

# Peste des petits ruminants



Wetlands supporting  
groups of susceptible  
animals

Wildlife ✓

Livestock ✓

Human ✗



Synonyms: Contagious pustular stomatitis, goat plague, kata, pest of small ruminants, PPR, pneumoenteritis complex, pseudorinderpest of small ruminants, small ruminant plague, stomatitis-pneumoenteritis syndrome

## KEY FACTS

### What is peste de petits ruminants (PPR)?

A highly contagious viral disease, primarily affecting goats and sheep. It is characterised by the sudden onset of fever, depression, eye and nasal discharge, immunosuppression, lesions of the mouth, laboured breathing or coughing, diarrhoea and death. Although often characterised by high morbidity and mortality rates, pathogenicity can vary significantly, with clinical disease ranging from mild to severe. The outcome of infection may often be complicated by the involvement of pre-existing secondary pathogens.

### Causal agent

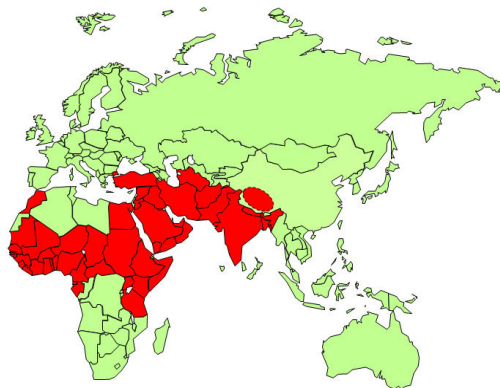
Peste des petits ruminants virus (PPRV), a member of the morbillivirus genus that includes measles virus and rinderpest virus (RPV).

### Species affected

Small ruminants, predominantly sheep and goats, although many other species have been reported to be infected and develop clinical disease. The role of wildlife species in the transmission of the virus remains unclear although zoological collections in Saudi Arabia and various wildlife species across Africa have been shown to be susceptible (*e.g.* Arabian oryx *Oryx leucoryx*, Dorcas gazelle *Gazella dorcas*, Laristan sheep *Ovis orientalis laristanica*, gemsbok *Oryx gazella*, Nubian ibex *Capra nubiana*, Thomson's gazelle *Eudorcas thomsonii*, grey duiker *Sylvicapra grimmia*, kobs *Kobus kob* and Bulbal hartebeest *Alcelaphus buselaphus*). Camels are also susceptible to infection and can display signs of clinical disease. Infection of other large ruminants (*e.g.* cattle and buffalo) and pigs has been reported although infection is generally subclinical in these species and viral excretion is unlikely.

### Geographic distribution

PPR has historically been associated with outbreaks across West, Central and East Africa, India and the Middle East. However, PPRV is now also considered to be endemic across North Africa, China and parts of the Far East. Increased awareness of the disease and reporting systems have highlighted the presence of PPR in areas previously thought to be clear of the virus.



Historical and recent distribution of PPR

- Environment**
- Any areas that support the existence of susceptible animals, including wetlands.

## TRANSMISSION AND SPREAD

**Vector(s)** Although PPRV is not vector-borne, it may be spread mechanically by infected animals and contaminated objects (see below).

**How is the disease transmitted to animals?** PPRV is most effectively transmitted between animals by direct contact, often through the inhalation of infective droplets. However, the virus is known to be excreted in eye and nasal discharge as well as, to a lesser extent, in urine and faecal matter. The UV lability and temperature sensitivity of the virus reduce the likelihood of transmission *via* routes other than droplet spread.

Transmission *via* infected bedding, water, feed troughs and other inanimate objects (fomites) is possible but is thought to occur at a very low level. There is currently no evidence for vertical transmission of PPRV (*i.e.* mother to offspring).

**How does the disease spread between groups of animals?** PPRV is considered to be highly infectious, often spreading rapidly between groups of susceptible animals. Wherever animals are in close contact the potential for transmission exists *e.g.* markets. The variability in virulence between different isolates of the virus is currently poorly understood. However, animals can excrete and therefore spread the virus in the absence of clinical disease, often allowing the spread of virus to naïve populations when groups of animals are moved. Clinical disease is often preceded by a 4-5 day incubation period where animals must be considered to be contagious.

The appearance of clinical PPR in an area may be associated with: the introduction of animals from another area; the general movement of animals; contact with livestock returning unsold from market; contact with traded livestock or nomadic animals (*e.g.* shared grazing, water, housing); and husbandry changes.

**How is the disease transmitted to humans?** PPRV is not known to be infectious for humans.

## IDENTIFICATION AND RESPONSE

**Field signs** PPR can quickly spread in populations of naïve small ruminants and cause the following symptoms:

- fever
- dry muzzle and dull coat
- discharge from the eyes, mouth and nose
- profound immunosuppression leading to the development of secondary infections
- sores on mucous membranes particularly in the mouth
- sudden onset of restless behaviour and depressed appetite
- scabs or nodules may be seen around the lips and muzzle in later stages
- laboured breathing, coughing and sneezing
- severe depression
- diarrhoea
- death (high mortality of up to 90% which can occur within 5-10 days after the onset of fever).

As well as causing high morbidity and mortality, the virus can also circulate in a mild form and can be very difficult to diagnose in the field. Factors affecting the outcome of infection include breed, age, immunological competence, general health, and the presence of secondary infections.

### Recommended action if suspected

PPR is a notifiable disease and suspected cases must be reported immediately to local and national authorities and the OIE.

Subsequent and additional measures:

- quarantine affected area and restrict movement of animals
- avoid introduction of healthy animals
- collect samples (where appropriate and as directed)
- dispose of carcasses (burning or burying as directed)
- disinfect in-contact fomites; most common disinfectants can be used.

### Diagnosis

A tentative diagnosis can be made based on the clinical signs described above.

Laboratory confirmation is required for a definitive diagnosis of PPR as clinical signs are similar to many other diseases including bluetongue virus, contagious caprine pleuropneumonia, foot and mouth disease, contagious ecthyma, Nairobi sheep disease, capripox virus, pasteurellosis and others.

Laboratory tests may detect the PPR virus itself, evidence of the presence of PPRV (virus antigen or genetic material) or antibodies against PPRV found in blood serum. Rapid laboratory diagnosis is achieved through immunocapture enzyme-linked immunosorbent assay (ELISA), counter immunoelectrophoresis, agar gel immunodiffusion and in some instances, polymerase chain reaction (PCR).

## PREVENTION AND CONTROL IN WETLANDS

### Environment

- Under ideal conditions (*i.e.* dark and cool) outside the body the virus is generally considered to be viable for less than four days and is able to spread only relatively short distances. The virus is inactivated by UV light and most lipid-solvent based detergents and is both thermo- (>70°C) and pH-labile (inactivated at pH <5.6 and > 9.6).
- The virus may survive for short periods in carcasses and in refrigerated meat, and may survive for several months in salted or frozen meat.
- It is not well understood how the virus is maintained between outbreaks.

### Livestock

Livestock stakeholders are advised to monitor susceptible animals closely and frequently for any signs of disease or developing illness. Where possible, any newly acquired small ruminants should be quarantined for a minimum of 21 days and monitored, before being released.

#### Epidemic

When PPR appears in a previously unaffected area, the following is advised:

- **Rapid identification and confirmation of the disease.**  
Contact a veterinarian immediately if unusual illness is noticed.
- **Humane slaughter and disposal of affected animals.**  
Infected animal carcasses should be burned or buried deep, along with their contact fomites (bedding, feed *etc.*).
- **Strict quarantine and control of movements.**  
Quarantine affected areas and avoid the introduction of healthy animals; isolate affected animals from the rest of the herd; do not allow contact

between sick animals and neighbouring livestock; restrict the movement of small ruminants to and from affected areas.

- **Disinfection and cleaning**  
Thoroughly clean and disinfect all contaminated areas and items (including holding pens, physical perimeters, clothing and equipment) with lipid solvent solutions of high or low pH and disinfectants.
- **Monitor** all livestock and interaction with susceptible wild animals closely.
- **Vaccination**  
Consider and seek advice on the best use of vaccine; strategically 'ring' vaccinate and/or vaccinate high-risk populations.

### **Endemic**

In PPR-affected areas, disease outbreaks are controlled by a combination of **quarantine** and **vaccination**:

- **Ring vaccination** in areas surrounding a PPR outbreak. This involves vaccinating susceptible animals in a given zone, forming a buffer of immune individuals that then limit disease spread.
- **Vaccination of high-risk** populations in high-risk areas (prophylactic immunisation).

Both vaccinated animals and small ruminants that recover from infection with PPRV generate a long lasting immunity that may last the lifetime of the animal.

### **Treatment**

There is no specific treatment for PPR but antibiotics and other supportive treatment may prevent secondary infections and decrease mortality.

## **Wildlife**

The role of wildlife in the maintenance and transmission of PPR remains unclear. However, numerous wildlife populations are susceptible and caution must be taken, by restricting interaction of livestock with wildlife species, and restricting movement of livestock where virus is known to be circulating.

## **Humans**

Livestock stakeholders such as veterinarians, traders, community animal health workers and members of pastoral communities, play an important role in the prevention and control of PPR. Raising awareness of the disease (signs of the disease, how the virus is spread, the role of trade and disease diagnosis), its reporting and prevention, and how best to control outbreaks, is fundamental to PPR control.

## **IMPORTANCE**

### **Effect on wildlife**

The host range of PPR in wild animals is still not fully understood, and the conservation status of some susceptible wildlife species could be at risk.

### **Effect on livestock**

PPR causes heavy losses to goat and sheep stock and is a major factor that affects the development of sustainable agriculture and food security.

### **Effect on humans**

There is no evidence to suggest direct public health implications exist although outbreaks threaten food security, especially for subsistence farmers, causing a substantial reduction in the availability of animal protein, as well as essential micro-nutrients, for human consumption.

### **Economic importance**

Direct and severe economic losses may be observed as a result of PPR, especially for pastoralist households and populations that rely on small

ruminants as trade commodities. Disease outbreaks are a substantial threat to livelihoods which may already be under strain due to recurrent droughts and other pressures.

The presence of PPR in a region also seriously constrains export, trade and the development of livestock production.

## FURTHER INFORMATION

### Useful publications and websites

- ☐ World Organisation for Animal Health (OIE). **Chapter 2.07.11: Peste des petits ruminants**. Manual of diagnostic tests and vaccines for terrestrial animals. [http://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahm/2.07.11\\_PPR.pdf](http://www.oie.int/fileadmin/Home/eng/Health_standards/tahm/2.07.11_PPR.pdf) [Accessed March 2012].
- ☐ Food and Agricultural Organization (FAO). **Recognizing peste des petits ruminants**. <ftp://ftp.fao.org/docrep/FAO/003/X1703E/X1703E00.PDF> [Accessed March 2012].
- ☐ Banyard, A. C., Parida, S., Batten, C., Oura, C., Kwiatek, O. & Libeau, G. (2010). **Global distribution of peste des petits ruminants and prospects for improved diagnosis and control**. *Journal of General Virology*, 91 (12): 2885-2897. <http://jgv.sgmjournals.org/content/91/12/2885.full.pdf+html> [Accessed March 2012].
- ☐ World Organisation for Animal Health (OIE). **Technical disease card: PPR**. [http://www.oie.int/fileadmin/Home/eng/Animal\\_Health\\_in\\_the\\_World/docs/pdf/PESTE\\_DES\\_PETITS\\_RUMINANTS\\_FINAL.pdf](http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/PESTE_DES_PETITS_RUMINANTS_FINAL.pdf) [Accessed March 2012].
- ☐ The Centre for Food Security and Public Health (CFSPH). **Peste des petits ruminants**. [http://www.cfsph.iastate.edu/Factsheets/pdfs/peste\\_des\\_petits\\_ruminants.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/peste_des_petits_ruminants.pdf) [Accessed March 2012].
- ☐ World Organisation for Animal Health (OIE). **World Animal Health Information Database (WAHID) Interface**. <http://web.oie.int/wahis/public.php?page=home> [Accessed March 2012].
- ☐ Merck & Co. Inc. **The Merck veterinary manual: peste des petits ruminants**. <http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/56100.htm> [Accessed March 2012].

### Contacts

- ☐ **FAO Animal Production and Health Division**. [www.fao.org/ag/againfo/home/en/who.htm](http://www.fao.org/ag/againfo/home/en/who.htm) [Accessed March 2012].
- ✉ **WHO Communicable Diseases Surveillance and Response (CSR)**. [zoonotic\\_alert@who.int](mailto:zoonotic_alert@who.int), [fmeslin@who.int](mailto:fmeslin@who.int) and [outbreak@who.int](mailto:outbreak@who.int)

### Laboratory confirmation

- Samples for diagnostic confirmation can be submitted to:
- ✉ **FAO Reference Laboratory For PPR (CIRAD-EMVT), Campus international de Baillarguet**, Montferrier-sur-Lez, BP 5034, 34032 Montpellier, Cedex 1, France, +33 4 67593705, [diallo@cirad.fr](mailto:diallo@cirad.fr).
  - ✉ **FAO World Reference Laboratory for Rinderpest Reference Laboratory for PPR, Institute for Animal Health, Pirbright Laboratory**, Ash Road, Pirbright, Woking, Surrey GU24 0NF, United Kingdom, +44 1483 232441, [ann.boddy@bbsrc.ac.uk](mailto:ann.boddy@bbsrc.ac.uk).
  - ☐ Detailed instructions for the collection and dispatch of PPR samples can be found in the publication **Collection and submission of diagnostic specimens to the FAO World Reference Laboratory for Rinderpest**. [www.fao.org/docrep/007/v9813e/v9813e00.htm](http://www.fao.org/docrep/007/v9813e/v9813e00.htm).