



## Case Definition

### Japanese Encephalitis (JE) (Notifiable)

July 2024

#### 1. Disease Information

**1.1 General Disease and Pathogen Information:** Japanese encephalitis (JE) is a zoonotic, mosquito-borne viral disease affecting swine, equids, birds, and humans. The disease is caused by the JE virus (JEV), a positive-strand RNA virus that belongs to the *Orthoflavivirus* genus in the *Flaviviridae* family. It is a member of a serological group that includes West Nile virus (WNV), Saint Louis encephalitis virus (SLEV), and five other viruses that together occur on every continent except Antarctica. Globally, this zoonotic disease is known to cause around 70,000 cases of human encephalitis each year. JE also causes significant reproductive losses in swine and encephalitis in horses.

There is only one known serotype of JEV, but at least five genotypes have been identified through sequencing of the viral pre-membrane region. Many different species are susceptible to natural JEV infection: swine, equids, birds, cattle, sheep, goats, dogs, cats, wild mammals, reptiles, amphibians, and humans. All animals except swine and birds are considered dead-end hosts; in other words, animals other than swine and birds experience infections with viremia levels too low to contribute to transmission to other animals or humans.

JEV is found throughout eastern, southeastern, and south Asian countries as well as parts of the Western Pacific. Its reach extends to the Indian subcontinent, as far west as Pakistan and as far south as northern Australia. In 2021 and 2022, JEV emerged in southeastern Australia where widespread transmission occurred; the source of introduction has yet to be determined. JEV has never been found in the United States.

#### 1.2 Clinical Signs

**1.2.1 Equids:** Although most JEV infections are subclinical, horses and donkeys can develop minor to severe illness followed by death or incomplete recovery. There are three syndromic manifestations: transitory, lethargic, and hyperexcitable. In horses, morbidity rates have been reported from less than 1 percent to just over 1 percent; case fatality rates are typically 5 percent to 15 percent but can reach 30 to 40 percent. The typical incubation period in JEV-infected equids is 8 to 10 days.

**1.2.1.1 Transitory illness:** Horses may experience a transitory infection and may experience fever, anorexia, lethargy, impaired locomotion, and congested or jaundiced mucosal membranes. Most recover in 2 to 3 days.

**1.2.1.2 Lethargic type:** Displays neurologic signs (in addition to signs attributed to the transitory type), such as difficulty swallowing, lack of coordination (ataxia), and impaired vision. Most recover in about a week.



**1.2.1.3 Hyperexcitable type:** Characterized by high fever, profuse sweating, and neurological signs, such as aimless wandering, aggressive or wild behavior, blindness, and muscle tremors. The hyperexcitable type may result in collapse, coma, and death. Death can occur in 1 to 2 days, and animals that recover may have persistent neurologic deficits. Approximately 5 percent of clinical cases are of this acute form.

**1.2.2 Swine:** JE typically causes subclinical infection in swine; reproductive disease is the most characteristic clinical manifestation. Stillborn or mummified fetuses delivered at full term are most common. Abortions and piglets born with muscle tremors/convulsions followed by death are also consequences of JE. Among swine, reproductive losses can reach 50 to 70 percent and mortality in infected piglets without immunity may reach nearly 100 percent.

**1.2.2.1 Adult swine** that are not pregnant typically either experience only mild transient fever or do not show signs of infection. Encephalitis is occasionally observed in naïve swine under 6 months of age. Other signs of JE include infertility in boars that may be permanent depending on the severity of the illness. Mortality rates are close to zero for adult swine.

## 2. Laboratory Criteria

**2.1 Agent Isolation and Identification:** Approved sample types for horses include fresh brain, cerebrospinal fluid, EDTA blood, or serum. Approved sample types for pigs include fresh brain, tonsils, spleen, EDTA blood, or serum, as well as aborted fetal brain. Polymerase chain reaction (PCR) can be used to detect JEV RNA.

**2.2 Agent Characterization:** Further characterization is conducted by whole genome sequencing.

**2.3 Serology:** While serology may be effective in JEV surveillance and diagnosis in endemic regions, its capability is limited in JEV-free countries due to the known cross reactivity to other endemic viruses.

## 3. Case Classification

**3.1 Suspect Case:** A susceptible animal with clinical signs consistent with Japanese encephalitis and

**3.1.1** a history of residence in a known or potentially endemic region; **OR**

**3.1.2** is located in or has recently visited an area with appropriate climate and active hematophagous insects; **OR**

**3.1.3** has an epidemiological link to JEV.

**3.2 Presumptive Positive Case:** A suspect case with a non-negative JEV PCR test result.

**3.3 Confirmed Positive Case:** An animal from which JEV has been isolated and/or identified via sequencing at the National Veterinary Services Laboratory (NVSL).

**4. Reporting Criteria:** Japanese encephalitis is a U.S. Notifiable disease that is immediately reportable under the APHIS [National List of Reportable Animal Diseases \(NLRAD\)](#).

**4.1** NLRAD reporting in accordance with the [NLRAD Standards](#) for Notifiable diseases; and by APHIS to the [World Organisation for Animal Health](#) (WOAH); **AND**



**4.2** FAD or Emerging Disease Incidents (EDI) also follow standard procedures according to the [Policy for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents](#)