

## **Rift Valley Fever**

### **Importance**

Rift Valley fever (RVF) is an arthropod-borne, acute, febrile, viral disease of sheep, cattle, and goats. RVF is highly contagious to humans producing fever and flu-like symptoms. Severe hemorrhages, meningoencephalitis, and retinopathy occasionally occur and may be fatal in humans. The mortality rate is high in young animals, as is the abortion rate in infected animals.

### **Etiology**

Rift Valley Fever virus (RVFV) is a single-stranded RNA virus in the *Phlebovirus* genus of the family Bunyaviridae.

### **Species affected**

Many species can be infected by RVFV, including humans. Sheep and cattle are the primary hosts and amplifiers of this virus. Goats and dogs are also highly susceptible. Horses and pigs are resistant to this disease.

### **Geographic distribution**

Rift Valley fever is found throughout most of Africa. Recent outbreaks have occurred in Saudi Arabia and Yemen.

### **Transmission**

Rift Valley fever is spread between hosts by mosquito vectors. *Aedes* mosquitoes are the reservoir for the virus. In endemic regions, outbreaks often occur in 5-15 year cycles, and are typically seen after periods of heavy rainfall in normally dry areas. Between outbreaks, the virus may be present in dormant eggs of the mosquito *Aedes lineatopinnus* in the dry soil of grasslands. Heavy rainfall allows water to pool and gives the eggs a place to hatch. These infected mosquitoes develop, and transmit the virus to a ruminant amplifying host. Other genera and species of mosquitoes can then become infected and rapidly spread the disease. If susceptible animal species are present, there are many clinical cases. In many areas of Africa, the disease is enzootic and sentinel animals are used to monitor its presence.

The Rift Valley fever virus can also spread, by aerosols, to humans who handle infected tissues (like when performing field necropsies). This virus can survive up to 4 months at 4°C, and 8 years at temperatures below 0°C. It can also survive for over 1 hour in aerosols.

### **Incubation period**

The incubation period for Rift Valley fever is up to 3 days in sheep, cattle, goats, and dogs. In newborn animals, it can be as short as 12 hours.

## **Clinical signs**

The clinical signs of Rift Valley fever vary with species and age. They can include fever, anorexia, weakness, and death within 36 hours in lambs. Adult sheep will have a fever, mucopurulent nasal discharge, and possibly vomiting. Fever and depression are seen in calves, and fever, weakness, anorexia, excessive salivation, and possibly fetid diarrhea in adult cattle. Abortion is the most common sign when pregnant animals are present.

## **Post mortem lesions**

Hepatic necrosis is the primary lesion, and is especially extensive in younger animals and fetuses. The liver will appear enlarged, yellow, and friable with petechial hemorrhages. In older animals, hepatic necrosis can be more focal and may only be visible microscopically. Cutaneous hemorrhages, hemorrhages on serosal membranes, and hemorrhagic enteritis may also be seen.

## **Morbidity and Mortality**

Rift Valley fever is often fatal in young lambs, calves, and kids. In lambs less than 1 week of age, the mortality rate can be 90% or higher. In calves it is 10-70%. The mortality rate is about 20% in adult sheep, especially ewes that have aborted, and 10% in adult cattle. Abortion rates are high; up to 100% of infected sheep, cattle, and dogs may abort.

## **Diagnosis**

### **Clinical**

Rift Valley fever should be considered when the following group of conditions occur: high abortion rates, especially in sheep, cattle and dogs; high mortality in young ruminants; severe hepatic necrosis on necropsy of young animals and fetuses; flu-like symptoms in humans; high numbers of mosquitoes; and rapid spread of disease.

### **Differential diagnosis**

The clinical signs of Rift Valley fever in animals can be similar to those of bluetongue, Wesselsbron, ephemeral fever, enterotoxemia of sheep, brucellosis, vibriosis, trichomoniasis, Nairobi sheep disease, heartwater, ovine enzootic abortion, *Campylobacter* or *Salmonella* infection, listeriosis, toxoplasmosis, or any other cause of abortion.

### **Laboratory tests**

The Rift Valley fever virus can be isolated in mice or hamsters, 1-2-day-old lambs, embryonated chicken eggs, or tissue culture. Viral antigen is identified by immunofluorescence, complement fixation, and immunodiffusion. Antigens can be detected in the blood with immunodiffusion or enzyme immunoassays. Serological tests include enzyme-linked immunosorbent assay (ELISA), virus neutralization, immunofluorescence, hemagglutination inhibition, plaque reduction neutralization, complement fixation, and immunodiffusion.

### **Samples to collect**

**Before collecting or sending any samples from animals with a suspected foreign**

**animal disease, contact the AVIC. These samples should only be sent under secure conditions, by authorized personnel, and to authorized laboratories to prevent the spread of disease. Rift Valley fever is a zoonotic disease. Care should be taken to avoid exposure to aerosols and infected tissues. At the minimum, a face mask or shield and rubber gloves should be worn.**

For virus isolation, heparinized blood or serum should be collected from febrile animals, and tissue samples of the liver, spleen, kidney, lymph node, heart blood, and brain from dead animals or aborted fetuses. Specimens should be submitted preserved in 10% buffered formalin and in glycerol/saline and transported at 4°C

## **Recommended actions if Rift Valley fever is suspected**

### **Notification of authorities**

State and federal veterinarians should be immediately informed of any suspected cases of Rift Valley fever. Federal: Area Veterinarians in Charge (AVICS)

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

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

### **Quarantine and Disinfection**

Sanitation and vector control should be attempted, but often do not control the spread of disease. RVFV is inactivated by ether, chloroform, and strong solutions of sodium or calcium hypochlorite (residual chlorine should exceed 5000 ppm). It is also destroyed by low pH (<6.8) and detergents. Carcasses should be buried or burned.

### **Public health**

Humans are highly susceptible to infection by mosquitoes or by exposure to aerosols when handling infected tissues during slaughter, necropsy of aborted fetuses, or laboratory procedures. In humans, the incubation period is 4-6 days. The symptoms are flu-like and may include fever, weakness, muscle pain, headache, nausea, and photophobia. Recovery generally occurs after 4 to 7 days. Occasionally, a hemorrhagic condition may develop 2 to 4 days after the fever appears. The signs include jaundice, hematemesis, melena, petechiae, and death. Some patients may have meningoencephalitis and others a retinopathy that develops 5 to 15 days after the onset of fever. Vaccination is available for those at risk of exposure.

### **For More Information**

World Organization for Animal Health (OIE)

<http://www.oie.int>

OIE Manual of Standards

[http://www.oie.int/eng/normes/mmanual/a\\_summry.htm](http://www.oie.int/eng/normes/mmanual/a_summry.htm)

OIE International Animal Health Code

[http://www.oie.int/eng/normes/mcode/A\\_summry.htm](http://www.oie.int/eng/normes/mcode/A_summry.htm)

USAHA Foreign Animal Diseases book

[http://www.vet.uga.edu/vpp/gray\\_book/FAD/](http://www.vet.uga.edu/vpp/gray_book/FAD/)

## **References**

Mebus, C.A. "Rift Valley Fever." In *Foreign Animal Diseases*. Richmond, VA: United States Animal Health Association, 1998, pp. 353-361.

"Rift Valley Fever." In *Manual of Standards for Diagnostic Tests and Vaccines*. Paris: World Organization for Animal Health, 2000, pp. 144-152.

Rift Valley Fever. Disease Lists and Cards. *World Organization for Animal Health*.  
<<http://www.oie.int>>.