AFRICAN HORSE FEVER

SEALAB
SOUTH-EAST ASIA LAB NETWORK

Context

- **African horse sickness (AHS) is a serious disease in horses with a mortality rate of 50-95%.**

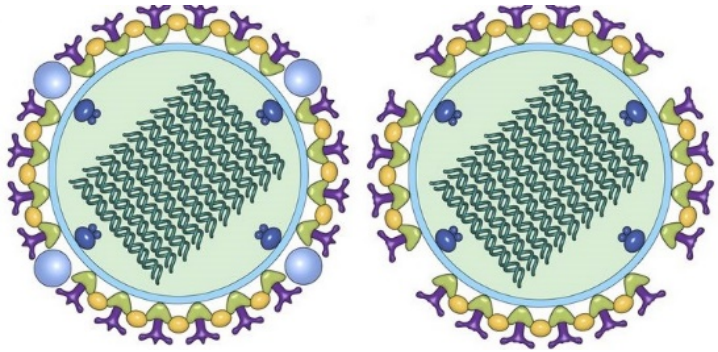
- Thailand reported its first AHS outbreak in early 2020 followed by Malaysia who reported the disease in September. Over the course of 2020, Thai Veterinary Services counted almost 600 horse deaths.
- Some of these recent outbreaks occurred in provinces of Thailand that share borders with Myanmar, Cambodia, Malaysia and Laos
- The hot and humid climate, with the absence of cold winters that would interrupt the activity of biting midges make the continuous transmission of the disease and its spread to neighboring countries highly plausible.

- Local Cambodian horses play an important role in the rural transportation system

ETIOLOGY

Characteristics of the virus

- AHS virus (AHSV): **RNA** virus of the family Reoviridae (same family that Blue Tongue disease of sheep or rotavirus of pigs)
- Nine different serotypes; Serotypes are not necessarily cross-protective
- It multiplies in regional lymph nodes and is spread through the blood and infects the lungs.
- AHS usually affects horses, donkeys, mules and zebras
- The incubation period lasts 2–10 days, depending on viral load, viral virulence and host factors
- Animals that survive infection do not become carriers of the virus



Organization of serotype 7 & 4

Disinfection /Survival of the virus

- The virus is inactivated with formalin and Virkon® S
- It is destroyed at a pH less than 6, or pH 12 or greater. Acidic disinfectants such as acetic or citric acid are recommended for decontamination.
- Alkaline disinfectants such as sodium hypochlorite are also recommended
- Can survive in frozen meat, but is inactivated at temperatures greater than 60°C
- It is rapidly destroyed in carcasses / rigor mortis due to low pH but, putrefaction does not destroy the virus: putrid blood may remain infective for >2 years

Epidemiology

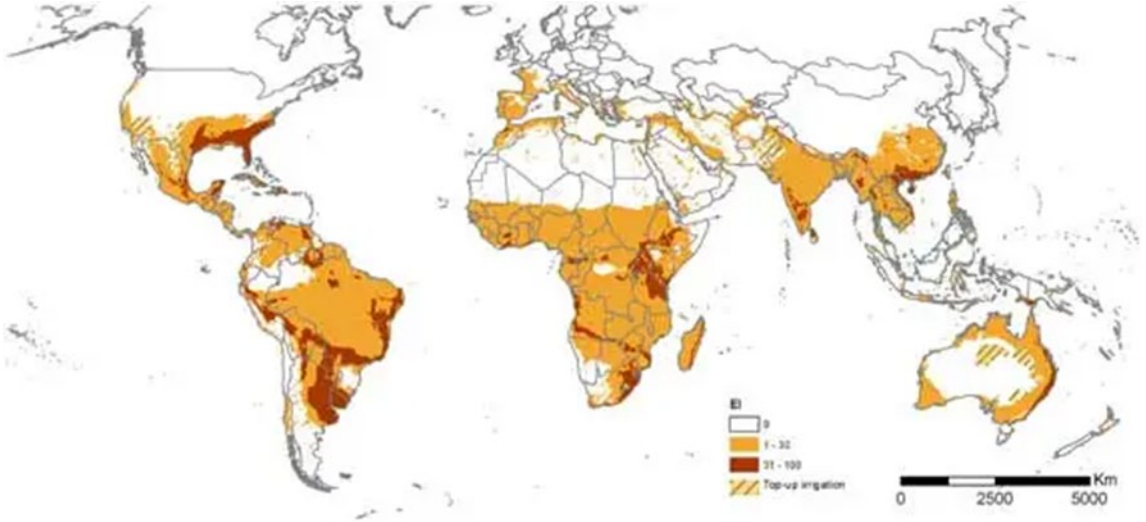
Susceptible Species

- Usual hosts are equids: horses, mules, donkeys and zebra
  - Reservoir host are believed to be zebras
- Dogs have per acute fatal infection after eating infected horsemeat, and unlikely to play a role in transmission
- AHS is not zoonotic

Transmission of AHS

- AHS is transmitted by Culicoides species midges and is not contagious between horses (Culicoides *imicola* and C. *bolitinos*)
- Transmission depends on infected horses developing a sufficient viraemia to infect insect vectors.
- Viraemia in horses can extend for 21 days but 4 to 8 days is more usual

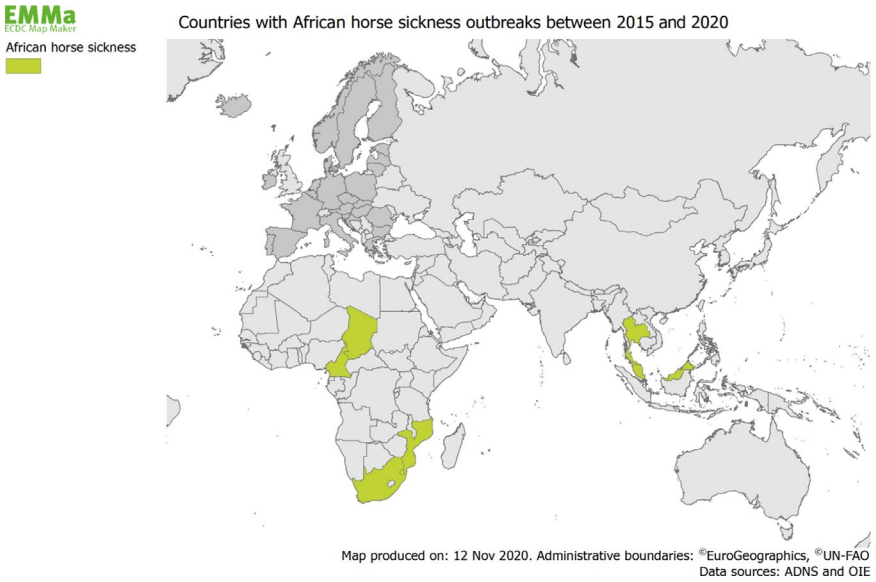
- Distribution of the disease is determined by the presence of competent vectors

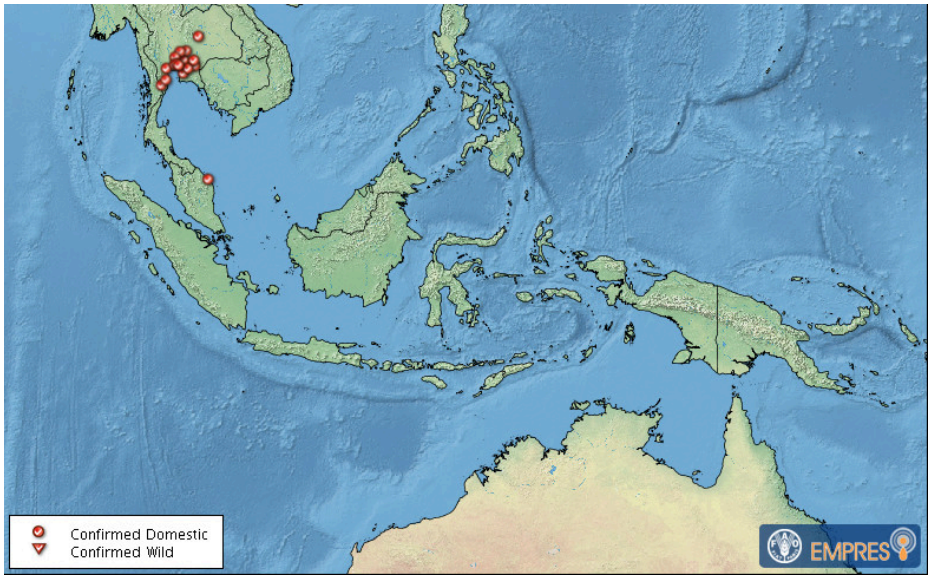


Morbidity and Mortality

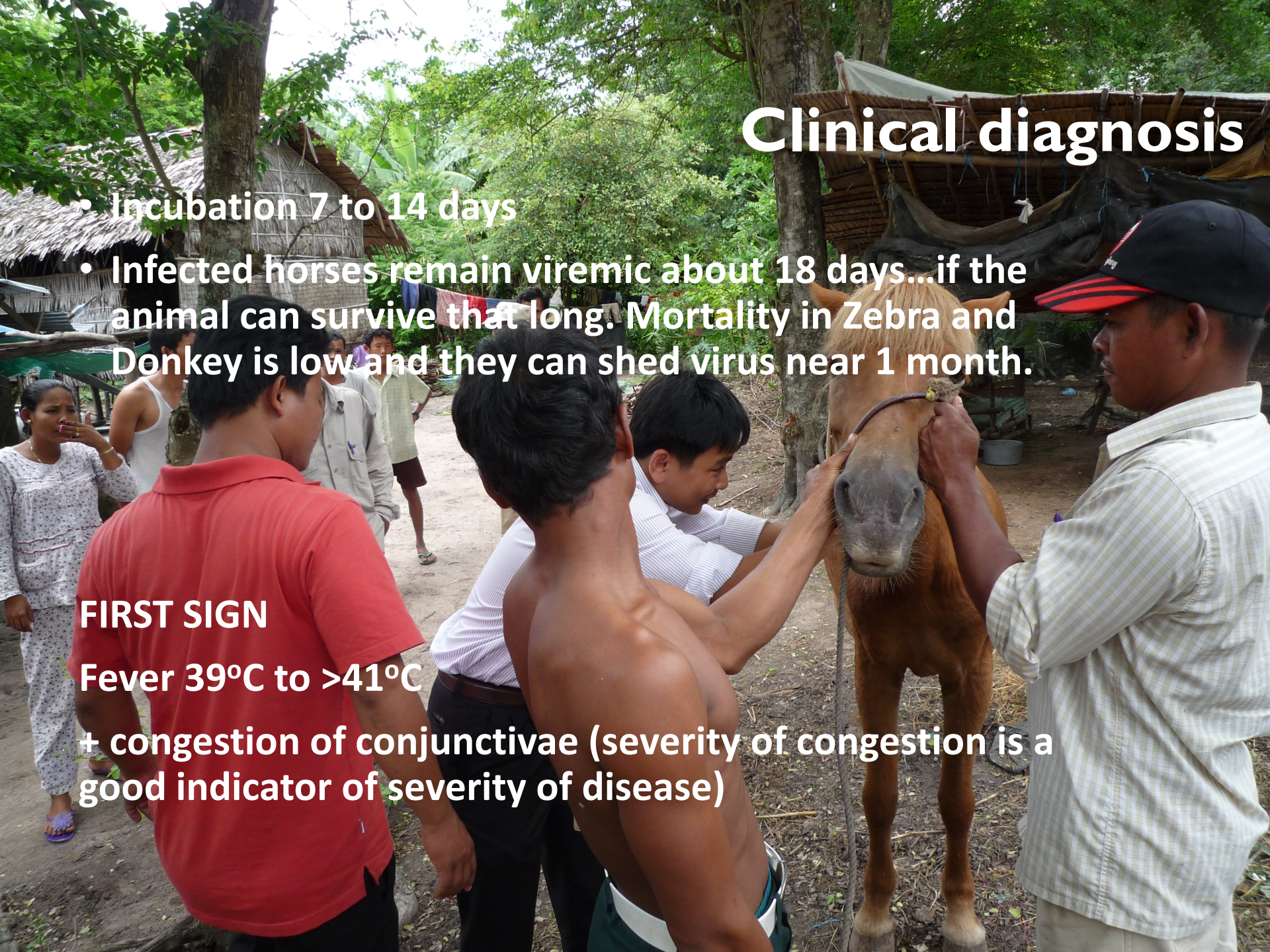
- Morbidity and Mortality range in horses: 75% to 95%
- In mules and donkeys the morbidity is lower: mortality is about 50% in mules and 10% in donkeys, but is not observed among African donkeys and zebra

Geographical distribution of AHS





DIAGNOSIS



Clinical diagnosis

- Incubation 7 to 14 days
- Infected horses remain viremic about 18 days…if the animal can survive that long. Mortality in Zebra and Donkey is low and they can shed virus near 1 month.

FIRST SIGN

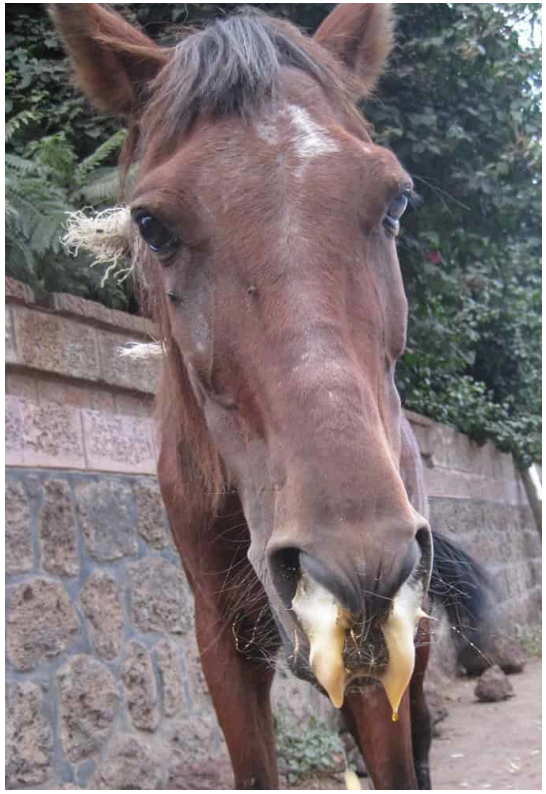
Fever 39°C to >41°C

+ congestion of conjunctivae (severity of congestion is a good indicator of severity of disease)

After initial signs, the disease can progress in 1 of 4 ways:

Acute respiratory or pulmonary form: high fever, rapid respiration up to 70/minute, coughing and sweating. Head extended and nostril dilated and frothy discharge.

When foam appears in nostril, death follows soon.



Subacute or cardiac form

Fever (39–41oC)

Swelling around the eyes, face, neck, thorax, brisket and shoulders but no edema of the lower legs (# Trypanosoma)

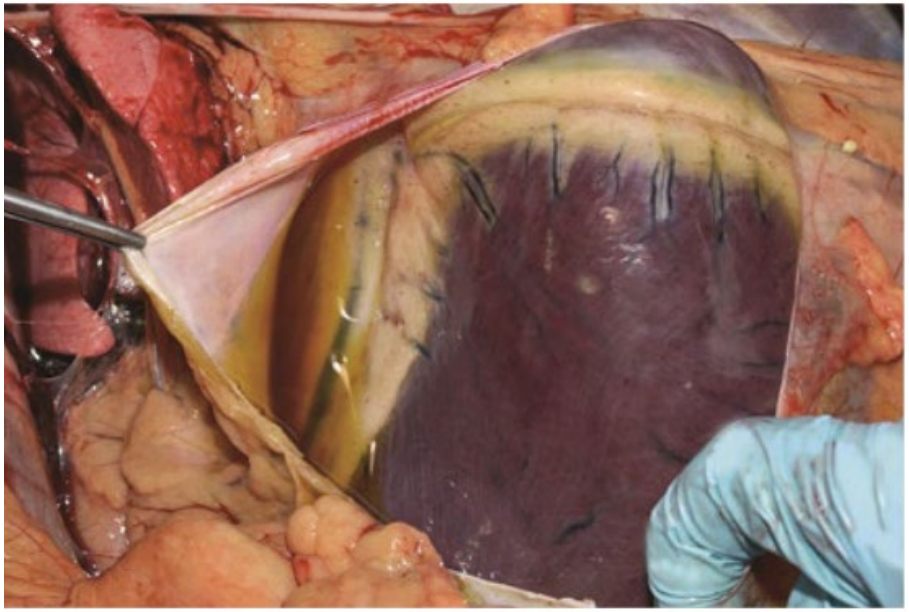
Petechia on conjunctiva and tongue

Animal may eat and drink until terminal stage

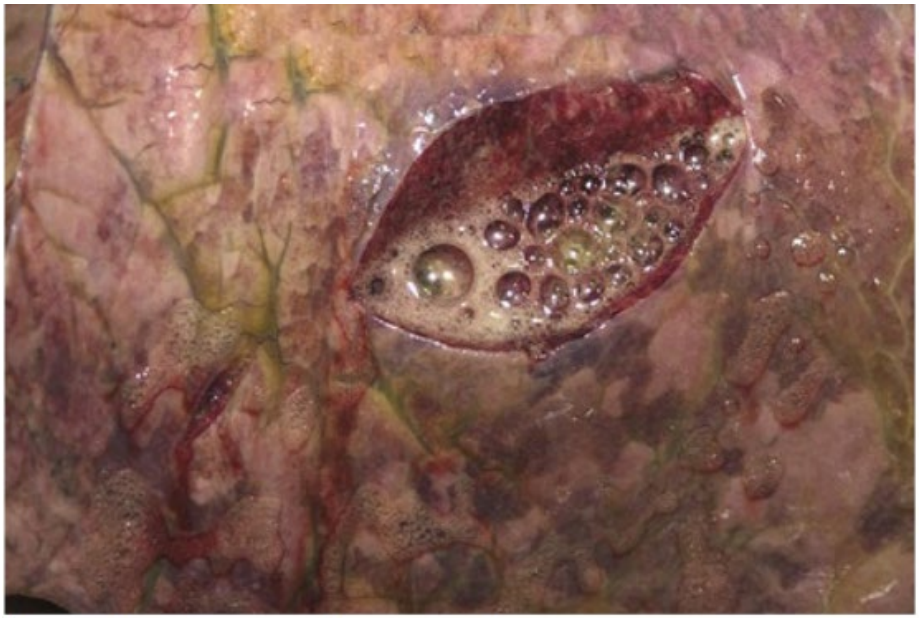
Mixed form (cardiac and pulmonary): mild respiratory signs that do not progress
Oedematous swellings and effusions
Death from cardiac failure in more than 80% of cases
Death usually within 1 week

Subclinical form (Horse sickness fever): mildest form, can be sub-clinical, occurs in zebra or donkey or horses with some immunity.
Intermittent fever, conjunctival congestion and respiratory rate increase

Post-mortem diagnosis



Horse, heart: moderate hydropericardium



Horse, lung: severe pulmonary edema

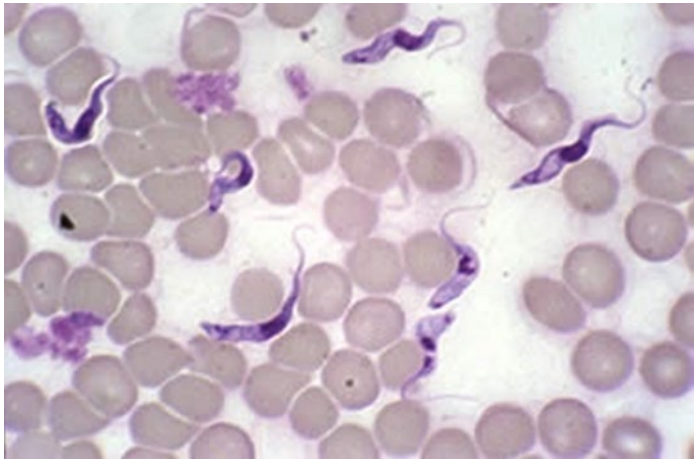
Differential diagnosis

Some clinical signs are characteristic, but, AHS can be confused with other diseases such as:

- **Trypanosomiasis**
- Equine encephalosis: same family of virus and vector than AHS. But mild and limited to foal.
- Piroplasmosis: transmitted by ticks. Febrile illness, with rapid respiration, and congestion of conjunctiva. Edema. But, urine becomes brown color. Identified in Malaysia, Philippines, Thailand…and China.
- Purpura haemorrhagic: it is a noncontagious, immune disease with edema of the head, ventral abdomen, and limbs and by petechial hemorrhages of conjunctiva. It is a complication of infection. Rare.
- Hendra virus**:** Symptoms are similar. The natural host of the virus are fruit bats (like for Nipah). It is a rare emerging zoonosis. Cases only in Australia but the flying foxes have been found in SEA

Tripanosomiasis (Surra)

The disease is often rapidly fatal in horses. Recurrent fever, petechial hemorrhage, edema, high mortality. Progressive anemia, weight loss and icterus. Outbreak in Takeo province in 2008, 90 deaths.



Diagnosis by blood smears during the febrile phase stained with Giemsa

Laboratory diagnosis

For Ag detection

- Blood samples (EDTA and plain tubes) to be sent at 4^{o}C to the lab
- Lymph nodes (especially mesenteric and bronchial), lungs, spleen from freshly dead horses. To be sent at 4^{o}C to the lab; do not freeze

For Serology

- Preferably paired serum samples should be taken 21-days apart and kept frozen at –20^{o}C

RT-PCR

Diagnostic in sick horses

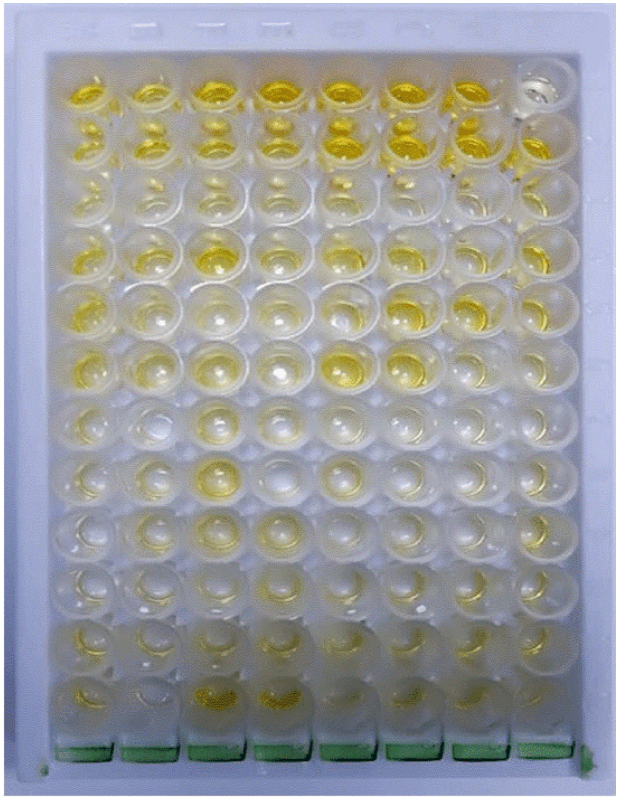
- RT-PCR is a highly sensitive technique that provides a rapid identification of AHS viral nucleic acid in blood and other tissues of infected animals
- There are number of commercial gel-based (conventional) and real-time RT-PCR kits available on market

Surveillance

- High sensitivity of test, detect traces of viral RNA in blood for long periods of time after infection.
- Difficult to discern whether an active virus infection is circulating within a population when horses are no longer infectious
- Cannot know if the positive result is from infection or vaccination

Serology

- The use of serology for surveillance is of high value as complementary information to the RT-PCR data.
- Serological data would only indicate whether AHS has been previously circulating in a horse population,
- Seroconversion: if samples collected from the same animal within a period of 2 or more weeks show a four-fold increase in antibody titre it would indicate that an active infection occurred between the sample collection

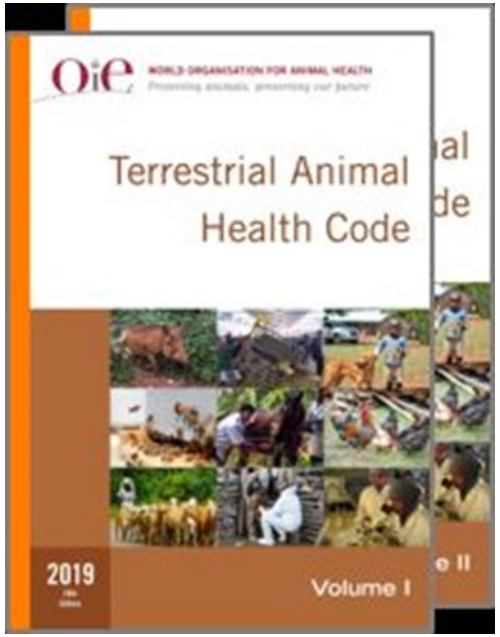


- The AHS serological tests recommended by the OIE is the Serum Neutralization Test (SNT); it is very laborious, slow, highly dependent of well-trained laboratory personnel, difficult to standardize and requires the use of biosafety cabinets (BSL2+).

TREATMENT AND PREVENTION

Notification to OIE

- AHS 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.
- It is the only equine infectious disease for which the OIE issues an official recognition of disease freedom for a country or parts thereof.
- Regaining OIE AHS-freedom status require active and passive surveillance strategies, using appropriate and validated diagnostic methods.



Treatment

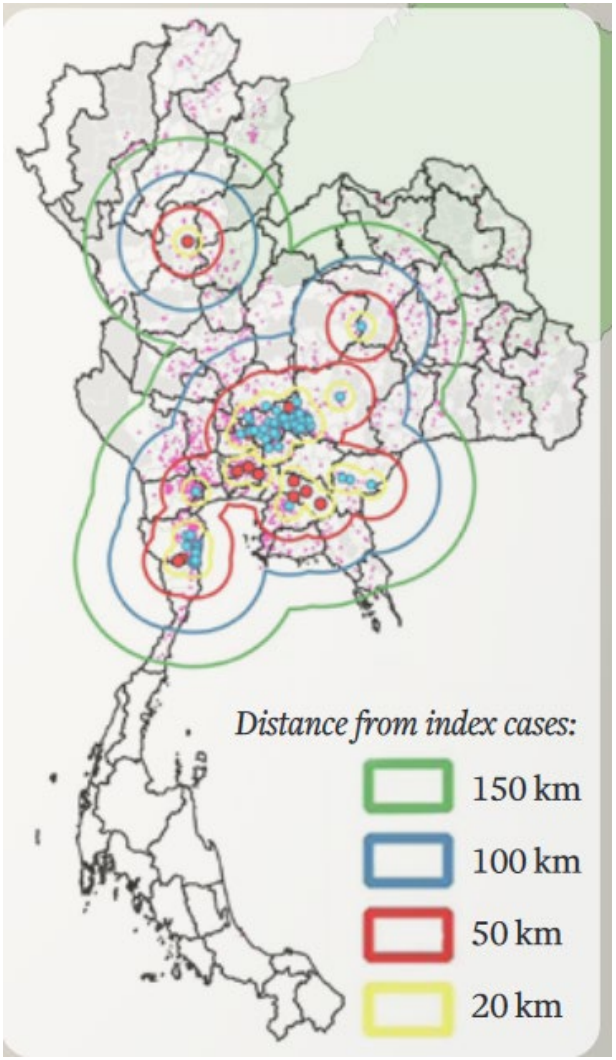
- No specific antiviral treatment is available for AHS
- Supportive care including diuresis to control lung edema and antibiotic injections to prevent secondary bacterial infections
- However treatment do not usually alter the clinical progression of any form of AHS.

Vaccination

- Attenuated (monovalent and polyvalent including several serotypes) live vaccines are currently commercially available.
- A revaccination with monovalent vaccine at the earliest eight weeks and at the latest less then one year after the first outbreak is strongly recommended
- Considering the risk of introducing AHSV serotypes foreign to a non-endemic country when using a LAV polyvalent, it is highly recommended to use a monovalent vaccine corresponding only to the serotype circulating.

Vaccinate or not, that is the question…

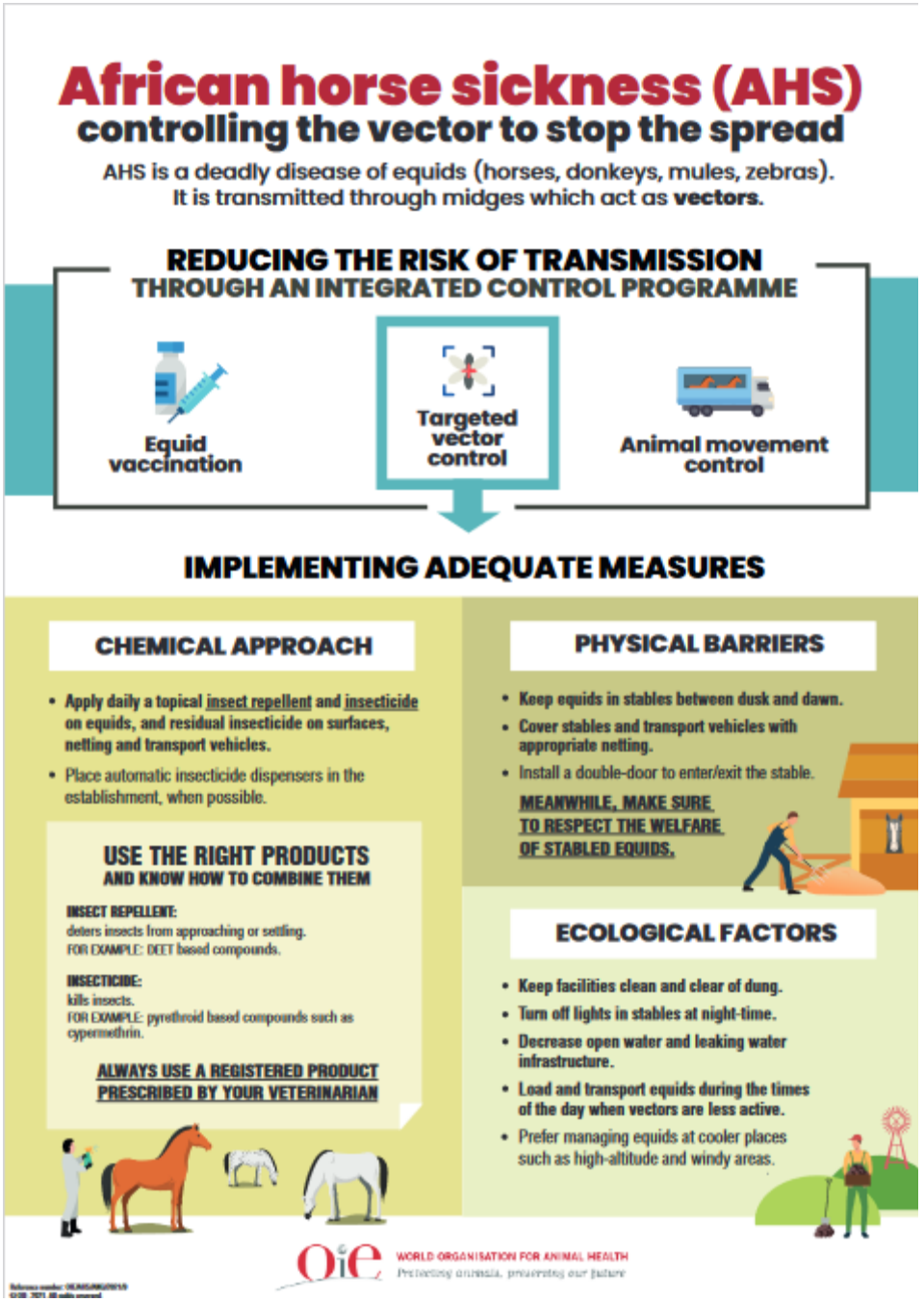
- Cambodia is a non-endemic country for AHS and so, the equine population is immunologically naive to the virus and highly susceptible to the severe clinical manifestations of the disease = high mortality
- Vaccination is an essential pillar of any AHS control program.
- Systematic use of vaccination of a horse population is incompatible with the OIE AHS disease-freedom status.
- The preventive use of vaccines in Cambodia will inevitably result in loss of the AHS-freedom status. **Does Cambodia need this AHS-freedom status?**



Prevention by OIE

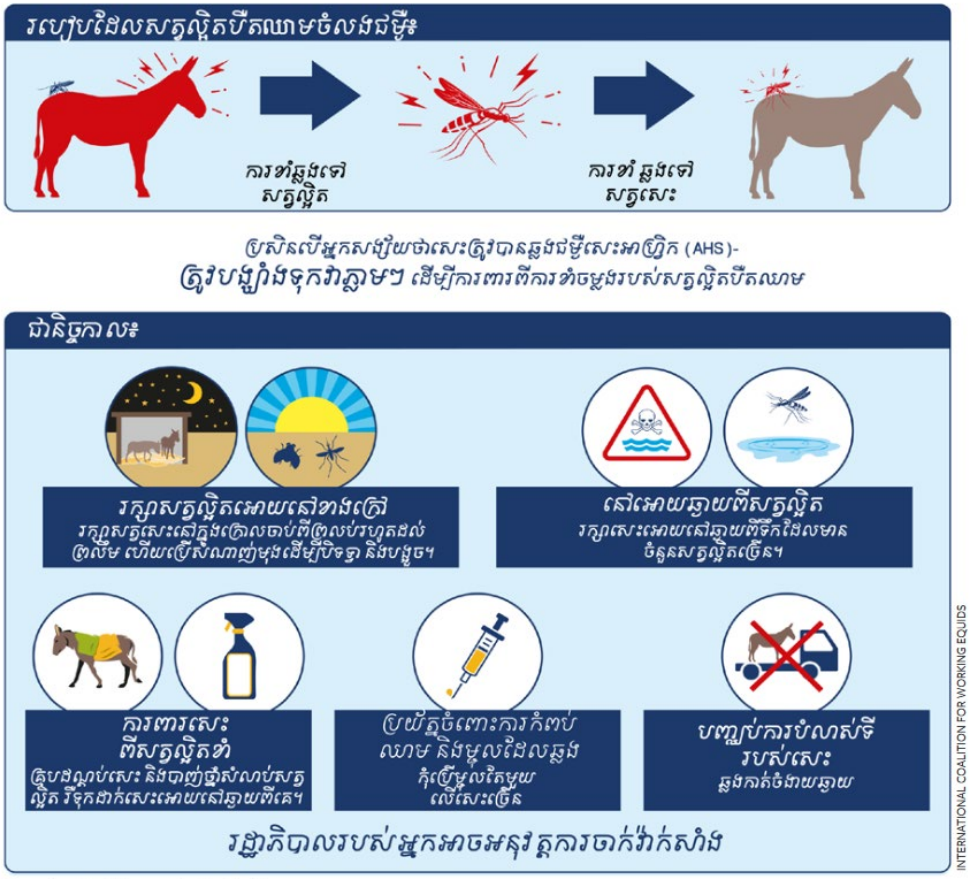
Other control measures are rapid accurate diagnosis, disease surveillance, prevention of insect biting and control of the movement of horses between geographical regions. regulating the movement of horses is challenging.

https://rr-asia.oie.int/wp-content/uploads/2020/04/ahs_guidelines_online.pdf



Prevention in Cambodia

- It is necessary to inform owner of horses, VAHW, District Vets…to know the risk, to be able to identify signs of the disease
- Informative tools suggest realistic measures to minimize the risk of contamination
- Surveillance should also include identifying the vector of the disease and its distribution and abundance



Part of an ICWE poster in Cambodia

Farmers preparing to prevent AHS in Cambodia