

## 2003 WORLD TROTTING CONFERENCE

**SPEAKER:** CATHERINE MARTIN

**TOPIC:** West Nile Virus

**DATE & TIME:** Saturday July 26  
10:30 am - Noon

**VENUE:** Imperial Room, Royal York Hotel

### PROFILE OF SPEAKER

**ORGANIZATION:**

☆ Wyeth Animal Health

**CURRENT POSITION:**

☆ Equine Product Manager

**MAJOR CAREER / ACADEMIC ACHIEVEMENTS:**

- ☆ Graduated from Seneca College in 1990 with honours as a
- ☆ Registered Veterinary Technician

**EXPERIENCE IN RACING OR ORGANIZATION REPRESENTED:**

- ☆ Worked at Toronto Equine Hospital in equine sports medicine and anaesthesia
- ☆ In 1998, joined Wyeth Animal Health as Sales Rep, and was promoted 1 year later to Equine Product Manager
- ☆ Active technician assisting a group of veterinarians at Woodbine Woodbine Racetrack

**EMAIL:** martincg@wyeth.com

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**SPEAKER:** DR. MOIRA GUNN

**TOPIC:** West Nile Virus

**DATE & TIME:** Saturday July 26  
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**VENUE:** Imperial Room, Royal York Hotel

### PROFILE OF SPEAKER

**ORGANIZATION:**

☆ Armstrong Bros. Farm

**CURRENT POSITION:**

☆ President of Armstrong Bros. Farm (since June 2000)

**MAJOR CAREER / ACADEMIC ACHIEVEMENTS:**

- ☆ Graduate of University of Edinburgh Scotland in Vet. Sc.
- ☆ Graduate of University of Guelph

**EXPERIENCE IN RACING OR ORGANIZATION REPRESENTED:**

- ☆ Has worked at Armstrong Bros. since 1988 when she was hired as a veterinarian
- ☆ In 1990, assumed duties as farm manager
- ☆ In 1997, became vice-president
- ☆ Appointed president in 2000

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## West Nile Virus

(References are made to PowerPoint presentation slides, which follow the written portion of this presentation)

I'm hoping the information I provide will help you walk away with a better insight as far as the impact of this disease across North America and globally. I will give you a brief overview as far as the history of West Nile, how it spread across the US, how it came over from Asia basically into the US, and the exposure levels in the US and how it came up into Canada as well. We will talk a little about the symptoms of the disease, treatment and prevention as well.

Historically, it was first isolated from a woman in Uganda in 1937. She was very febrile and a blood sample taken from this woman isolated this particular virus. It comes from a family called flaviviridae. As you can see all the different complexes of diseases here, if you look at the one that's highlighted in white, the St. Louis encephalitis virus, is the same virus that hit New York City many years ago. It falls into the same family as West Nile virus. Mosquitoes transmit all of these diseases; all cause fever in people and are usually fatal. The first epidemic was in Israel in 1950. It was a massive epidemic where a lot of people were getting very ill and it was soon recognized as one of the most wide spread flaviviruses over in the Eastern part of the world. It quickly distributed throughout Africa, West Asia, and Europe and into the Middle East. It wasn't until 1999 that New York found their first fatality in zoo birds. Numerous zoo birds were dropping dead basically because of this virus. When they took blood from these birds they isolated the virus strain that was typical to that one in Israel, but it had mutated, become cleverer and a lot more pathogenic, affecting more species as well. If you look at this map you can see in the blue, the West Nile virus affecting Asia back in the year 2000, and it became wide spread in certain parts of the world. It wasn't until 1999 in September in New York City that it started to cause fatality in people and horses as well. It was isolated from several thousands of birds and found in well over 42 states in the United States. In 1999, there were over 6000 equine cases that were confirmed positive and it was anticipated at that point in time that by the end of 2003, it would be affecting the Western seaboard right across the United States. As I go into my presentation, you will see how true that was. If you look down at the bottom of the tip here you will see basically the floor of the Atlantic peninsula down here and that is where it became very heavy. This was first noted in 2001. A lot of birds were coming up through the Atlantic coast flyway and it was affecting other birds in the area and it soon spread to people and horses along this area. And if you were to look at this map more closely you will see that all birds, people and horses were starting to be affected right at that Southern tip. First it was the birds slowly affecting the people and moving into the horse population as well. If we look at 1999 going right through to 2001, you can see in humans, the cases started to progress and become more prevalent throughout North America. By 2001 they had up to 55 positive humans cases, with 8 deaths and 416 equine cases and 71 deaths. At that point in time the death ratio was approximately 24%. How was this disease coming into North America? What they found was that it is isolated from numerous wild birds, both wet land and terrestrial species. Birds are known to be the primary amplifier host of this disease. Where it comes from and how they get it is still relatively unknown. Research continues

to try to verify that. So the migratory bird route in distribution of this disease is very important. How this disease is working its way North and West into our country and the role of other vertebrates is very much unknown. This is the Atlantic coast flyway and the map that I showed you in Florida a few slides before showed you how it was progressing up through the US at that point in time. Birds are considered to be the primary amplifier hosts of this disease and the migratory route is very important. It is something to remember depending on what kind of country you are coming from and what type of birds are being introduced into your country because certainly if you have birds there is potential for mosquitoes and ticks. You can see by this map in 2000, it was just the Atlantic coast flyway going into the Mississippi flyway, Central flyway and has gone right over the Pacific coast. So our prediction as far as hitting 2003 Western seaboard has basically come true. The most prominent birds that we've seen carrying this disease are crows. I don't know how prevalent crows are in some of the other countries but certainly in North America they are and seem to be the ones showing the disease first but eventually it moves into birds like the raven. The raven is very common in Ontario as well as the blue jay and magpies. Magpies seem to be showing up quite prominently in Western Canada and those have been the ones that are popping up with West Nile recently. The way they determine whether these birds do in fact have West Nile is post mortem they are submitted for testing. A section of the bird's brain is put through what they call a PCR test or some type of testing which can isolate these little black particles in their brain. That's basically indicative of West Nile virus. The mosquito is certainly a number one vector of this disease. Currently at this point in time, it's isolated well over 48 different species of mosquitoes. We anticipate that number to increase. The species that is most prevalent in Ontario is the culex species, which is your everyday household mosquito that they're seeing them in. There is also evidence of it being isolated in ticks, certainly in Asia at the time they did see a lot of West Nile virus in ticks in certain areas of the world. So what happens here? The mosquito will usually feed on an infected bird and its usually mosquitoes that fly at a higher altitude are the ones that are going to hit these birds and they will pass this virus on to other warm blooded animals. We will talk a little bit more about what animals are more susceptible. But horses are infected by mosquito bites and so do humans. Humans are the ones that are at risk for fatal encephalitis and we will talk a little bit more about that as well. You can read in the red, this is a very important point, **that horses cannot spread the West Nile virus to other horses, people or pets**. They are what is known as dead end hosts to the disease, they cannot transmit it further. The reason being is by the time the mosquito bites the horse, the virus in the horse becomes so diluted that it doesn't create enough viremia that if another mosquito comes by and takes a blood meal from that horse, nothing will happen. Ironically birds can pass this virus among each other and it is uncertain how this happens. Whether it is through the saliva, feeding methods etc is yet to be determined. If we look at the transmission cycle you can see that mosquitoes are once again the number one vector for this disease and they take their blood meal from the bird. Birds are what we call reservoir hosts for this disease, and they can pass this virus among one another. However we cannot spread the disease with only one exception to that. Last year there was evidence of people going for surgery and receiving blood transfusions, from people infected with West Nile, and then having the circulating viremia in their system post

blood transfusion. It's unfortunate that disabled people tend to be the ones with the disease problems, and are the ones that get hit more severely.

Ticks in Europe and Asia have tested positive but none currently have been found in the United States. What will happen when a mosquito takes a blood meal from a bird? It basically gets digested into their stomach and it takes anywhere from about 10-15 days for the viremia to work its way back up into the salivary gland of the mosquito and at which point they become infected. So again it's roughly a 10-15 day incubation period before that mosquito can actually pass the viremia on to either horses or people. And the tiger mosquitoes are also very prominent feeders as well and pass on the virus. Any animal that the mosquito bites for a blood meal is actually the hosts for this disease. So we have had speculation that it is possible with bats and mice and cattle. Actually there was a cow down in the US last year that was confirmed positive for West Nile. It was one of those very obscure cases and inevitably when an infected mosquito bites any mammal there is certainly potential for that virus to be circulating within that animal's body. It depends on their defense mechanism as to how well they are able to fight off the disease, and in some respect they learn how to neutralize the virus. That is one explanation to say that why it affects some animals and not others. We've had cases of a couple of dogs in the United States and this was rather interesting. In 2001 in Georgia, there was a rottweiler that started showing some bizarre clinical signs: stumbling, very depressed, off feed. After many studies, they decided to test the dog for West Nile virus and sure enough it turned up positive. There was another dog reported with similar symptoms and it turned up West Nile positive. Why it's not showing up in more dogs is very uncertain. We anticipate eventually it may increase in canines and the research is progressing to the point where we need to know more about this.

This is a map showing the first exposures back on October 31, 2001. And you have to remember at this point it has gone through the United States and its worked it's way north and west in the US. Now it is showing for the first time into Canada. Southwestern, Ontario got hit the hardest. Windsor, Ontario has a heavy horse population out in that area and very high in standardbreds. We had quite a few incidents of positive birds showing up so at this point they were saying that's where the positive birds were coming from. And if you look at October 31, 2001 you can see it becoming a little more densely populated and again we're talking about only birds at this point in time. And at this point it was the crow and blue jay that were showing up positive for this disease. If we go into Ontario August 27, 2002 we're showing now in purple these are the positive cases that were submitted and you can see how rapidly it spread across Ontario. At this point in time we had 177 crows showing positive and 14 ravens. So crows and the ravens are very prominent. If we move on to September 10, 2002 you can see densely populated 228 crows at this point in time. And if you go to September 24 we had 232 showing positive. So you can see how rapidly this has spread throughout Ontario upon its first exposure in 2001. So in August we first detected it in dead crows. And it wasn't until May of 2002 that we had our first positive crows. In August, it was first detected in horses in Southwestern, Ontario. In September we had detection in humans as well. So at this point in time in 2002 we had well over 36 counties showing positive for mosquitoes and birds and 18 of which had equine cases as well. Majority of those cases is a mixture of anywhere from pleasure horses to standardbred and thoroughbred horses. Now interesting enough, we had a very unusual outbreak in snowy owls. There is a snowy owl sanctuary

just south of here in Welland Ontario and they had snowy owls getting very ill and many of them dying. Blood samples were taken again and determined that it was West Nile Virus that affected these owls. They basically purchased a whole lot of our equine vaccine and started vaccinating the owls. Totally off label use, but apparently the equine vaccine works well in birds. So where is West Nile in Canada? If we look at September 3, 2002 you can see that 274 crows and up to 9 out of 138 blue jays were submitted and you can see at this point its moving west bound and it's a little scattered into Saskatchewan. By September 27 you can see it moving right across and into Alberta again. The Atlantic provinces out in the East end of Canada were starting to submit a lot of birds as well and at this point in time we had the American crow again and so you can see how prevalent the crow is at carrying this virus. And in Quebec they had a lot of birds submitted as well. If we look at the United States and just reflect back, West Nile virus in 2002, in the light round here, you can see the verified avian and animal mosquito infections and this, as of September 30, in the dark patterns indicate human cases. There are well over 4000 human cases in the US last year, which is just devastating, so you can see how rapidly this has spread and the effect of humans, horses and birds. So a lot of these provinces have been very proactive in setting up measures of prevention. This is a summary of 2002 and well over 14,000 equine cases in the United States. In general it is 1/3 of the equine population that is confirmed with West Nile and basically will have to be euthanized because of the disease. People are asking me why haven't we seen any positive equine cases? By the end of August, September, October we are going to start seeing some positive equine cases inevitably but there is going to be something that changes that ratio in comparison to last year and I will talk about that in a minute. If we look at the number of doses for our West Nile virus vaccine and to date this is as of June there is well over 770,000 doses that have been sold across Canada to veterinarians. Actually 45% of the horse population in Canada have been vaccinated to date. So let's look at some clinical signs here. In people it varies. There are two forms of West Nile - West Nile fever or you can have West Nile encephalitis. West Nile encephalitis is considered the full-blown form. West Nile fever is where you could walk around with a really bad headache, you might get a rash on your arm or your stomach, just feel nauseous, really lethargic for a couple of days and just feel like you've got the flu and 10 days later you would feel fine again. So basically you get the sore throat and the back ache, all typical flu like symptoms. It's not until people who are compromised with other illnesses, elderly people where their immune system is down. It's usually those unfortunate people that get hit hardest with the more severe form of the disease. But in general, most people would walk around feeling like they had the flu with no indication that they have West Nile. Fever is not always a prominent symptom in horses. They can be very depressed. As we all know the first thing a horse does when they are not feeling well is look pretty dull eyed and off feed and lethargic. As this disease progresses they can start showing neurological signs. Signs from ataxia include walking like they are drunk in their hind end. They are unable to rise. Which again as this disease progresses, gets more severe to the point where the horses can't support themselves. It is very important to understand that this disease can get confused with Equine Protozoal Myelopathy (EPM). EPM is another disease that affects the central nervous system like rabies, and equine's herpes virus. It is very important that these diseases get ruled out before you jump to the conclusion that it is West Nile. Certainly if you have any dead

birds in the area you want to rule that out as well too. How do we diagnose West Nile? Obviously the critical signs are important. Again you want to rule out all of the other diseases. Some of the tests they do will give you an indication of whether the horse has recently been exposed or whether their exposure is the result of an actual field strain exposure of West Nile or from a vaccination. When the horse is euthanized because of severe complications from West Nile, they do what they call a PCR testing and that will confirm if the horse was infected. So treatment is very symptomatic. It depends on the horse, the progression of how this disease is spreading amongst horses. IV fluids are number one. Again it is very important that you keep their circulation going. Horses aren't meant to lie down for long periods of time and we want to get their blood flow moving. IV DMSO has shown to be a good therapy for horses in more severe stages. As they get more severe symptoms and when they can't support themselves, they will put these horses in a sling to help them.

We're going to talk a little bit about prevention of West Nile and obviously preventing mosquito populations is very important in aerial spraying within the area. It's important to keep horses housed in mosquito free environments during peak hours especially in the evening. Obviously there is a vaccine available. Fluorescent lights have proved to be very beneficial in keeping mosquito populations down, and cleaning water troughs are important which is an ideal breeding ground for mosquitoes, and obviously there are mosquito repellents available. Any source of opportunity of water pool, you want to eliminate it. The vaccine helps increase an immune response in these horses and it also helps minimize local reactions. The vaccine was fully approved for license in February of this year. It's gone through all the trial data. The vaccine that's come out is now labeled as West Nile innovator. It is a kill virus vaccine and is safer than modified vaccines. The labeled recommendation is two shots intramuscularly, 3-6 weeks apart. That is extremely important to build up the proper anti-body response in protection for West Nile. Some people have the feeling that they can give it one shot and be protected. That is not the case. After one dose, you're getting about 30% protection. That second booster is where the prevention percentage goes up to 94%. Ideally when should I be vaccinating my horse? You want to keep your titers in your horses at the highest at the onset of mosquito season. The vaccine itself has about a 10-12 month protection claim. However, because of the diversity of mosquito populations in the world and the different climate changes, if your horse is going to a higher area of mosquito exposure you should be vaccinating your horse at least 30 days prior to exportation to get adequate protection. Maureen Long from Florida state, and this is from the American Association of Equine Practitioners, have a current recommendation to boost horses within 4-6 months before mosquito season. It's also important to consult your veterinarian. Again, there is no vaccine in this world that is 100% but this vaccine has a very high efficacy that protects horses against the disease. Any pregnant animal should always get vaccinated with a kill virus vaccine, which is the one used for West Nile. Even though it's not on our label, we have studies to support this vaccine in pregnant mares. The current recommendation is to vaccinate your pregnant mare 4-6 weeks prior to foaling. The foal will receive some protection from the mare when she is feeding. If the mare is not vaccinated, your foal should start to be vaccinated at 2-3 months of age. If the mare is vaccinated you can start vaccinating at 6 months of age. Foals need 3 boosters to build up a proper anti-body response and that is very

important for these little guys. That wraps up the equine portion here. Do any of you have any questions?

Question:

What is the cost of that vaccine?

The cost of the vaccine will vary because it actually gets sold to veterinarians. The range that it's being charged is anywhere from \$25 - \$50 Canadian.

Question:

Has there been any known cases where the horse has recovered and raced?

I don't know the outcome on these horses. I don't think we know at this stage the level of recovery. In most neurological diseases it depends on the extent of damage to the nerves as to how they will perform afterwards but I don't think we know the answer to that yet. I do know that there were 3-4 thoroughbred race horses at Woodbine that were positive for West Nile and luckily they were caught early enough and all 3 of them are back fully recovered. There is only one that produces a constant sweat than it normally does.

Question:

I've been breeding for about 30 years and just recently euthanized a yearling filly with so called Wobbler. Is there a connection in anyway?

Wobbler's syndrome usually refers to OCD lesions of the spinal column. Wobbler is a common name that some people use just for general neurological signs but in veterinary terms it is named for disease of the bone of the spine and it's a multi-factorial disease. There is some genetic pre-disposition. There is some nutrition component as well as some other environmental factors but it is not in any way related to infectious disease processes.

Question:

Is there any work toward a human vaccine?

There is a British company last fall saying that they were 3 years from presenting a vaccine for people. You would have thought it might have been more proactive with the risks to humans. There is one becoming available and by the time it is available, I guess the question is are we all going to be able to neutralize the anti-bodies ourselves? I think that down the road even with horses you are going to see this trailing off because horses can build up enough of an immune response to cope with the disease and I'm sure it will be the same in humans.