Equine Influenza

Equine influenza, caused by the orthomyxovirus equine influenza A type 2 (A/equine 2), is one of the most common infectious diseases of the respiratory tract of horses. It is endemic in the equine population of the United States and throughout much of the world, with the notable exceptions of New Zealand and Iceland. Equine influenza virus does not constantly circulate, even in large groups of horses, but is sporadically introduced by an infected horse. This epidemiologic finding and the rapid elimination of the virus by the equine immune response suggest that infection can be avoided by preventing entry of the virus into an equine population (i.e. by the quarantine of newly arriving horses for at least 14 days), and by appropriate vaccination before exposure. All horses should be vaccinated against equine influenza unless they live in a closed and isolated facility.

To date, the most important factors associated with increased risk of infection have been identified as:

1) Age: Horses 1 to 5 years old are more susceptible. Older horses are generally less susceptible to infection, but immunity can be overwhelmed in horses frequently exposed at shows or similar athletic events.

2) Serum concentrations of influenza virus-specific antibody: The importance of local mucosal protection is difficult to quantitate by methods currently available.

3) Frequent contact with large numbers of horses.

Equine influenza is highly contagious and the virus spreads rapidly through groups of horses in aerosolized droplets dispersed by coughing. The severity of clinical signs depends on the degree of existing immunity, among other factors. Horses that are partially immune can become subclinically infected and shed virus. Immunity to the same (homologous) strain of virus following natural infection persists for approximately one year. Immunity following vaccination with inactivated influenza vaccines can be short-lived, allowing recently vaccinated horses to become infected and shed virus, thereby contributing to maintenance and spread of infection within the equine population. For these reasons, only vaccines of proven efficacy should be selected for use.

Although influenza is endemic in many countries and circulates continuously in the equine population, explosive outbreaks occur at intervals of several years when the immunity of the equine population wanes, and sufficient antigenic drift in the virus has occurred, allowing the virus to evade vaccinal immunity. Antigenic drift, by generating antigenically heterologous viruses, reduces the degree and duration of protection conferred by previous infection or vaccination. Although antigenic drift of equine influenza virus is slower than that of human influenza virus, it is still recommended that equine vaccines contain killed viral antigens from isolates obtained within the most recent 5 years. The 2010 OIE Expert Surveillance Panel on equine influenza vaccine composition had a number of findings and recommendations:

- All equine influenza virus isolates in the previous two years (2008-09) were of the American lineage (Florida sublineage), and comprised two clades: Clade 1 was identified in North America, and parts of Europe; and Clade 2 was identified in Europe and parts of Asia. Global surveillance is likely insufficient to assure that these geographic restrictions are absolute but it seems likely that the equine influenza viruses circulating in North America are all from Clade 1: i.e. A/South
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- Because of the antigenic differences between Florida Clade 1 and Clade 2, it is possible that vaccination with only one of these antigens will not fully protect against disease caused by the other. However, at this time there is no evidence of a vaccine failure resulting from this phenomenon. This means that North American horses vaccinated with a Clade 1 virus, such as A/Ohio/2003-like, should be protected from current circulating North American influenza viruses, but may not be fully protected if they travel overseas, or in the event that Clade 2 viruses are introduced to North America, for example in a horse transported here for competition.
- The OIE panel recommended that vaccines contain examples of both Clade 1 (e.g. A/South Africa/2003-like or A/Ohio/2003-like) and Clade 2 (A/Richmond/1/2007) viruses particularly for horses traveling internationally.
- The absence of any isolation of Eurasian lineage influenza virus means these viruses no longer need to be included in vaccines.

Historically, equine influenza vaccines have been administered at intervals as short as every 3 months to horses considered at high risk of infection. All currently marketed equine influenza vaccines are likely to provide protection of at least six months duration. This is true for both of the modified live vaccines on the market today, and for inactivated vaccines. This performance depends on the quality of currently marketed vaccines, and maintaining this performance will depend on the inclusion of any new antigenically distinct equine influenza viruses that may appear in the horse population in the future.

**Vaccines:**

There are three types of equine influenza virus vaccine currently marketed:

**Inactivated vaccines**

Each of these has been shown to be efficacious in providing protection against clinical disease and viral shedding when used appropriately. These vaccines frequently include multiple strains of equine influenza virus A2 representing the major circulating strains. Some of these vaccines also contain the A1 strain (now thought to be extinct), because this was part of their original formulation; this strain will likely be phased out of all equine vaccines in time. The majority of these vaccines require two-dose priming regimens, although a three-dose priming regimen is recommended here as described below; a 3-dose regimen is required for at least one of the most effective inactivated vaccines. These vaccines are well suited to pre-foaling boosters designed to increase colostral antibody levels against influenza virus.

**Modified-live (MLV) cold-adapted equine influenza /A2 vaccine**

This product is administered intranasally. The vaccine has proven to be very safe and a single administration to naïve horses is protective for 12 months, although only a 6-month claim is made on the product data sheet. Circulating antibody responses post-vaccination are minimal, suggesting that that other factors, such as local protection at the nasal mucosa may be enhanced by this vaccine. The product is licensed for vaccination of non-pregnant animals over 11 months of age using a single dose of vaccine, followed by boosters at 6-month intervals. Generally, horses shed vaccinal virus for less than 1 week after vaccination. However, the amount and duration of shed vaccinal virus is so minimal that other horses in contact with them will not be vaccinated. Incorporation of the MLV vaccine into a program which previously used inactivated vaccine can be easily accomplished by just substituting the MLV when routine boosters are scheduled.

Experience strongly supports the safety of the MLV intranasal vaccine when administered to foals less than 11 months of age. Similarly, the vaccine is protective when administered to foals six months of age...
or older. The onset of protection in previously unvaccinated naïve horses has been documented as early as seven days after vaccination. The vaccine is not recommended for vaccination of mares in late pregnancy to boost colostral antibodies, as data available to date suggest that circulating antibody responses to vaccination are low.

Canary pox vector vaccine

This product is to be administered by intra-muscular injection and has been shown to provide protection of at least six months duration. A two-dose priming regimen is recommended, with boosters at a six-month interval. The vaccine is safe to use in foals as young as four months of age, and there is some evidence of efficacy in the face of maternal immunity. Because this vaccine generates high levels of antibody response, it is likely to be suitable for pre-foaling boosters.

Vaccination Schedules:

Adult horses, previously vaccinated: Mature performance, show, or pleasure horses constantly at risk of exposure should be revaccinated at 6-month intervals. Other adult horses could be vaccinated as infrequently as once a year.

Adult horses, unvaccinated or having an unknown vaccination history: Either one dose of the MLV intranasal vaccine or a 2-dose series of canary pox vector vaccine at a 4- to 6-week interval (revaccinate semi-annually) or a primary series of 3 doses of the inactivated-virus vaccines is recommended. The ideal intervals between these vaccinations are three to four weeks between the first and the second vaccination, followed by an interval ideally as long as three to six months before the third vaccination. This regimen generally induces higher and more persistent antibody titers than those induced by use of the previously recommended 2-dose initial series. Subsequent revaccination should be at intervals of 6 to 12 months, depending on the age of the horse as well as the degree and duration of risk of acquiring infection.

Pregnant broodmares, previously vaccinated: Vaccinate 4 to 6 weeks before foaling using an inactivated-virus vaccine or the canary pox vectored vaccine.

Pregnant broodmares, unvaccinated or having an unknown vaccination history: Use a 3-dose series of the inactivated-virus vaccines, with the second dose administered 4 to 6 weeks after the first dose and the third dose administered 4 to 6 weeks pre-partum. With a canary pox vector vaccine, a 2-dose series is recommended with the second dose administered 4 to 6 weeks after the first dose but no later than 4 weeks pre-partum.

Foals of vaccinated mares: Administer either a single dose of the MLV intranasal vaccine (2 doses are recommended if foal is less than 11 months of age, 1st dose at 6 to 7 months of age and second dose at 11 to 12 months of age) or a primary series of 2 doses of canary pox vector vaccine at a 5-week interval or 3 doses of inactivated-virus vaccine beginning at 6 months of age. The recommended intervals between these vaccinations with an inactivated-virus vaccine are 4 to 6 weeks between the first and the second vaccinations. The third dose should be administered between 10 and 12 months of age.

Foals of nonvaccinated mares: Administer either a single dose of the MLV intranasal vaccine (2 doses are recommended if foal is less than 11 months of age, 1st dose at 6 to 7 months of age and second dose at 11 to 12 months of age) or a primary series of 2 doses of canary pox vector vaccine at a 5-week interval or 3 doses of inactivated virus vaccine at 6 months of age (see above), unless there is an unusual threat that recommends earlier vaccination. Because some maternal anti-influenza antibody is still likely to be present, a complete series of primary vaccinations should still be given after 6 months of age.
Outbreak Mitigation:

Vaccination to boost immunity in the face of an outbreak may be a valuable strategy if the outbreak is detected early enough. In previously vaccinated horses, any vaccine can be used for this purpose. In unvaccinated horses, or horses with an unknown vaccination history, the early onset of immunity after administration of the intranasal product (protection within 7 days), may recommend it for use. The use of a canary pox vectored vaccine may also be considered for this purpose. (View AAEP Infectious Disease Control Guidelines—Influenza.)