

Rift Valley fever



Wetlands supporting
groups of susceptible
animals

Wildlife ✓

Livestock ✓

Human ✓



Synonym: RVF

KEY FACTS

What is Rift Valley fever?	An insect-borne viral disease that primarily affects animals but can also affect humans. The virus is mostly transmitted by the bite of infected mosquitoes, mainly of the <i>Aedes</i> species, which acquire the virus when feeding on infected animals. The main amplifying hosts are sheep and cattle. The disease can cause abortions and high mortality in young animals throughout its geographic range. In humans it causes a severe influenza-like illness, with occasionally more serious haemorrhagic complications and death.
Causal agent	Rift Valley fever virus (RVFV) from the genus <i>Phlebovirus</i> .
Species affected	Many species of terrestrial mammal, particularly sheep, cattle and wild ruminants, although most indigenous livestock species in Africa are highly resistant to the disease. Humans are very susceptible.
Geographic distribution	Endemic in tropical regions of eastern and southern Africa, with occasional outbreaks in other parts of Africa. Rift Valley Fever (RVF) was detected outside Africa for the first time in 2000, with cases in Saudi Arabia and Yemen
Environment	An epidemic can occur when there is a susceptible livestock population, a large population of vector mosquitoes and the presence of the RVFV. Major epidemics occur at irregular intervals of 5-35 years: in Africa, outbreaks typically occur in savannah grasslands every 5-15 years, and in semi-arid regions every 25-35 years. Epidemics are associated with the hatching of mosquitoes during years of heavy rainfall and flooding.

TRANSMISSION AND SPREAD

Vector(s)	Mainly mosquitoes (<i>e.g. Aedes, Anopheles, Culex, Eretmapodites</i> and <i>Mansonia</i> species) and other biting insects.
How is the disease transmitted to animals?	Most commonly spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected animals and the female mosquito can also transmit the virus directly to her offspring <i>via</i> eggs. In mammalian species the virus can also be transmitted to the foetus of an infected female.
How does the disease spread between groups of animals?	The main amplifying hosts are sheep and cattle and once livestock are infected, many species of mosquitoes (<i>e.g. Aedes, Anopheles, Culex, Eretmapodites</i> and <i>Mansonia</i> species) and biting insects can then spread the disease to other animals and humans. Transmission can also occur through direct contact, which may become relatively more important as an outbreak progresses.

How is the disease transmitted to humans?

Humans can be infected through the bite of an infected mosquito, but most reported cases occur through contact with the blood or organs of infected animals, through the handling of animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures, or from the disposal of carcasses or foetuses. The disease may be spread by ingesting the unpasteurised or uncooked milk of infected animals. The virus can also be transmitted vertically to the human foetus.

IDENTIFICATION AND RESPONSE

Field signs

There may be a sudden onset of large numbers of abortions in sheep ('abortion storms' with up to 100% of a flock affected), goats, cattle or camels and deaths in lambs, kids or calves, a high neonatal mortality, and the presence of liver lesions which may be particularly severe in foetuses and newborn animals. Jaundice may be noted in surviving lambs. There is a higher risk of an outbreak in irrigated areas or if there is surface flooding in savannah or semi-arid areas followed by prolonged rains, if the mosquito populations are high, and if there is concurrent illness.

Humans may suffer from influenza-like symptoms which can include fever, headache, muscular pain, weakness, nausea, sensitivity to light, loss of appetite and vomiting. Recovery usually occurs within 4–7 days. Complications can lead to ocular disease (with loss of vision), meningoencephalitis, hepatitis, haemorrhagic fever and occasionally death.

Recommended action if suspected

Contact and seek assistance from animal and human health professionals immediately if there is any illness in livestock and/or people. RVF is a notifiable disease and suspected cases must be reported immediately to local and national authorities and the OIE

Diagnosis

Isolation of the causative agent by health professionals is needed for a definitive diagnosis. For dead animals, whole blood, liver, lymph nodes and spleen are preferable tissues for detecting the virus. In live animals and humans, diagnosis is usually made by testing blood/serum.

PREVENTION AND CONTROL IN WETLANDS

Overall

Environmental (habitat) management

Encourage mosquito predators and their access to mosquito breeding habitats:

- Connect shallow water habitat (mosquito breeding areas) with deep-water habitat > 0.6m (favoured by larvivorous fish) with steep sides, through meandering channel connections, deep ditches and tidal creeks.
- Include at least some permanent or semi-permanent open water.
- Construct artificial homes or manage for mosquito predators such as bird, bat and fish species.

Reduce mosquito breeding habitat:

- Reduce the number of isolated, stagnant, shallow (2-3 inches deep) areas.
- Cover or empty artificial containers which collect water.
- Manage stormwater retention facilities.
- Strategic manipulation of vegetation.
- Vary water levels.

- Construct a vegetation buffer between the wetland and adjacent land to filter nutrients and sediments.
- Install fences to keep livestock from entering the wetland to reduce nutrient loading and sedimentation problems.

In ornamental/more managed ponds:

- Add a waterfall, or install an aerating pump, to keep water moving and reduce mosquito larvae. Natural ponds usually have sufficient surface water movement.
- Keep the surface of the water clear of free-floating vegetation and debris during times of peak mosquito activity.

Vector control (chemical)

It may be necessary to use alternative mosquito control measures if the above measures are not possible or ineffective:

- Use larvicides in standing water sources to target mosquitoes during their aquatic stage. This method is deemed least damaging to non-target wildlife and should be used before adulticides. However, during periods of flooding, the number and extent of breeding sites is usually too high for larvicidal measures to be feasible.
- Use adulticides to spray adult mosquitoes.
- The environmental impact of vector control measures should be evaluated and appropriate approvals should be granted before it is undertaken.

Biosecurity

Protocols for handling sick or dead wild animals and contaminated equipment can help prevent further spread of disease:

- Avoid contact with livestock where possible.
- Wear gloves whilst handling animals and wash hands with disinfectant or soap immediately after contact with each animal.
- Change or disinfect gloves between animals.
- Change needles and syringes between blood collection from different animals.
- Wear different clothing and footwear at each site and disinfect clothing/footwear between sites.
- Disinfect field equipment between animals and sites.

Monitoring and surveillance

- Regular inspection of sentinel herds (small ruminant herds located in geographically representative areas) in high risk areas such as locations where mosquito activity is likely to be greatest (*e.g.* near rivers, swamps and dams). As a general guide, sentinel herds should be sampled twice to four times annually, with an emphasis during and immediately after rainy seasons.
- In livestock, clinical surveillance for abortion with laboratory confirmation and serology, and disease in humans in areas known to have had outbreaks.

Livestock

- **Vaccination**
 - Animal vaccination must be implemented *prior* to an outbreak. Consider vaccination of all trade animals at 9-12 months of age. Vaccination in outbreak areas is *not* recommended.
- **Restrict or ban the movement of livestock** to slow the expansion of the virus from infected to uninfected areas:
 - Livestock should not be moved into/out of the high-risk epizootic areas during periods of greatest virus activity, unless they can be moved to an area where no potential vector species exist (such as at high altitudes).
 - All trade should cease once pre-epidemic conditions have been recognised and until at least six months after the last evidence of virus activity.
- **Bury animals** rather than butchering them as freshly dead animals are a potential source of infection.

Wildlife

RVF is thought to occur in endemic cycles between wild African ruminants and mosquitoes, with little apparent disease. For control of disease in captive collections of wild ruminant species, guidelines above for livestock, habitat and vector management may be applicable.

Humans

In the epidemic regions, **thoroughly cook** all animal products (blood, meat and milk) before eating them.

Avoid contact with livestock where possible [[▶ Biosecurity section](#) above].

Reduce the chance of being bitten by mosquitoes:

- Wear light coloured clothing which covers arms and legs.
- Use impregnated mosquito netting when sleeping outdoors or in an open unscreened structure.
- Avoid mosquito-infested areas or stay indoors when mosquitoes are most active.
- Use colognes and perfumes sparingly as these may attract mosquitoes.
- Use mosquito repellent when outdoors. Note that some repellents cause harm to wildlife species, particularly amphibians. Wash hands before handling amphibians.
- Use citronella candles and mosquito coils in well ventilated indoor areas.
- Use mesh screens on all doors and windows.

IMPORTANCE

Effect on wildlife

RVF is thought to occur in endemic cycles between wild African ruminants and mosquitoes with little apparent disease. African buffalo and domestic buffalo are considered 'moderately' susceptible with mortalities of less than 10%. Camels, equids and African monkeys including baboons are all considered 'resistant' with infection being inapparent. Birds, reptiles and amphibians are not susceptible to RVF.

Effect on livestock

Pregnant livestock are most severely affected with abortion of nearly 100% of foetuses. Lambs and kids are most at risk with mortalities of 70–100%, followed by sheep and calves (20–70%), and then adult cattle, goats and domestic buffalo (<10%).

Effect on humans

Whilst most cases in humans are relatively mild, a small proportion may develop more severe illness such as ocular (eye) disease (0.5-2% of people), haemorrhagic fever (<1%) or meningoencephalitis (<1%). Few infected humans die of the disease (1%).

Economic importance

There is potential for significant economic losses in the livestock industry due to death and abortion of infected animals and possible trade restrictions imposed during and after an outbreak. Illness in humans can result in economic losses due to the time lost from normal activities.

FURTHER INFORMATION

Useful publications and websites

- ☐ Food and Agriculture Organization (FAO). **Animal health manual No. 17: recognising Rift Valley fever.** www.fao.org/docrep/006/y4611e/y4611e00.htm#Contents [Accessed March 2012].
- ☐ Food and Agriculture Organization (FAO). **Animal health manual No. 15: preparation of Rift Valley fever contingency plans.** www.fao.org/DOCREP/005/Y4140E/y4140e00.htm#TopOfPage [Accessed March 2012].
- ☐ World Organisation for Animal Health (OIE). **Chapter 2.01.14: Rift Valley fever.** Manual of diagnostic tests and vaccines for terrestrial animals. www.oie.int/fileadmin/Home/eng/Health_standards/tahm/2.01.14_RVF.pdf [Accessed March 2012].
- ☐ World Health Organization (WHO). **Rift Valley fever factsheet.** www.who.int/mediacentre/factsheets/fs207/en/ [Accessed March 2012].

Further information on disinfectants

- ☐ FAO, Rome. **Manual on procedures and for disease eradication by stamping out.** (2001). www.fao.org/DOCREP/004/Y0660E/Y0660E03.htm [Accessed March 2012].

Contacts

- ☐ **International Rift Valley fever experts and laboratories (FAO).** www.fao.org/DOCREP/005/Y4140E/y4140e13.htm#P1_10 [Accessed March 2012].
- ☐ **Rift Valley fever vaccine sources (FAO).** www.fao.org/DOCREP/005/Y4140E/y4140e14.htm#TopOfPage. [Accessed March 2012].