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West Nile Virus Infection in Horses

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West Nile Virus (WNV) primarily causes disease in birds and is usually spread by mosquitoes but it occasionally causes disease in horses. Horses become infected with WNV by the bite of a mosquito which previously (at least six to ten days earlier) fed on a bird infected with WNV. Infection does not always cause clinical disease in horses. When horses have clinical signs, the disease can be very serious. There were 738 clinically affected horses reported in the United States in 2001 and over 14,000 reported in 40 states in 2002. Pennsylvania had 97 equine cases in 2002.

Horses with West Nile Virus can have a variety of clinical signs. They may have a mild flu-like syndrome with fever, depression, listlessness, and occasionally somnolence. When fever occurs it may be biphasic with the early fever associated with mild flu-like signs and a second fever a week later associated with the onset of more serious neurologic signs. Many cases never develop a fever. Some cases will develop local muscle contractions and an unusual muzzle twitching. They may show more serious neurologic signs including incoordination and ataxia (stumbling), circling, aimless wandering, head pressing, and hyperexcitability followed by convulsions, coma, and death. In some outbreaks a progressive hind limb paresis (incoordination, ataxia, stumbling) progressing to complete hind limb paralysis (inability to rise behind) and finally front leg involvement is reported as typical. Simultaneously, brain signs will be progressive (depression, somnolence or hyperexcitability, convulsions, coma). Death may occur within hours or after 5 to 10 days of development of serious signs in up to a third of the cases. Survivors will recover with the most dramatic improvement within three weeks.

West Nile Virus is primarily transmitted between birds by mosquitoes. Occasionally virus-carrying mosquitoes will bite mammals exposing them. Based on recent experimental inoculations carried out on horses, horses are not involved in the transmission cycle of WNV. That is, horses are terminal hosts because they do not maintain a sufficient viremia (presence of virus in the blood) to infect mosquitoes or other mammals. Previous studies in horses support this conclusion. This means that infected horses will not transmit WNV to other horses or to people. So an infected horse is not a threat to other horses in contact with it and

people cannot contract West Nile Fever by caring for an infected horse. However, special care should be taken when handling blood, spinal fluid, or nervous tissue from suspect animals since these may contain virus.

The virus is introduced into an area through infected birds. Some infected birds develop neurologic signs such as loss of coordination, tremors, abnormal head posture, circling, convulsions followed by death. The appearance of dead birds in an area may be an

According to the Epidemiological Bulletin, Pan American Health Organization, people can take some basic precautions to limit their exposure to the virus:

- Put screens on windows and block any holes in the house where mosquitoes can enter.
- Wear long pants and long-sleeved shirts, particularly when remaining outdoors for extended periods, especially at times when mosquitoes are active.
- Minimize outdoor activities at dawn and dusk, when mosquitoes are most likely to bite.
- Use insect repellent, always following directions on the package.
- Herbal and ultrasonic repellents are ineffective against mosquitoes.

early warning that the virus is present. When handling dead birds that may have died from WNV infection, care should be taken. There is no evidence that people can catch this disease from dead birds, but the Centers for Disease Control and Prevention recommends that no one should ever touch any dead animal barehanded. Call your local health department for proper procedures for handling of dead birds.

How can horses be protected from WNV infection if the virus enters the area? One key is mosquito control to stop the bird-mosquito infection cycle. The primary mosquito carrier transmitting the disease to horses has not been identified. Over 30 species of mosquitoes have been found positive for WNV. A frequently identified species is *Culex*. This mosquito spends its entire life within a range of about 1000 yards. Thus local control can be very effective in stopping WNV transmission by this mosquito. With all mosquito species, the most effective method of mosquito control is to destroy the mosquito larval habitat. *Culex* mos-

quitoes can breed in any puddle that lasts more than four days. So it is important to reduce the amount of standing water available for breeding such as water troughs (should be cleaned at least once or twice a week), water buckets not in use, plastic wading pools, bird baths, wheelbarrows, clogged roof gutters, discarded tires, tin cans, plastic containers, ceramic pots or any water-holding container.

Although less effective than preventing mosquito breeding, it is advisable to make efforts to limit the horse's exposure to adult mosquitoes. Because different mosquito species have different feeding preferences and we are unsure which mosquito species transmits the disease to horses, specific stabling recommendations can not be made. One recent study suggested that horses stabled at night are less frequently affected by the virus, so nighttime stabling maybe helpful. Also, insect repellent approved for horses can be used (always follow label instructions), but insect repellent should not be used as the sole control method.

Another key to prevention is vaccination. A conditionally licensed WNV vaccine is available. Conditional licensing means that the product has been shown to be safe, pure, and have a reasonable expectation of efficacy in preventing illness caused by WNV. Widespread use of this vaccine over the past year suggests that it is safe but its efficacy in preventing disease from WNV remains unproven.

Recent Gifts of Note

An anonymous faculty member has made a \$100,000 gift to the Department of Clinical Studies-Philadelphia to establish an endowment to fund basic research projects by clinical faculty.

A gift of \$100,000 for the Teaching and Research Building has been made by Louis DeNaples. The Montgomery County Kennel Club contributed to the Josephine Deubler bridge in the Teaching and Research Building and to the Josephine Deubler Genetic Disease Testing Laboratory. The Devon Dog Show Association made a gift to the Ryan Veterinary Hospital.

The Gerald B. Shreiber Foundation made a gift of \$15,000 to the Special Species Clinic in appreciation of the care Mr. Shreiber's pet "Goose-Goose" received. The funds will be used to purchase a special endoscope for sole use in the Special Species Clinic.