EQUINE INFECTIOUS ANEMIA

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What is EIA?

Equine Infectious Anemia (EIA), also known as Swamp Fever, is a viral disease of horses, donkeys and mules around the world. Closely related to the Human Immunodeficiency Virus (HIV), this virus affects horses' immune systems; however, it has never been reported to pose a threat to human health. There is no cure. While most infected horses don't show any symptoms, they remain carriers for life, thereby jeopardizing the health of other horses.

The EIA virus reproduces in white blood cells throughout the body of the horse. White blood cells, or leukocytes, are cells of the immune system involved in defending the body against infectious disease. Virus particles attach to red blood cells which are then attacked and destroyed by the immune system, leading to anemia. Inflammation associated with the viral infection may damage vital organs, such as bone marrow, liver, heart and kidney. Secondary infections (e.g. pneumonia) may occur due to subsequent immune suppression. Horses infected with EIA virus may die from the direct effects of the virus or from secondary infections.

EIA in Canada

The first case of EIA was recorded in North America in the 1880s in the state of Wisconsin and subsequently spread across the continent. Over the last century cases have been detected in most parts of Canada, including the Yukon Territory.

Horses on pasture
Saskatchewan Agriculture

Until 1970, EIA was diagnosed primarily by clinical signs due to a lack of diagnostic tests. The development of the first accurate laboratory procedure for diagnosing the disease in 1970 led to the widespread application of EIA control programs across North America. In 1971, EIA was named a reportable disease in Canada and a national control program was implemented.

During the first year of the control program, over 1,400 cases of EIA were detected in Canada (2.9% of all horses tested; Figure 1, Table 1). The number of positive cases detected peaked in 1975 with almost 2,200 confirmed cases of EIA. From 1976 onwards, the success of the control program became evident as fewer cases were detected each year. In 2010, only 23 infected horses were detected across all of Canada (0.04% of all horses tested).

Saskatchewan Ministry of Agriculture

Despite the best efforts of the horse industry and governments, EIA continues to be detected in Western Canada, particularly in the northern parts of British Columbia, Alberta and Saskatchewan, as well as in the Yukon. Periodic increases in occurence point to pockets of infection which maintain the virus in the equine population.

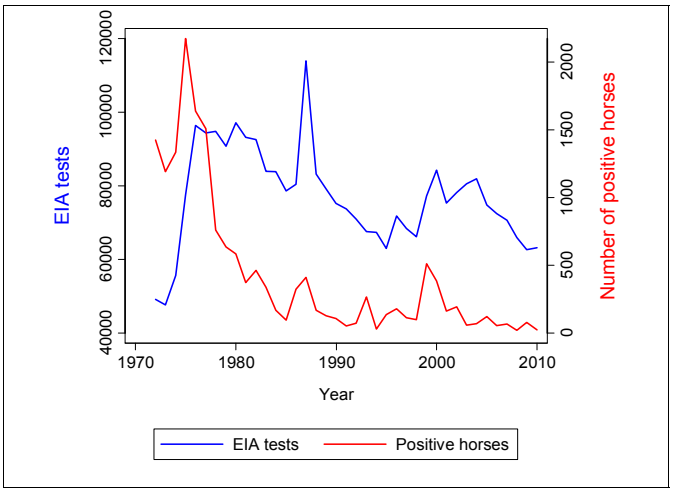

Figure 1: EIA tests and positive reactors in Canada, 1972-2010.

Table 1: EIA tests and positive reactors in Canada, 1972-2010.

Year	EIA tests	Positive horses	Year	EIA tests	Positive horses
1972	49,114	1424	1992	70,984	71
1973	47,599	1190	1993	67,551	264
1974	55,592	1334	1994	67,356	29
1975	77,581	2172	1995	62,972	135
1976	96,389	1639	1996	71,810	179
1977	94,339	1509	1997	68,347	111
1978	94,815	759	1998	66,177	96
1979	90,739	635	1999	77,222	510
1980	97,168	583	2000	84,217	384
1981	93,202	373	2001	75,305	161
1982	92,524	463	2002	78,183	193
1983	83,913	336	2003	80,506	58
1984	83,793	168	2004	81,925	69
1985	78,617	94	2005	74,765	121
1986	80,464	322	2006	72,402	54
1987	113,979	410	2007	70,590	64
1988	83,178	166	2008	65,978	18
1989	79,116	127	2009	62,604	78
1990	75,248	105	2010	63,205	23
1991	73,741	52			

EIA in Saskatchewan

Province-level statistics on EIA cases are available from 1993 onwards. With the exception of four cases in 2009, EIA was not detected in Saskatchewan between 2004 and 2011 (Table 2). In 2011, this situation changed drastically when over 60 EIA-infected horses were found on 11 different premises (Figure 2). This spike in EIA incidence, after a number of years of little or no activity, is worrisome. It is evidence that the virus continues to circulate in some horse populations, serving as a source of infection threatening the rest of the provincial horse population.

Voluntary testing has decreased considerably over recent years, reducing the potential for detecting carrier animals. Currently, horse owners voluntarily test fewer than 1,200 of Saskatchewan's estimated 108,000 horses (Figure 3). In the last few years, approximately half of the EIA tests conducted in this province have been mandatory testing of horses exported to countries other than the United States.

Table 2: EIA tests and positive reactors in Saskatchewan, 1993-2011

Year	EIA tests	Positive horses	Year	EIA tests	Positive horses
1993	2,036	0	2003	5,912	2
1994	3,562	1	2004	5,024	6
1995	4,119	43	2005	3,032	0
1996	8,201	6	2006	2,977	0
1997	5,302	18	2007	2,808	0
1998	3,460	17	2008	2,640	0
1999	8,933	48	2009	2,455	4
2000	7,662	8	2010	2,215	0
2001	5,524	15	2011	na*	>60**
2002	5,312	6			

*total number of tests not available at time of writing
**results of testing completed up to October 2011

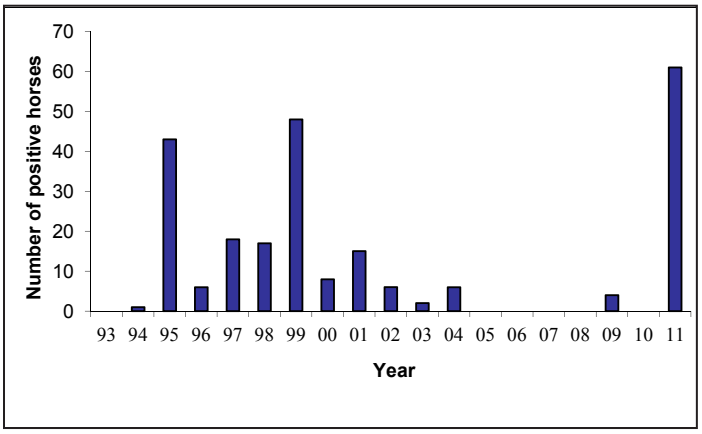

Figure 2: Number of EIA cases detected in Saskatchewan, 1993-2011.

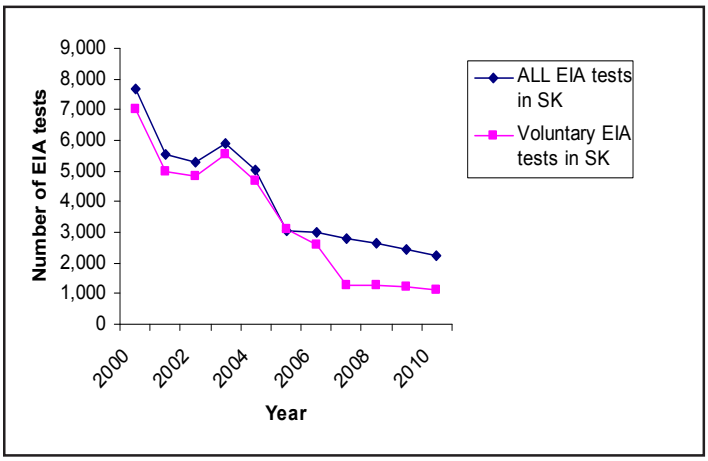

Figure 3: Declining trend in EIA testing in Saskatchewan, 2000-2010.

How is EIA transmitted?

The EIA virus is most commonly transmitted by blood. Biting insects, such as deer and horse flies, are largely responsible for transmission from infected horses to non-infected horses.

The virus does not multiply in the insect but is passed from one horse to another mechanically on the insect's mouthparts as it feeds. The bites of these flies are painful, and the animal's reaction interrupts feeding. The fly attempts to resume feeding immediately, either on the same animal or on another nearby horse, resulting in the transfer of infectious blood. The virus survives for only a short period of time on the mouthparts of insects, and it is less likely to be spread to more distant horses.

Horse fly
Photo courtesy of Dennis Ray

Because these insects reproduce in wet areas, outbreaks of EIA have often been associated with pasturing in swampy areas, hence the name Swamp Fever. However, the disease is not limited by geography and can be found in drier climates as well.

Deer fly
Photo courtesy of Bruce Marlin

Another means of blood transmission is the practice of re-using needles and syringes. In the past, this was probably the primary method by which EIA spread from horse to horse. Re-using needles is no longer common practice, so now EIA transmission occurs mainly as a result of biting insects. Other blood contaminated equipment such as dental floats, tattooing equipment and rectal sleeves can also spread the virus. The virus can pass from mare to foal during pregnancy or during nursing. Venereal transmission may be possible as well, since the virus can be found in semen. For this reason, stud horses are usually required to be tested and shown to be free of EIA.

What is the incubation period?

The incubation period is normally one to three weeks, but clinical disease may take as long as three months to develop. Some horses do not develop clinical disease, although most infected horses will develop antibodies which can be detected seven to 14 days after infection and last for life. Occasionally, some horses take up to 45 days to develop detectable EIA antibodies.

What are the clinical signs?

EIA generally has three forms:

- Acute: Seen within one to two weeks after the horse's first exposure to the virus, this phase is the most detrimental. It may be difficult to accurately diagnose acutely infected horses, as antibodies are not immediately produced and anemia is not present at this stage. However, the virus is active and is multiplying and damaging the immune and other organ systems.

- Chronic: If the horse survives the acute phase, a subacute or chronic phase may occur. The classic signs of EIA, such as fever, depression, weight loss, anemia and petechial (pinpoint-sized) hemorrhages on the mucous

membranes, are most likely seen in this phase. Repeated flare-ups of clinical signs often occur. Such episodes are seen with reactivation of the virus and viremia (virus present in the bloodstream) during periods of stress or when corticosteroids are given.

- Non-apparent: Over time, the periodic episodes decrease in severity and frequency. Within a one-year period many horses begin to control the infection and show no clinical signs. These non-apparent carriers are infected for life and may be a source of infection for other horses.

Even when clinical signs occur, EIA can be difficult to diagnose because the symptoms vary from horse to horse and can resemble other diseases. Clinical signs of EIA may include one or more of the following:

- Fever;
- Depression;
- Small hemorrhages in mucous membranes;
- Decreased platelet numbers;
- Decreased red blood cell numbers (anemia);
- Swelling of legs, lower chest and abdomen;
- Fatigue, reduced stamina or weakness;
- Rapid breathing;
- Rapid weight loss;
- Nasal bleeding;
- Pale or yellowish mucous membranes (jaundice);
- Irregular heartbeat and/or weak pulse;
- Colic; and/or
- Abortion

How is EIA diagnosed?

When a horse is infected with the EIA virus (or other contagious diseases), the immune system produces antibodies. These antibodies are proteins used by the immune system to identify and neutralize foreign objects such as bacteria and viruses.

To accurately determine whether a horse is infected with the EIA virus a blood sample from the horse is tested for the presence of EIA antibodies. There are two laboratory tests available to detect antibodies to EIA. The first test was developed in 1970 by veterinary researcher Dr. Leroy Coggins. This test is considered the "gold standard" and is commonly known as the Coggins test. A negative Coggins test means there are no detectable antibodies at the time of testing. A positive test indicates the horse is infected and a carrier of the virus. More recently a c-ELISA (competitive enzyme-linked immunoadsorbent assay) has been developed. The c-ELISA is becoming more widely used since it offers the advantage of rapid results. However, false-positive results can occur with this test. In Canada, therefore, a positive c-ELISA result is confirmed using a standard Coggins test. Foals born to positive dams may be false positive for as long as six months after birth with either test, due to maternal antibodies passed via colostrum.

Because the Coggins test was the most widely used test for decades, the certificate of EIA status has become known as the "Coggins Certificate" and is commonly referred to by this name regardless of which test was used. This sometimes causes confusion since "Coggins" does not appear anywhere on the EIA Serum Test Report and Certificate.

Drawing blood from a horse for testing
***Photo:* ©Vriesela**

Blood samples must be taken from horses by veterinary practitioners who are accredited by the Canadian Food Inspection Agency (CFIA) for EIA testing. Many veterinary clinics have accredited veterinarians on staff. **If you are interested in having your horse tested, contact your local veterinarian for more information.**

What are risk factors for EIA transmission?

Certain management and geographic factors put horses at greater risk for contracting EIA. These include:

- Pasturing horses in damp, swampy areas.
- Pasturing horses in areas where EIA testing is not routinely done.
- Animals that are in frequent contact with outside horses or that live or travel in geographic regions known for EIA outbreaks.
- Environments that have a constant influx of new horses, especially if negative Coggins certificates are not required.
- Exposure to other horses at events such as shows, clinics, sales, etc. especially if rigorous health care regulations are not enforced and a current Coggins certificate is not required.
- Exposure to feral horses, as EIA may be present in these populations.

How can I protect my horse from EIA?

The only protection is prevention. There is no effective treatment for EIA, there is no vaccine to prevent it and there is no cure. However, good management can reduce the potential for infection. The following BIOSECURITY MEASURES can help minimize the risk of EIA transmission:

Pasturing horses in damp, swampy areas increases risk of EIA transmission.

- Test ALL your horses at least once a year. One infected animal puts all your horses at risk. High-risk horses should be tested more frequently.
- Test horses at the time of purchase.
- Farm and stable operators should require a current Coggins certificate before allowing new horses onto the premises
- Horse shows, racetracks, rodeos and other events should require a current Coggins certificate for all horses entering the event.
- Keep new horses in isolation for 45 days and observe them for any signs of illness before introducing them into the herd. Daily rectal temperatures will help detect sick horses.
- Take measures to control biting flies. Provide adequate drainage to discourage breeding sites for pests.
- Use disposable needles and syringes, one per horse, for vaccinations and medication.
- Sterilize dental tools and other instruments before using them on other horses.

Difficult choices

When horses are confirmed to have EIA, the options are very limited. The Canadian Food Inspection Agency (CFIA) requires that positive horses be either euthanized or quarantined for life. Euthanasia is considered the most sensible, although emotionally difficult option, since it may be virtually impossible to properly quarantine the horse and still maintain a good quality of life for the animal.

Because they are life-long carriers of the virus, EIA-positive horses will always pose a risk to other horses even if they do not show signs of illness. Even in the best management situations, biting and blood-sucking insects cannot be totally controlled or eliminated. To eradicate the disease it is necessary to eliminate the carriers. Horses testing positive for EIA are required by law to be permanently identified through branding or tattooing, as well as quarantined. Transportation and housing are severely restricted. Contact the CFIA for specific requirements.

Some horse owners choose not to test their horses in order to avoid the possibility of having to make a difficult choice. While this attitude is understandable, it is the wrong decision. Without testing, EIA carriers cannot be identified which puts many other horses at risk.

To illustrate, consider a recent outbreak of EIA on a farm in Arkansas: of the 80 horses residing on the property, a total of 40 horses were EIA-positive and either died or were euthanized. Despite a state law requiring annual testing, these horses were not tested for several years prior to the outbreak. Early detection would have limited the spread of the virus in this herd and saved the lives of many valuable animals. This case demonstrates the consequences of failing to test for EIA.

Seemingly healthy carriers of the EIA virus jeoparadize the health of other horses.
Saskatchewan Agriculture

Federal Regulations

EIA became a federally reportable disease in Canada in 1971. By law, all positive cases must be reported to the CFIA. EIA-positive horses must then either be euthanized or permanently quarantined. Owners of euthanized horses are compensated by the CFIA at a specified rate for the loss.

The CFIA requires that horses being imported into Canada test negative to the Coggins test. Horses entering the United States from Canada must be accompanied by evidence of a negative Coggins test within 180 days prior to export. More information on the CFIA's EIA control program can be found at CFIA's website at Animals > Animal Diseases > Equine Infectious Anemia.