
WEST NILE VIRUS in ALBERTA HORSES:
A Descriptive Summary (2003)



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Introduction

West Nile virus (WNV) affects the central nervous system in humans, birds and horses, causing mild to severe illness and sometimes death. The virus is spread by mosquitoes that become infected by feeding on infected birds. First reported in Uganda in 1937, WNV is widespread in most of Africa and Eurasia. In 1999 it was identified in North America for the first time and scientists believe that it is now here to stay. Alberta detected its first cases in humans, birds and horses in 2003. The *Culex tarsalis* species of mosquito is responsible for spreading the virus in Alberta.

Horses become infected by WNV by being bitten by mosquitoes that carry the virus. Research suggests that most horses bitten by infected mosquitoes will not develop clinical disease, but rather eliminate the virus uneventfully. Symptoms of WNV can include weakness, fever, lack of co-ordination, listlessness and an inability to rise. There is no specific treatment for horses affected with WNV. Up to 35 percent of horses that develop clinical signs may die or have to be euthanized due to complications.

In 2003, WNV in horses became a provincially reportable disease, under Alberta's *Livestock Diseases Act*. This requires all suspected or confirmed cases to be reported to the Chief Provincial Veterinarian (CPV). Private veterinary practitioners were asked to complete an initial survey when a case was suspected, and then a follow-up survey if the case was laboratory confirmed as positive. Questions focused on clinical signs, environment and whether preventive measures were in place, in hopes of providing some insight into the epidemiology of WNV in Alberta.

WNV in all species of animals is also Immediately Notifiable under Canada's *Health of Animals Act*.

Objectives

The objectives of the WNV surveillance program and survey of horses in Alberta were to:

- determine the number of horses affected with WNV in Alberta in 2003,
- explore the distribution of risk factors involved, and
- determine the use and effectiveness of preventive measures.

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Methods

As WNV is a reportable disease in horses in Alberta, all veterinary practitioners who examined a horse with suspicious clinical symptoms were required to report those findings to the Chief Provincial Veterinarian. Once a suspected case was laboratory confirmed as positive, a survey was sent to the practitioner to explore possible associated risk factors. If the case was laboratory negative, the survey was not sent out.

Results

The first suspected case of WNV in horses was reported in late July 2003, with reporting continuing until November 2003. During 2003, private veterinary practitioners reported 222 cases of possible WNV infection. Of the cases reported, 170 horses were laboratory confirmed (IgM Elisa serology) with WNV, 30 horses were laboratory negative, two were reported as suspicious and 20 owners declined further testing. Of the 170 horses laboratory confirmed with WNV, 111 recovered from the viral infection and 59 animals (34.7 percent) died or were euthanized due to complications associated with the disease. Of the 222 horses reported for possible WNV infection, 21 practitioners/owners reported that the horse had been vaccinated for WNV, although the details of the vaccination protocol were not provided. Of the horses vaccinated, 11 were laboratory confirmed with WNV and four (36 percent) died.

Clinical Findings

To assess the clinical findings of WNV infection, practitioners were asked if the horse demonstrated specific clinical signs (Figs. 1 to 3). Of the 163 completed or partially completed surveys with regards to clinical findings, 19 (12 percent) horses had an elevated body temperature. One hundred forty-two (88 percent) horses demonstrated signs of weakness with 74 (47 percent) unable to rise to a standing position. Eleven (7 percent) horses showed signs of head pressing and 37 (24 percent) horses were hypersensitive to sound. Muscle tremors were seen in 99 horses (62 percent), eight (5 percent) horses showed signs of blindness, and 13 (8 percent) horses had seizures. Loss of appetite was seen in 44 (28 percent) horses, with 102 (65 percent) reported cases of depression. Sixty-five (44 percent) cases reported paralysis of hind limbs and 86 (54 percent) horses demonstrated muzzle twitching. Signs of hyperexcitability were seen in 40 (26 percent) horses and 11 (7 percent) horses exhibited circling. Three (2 percent) horses were already comatose when examined. Any given animal may have

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exhibited numerous clinical signs, so the total percentage reported exceeds 100 percent.

Though actual numbers are too small for meaningful statistical comparison, the graphical comparison of animals that recovered to those that died, relative to their clinical signs (Fig. 3) reflects, not surprisingly, that those with more severe clinical symptoms were less likely to recover. Additional comparisons (for example, between vaccinates and non-vaccinates) included too few animals to suggest trends.

Risk Factors---Environmental

To determine possible risk factors associated with exposure to WNV in horses, the survey focused on environmental conditions, travel history and mosquito control measures (Figs. 4 to 6). Of the 157 surveys completed or partially completed with regards to possible exposure to risk factors, 76 horses had access to a natural water source such as a dugout, slough or creek and 64 horses had access to areas of bush. Both of these types of areas are expected to have higher concentrations of mosquitoes, thus increasing the possibility of exposure to WNV. Practitioners/owners were asked if there was any form of mosquito control in place and only three reported some sort of mosquito control used.

Practitioners/owners were asked if the affected horse had exposure to other horses in the area and if these horses had shown clinical signs of possible WNV infection. Of the 157 laboratory confirmed horses, 145 had contact with other horses and 12 other horses had shown clinical symptoms of infection.

Since wild birds such as crows, magpies and blue jays are quite susceptible to the effects of WNV infection, large numbers of deaths of these birds in an area may be an indication of the arrival of WNV. Thirty-five practitioners/owners reported dead wild birds in the area. Twenty-six practitioners/owners reported that the affected animal had traveled off the premise in the three weeks before clinical symptoms were noticed. Virtually everyone who completed the survey reported that the affected horse was housed outside during the day and in the early mornings/late evenings most of the time.

Risk Factors---Horse Age/Breed

When examining the range of age of laboratory confirmed horses, the greatest number of horses affected were those that were six to 10 years of age. Sixty-seven

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percent of these recovered from the infection (Figs. 7 and 8). While the age distribution of Alberta horses is not available for comparison, it is interesting to note that horses under 15 years of age had a better chance of recovery than those that were older. Quarter horses were the breed most affected by WNV in Alberta last summer (Fig. 9). When those affected were compared as a percentage of the approximate population by breed within Alberta (Agriculture Statistics Yearbook), the breed with the largest proportion affected was the Arabian, but there were minimal differences among the major breeds (Fig. 10).

Geographic Distribution

The geographic distribution of suspected WNV cases according to the health authority region and laboratory confirmation is shown in Figure 11. Figure 12 maps the location of laboratory confirmed positive cases in Alberta in 2003 according to health region. Most horses suspected of having WNV in Alberta were located in the East Central (34), Calgary (29) and Capital (29) health regions. This distribution reflects the owner's address, which may not have been the same as the location of the affected animals. While a legal land description was provided, it was not translated into regional health authority distribution.

Conclusion

In 2003, there were 222 horses suspected of having WNV in Alberta. Of these, 170 were laboratory confirmed as positive for the disease and 59 (34.7 percent) of these died.

The 2003 study of WNV in horses was an initial attempt to describe the disease in Alberta horses once it had been detected in the province and will provide the basis for future investigations. A second study will be conducted in 2004 to add to the knowledge learned from the results obtained in 2003.

Acknowledgements

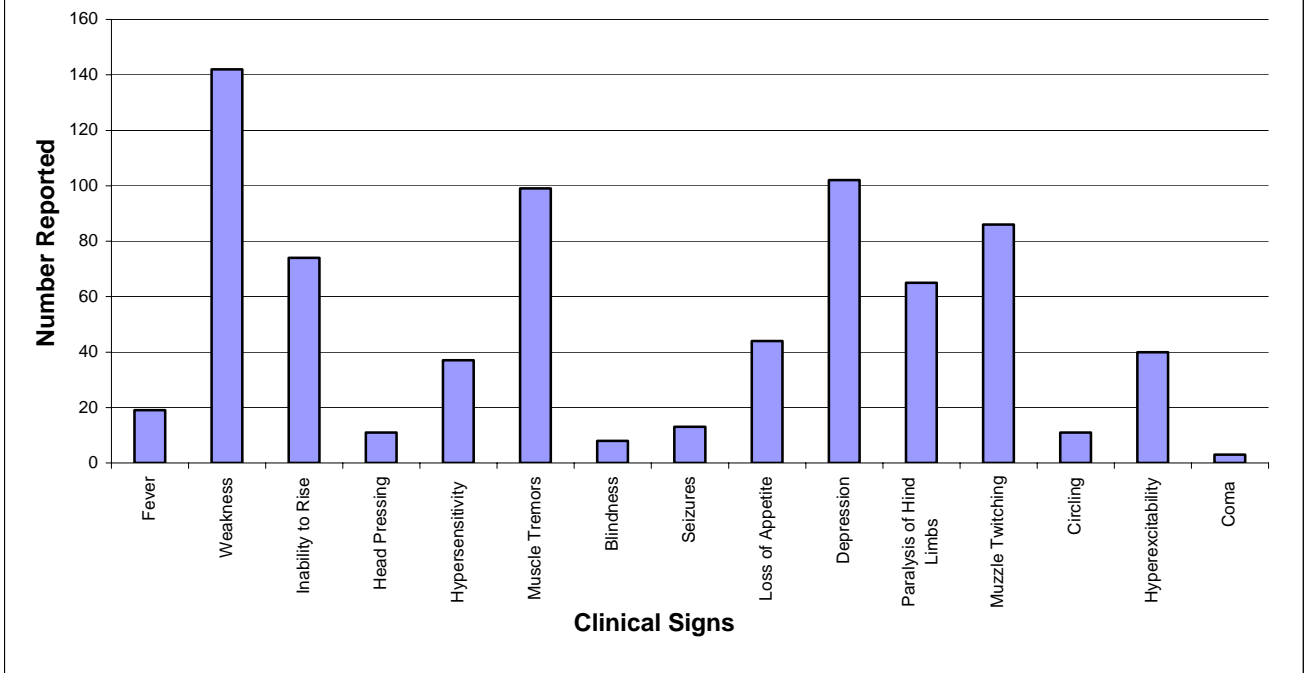
The Chief Provincial Veterinarian's Office would like to thank the veterinary practitioners of Alberta who took the time to complete surveys and submit them to our office, the horse owners for their cooperation and the Alberta Veterinary Medical Association (AVMA) for their assistance in publicizing and distributing the 2003 survey.

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We are also grateful to Dr. Mary VanderKop, Annette Visser and Chris Duffy, all of AAFRD, for their assistance in preparing this report, including data entry, graphical analysis and mapping.

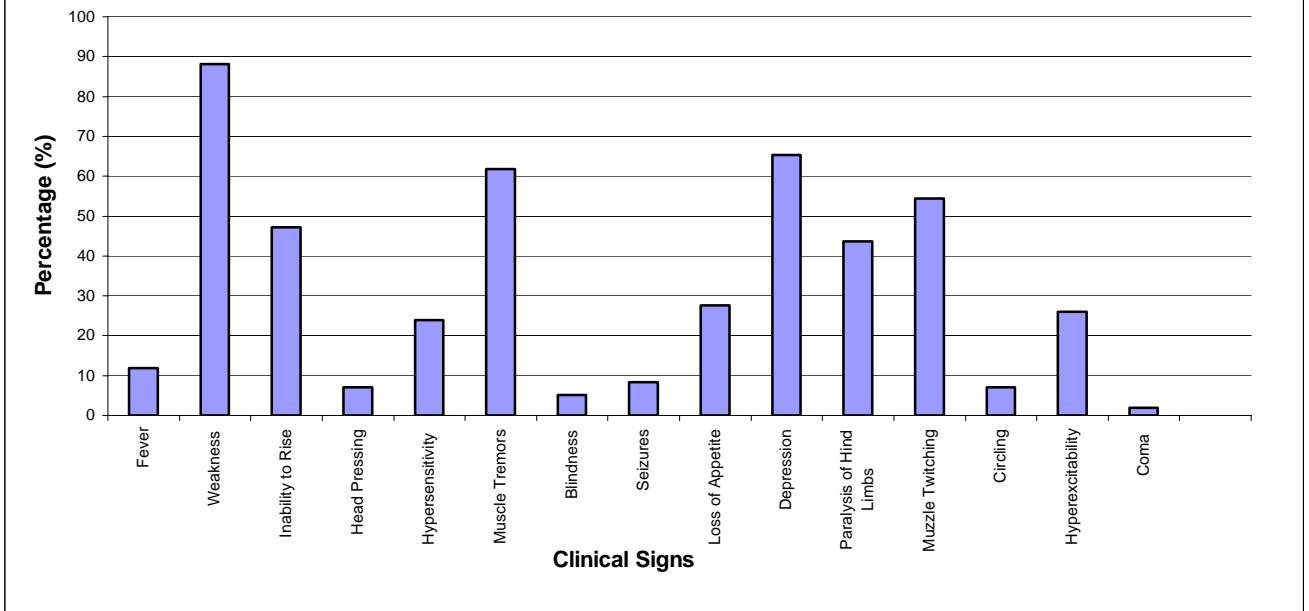
Thanks is also extended to Laura Plant-Edmonds and Melissa MacLean, both of the CPV Office, for helping to develop the 2003 survey and for following-up with veterinarians, horse owners and private diagnostic laboratories to gather missing information.

Figure 1 -- Frequency of Clinical Signs Reported for Laboratory Confirmed Positive Equine West Nile virus (WNV) Cases in Alberta (2003)* (n=163)



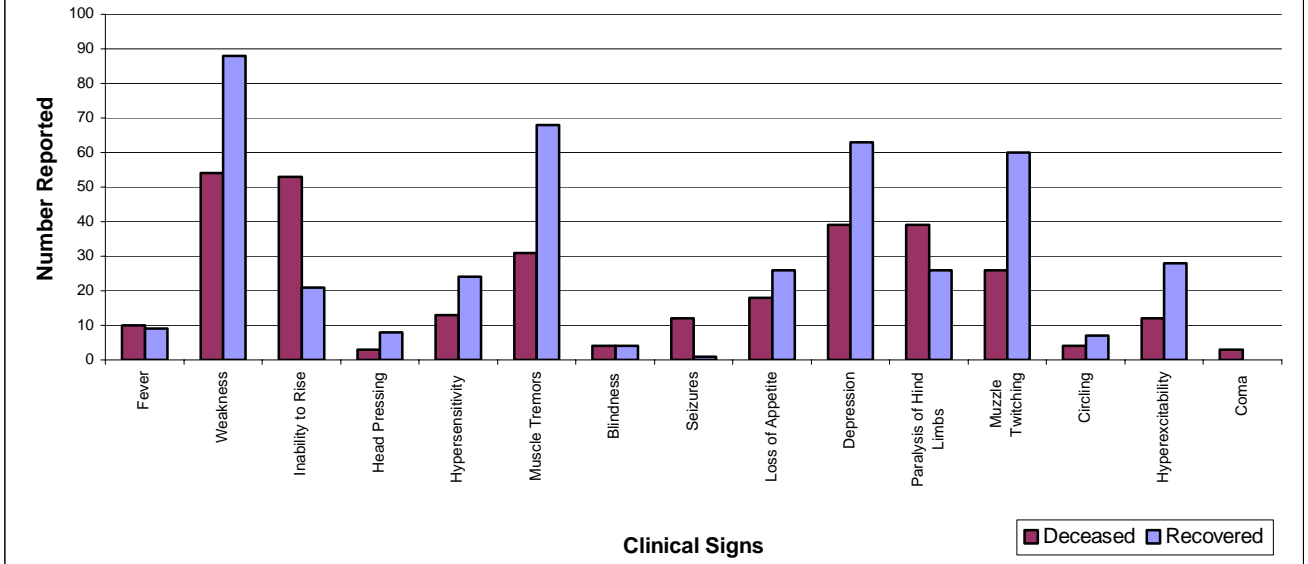
* Total exceeds 163, as any given animal could have displayed more than one clinical sign

Figure 2--Percentage of Laboratory Confirmed Positive Equine Cases of West Nile virus (WNV) in Alberta (2003) Displaying Various Clinical Signs * (n=163)



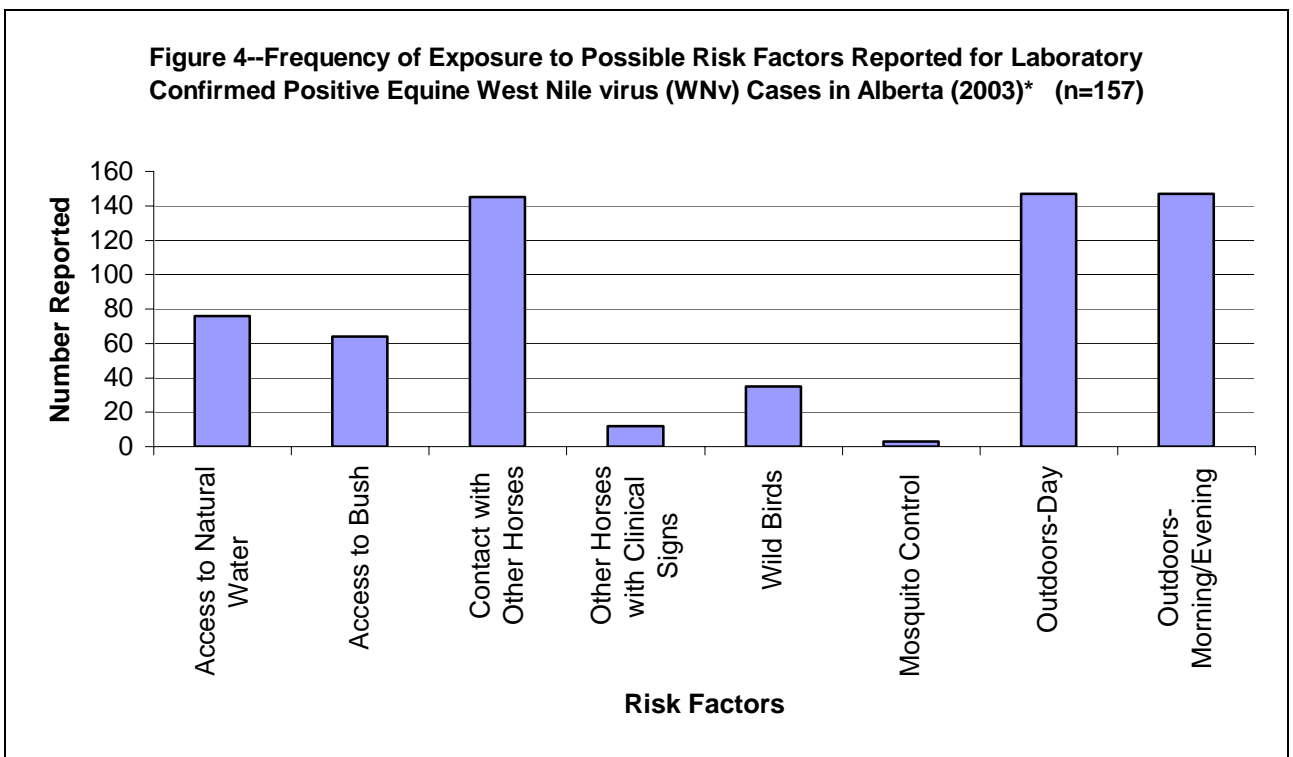
* Percentages exceed 100%, as any given animal could have displayed more than one clinical sign

Figure 3 -- Comparison of Animal Status and Frequency of Clinical Signs Reported for Laboratory Confirmed Positive Equine West Nile virus (WNV) Cases in Alberta (2003)* (n=163)



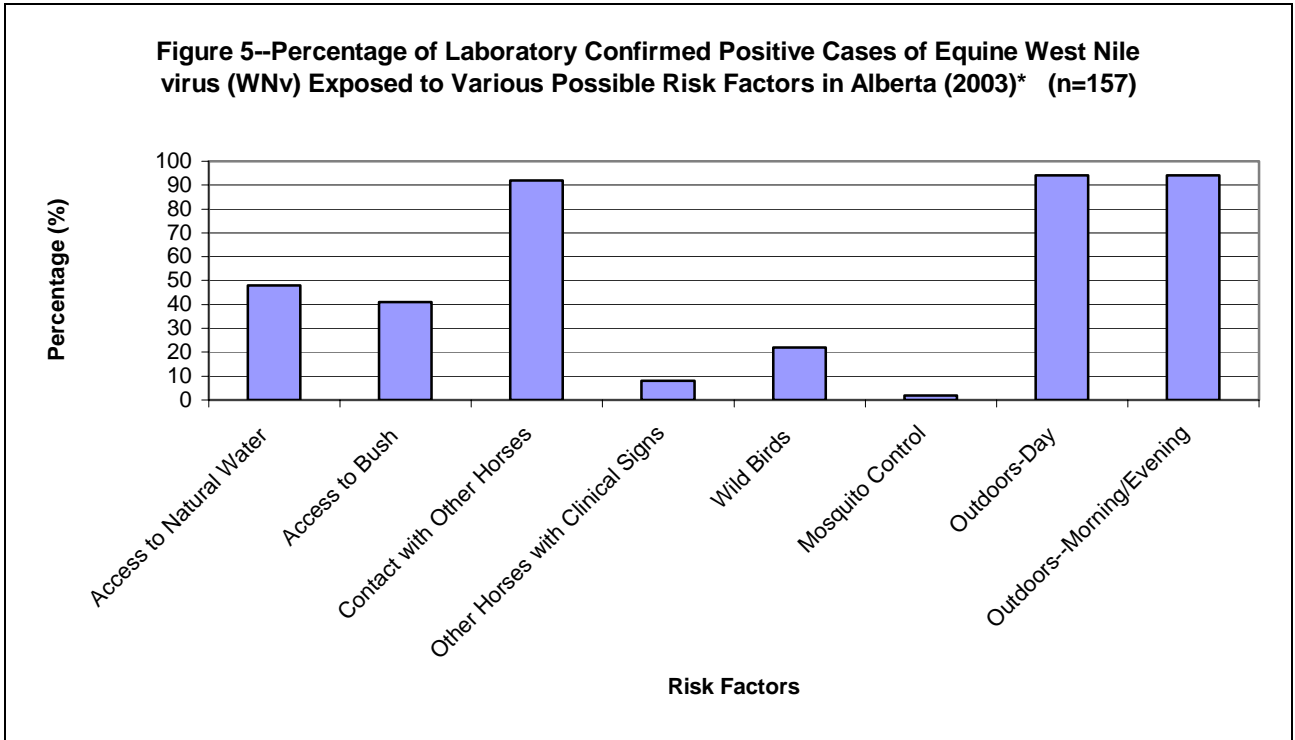
* Total exceeds 163, as any given animal could have displayed more than one clinical sign

Figure 4--Frequency of Exposure to Possible Risk Factors Reported for Laboratory Confirmed Positive Equine West Nile virus (WNV) Cases in Alberta (2003)* (n=157)



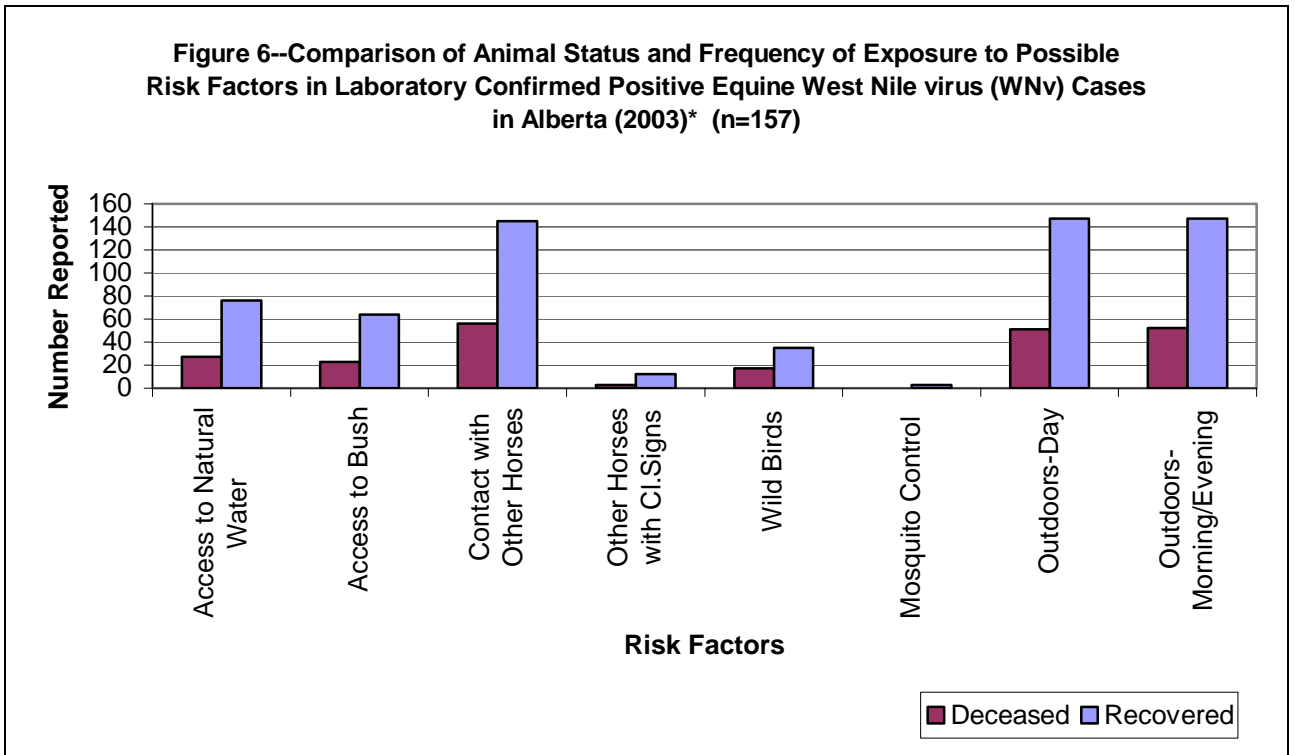
* Total exceeds 157, as any given animal may have been exposed to more than one risk factor

Figure 5--Percentage of Laboratory Confirmed Positive Cases of Equine West Nile virus (WNV) Exposed to Various Possible Risk Factors in Alberta (2003)* (n=157)



* Percentages exceed 100%, as any given horse may have been exposed to more than one risk factor

Figure 6--Comparison of Animal Status and Frequency of Exposure to Possible Risk Factors in Laboratory Confirmed Positive Equine West Nile virus (WNV) Cases in Alberta (2003)* (n=157)



* Total exceeds 157, as any given animal may have been exposed to more than one risk factor

Figure 7 -- Age Distribution for Equine Laboratory Confirmed Positive Cases of West Nile virus (WNV) in Alberta (2003) (n=157)

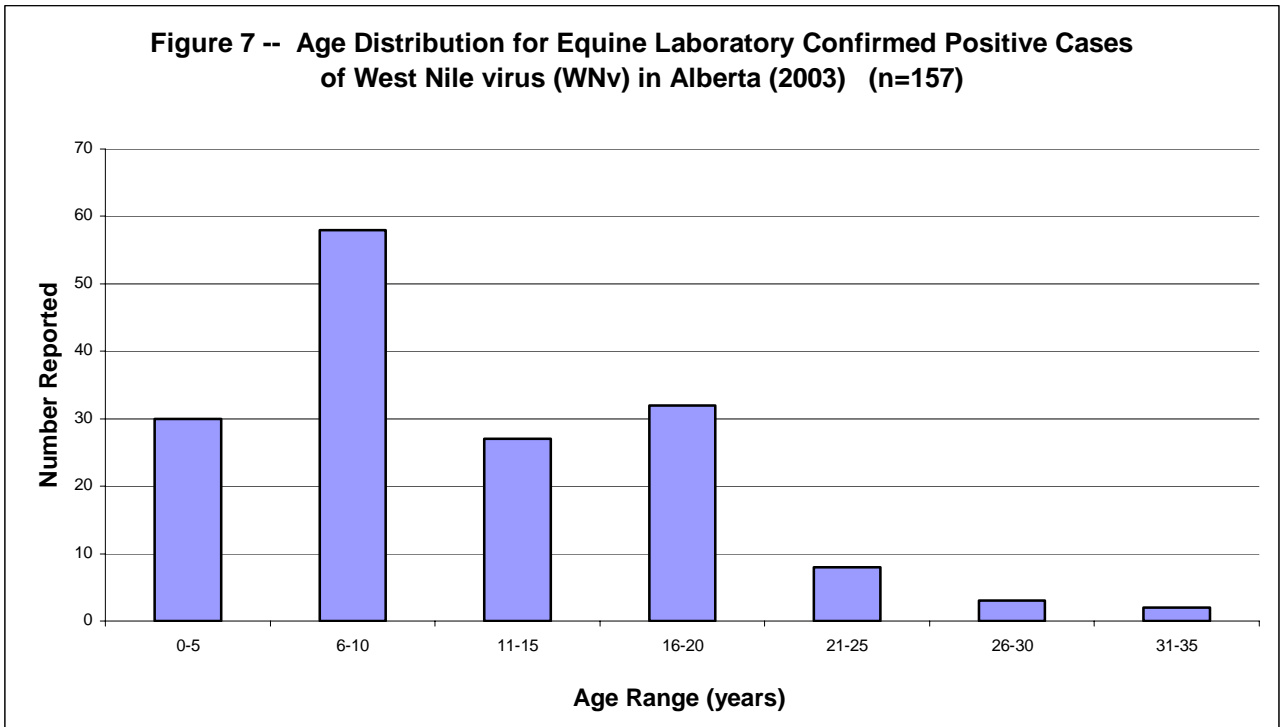


Figure 8 -- Comparison of Animal Status and Age Distribution of Laboratory Confirmed Positive Equine Cases of West Nile virus (WNV) in Alberta (2003) (n=157)

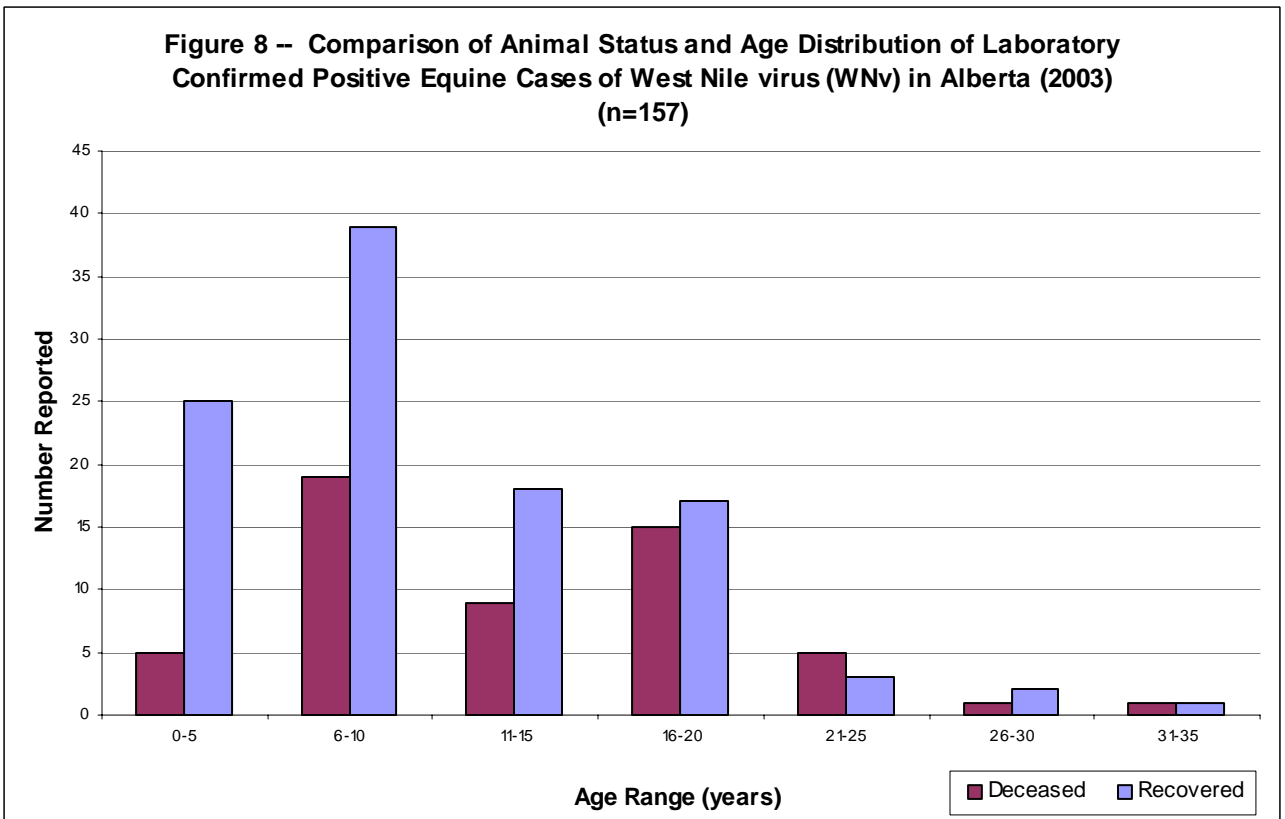


Figure 9--Frequency of Laboratory Confirmed Positive and Negative Equine West Nile virus (WNV) Cases Distributed Among Breeds in Alberta (2003) (n= 222)

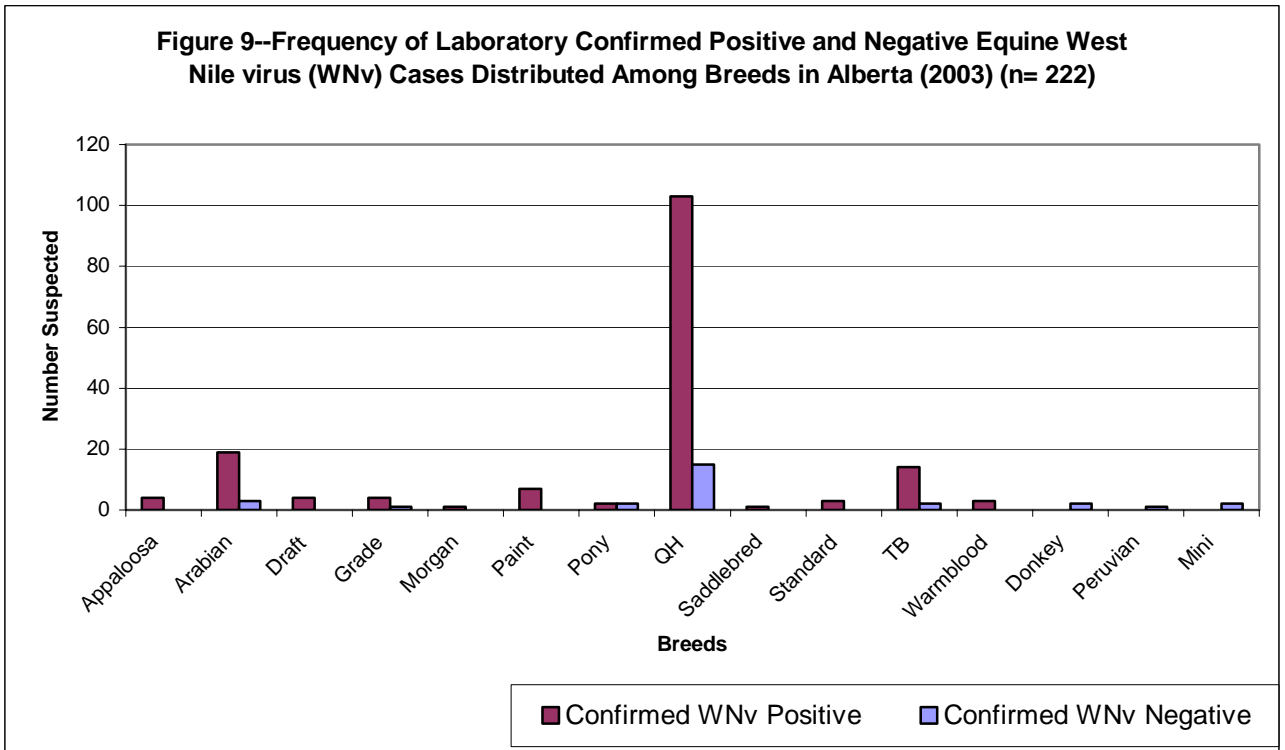


Figure 10 -- Comparison of Horses Laboratory Confirmed Positive for West Nile virus (WNV) as a Percentage of the Approximate Population by Breed Within Alberta (2003) (n=157)

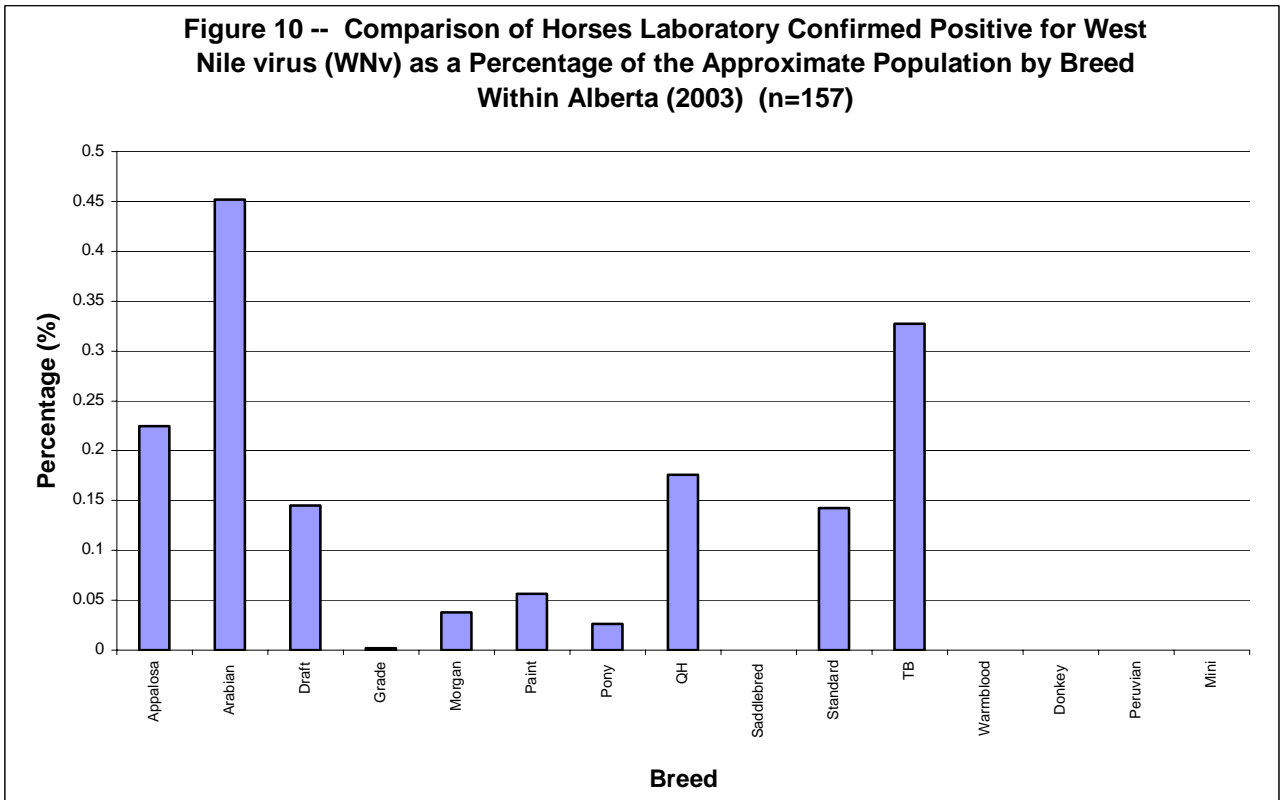
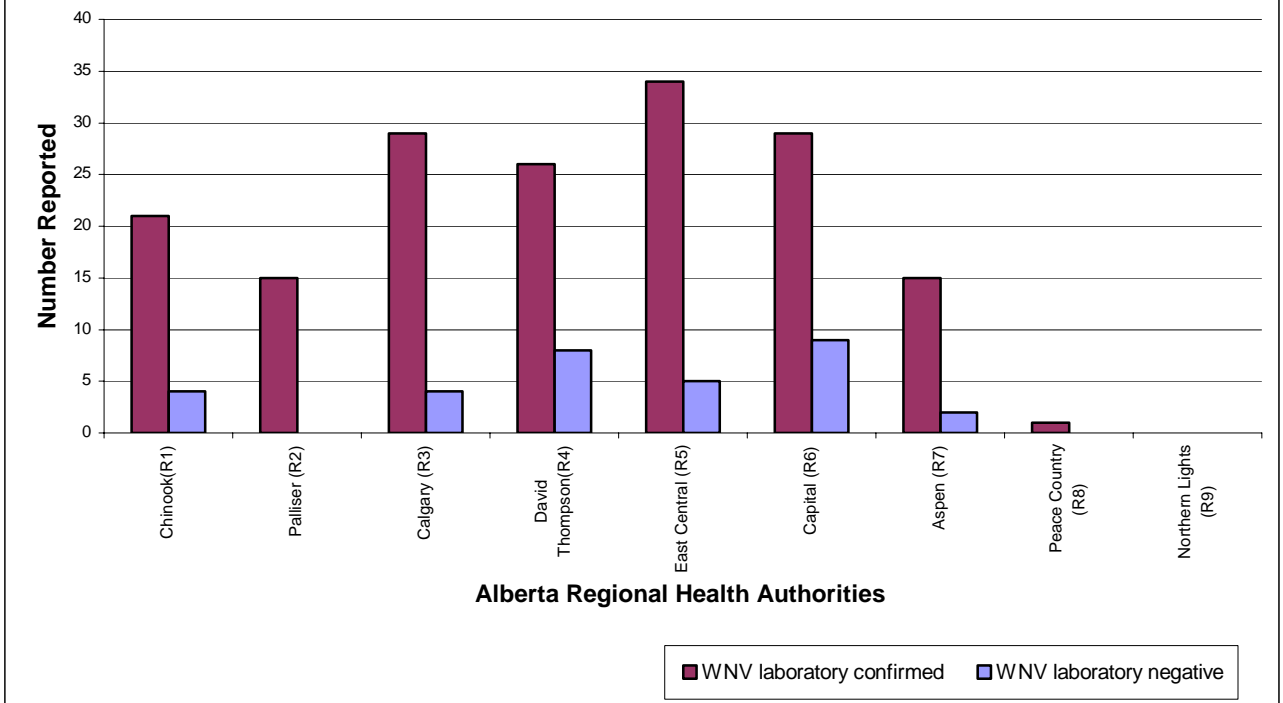


Figure 11 -- Frequency of Suspected Cases of Equine West Nile virus (WNV) Infection Distributed Among Regional Health Authorities in Alberta (2003) (n=222)



**Figure 12. Geographic Distribution of Equine Laboratory Confirmed Positive Cases of West Nile virus (WNV) by Regional Health Authorities in Alberta (2003)
(n =170)**

