

# Menangle

*Menangle virus*

**Last Updated:** Jan. 24, 2006

## Links:

This factsheet contains links to the CFSPH Image Database and to other factsheets. Select the [blue links](#) within the text to view the additional materials.



**Institute for International  
Cooperation in Animal Biologies**  
*An OIE Collaborating Center*  
Iowa State University  
College of Veterinary Medicine



**Center for Food  
Security and Public Health**  
College of Veterinary Medicine  
Iowa State University  
Ames, Iowa 50011  
Phone: (515) 294-7189  
FAX: (515) 294-8259  
E-mail: [cfsph@iastate.edu](mailto:cfsph@iastate.edu)  
Web: <http://www.cfsph.iastate.edu>

## Importance

Menangle is a newly emerged disease of swine, currently limited to one outbreak in Menangle, New South Wales, Australia. This viral disease caused mummified and stillborn piglets, reduced farrowing rates and reduced litter number and size, as well as occasional abortions. All postnatal pigs seroconverted to the virus and were unaffected. The disease appears to be maintained and spread by fruit bats (flying foxes); however the route of transmission among swine is currently unknown.

## Etiology

Menangle is one of several recently discovered RNA viruses in the family Paramyxoviridae. Molecular characterization of the virus has placed it in the genus *Rubulavirus*. No serological cross-reactivity occurs between Menangle and other known paramyxoviruses (i.e., Hendra or Nipah viruses). The virus does not appear to be highly contagious but tends to spread slowly throughout the population. The virus does not appear able to survive in the environment for any length of time.

## Species affected

Menangle virus infections have only been reported in pigs in New South Wales, Australia. Cattle, sheep, birds, rodents, cats and dogs in the vicinity of the outbreak piggery were found to be seronegative for the virus. During the 1997 outbreak, only two of more than 250 humans with potential exposure were clinically affected by and seropositive for the virus. These two people were in prolonged close contact with infected pigs. Fruit bats (*Pteropus* spp.), are the probable reservoir for the virus. They have been found to be seropositive for the virus but are asymptomatic.

## Geographic distribution

Menangle virus has only been reported in one outbreak in a 2600-sow intensive piggery in New South Wales, Australia in 1997. Several species of fruit bats (*Pteropus* spp.) are native to this geographic area and have been found to be seropositive for the virus prior to the outbreak.

## Transmission

Currently, the route of transmission of Menangle virus between pigs, flying foxes and humans is unknown; a fecal-oral or urinary-oral transmission is suspected. In the two human cases of Menangle, both were closely associated with the infected pigs (i.e., birthing piglets and performing necropsies of infected piglets without wearing protective gloves or eyewear). Menangle virus has been found in the lung, brain and myocardium of fetal pigs.

Pigs between 10 and 16 weeks old are considered to harbor an active infection since this is the period when their maternal antibody protection is waning. These pigs do seroconvert to the virus as their immune system matures. Experimentally, susceptible sentinel pigs were placed into an uncleaned area, which had been recently occupied by infected pigs. The sentinel pigs did not become infected with the virus.

## Incubation period

The incubation period for Menangle is not known. However, infection in pigs seems to be of short duration (10 to 14 days) and results in strong immunity. Persistent infection in pigs does not occur.

## Clinical signs

Menangle virus is thought to cross the placenta to affect the developing fetuses and reproductive performance of naïve swine. Affected litters consisted of a mixture of mummified, autolysed and fresh stillborn piglets and a few normal live piglets. Many had deformities of the skeletal or nervous systems (i.e., arthrogryposis, brachygnathia, degeneration of spinal cord). Although no disease is observed in postnatal animals of any age, sows will have reduced farrowing rates; smaller litters sizes and possibly abort. Some sows returned to estrus approximately 28 days after mating; however others remain in a state of pseudopregnancy until more than 60 days after mating.

## Post mortem lesions [Click to view images](#)

Post mortem examination of the affected piglets revealed severe degeneration of the brain or spinal cord (was almost absent in some), arthrogryposis, brachygnathia, kyphosis, and occasionally fibrinous body cavity effusions and pulmonary hypoplasia were seen. The cranium of some piglets was slightly domed in some cases.

Histological examination of the brain and spinal cord revealed extensive degeneration and necrosis of the gray and white matter with infiltrations of inflammatory cells. Neurons contain intranuclear and intracytoplasmic inclusion bodies. Nonsuppurative myocarditis was found in some piglets.

## Morbidity and mortality

Menangle virus affected the reproductive potential and productivity of swine herds. Once infection was endemic in the herd, no further reproductive failures occur. No disease is observed in postnatal animals of any age.

During the 1997 outbreak, farrowing rates decreased from an expected 82% to as low as 38%. Additionally, the number of live piglets declined in 27% of litters. A total of 45% of sows farrowed litters with a reduced number of live piglets and an increased number of mummified and stillborn piglets. The mummified fetuses were of varying size, ranging upward in gestation age from 30 days.

## Diagnosis

### Clinical

The most notable clinical signs with Menangle infection would be an increased proportion of mummified and stillborn piglets and reduced litter size.

### Differential diagnosis

The differential diagnosis includes [classical swine fever](#), porcine reproductive and respiratory syndrome, porcine parvovirus, [Aujeszky's disease \(pseudorabies\)](#), and blue eye (La Piedad Michoacan) paramyxovirus.

### Laboratory tests

The most rapid method of testing for Menangle virus is by testing sows for the presence of specific antibody by virus neutralization or ELISA testing. Fetal specimens should be collected for virus isolation, serology and pathology. Virus can be isolated from brain, lung and myocardium of piglets. The virus does not hemagglutinate, therefore definitive diagnosis depends on electron microscopy and neutralization results with specific antiserum.

### Samples to collect

**Before collecting or sending any samples from animals with a suspected foreign animal disease, the proper authorities should be contacted. Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease. Two human infections of Menangle have been documented in persons closely associated with infected pigs. Precautions should**

**be taken while working with this virus. Menangle virus can be isolated from the brain, lung and myocardium of piglets. Serum from the farrowing sow should also be collected.**

## Recommended actions if Menangle is suspected

### Notification of authorities

Menangle virus infections must be reported to state of federal authorities immediately upon diagnosis or suspicion of the disease.

Federal Area Veterinarians in Charge (AVIC)

[http://www.aphis.usda.gov/vs/area\\_offices.htm](http://www.aphis.usda.gov/vs/area_offices.htm)

State Veterinarians

<http://www.aphis.usda.gov/vs/sregs/official.html>

## Quarantine and disinfection

In areas with native fruit bat populations, prevention of contact between bats and pigs is essential. Flowering or fruiting trees should not be grown near pig farm buildings as they may attract bat activity. In an outbreak situation, infection will most likely have spread through the herd before the first affected litters are farrowed.

To eradicate the disease from an endemic population, pigs ages 10–16 weeks should be isolated or removed from the population (most pigs become infected at 12–16 weeks of age, after colostral immunity wanes) or the herd should be restocked with unexposed pigs or pigs known to be immune to the virus. Currently there is no vaccine for Menangle available.

## Public health

During the 1997 Menangle outbreak, two humans in close contact with infected pigs developed influenza-like illness followed by the development of a macular rash. Both recovered after 10–14 days. People in close contact with infected pigs should take proper precautions since the route of transmission for pigs to humans is not known at this time.

## For more information

Menangle virus, Australia, Emerging Disease Notice.  
U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Center for Emerging Issues  
[www.aphis.usda.gov/vs/ceah/cei/menangle.htm](http://www.aphis.usda.gov/vs/ceah/cei/menangle.htm)

Menangle virus. Commonwealth Scientific & Industrial Research Organisation - CSIRO Online  
[www.csiro.au/index.asp?type=faq&id=Menangle](http://www.csiro.au/index.asp?type=faq&id=Menangle)

Australian bat Lyssavirus, Hendra virus and Menangle virus information for veterinary practitioners. Communicable Diseases Network Australia  
[www.health.gov.au/pubhlth/cdi/pubs/pdf/batsgen.pdf](http://www.health.gov.au/pubhlth/cdi/pubs/pdf/batsgen.pdf)

References

- Chant K, Chan R, Smith M, Dwyer DE, Kirkland P, et al. Probable human infection with a newly described virus in the family Paramyxoviridae. *Emerging Infectious Diseases* 1998;4(2):273–275.
- Kirkland PD, Daniels PW, Mohd Nor MN, Love RJ, Philbey AW, Ross AD. Menangle and Nipah virus infections of pigs. *Vet Clin of N Amer Prac Food Anim* 2002;18:557–571.
- Kirkland PD, Love RJ, Philbey AW, Davis RJ, Hart KG. Epidemiology and control of Menangle virus in pigs. *Aust Vet J* 2001;79(3):199–206.
- Love RJ, Philbey AW, Kirkland PD, Ross AD, Davis RJ, Morrissey C, Daniels PW. Reproductive disease and congenital malformations caused by Menangle virus in pigs. *Aust Vet J* 2001;79(3):192–198.
- Philbey AW, Kirkland PD, Ross AD, Davis RJ, Gleeson AB, Love RJ, Daniels PW, Gould AR, Hyatt AD. An apparently new virus (Family Paramyxoviridae) infectious for pigs, humans and fruit bats. *Emerging Infectious Diseases* 1998;4(2):269–271.