considered for future export.

- **Sero-negative stallions**
  - Stallions should be isolated for four weeks after initial vaccination. After the initial vaccination, vaccine-strain virus can be transiently shed in respiratory secretions (in very low numbers). This isolation period will also prevent possible exposure to the natural virus prior to the stallion becoming fully protected from infection. There is also a remote chance the stallion can shed vaccine-strain virus in his semen, but this has not been documented to the author’s knowledge.
  - The stallion should receive an annual booster vaccination four weeks prior to the breeding season.

- **Sero-positive stallions**
  - The horse’s shedding status must be determined. This can be done either by testing semen samples for the presence of EAV (via virus isolation) or by test breeding two seronegative mares and testing them for sero-conversion 28 days post-breeding.
  - Nonshedding stallions are qualified for breeding.
  - Shedding stallions must be housed, handled, and bred in a facility separate from noncarrier stallions. Mares bred to the stallion must be sero-positive (either from natural infection or from previous vaccination).

**Mares**

- Prior to breeding to a carrier stallion or to breeding with virus-infected semen, the mare’s serological status must be determined.
  - Sero-negative mares should be vaccinated and isolated for three weeks prior to breeding. (This period of isolation has recently been questioned due to the extremely low risk of vaccine-virus shedding with subsequent transmission.) Following breeding, the mare should be isolated for an additional three weeks. This additional isolation period is only necessary with the first breeding following the initial vaccination. However, on subsequent breedings the mare should be isolated for at least 24 hours to prevent transmission via voided semen.
  - Sero-positive mares can be bred without vaccination. The mare should be isolated for 24 hours after breeding to prevent transmission via voided semen.

- Nurse mares should be vaccinated annually.

- Vaccination of pregnant mares is not recommended, but has been done in the face of disease outbreaks. Vaccination in the last two months of gestation can lead to abortion secondary to the vaccine-virus.

**Foals**

- Vaccination of foals under 6 weeks of age is not recommended unless in the face of disease outbreak.

- Following confirmation of sero-negative status, colts should be vaccinated between six and twelve months of age. An isolation period of three weeks should be instituted following vaccination.

**Conclusion**

Equine viral arteritis is a highly controllable disease, but the current lack of industry standards allow for continued disease outbreaks. Appropriate serological testing and vaccination strategies can significantly decrease the incidence and impact of this disease. Unfortunately, while the USDA has recommended mandatory testing of all breeding stallions as a condition for registration, to the author’s knowledge no breed registry has instituted this practice.
CONTAGIOUS EQUINE METRITIS

Overview

The first documented outbreak of contagious equine metritis (CEM) took place in Newmarket in Suffolk, England in the spring of 1977 (Crowhurst, 1977). It was noted that a large number of mares had a shortened interestrus interval and approximately 40% of mares covered developed profuse mucopurulent discharge within 48 hours of breeding. Similar outbreaks had occurred shortly prior to and after that time in Ireland and Australia. The causative agent was ultimately identified in June of 1977 and termed *Haemophilus equigenitalis* (Taylor et al, 1978). After further characterization of the organism, it was transferred to the *Taylorella* genus in 1983 (Sugimoto et al, 1983).

The first documented outbreak of CEM in the United States occurred in Kentucky during the 1978 breeding season with a subsequent outbreak in Missouri the following year. At the time, control measures were quickly implemented and the disease was eradicated. Since that time, only sporadic cases had been documented in the United States until December of 2008. As of this writing, the current outbreak involves 988 horses in 48 states. Interestingly, the disease was first discovered in a stallion undergoing routine CEM screening for international shipping. Classic clinical signs of CEM (shortened interestrous interval, decreased fertility, copious vaginal discharge following breeding, etc.) were not seen in this outbreak leading one to wonder just how extensive the risk of CEM is within the breeding industry.

Etiology, Transmission, and Clinical Signs

*Taylorella equigenitalis* is a fastidious, micro-aerophilic gram-negative coccobacillus. Recently, a closely related bacterium, *Taylorella asiigenitalis* has been isolated from equids although it does not appear to be as pathogenic (Båverud et al, 2006). *Taylorella equigenitalis* is primarily venereally transmitted although it can be spread via artificial insemination or via contact with contaminated breeding equipment. The disease is highly contagious. The source of infection during an outbreak is typically an undetected carrier stallion, which can harbor the bacteria on the external genital for years in the urethral fossa, the urethra sinus, the distal urethra, the surface of the penis or the sheath (Powell, 1978). Mares can also become chronic carriers, typically harboring the bacteria in the clitoral sinuses and fossa for months (Timoney, 1996).

Infected stallions are asymptomatic. Signs in mares may be subclinical with only a shortened diestrus period noted. Clinical disease typically develops 10-14 days after breeding and is limited to the reproductive tract. Signs can range from subtle endometritis with temporary infertility to a copious gray-yellow vaginal discharge noted 1 to 2 weeks after breeding. Most infected mares will not conceive, but those that do may deliver an asymptomatic carrier of the disease. *T. equigenitalis* rarely causes abortion (Timoney, 1996).

Diagnosis

Definitive diagnosis of the disease relies on isolation of the bacteria via culture. The recommended transport medium for culture is Aimes supplemented with charcoal (Samper & Tibary, 2006). The sample should be refrigerated immediately and needs to arrive at the diagnostic lab within 48 hours. The possibility of a false negative result with culture is fairly high, due to the fastidiousness of the organism and its slow-growing nature. Therefore, three sets of cultures taken at three day intervals are recommended. Culture sites in the stallion include: the urethral sinus, the fossa glandis, the prepuce, and possibly the terminal urethra. Culture sites in the mare include: the clitoral sinuses, the clitoral fossa, and the endometrium. PCR can be used in combination with culture due to its high sensitivity. However, Moore et al (2000) cautioned that *Taylorella asiigenitalis* can be misidentified as *T. equigenitalis* with this test. Serology via complement fixation testing can be used as an adjunct screening tool in mares, but should not be relied on as a diagnostic tool.
For stallions, test breedings with two mares are performed after negative culture results are received. The test mares are cultured three times at three day intervals after breeding. Complement fixation testing is also performed on the mares after breeding.

**Disease Treatment and Prevention**

Treatment of the disease is primarily local and involves cleansing of the affected areas followed by topical antiseptic/antibiotic application. The treatment is repeated for five to seven consecutive days. The addition of systemic antibiotics (Trimethoprim Sulfamethoxazole®) has been reported to be helpful adjunct to topical treatment (Kristula & Smith, 2004). It is important to note that the mare cannot be successfully treated for CEM until the bacteria has cleared from the uterus.

Poor biosecurity in the breeding shed can easily lead to disease transmission. The following practices should be instituted to decrease the transmission of *Taylorella equigenitalis*.

- Washing the breeding mount between stallions with a suitable disinfectant. A disposable protective barrier at the caudal aspect of the breeding mount should be used and changed between stallions.
- AV’s should be adequately washed between uses and should not be shared between stallions.
- Any other equipment used in the breeding shed should not be shared between stallions without appropriate disinfection/sterilization. Also, hands should be thoroughly washed between collections.
- An appropriate antibiotic should be present or added to the semen extender.

**Conclusion**

Prior to December 2008, the prevalence of contagious equine metritis in the United States was presumed to be low, primarily due to the existence of strict importation regulations. However, this most recent outbreak has shown that not to be the case. Current investigation and testing is ongoing. While these efforts are costly and time-consuming, they are critical in the effort to avoid the establishment of this disease within the United States.

**FURTHER READING**


