

# Eastern Equine Encephalomyelitis

Eastern equine encephalomyelitis (EEE) is a mosquito-borne viral disease of all equine species such as horses, asses, and zebras. After infection, equines may suddenly die or show progressive central nervous system disorders. The rapidity of deterioration and eventual outcome of infection vary among individual horses. The equine mortality rate due to EEE ranges from 75 to 90 percent.

Humans can also contract this disease. Healthy adults who become infected by the virus may experience flu-like symptoms such as high fevers and headaches. The young, the elderly, and people with weakened immune systems can become severely ill or die from this disease.

More information regarding the human form of EEE can be found on the Centers for Disease Control and Prevention Web site at [www.cdc.gov](http://www.cdc.gov)

## History

Eastern equine encephalomyelitis virus (EEEV) is thought to have been the cause of EEE in North American horses since 1831. However, the virus itself may have been present in its endemic form long before that. The virus did not receive its name until a major outbreak occurred in horses in coastal areas of Delaware, Maryland, New Jersey, and Virginia in 1933.

Additional outbreaks occurred in Virginia and North Carolina in 1934 and 1935 respectively. Mosquitoes were first determined to be potential carriers of EEEV in 1934. Since then, a number of studies have shown that various mosquito species of *Aedes* and *Culex* could become infected with and transmit EEEV from one vertebrate to another.

It was during the 1935 outbreak that birds were considered to be a possible reservoir host for the virus, but it was not until 1950 that the first virus isolation was made from a wild bird proving that to be true. Subsequent studies have shown that many birds, including almost all passerine species (i.e., jays, blackbirds, warblers, finches, and sparrows), are susceptible to EEEV infection.

Because outbreaks of EEE are infrequent, the disease has a significant economic and social impact once a specific area has been identified. When the disease appears in an area for the first time, there is a loss of horses and/or poultry. The area may also

experience an increase in human morbidity and mortality.

## Clinical Signs

Equines infected with EEE may show one or more of the following signs:

- Fever
- Depression
- Loss of appetite
- Weakness
- Central nervous system disorders (lack of coordination, chewing movements, head pressing, "sawhorse" stance, circling, paddling motion of the limbs, and convulsions)
- Irritability and aggressiveness towards handlers
- Blindness
- Excitability
- Abnormal sensitivity to light and sound

In some cases, horses infected with EEE may show no clinical signs before dying.

## Confusion with Other Diseases

The clinical signs of EEE can be confused with those of other diseases that affect the central nervous system. These include Venezuelan equine encephalitis, Western equine encephalitis, West Nile equine encephalitis, African horse sickness, rabies, tetanus, and bacterial meningitis. EEE might also be mistaken for toxic poisoning. Definitive diagnosis can be made by isolating the virus in a laboratory or by testing blood for the presence of antibodies to the virus.

## How it Spreads

The virus that causes EEE is transmitted primarily by mosquitoes that bite an infected animal and then bite and feed on another animal or human. The speed with which the disease spreads depends on the density of mosquito populations.

## Control Measures

EEE probably will never be eradicated from the United States because of the reservoirs that exist in so many areas throughout the country. Therefore, continual vigilance and conscientious immunization programs will always be necessary.

Monovalent, bivalent, or trivalent horse vaccines containing EEE are available. Horse owners should choose such vaccines depending on the prevalence or likely occurrence of the disease.

General control measures aimed at reducing mosquito-carrying populations will significantly diminish but not eliminate the risk of equine infection.

## **Report Suspicious Signs**

Owners of equines have an essential role in preventing EEE from spreading. Horse owners are encouraged to vaccinate their animals and put safeguards in place that prevent animals' exposure to mosquitoes, as well as report any suspicious signs of EEE in animals to a veterinarian.

## **Additional Information**

For more information, contact  
USDA, APHIS, Veterinary Services  
4700 River Road, Unit 41  
Riverdale, MD 20737-1231  
Telephone (301) 734-8093  
Fax (301) 734-7817

or visit our Web site at  
[www.aphis.usda.gov/animal\\_health/index.shtml](http://www.aphis.usda.gov/animal_health/index.shtml)

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.