



# West Nile Virus— Here To Stay

by **HEATHER SMITH THOMAS**

West Nile Virus (WNV) is a disease of birds that is spread by mosquitos and occasionally affects horses and humans as end-stage hosts. The mode of transmission, and some aspects of the disease, are similar to Eastern Equine Encephalomyelitis (EEE) and Western Equine Encephalomyelitis (WEE). It first arrived in the U. S. in 1999. Based on molecular typing of the virus, researchers are fairly sure it came from the Middle East. The strain of WNV in the U. S. is a perfect match with a strain isolated in domestic geese in Israel in 1998. No one is sure how it got into this country, but it first showed up in New York, at the Bronx Zoo.

Wayne Kramer, entomologist in the Nebraska State Veterinarian's office, has been working with the problem of WNV in mosquitos. "I am a medical entomologist by training—a mosquito biologist—and that's how I became involved in the WNV situation. We've had 700 horse cases in Nebraska so far this year (September 12), so we are right in the midst of it. Unfortunately, few people vaccinated their horses early, and were not well prepared when it came."

There have been some panic situations as the disease arrived in some regions more quickly than anticipated. "Even though most people knew it was coming, they didn't take it seriously until it was in their state, and with WNV, that's too late, because you

don't have time to vaccinate. With a lot of other diseases, you can vaccinate and get quick immunity (within 10 days or two weeks), but WNV takes a lot longer," he says.

The disease swept across the mid-west and reached the eastern slope of the Rockies (Montana, Colorado and Wyoming) by late summer. "One of the things that is not well understood by people is that there are many kinds of mosquitos. The ones in the western U. S. that readily transmit this virus and bite horses are different than those found in the eastern U. S.," he says.

"When this virus was introduced into the U. S., it was shown experimentally that the western U. S. mosquito, *Culex tarsalis*, is an exceptionally good transmitter of WNV. That may be why we are seeing more cases out here. This mosquito is most prevalent in the west. We are trapping mosquitos and testing them for WNV and most of our isolates of the virus come from this mosquito," he says. "This mosquito is very important in spreading WNV. It's a very common and abundant mosquito in western Nebraska, where it is associated with irrigated agriculture. WNV is not going to behave the same in all regions because there are differences in the virus cycle with birds and mosquitos in different parts of the country. Based on what we've seen in Nebraska and the Dakotas (and now in Colorado and Wyoming), California may be in for a rough time. This

mosquito is very prevalent in California," says Kramer.

"It is very important that people get their horses vaccinated. The problem in Nebraska is that people started late in the season. As we learned in Florida last year, getting the first shot of the two shot series is not sufficient to give any protection." It merely sensitizes the horse and prepares the body to start building immunity after the second inoculation.

"Maximum immunity is not obtained until at least three weeks after the second shot, so it's six to eight weeks from the time of the first shot before you have any protection. People are starting late and many of those horses are coming down with the disease because they became exposed before they could develop immunity." The vaccine has been effective, in most instances. Some vets are recommending more than the two shots, in regions that have year-round mosquitos.

"In Nebraska the highest risk of transmission of these types of virus increases throughout the spring and into the summer and fall as long as the weather is favorable. The virus transmission activity is still increasing here, in September. It won't change until the first frost. That will kill some of the mosquitos, and interrupt part of the virus transmission cycle but there will still be some going on. Once we get the first hard frost, it will take out most of the mosquitos and end the virus transmission season. People shouldn't

be lulled into a sense of security just because the heat of summer is gone and mosquitoes don't seem as numerous. There can be transmission going on, long into the fall, as long as the weather is favorable."

Since the mosquitoes start slowly in the spring, there is not much risk of transmission until well into the season. "People are safe if they start vaccinating at a reasonable time like April or May, depending on where they live, and how early the mosquitoes get going. In most areas it's not until July, August and September that the majority of the virus is being transmitted," he says. As with WEE and EEE, August is often the worst month for seeing cases (in unvaccinated horses).

Horses that develop WNV soon after vaccination sometimes seem to have a lesser illness—it may be that there is some protection, but this is not an established fact. Severity of the illness can vary greatly under natural conditions and some horses don't even show any signs at all. "We have done studies where we've taken blood from horses on farms where no horses were vaccinated (where some horses died of WNV) and found that the other horses that seemed healthy were indeed infected—they tested positive," says Kramer.

"Another thing we are doing is working with veterinarians on farms where there are sick horses, trapping and testing mosquitoes at those farms. Up to 35 percent of those mosquitoes are testing positive. Thus, we are documenting that we can find infected mosquitoes on premises where there are cases of WNV. We've also had 15 human cases (and one death) in Nebraska—we've got WNV in birds, mosquitoes, horses and people," he says.

"It will be with us from now on, but this has happened before, with WEE and EEE. WEE affected many horses early in this century. WNV will also reach equilibrium with the environment, and won't continue to kill so many birds—it will become one of those viruses we vaccinate our horses for every year, like WEE, EEE." After four to five years there will probably be a lower level of incidence because

there will be more immunity in the general population, he says.

"There are not as many birds dying on the east coast right now, as there were the first couple of years. By contrast we are experiencing a very high amount of bird mortality in Nebraska, this first year, with the massive amount of virus present," he says.

"Right now it's an exotic virus in a new environment, and none of the animals have any immunity. Once horses are exposed, some of them may have natural immunity for awhile, but we don't know how long this immunity really lasts. I don't know if it's variable between horses, or a long-lasting immunity," says Kramer.

### **The Vaccine**

At present, Fort Dodge is the only company making the vaccine. It was approved in August 2001, under a conditional license (meaning it has not undergone full testing yet), and is only sold to veterinarians. Each state must approve its use in that state and can also place its own restrictions on it. In a few states, only veterinarians are administering the vaccine—in other areas they are dispensing it to clients to give to their own horses, where they have a good client-veterinarian relationship (on a prescription basis). Costs of the vaccine vary, depending on where you live and on whether the veterinarian gives the shots. In some areas, horsemen are hesitant to vaccinate all their horses because of the expense. Horse owners are hoping that once Fort Dodge gets a full license, the price will come down.

"The vaccine has proven to be safe and effective; it shouldn't be long before it is granted full license. We are all hopeful it will then be sold over the counter. That would be an improvement. They could also include it with EEE, WEE, flu and tetanus, as a multi-valent vaccine, and more people would use it," says Kramer.

### **Mosquito Control**

Besides vaccination, mosquito control and protecting horses (and humans) from mosquitoes are ways to deal with WNV, but it is not simple.

"In Nebraska, for example, there

are 50 different species of mosquitoes. Not all species transmit WNV. A person might come to the conclusion, seeing mosquitoes on a horse, that the horse is at high risk. But those might be the wrong mosquitoes. In Nebraska we've had severe drought this year, yet the virus has been very active. The varieties of mosquitoes that transmit this virus live in more permanent water bodies, that are there even in a drought. In general, our mosquito populations are very low this year and people don't understand how we can be having a mosquito-borne virus when there's a drought. But there are enough of the right kind of mosquito," he explains.

"In fact, most of the harmless mosquitoes are the ones people notice. Those are the ones that are not around when it's dry. Two weeks ago we had a rain—now we have a big emergence of mosquitoes and I've seen a lot of mosquitoes biting my horses at the farm. So I collected 100 off the horses one night, in half an hour. But they were all the kind that don't transmit WNV. Things are not always as they appear on the surface. All mosquitoes are not equally capable of transmitting the virus."

The kind that transmit the virus live in more permanent waterlike lagoons, wetlands, water in a ditch, horse tanks that aren't treated or don't have fish, etc. Those are always full of water. "I put fish in my horse tanks, and the fish eat all the mosquitoes, so I don't have to use any chemicals. If you know more about the cycles, and which kinds of mosquitoes, it enables you to do some common sense things to lessen the risk," says Kramer.

"Some of the insecticide and repellent sprays are effective—for short periods—and some people keep horses inside at night. There are a few things you can do to lessen the risk," he says. If horses are put indoors before the evening mosquitoes come out, they are fairly well protected if the barn openings have mosquito-proof screening. Fly sheets and face masks are helpful. Vaccination and mosquito control are the best insurance against WNV.