



# Peste des Petits Ruminants

# OIE Members' official peste des petits ruminants status map

Last update May 2021

## Critical facts

- *Peste des petits ruminants* (PPR) is also known as goat plague or ovine rinderpest
- Peste des Pestes Ruminants virus (PPR) is the most globally widespread infectious disease of small ruminants
- Following the global eradication of Rinderpest in 2011, the OIE and FAO have joined target PPR as the next animal disease to eradicate; the road to eradicating PPR began in 2015, with the goal of ending the disease by 2030
- Despite efforts, PPR is emerging in new regions in the world: on 8 February 2021, Thailand reported peste des petits ruminants (PPR) outbreak in goats imported from Western Africa

 Suspension of PPR free status

 Members and zone recognised as free from PPR

 Countries and zone without an OIE official status





# Sheep and goat farming in Cambodia

- Goat raising can be a successful low input livestock system for smallholder farmers and is increasing in importance in Cambodia.
- However, only few thousands of heads are raised in Kampot, Kampong Chhnang, Kratie...often related to small organic farms, eco-resort or NGO programs.
- But Cham community import regularly sheep from Vietnam and slaughtering of sheep (50 per day) in Phnom Penh arriving from Banteay Mancheay coming (actually likely from Thailand) are reported <https://www.phnompenhpost.com/national/goat-meat-dust-due-illegal-slaughter>

## In conclusion:

1. Cambodia is a country at risk of PPR
2. Cambodia must commit to the **PPR Global Control and Eradication Strategy** of OIE

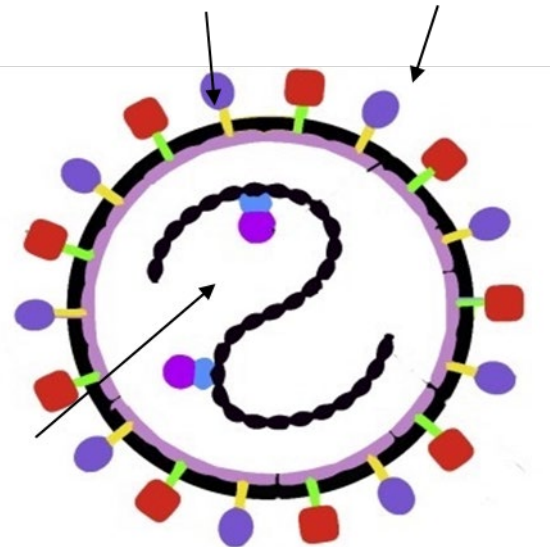


**ETIOLOGY**

# Classification of the causative agent

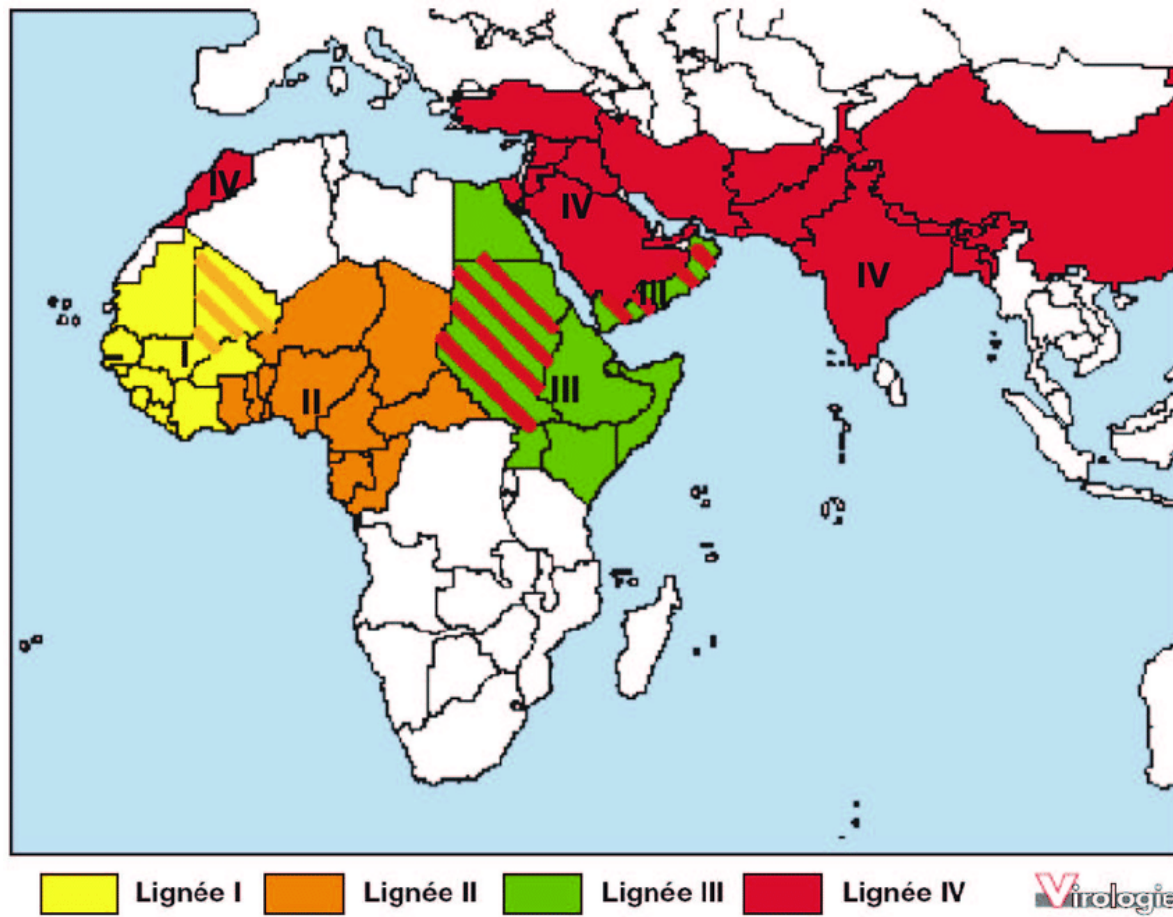
- PPR is caused by a *Morbillivirus*
- Family *Paramyxoviridae*; it is a *RNA virus*
- Paramyxoviruses cause a wide variety of diseases in animals: rinderpest, Newcastle disease, canine distemper, Nipah...
- The virus is enveloped and has a capsid that contains a single-stranded RNA genome.

that





There is a single serotype of PPR virus, but four distinct genetic lineages; lineages I, II, and III are restricted primarily to the African continent, while lineage IV is found throughout Asia and the Middle East





# Survival of the virus

- Inactive after 10 minutes at 60°C
- Stable pH 4 to 10
- Is killed by most disinfectants; formaldehyde 0.25% completely inactivate the virus within 5 minutes
- Long survival in chilled and frozen tissues; it is capable of surviving in culture for at least 4 months at  $-20^{\circ}\text{C}$
- Inactivated when exposed to ultraviolet radiations for 12 hours.
- It is assumed that, like Rinderpest virus, it would be rapidly inactivated by the putrefaction in the carcass of an animal dying from PPR



**EPIDEMIOLOGY**



# Susceptible Species

- Sheep
- Goats
- Cattle, buffaloes and pigs can be infected but don't develop any clinical signs
- PPR could affects some wild species; Growing evidence suggests that multiple wildlife species can be infected, with important consequences for the potential maintenance of PPRV
- PPR is not zoonotic. *However, the carcasses of animals suffering from PPR are unlikely to provide good-quality meat and should be buried or destroyed by heat*

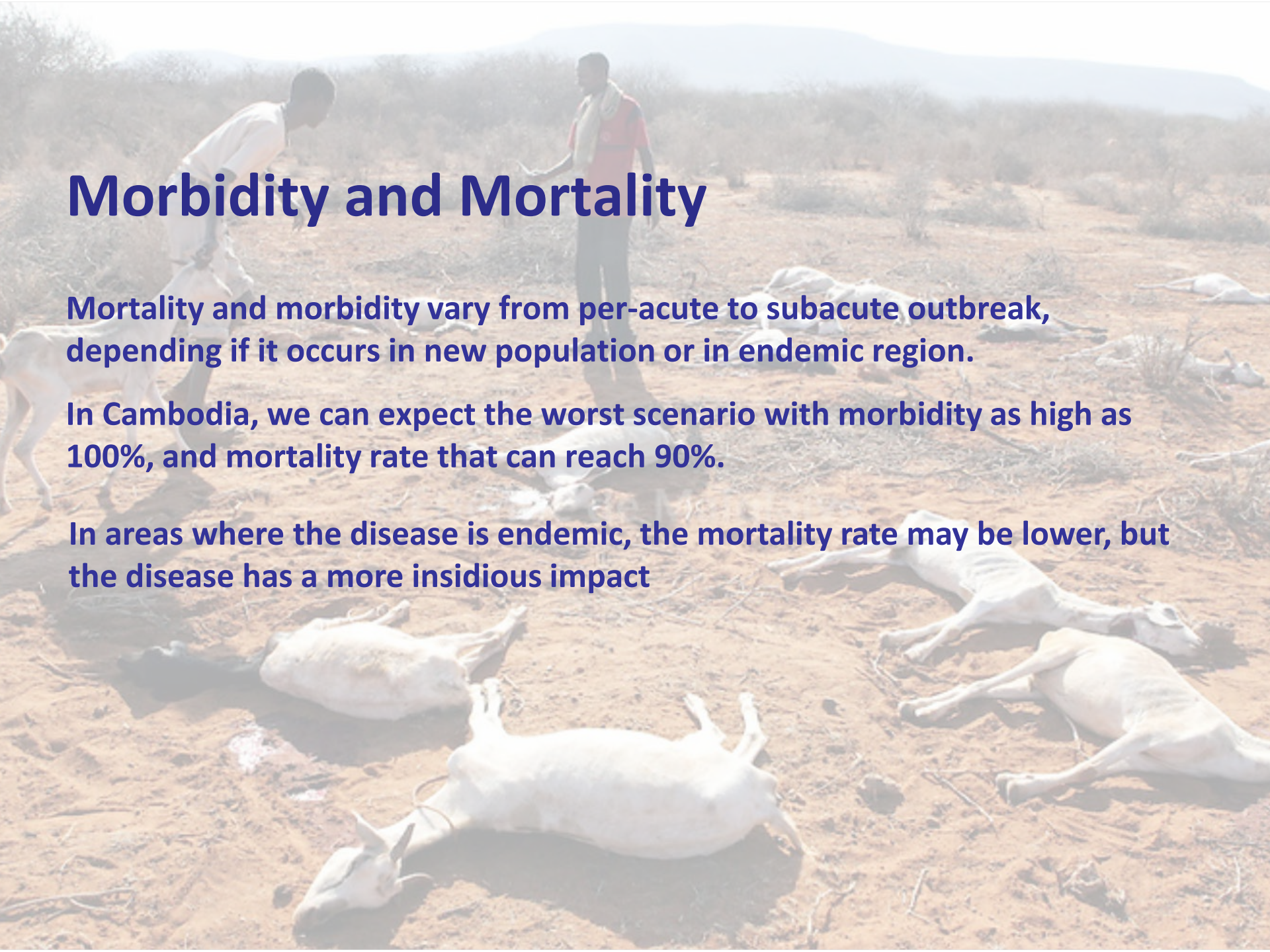


# Morbidity and Mortality

Mortality and morbidity vary from per-acute to subacute outbreak, depending if it occurs in new population or in endemic region.

In Cambodia, we can expect the worst scenario with morbidity as high as 100%, and mortality rate that can reach 90%.

In areas where the disease is endemic, the mortality rate may be lower, but the disease has a more insidious impact





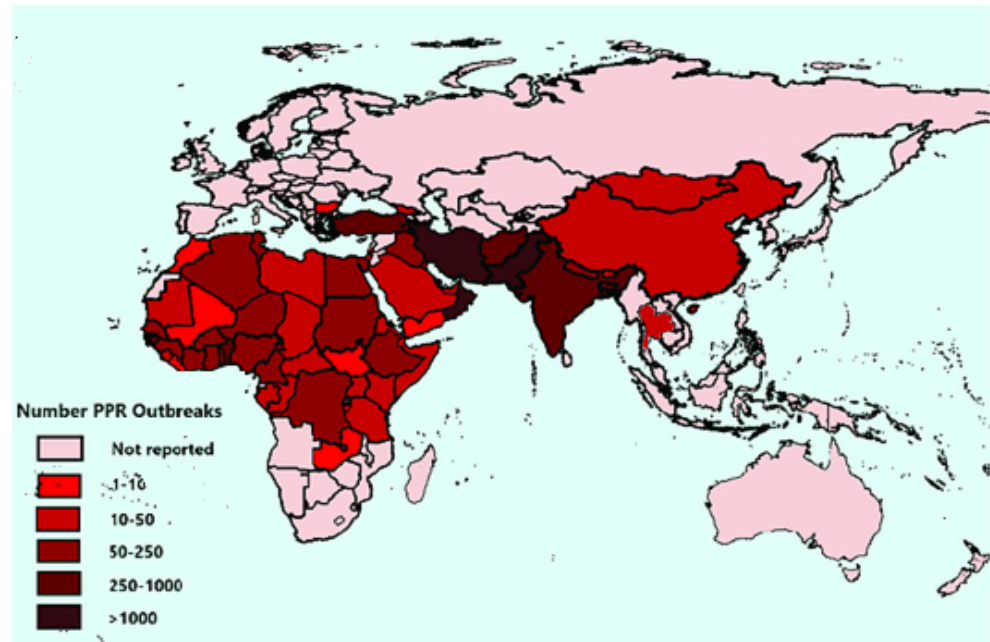
## Transmission of PPR

- PPR virus has a direct life cycle, maintained by infected animal to susceptible animal transmission **without involvement of carrier animals** (once infected, the animal either dies or recovers) **or vectors**
- The virus is shed in secretions (e.g., nasal and salivary) and excretions (e.g., feces) of infected animals.
- Transmission is by close contact:
  - *PPRV is transmitted mainly by aerosols between animals living in close contact*
  - *Or ingestion by nuzzling or licking*
- Fomites such as water, feed troughs, and bedding can transmit PPR virus for a short time but do not remain infectious for extended periods.
- Animals are considered infectious during the incubation period, which might range from 2 to 10 days.



## Geographical distribution of PPR

- PPR was first described in Cote d'Ivoire (Gargadennec & Lalanne, 1942)
- In 1950s & 1960s PPR was discovered in other parts of West Africa
- Since the late 1990s, it has expanded its range to cover large regions of Africa, from North Africa to Tanzania, the Middle East, and is also widespread in countries from central Asia to South and East Asia
- To SEA in 2021 (Thailand)





**DIAGNOSIS**





## Clinical signs

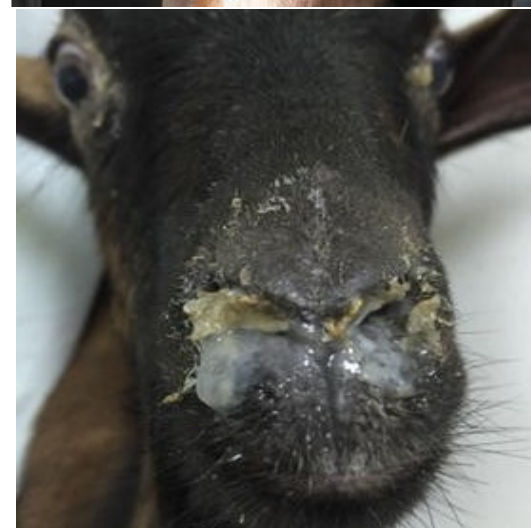
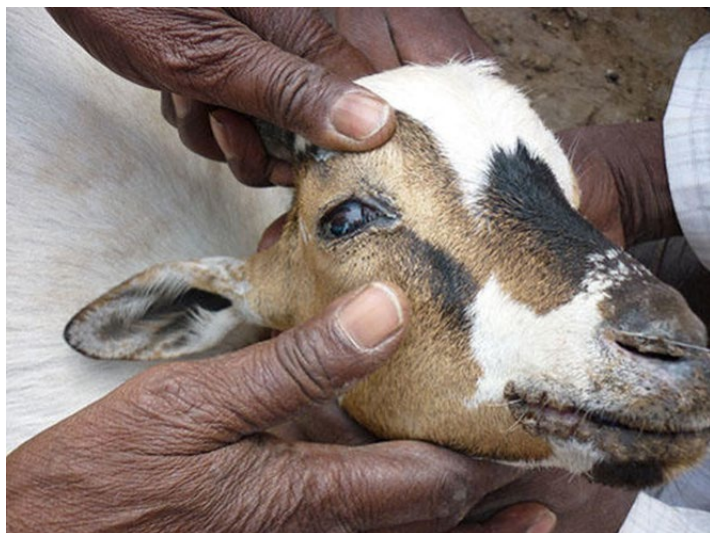
PPR is a fast-spreading disease that primarily infects domesticated sheep and goats. Outbreaks will not involve cattle (vs. FMD)

The incubation period can range from 2 to 10 days after infection, but most clinical signs are observed within 2 to 6 days of infection:

- sudden onset of depression,
- fever, anorexia
- discharge from the eyes and nose, to sero-mucopurulent nasal discharges resulting from bacterial superinfection
- sores in the mouth,
- difficulty breathing, coughing,
- foul-smelling diarrhea,
- death.



## Discharge from eyes and nose

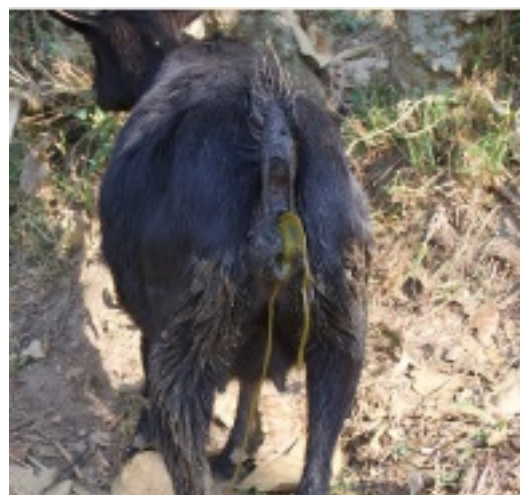




## Sores in the mouth



## Foul-smelling diarrhea







# Differential diagnosis

## Similar clinic picture

- Rinderpest: similar signs but eradicated. it is very important that PPR and rinderpest be lab differentiated because any outbreak of rinderpest anywhere represents an **international emergency**
- Bluetongue: vector-borne. Salivation, nasal discharge, profuse diarrhea, and pneumonia but actually many animals infected with the bluetongue virus do not show signs of disease; it is not contagious.

## Profuse diarrhea

- Coccidiosis: affect lambs



## Respiratory signs

- Pneumonic pasteurellosis: is a purely respiratory disease of sheep and goats. Mostly associated to stress conditions (transportation, malnutrition, poor-management...). Antibiotic active
- Contagious caprine pleuropneumonia: due to Mycoplasma. Similar high morbidity and high mortality but symptoms limited to strict pneumonia mouth lesions or diarrhea are not present in CCPP.

## Sore mouth

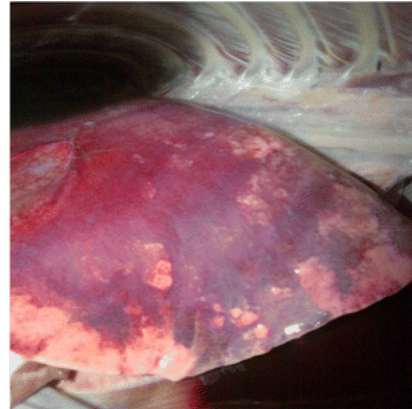
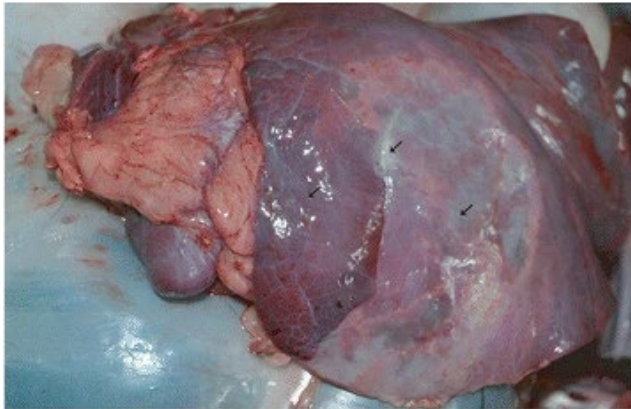
- Foot-and-mouth disease (FMD): absence of breathing problems and diarrhea, and the presence of lameness
- Contagious ecthyma (or “sore mouth”): limited to small bumps or blisters, usually around the mouth. No mortality.
- Sheep and goat pox: similar to LSD in cattle. No mortality



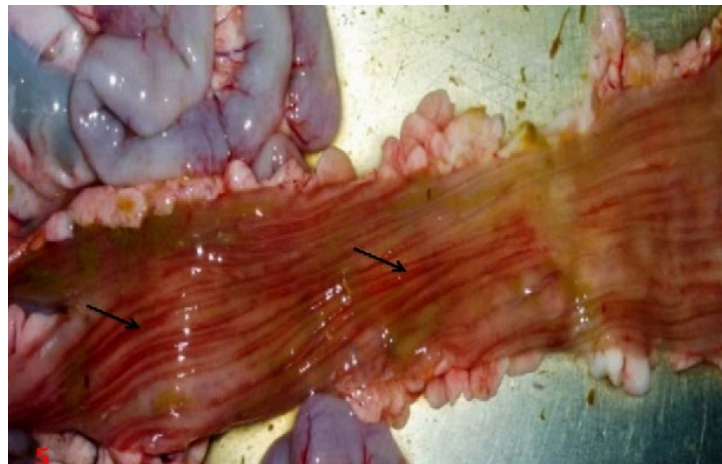
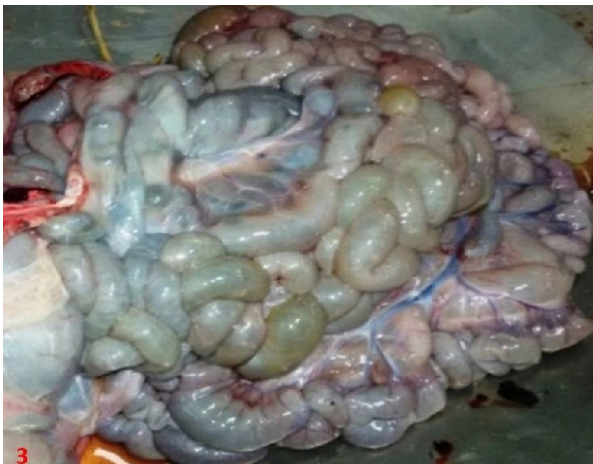


# Autopsy

- Lungs firm to the touch with dark red or purple areas.



- Intestines are congested (reddened), have hemorrhagic streaking





## **Lab Diagnosis**

# Sampling

- Before collecting or sending any samples, the NAHPRI should be contacted
- Samples should only be sent chilled and under secure conditions to prevent the spread of the disease
- In live animals, presence of the virus can be confirmed using swabs of ocular (eye) discharge, nasal (nose) and oral (mouth) mucus, or — in the very early stages of disease — whole blood collected in an anticoagulant tube.
- In carcasses, organ tissue samples can be tested.



# Lab techniques

## Confirmation of clinical cases by antigen detection

The most important factor when confirming a presumptive field diagnosis of PPR is speed

- **RT-PCR**, the reverse-transcription (it is a RNA virus) PCR) is a highly sensitive technique; it is useful for screening suspect cases, even before clinical signs appear. Results from PCR testing can be available in **5 hours**. *PCR testing does not differentiate between live or dead virus.*
- **Virus isolation** and identification may not always be necessary vs. PCR but, it is critical for enabling further study of pathogenesis
- **Immuno-capture ELISA** the test is capable of the differential diagnosis of both rinderpest and PPR antigens. The assay is available in kit form. The test is very specific and sensitive, the results are obtained in **less than 2 hours**  
RT-PCR provides significantly increased sensitivity over IC ELISA



## Surveillance by antibody detection

The objective is to assess:

1. Freedom from infection
2. Prevalence of infection (surveillance)
3. Immune status post-vaccination
  - Virus neutralization: the basis of this test is that antibodies react with PPR virus
  - Competitive ELISA: Although widely used in the past, the virus neutralization test has been replaced in most laboratories by the competitive ELISA. The competitive ELISA is the recommended test for large-scale serological surveys. The test is rapid, with results being obtained within 3 hours.





**TREATMENT, PREVENTION AND CONTROL**



## Disease Treatment

There is no specific treatment for PPRV infection itself, but broad spectrum antibiotics may be given to prevent secondary infections and other anti-inflammatory treatments given to alleviate the clinical signs:

- TMP-Sulfa associated with tetracycline
- Or Quinolones
- + Dexamethasone



## Vaccines

- The main strategy for PPR control is vaccinating sheep and goats with live attenuated PPRV.
- Single vaccination gives life-long immunity.
- However there are no DIVA vaccines currently available, preventing the differentiation of infection in vaccinated animals (DIVA) and sero-monitoring.
- Thermostable PPR vaccine that can be stored at ambient temperatures for long periods of time (up to 30 days) not yet available





## Vaccines used against PPRV

**Heterologous rinderpest vaccine** was used for many years to control PPR disease. However, after the eradication of rinderpest, it was necessary to restrict the use of this vaccine.

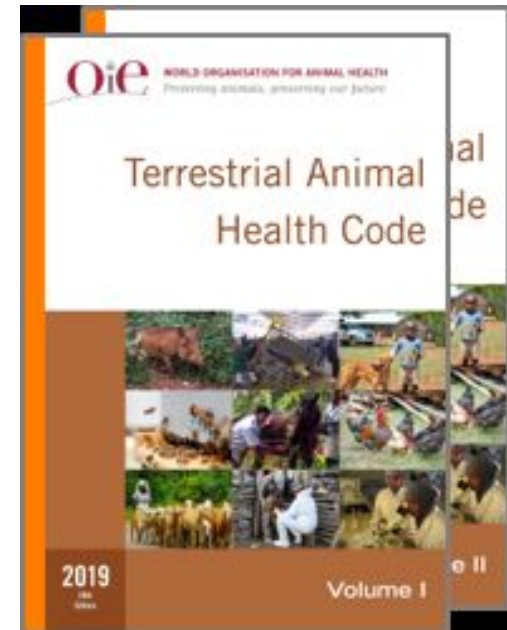
**PPR homologous live-attenuated vaccine** are very efficient and use 4 different strains

- The first attenuated vaccine used the strain Nigeria 75/1. Subsequently, three more attenuated vaccines were developed in India by using 3 other lineages
- *The use of Nigeria 75/1 vaccine in Asian countries may increase the likelihood of mixing up of lineages and the development of mutants with high virulence.*



## Notification to OIE

- PPR is on the list of OIE-notifiable diseases
- Member Countries are obligated to report cases and outbreaks to the OIE, according to the Terrestrial Animal Health Code
- Diagnostic and reporting are critical due to similar symptoms with Rinderpest which is eradicated



For more details, visit

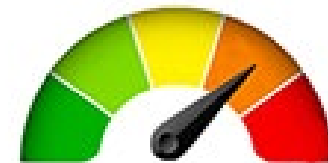
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# Control of PPR outbreaks

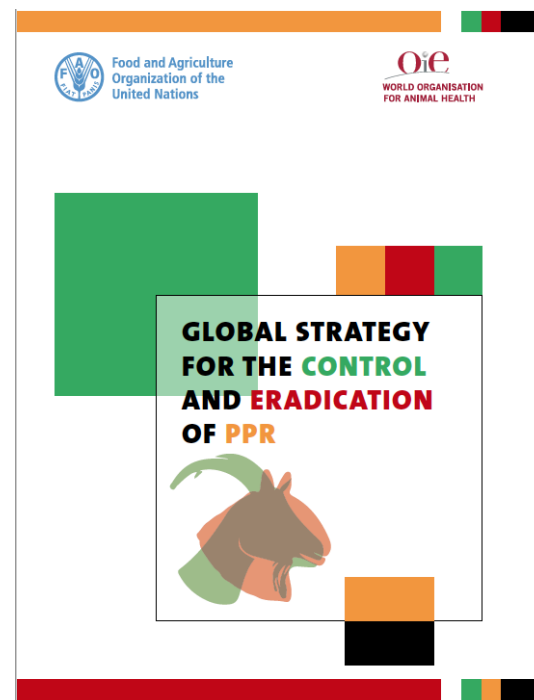
- Setting up capacity of NAHPRI to perform lab diagnosis of PPR
- Reporting: district vet      GDAHP/NAHPRI      OIE
- Control of animal movement (importation from Thailand) / quarantine
- Stamping out of infected animal (confirmed by lab testing)
- Physical barriers / cleaning and disinfection of contaminated surfaces  
PPRV, is sensitive to a wide range of disinfectants
- Vaccination, ring vaccination (stock of vaccine?)
- Confirmed outbreak in Thailand and concern about controlling PPR at the livestock-wildlife interface show that Cambodia is at risk





# Worldwide control and eradication

- OIE and FAO released a strategy in 2015 aiming for global eradication of PPR by 2030
- The Global Strategy has three integrated components:
  - Eradication of PPR (Component 1)
  - Strengthening veterinary services as a country moves towards PPR eradication (Component 2) and
  - Creating cost effective opportunities to control other priority diseases (Component 3)



<https://www.fao.org/3/i4460e/i4460e.pdf>