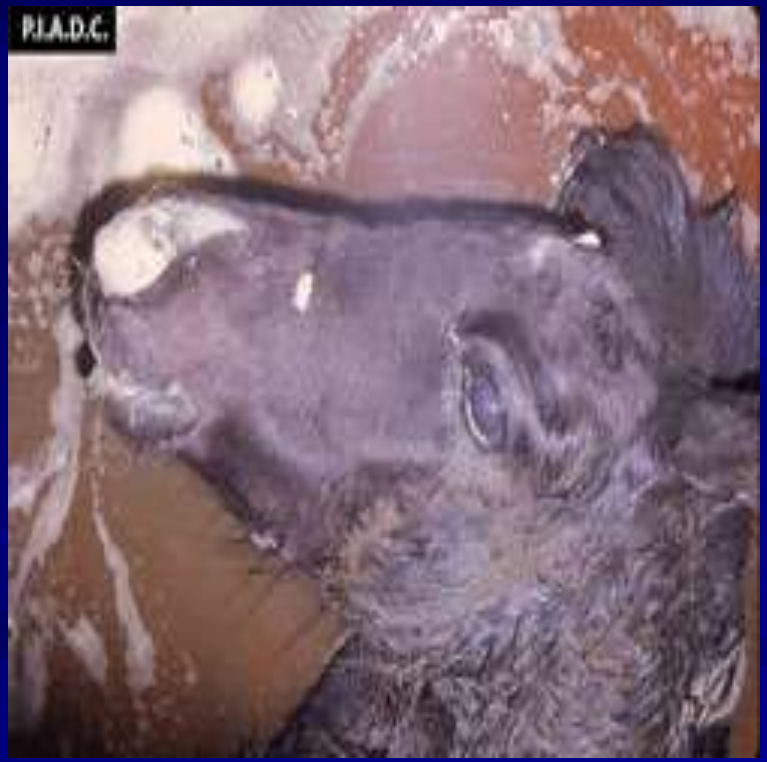
African Horse Sickness (AHS)
طاعون الخيل Equine plague



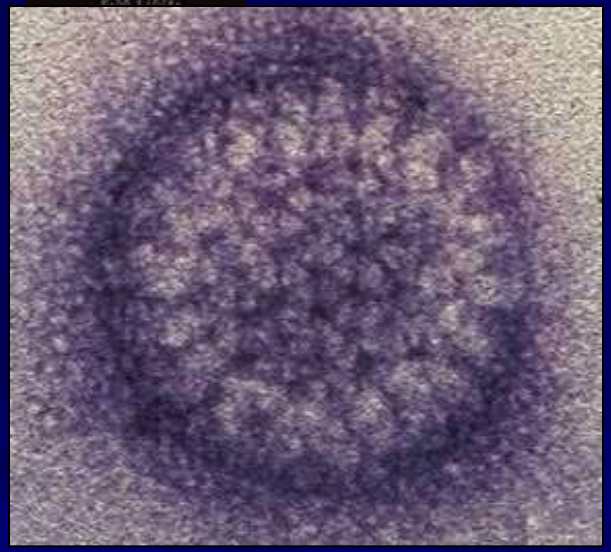
AHS is an infectious but noncontagious, insect-borne viral disease affecting all species of equine.

But don't forget to look for zebras too!

It is characterized by clinical signs and lesions associated with respiratory and circulatory impairment.

Etiology

- Family: Reoviridae
  Genus: *Orbivirus*
- Nine different serotypes
- Viscerotropic virus



Serotypes

All serotypes of AHS virus occur in eastern and southern Africa; It reflects the geographic pattern of zebra, which cycle the virus asymptomatically and probably serve as a reservoir for the virus.

Serotypes

Periodically, AHS virus spreads beyond sub-Saharan Africa and the disease has caused major epizootics extending as far as Pakistan and India in the east and Morocco, Spain and Portugal in the West.

Host Range

In order of decreasing severity of disease:

- Horses
- Mules
- Donkeys
- Zebras

Mortality is
70-95 % of all horses
developing the disease

mortality percentage for mules is only about 50 percent

and for donkeys only 10 percent.

Zebras

- AHS remains endemic in zebra populations across South Africa
- They harbor the virus and are often the source of sudden outbreaks in Africa

Transmission:

- Primarily by *Culicoides* (ex: biting flies and mosquitoes) .*Culicoides* are biological vectors because the disease can replicate in the midge.
- The horse is an amplifier of AHS virus and source of virus for arthropods.
- Arthropods other than *Culicoides* may spread the virus as mechanical vectors.
- By transfer of blood.

Host Range

Dogs can also become infected by eating infected meat; with suggestion of infection by arthropod bites.

Dogs mostly have the pulmonary form of the disease.

African Horse Sickness

Zoonosis: There is no evidence that humans can be infected by field strains of the disease. However, intranasal exposure to neurotrophic vaccine strains has caused encephalitis and retinitis in humans.

Incubation

In natural infections is about 5- 7 days. Morbidity is dependent upon exposure, Mortality varies with serotype and strain; mortality in naïve horses can be high.

Pathogenesis of AHS:

- Virus serotype tissue tropism determines which organs are more severely affected (target organ).

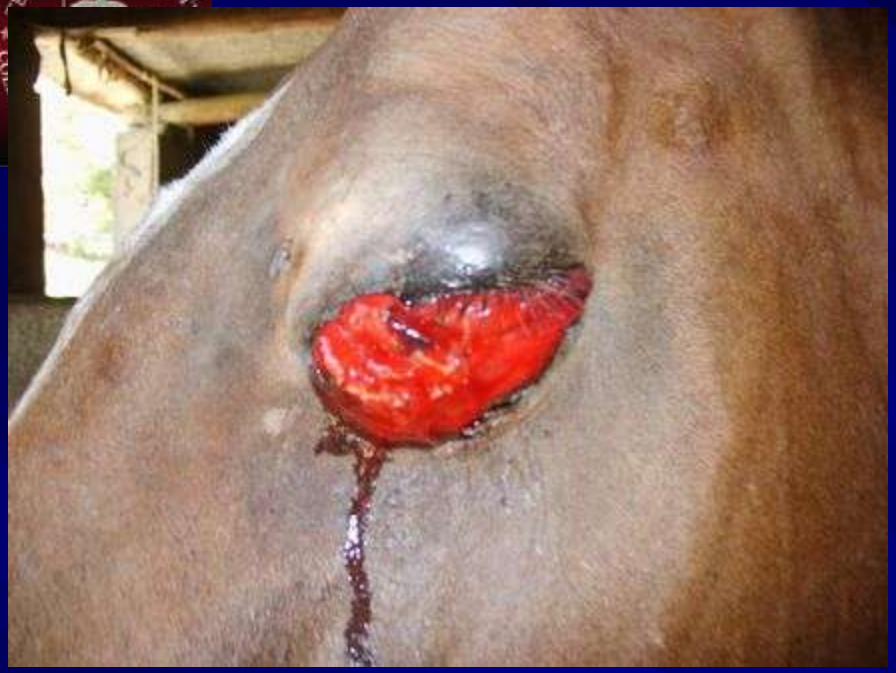
Insect bite infection….virus replicates preferentially in endothelium of the heart and lung (although any vessels can be affected)… Vessels become leaky and result in heart failure and pulmonary edema, multifocal myocardial necrosis and haemorrhages….. Bound to RBCs.. it stays in the blood for 18 days (Viraemia) with fever…resolution of viraemia……. Virus localizes with secondary virus multiplication in the endothelium of target organs.

Clinical Signs

1. Initial signs:

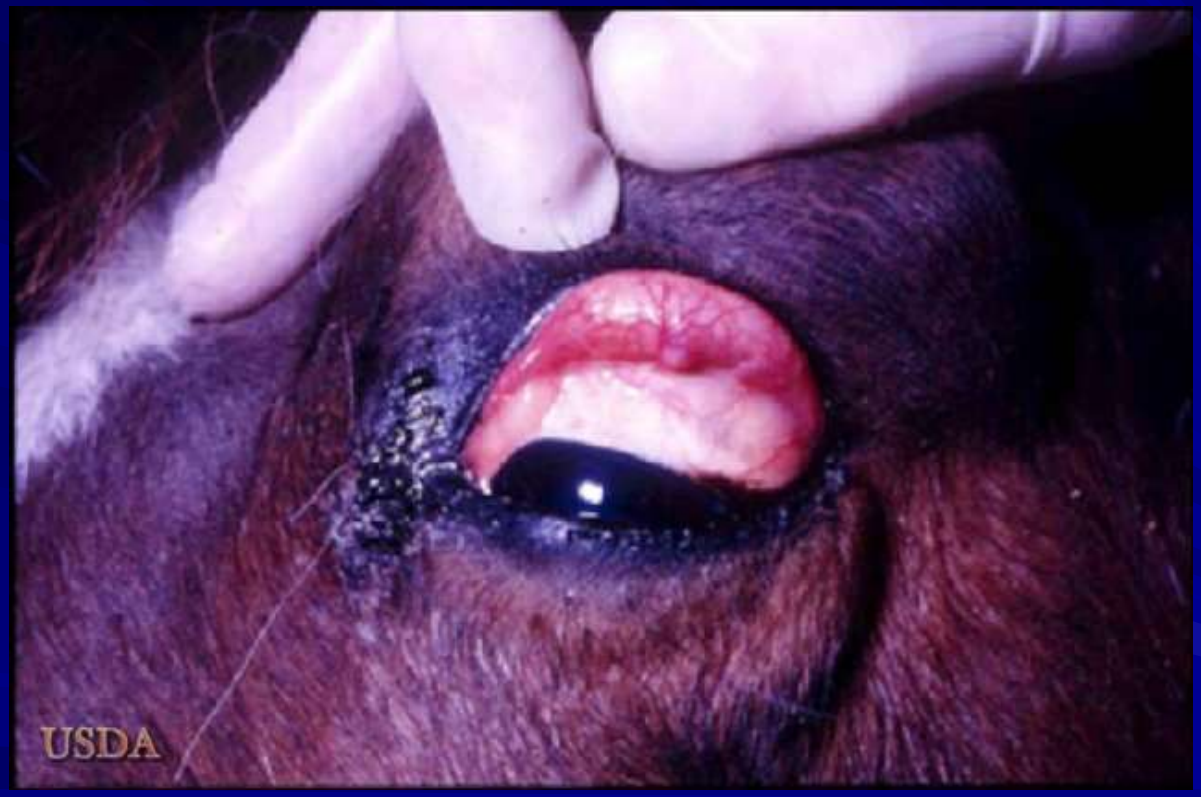
a. First Sign is Fever of 38.9°C - 41.1°C.

b.. Congestion of the conjunctivae; Severity of congestion is good indication of severity of infection.



African Horse Sickness

Clinical Signs



Clinical Signs

Lower Eyelid Conjunctivitis

2. After initial signs, the disease can progress in one of four ways:

- peracute pulmonary form
- Acute, Central (Pulmonary) form “Dun kop”.
- Sub-acute, Peripheral (Cardiac) form “Dik kop”.
- Mild form (Horse sickness fever).

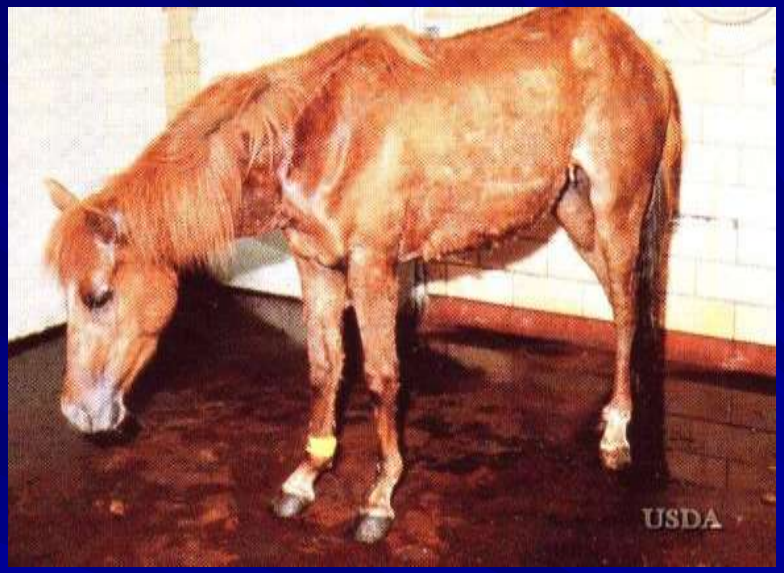
1. peracute, pulmonary form occurs in fully susceptible animals and has a short course, often only a few hours, and a high mortality rate.

2. Acute, central (Pulmonary) “Dun kop”

- The most common form.
- Fever.
- Increasingly more rapid respiration (labored respiration) and abdominal expiration.
- Severe paroxysms of coughing, profuse serous yellow nasal discharge with froth.

- Profuse Sweating.
- Profound weakness and a staggery gait progress to recumbency.
- As pulmonary distress increases: Animal stands with forelegs apart, head extended and nostrils dilated. Once foam appears in nostrils, death follows rapidly. Total course of 4-5 days.

Clinical Signs: Pulmonary



Once foam appears in nostrils, death follows rapidly.

Animal may drink and eat, even in terminal stages.

Clinical Signs: Pulmonary

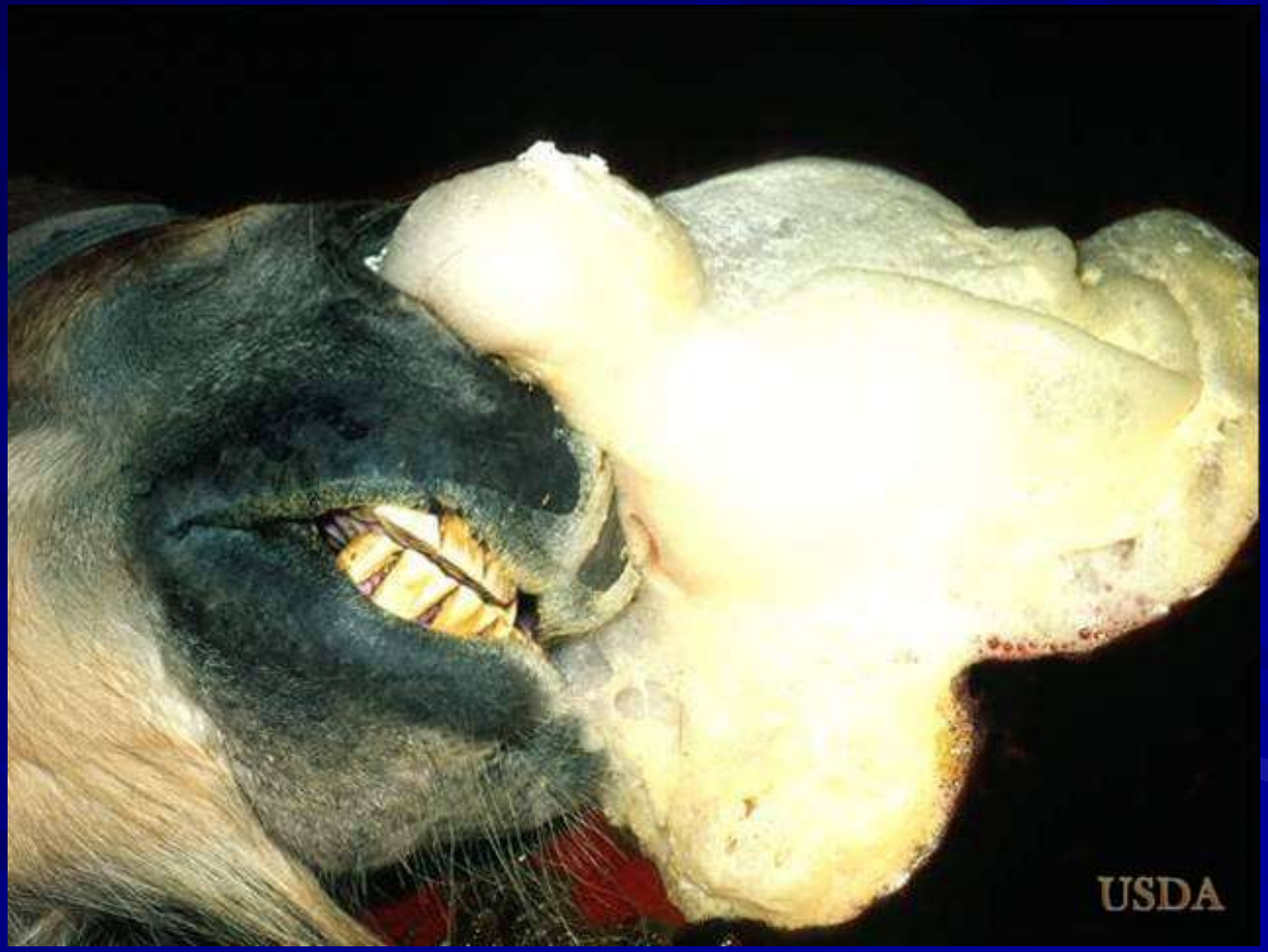


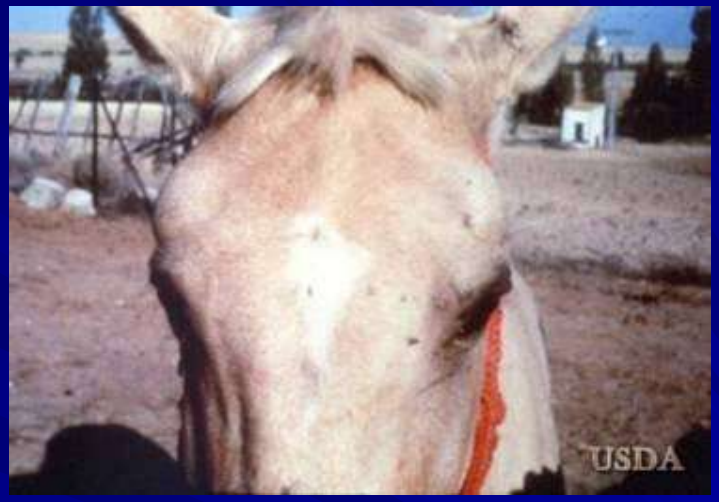
Photo courtesy of Plum Island

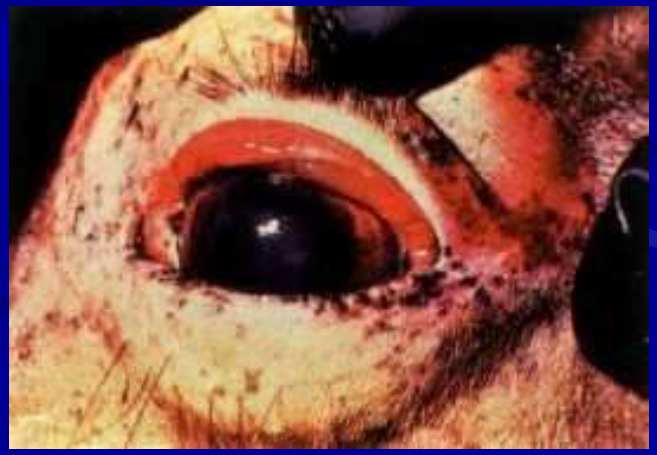
3. Sub- acute, cardiac form:

- Incubation is usually longer; up to three weeks and it has a more protracted course
- Fever usually lasts 3-6 days.
- At the end of the febrile period, marked oedema and swelling of the head (especially the supra orbital fossa, eye lids, conjunctiva, cheeks, tongue, Intermandibular space and lips), chest brisket neck and ventral thorax may occur

- No edema of the lower parts of the legs occurs.
- - Oral mucosa is bluish with petechial hemorrhages on the ventral surface of the tongue and in conjunctiva may occur.
- - Auscultation of the heart and lungs reveals evidence of hydro pericardium, endocarditis and pulmonary oedema.
- there may be restlessness and signs of abdominal pain and oesophageal paralysis with inability to swallow and regurgitation of food and water through nostrils.

- Recovery is prolonged and finally, animal becomes prostrate, and dies.
- - Again, animal may eat and drink, even in terminal stages. In some cases the disease is not fatal; the edema will subside over 3 to 8 days.
- - Mixed form; both pulmonary and cardiac may occur together.





African Horse Sickness

http://www.spc.int/rahs/Manual/images/AfrHorsSick-09.jpg

- 4. Mild form- Horse sickness fever: More common in enzootic areas; may be easily overlooked; fever for few days, then returns to normal, poor appetite, slight conjunctivitis and respiratory distress.

- Morbidity is dependant upon exposure

- Mortality varies with serotype and strain; mortality in naïve horses can be high

Post Mortem Lesions

Sudden Death

- Pulmonary alveolar edema although not seen in all animals.
- Hydropericardium, myocardial necrosis,
- Oedema and haemorrhages of blood vessels, alveolar edema, and rarely acute myocardial necrosis +/- multifocal myocardial hemorrhage. If vessels of the gut become leaky, clinical signs of colic may result.

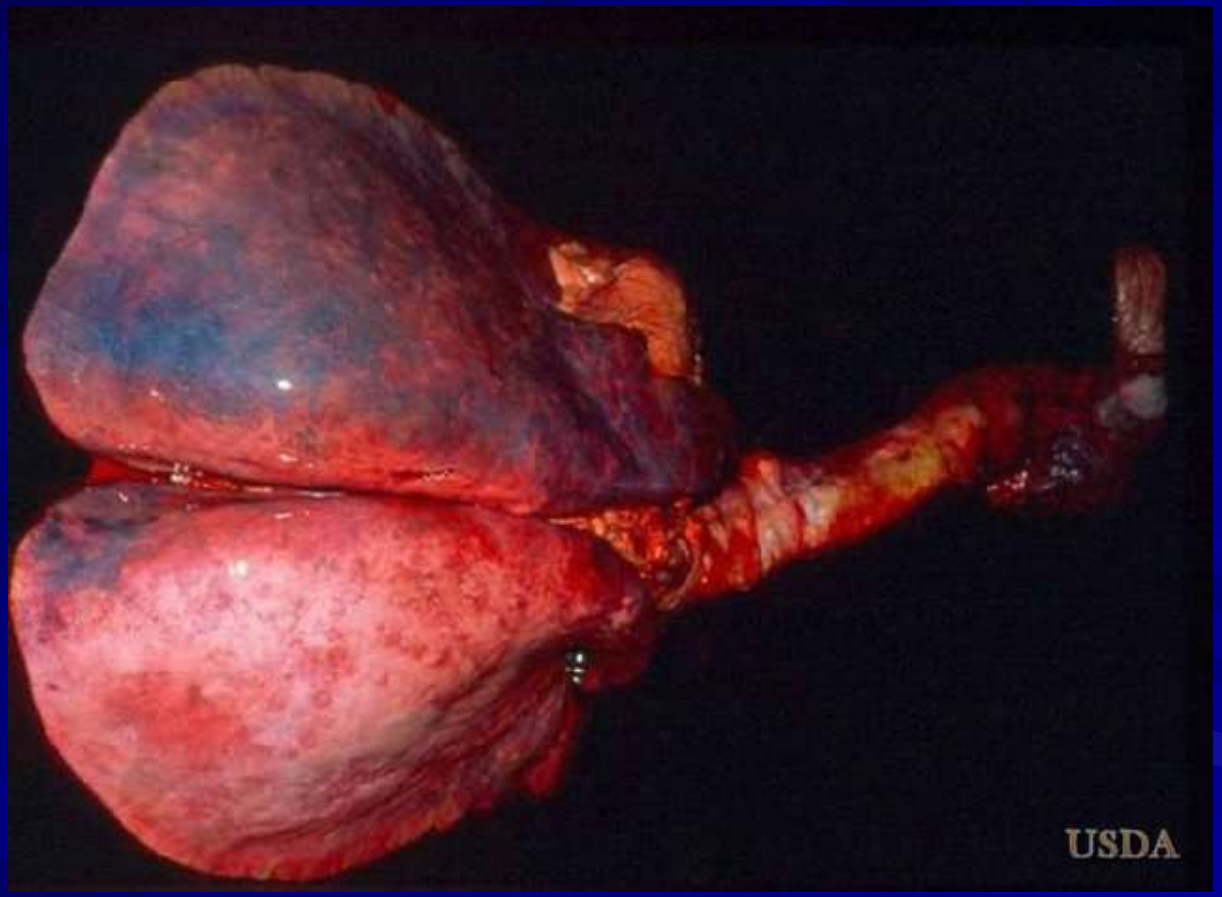
African Horse Sickness

Pulmonary edema

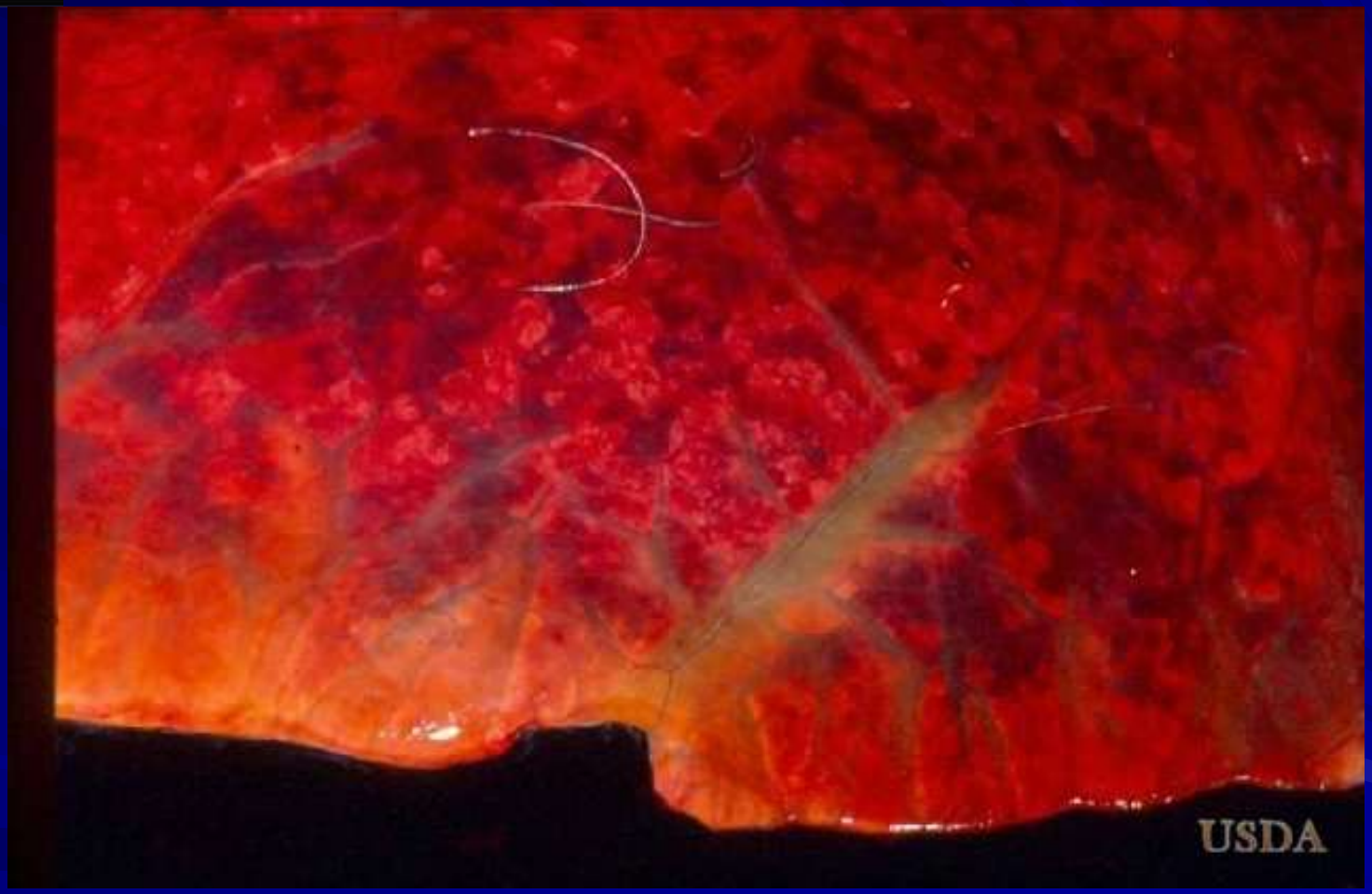
Pulmonary edema not seen in all cases;

Rarely seen in euthanized animals

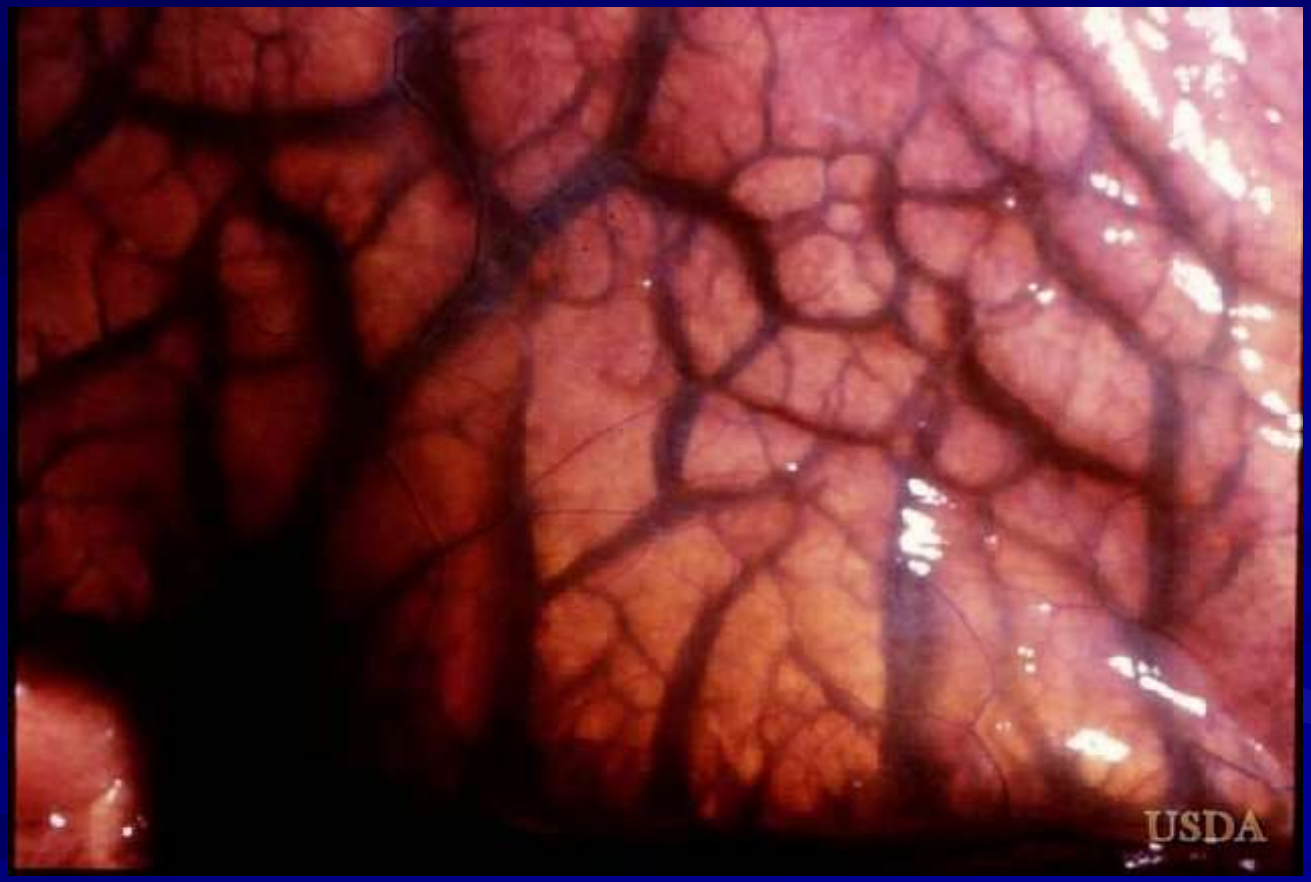
Pulmonary Edema



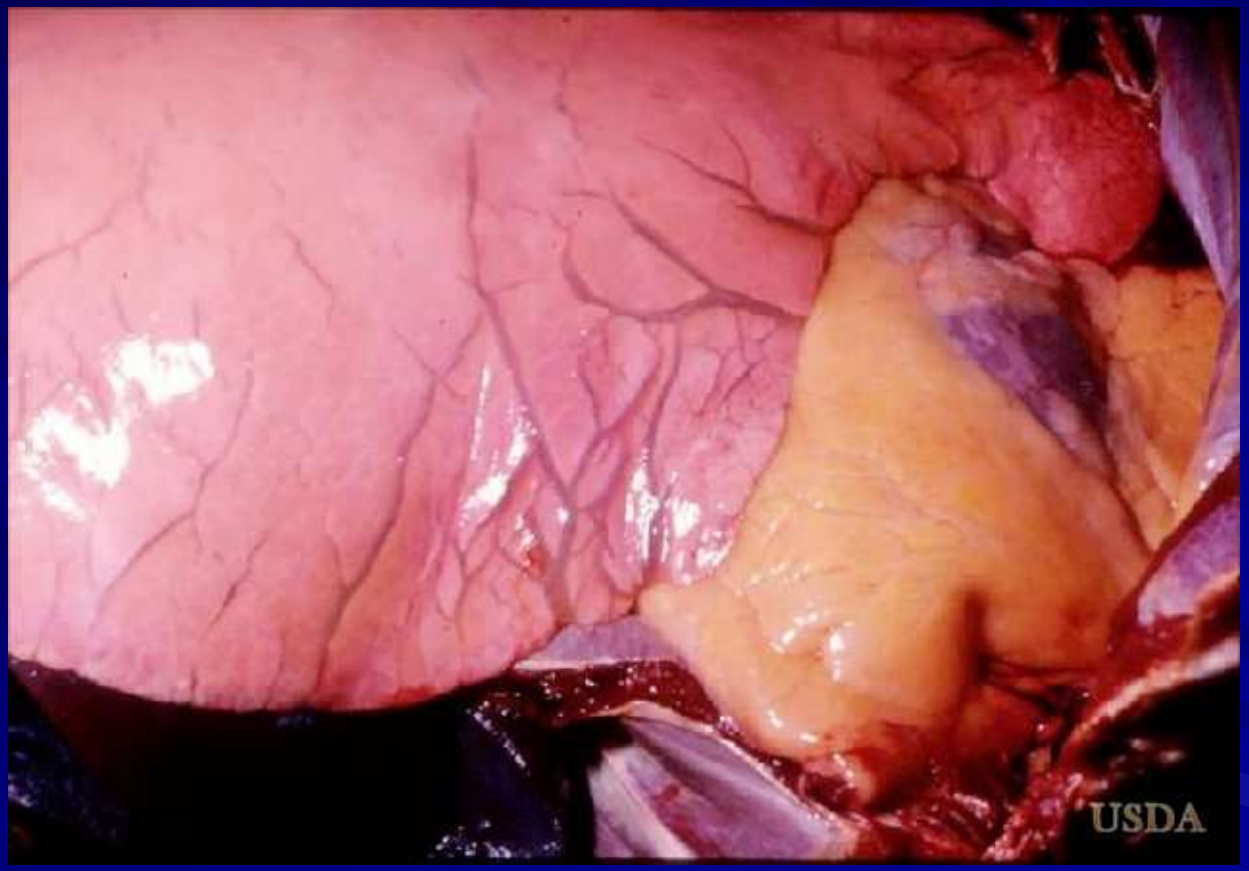
Pulmonary Edema



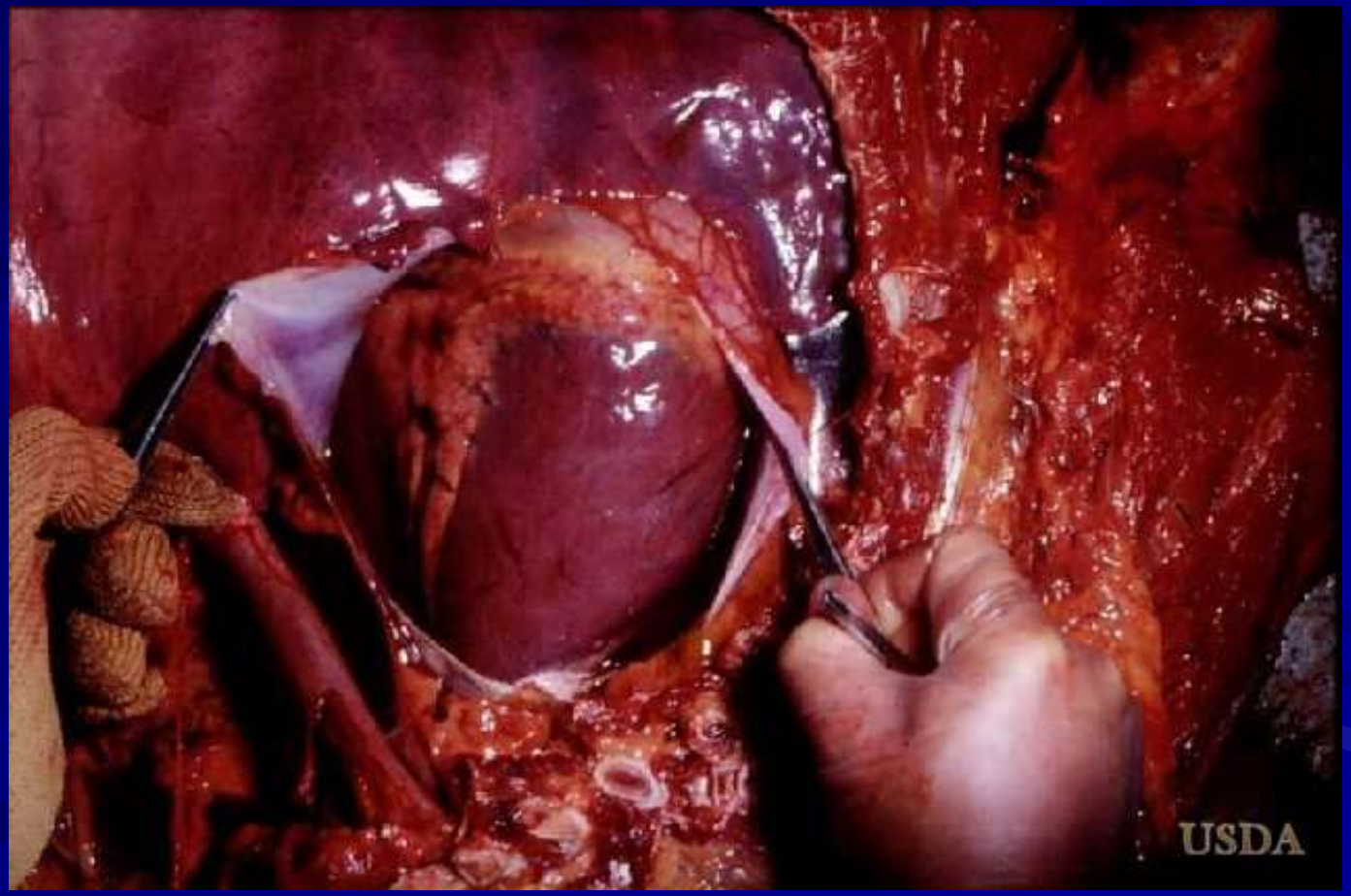
Pulmonary edema



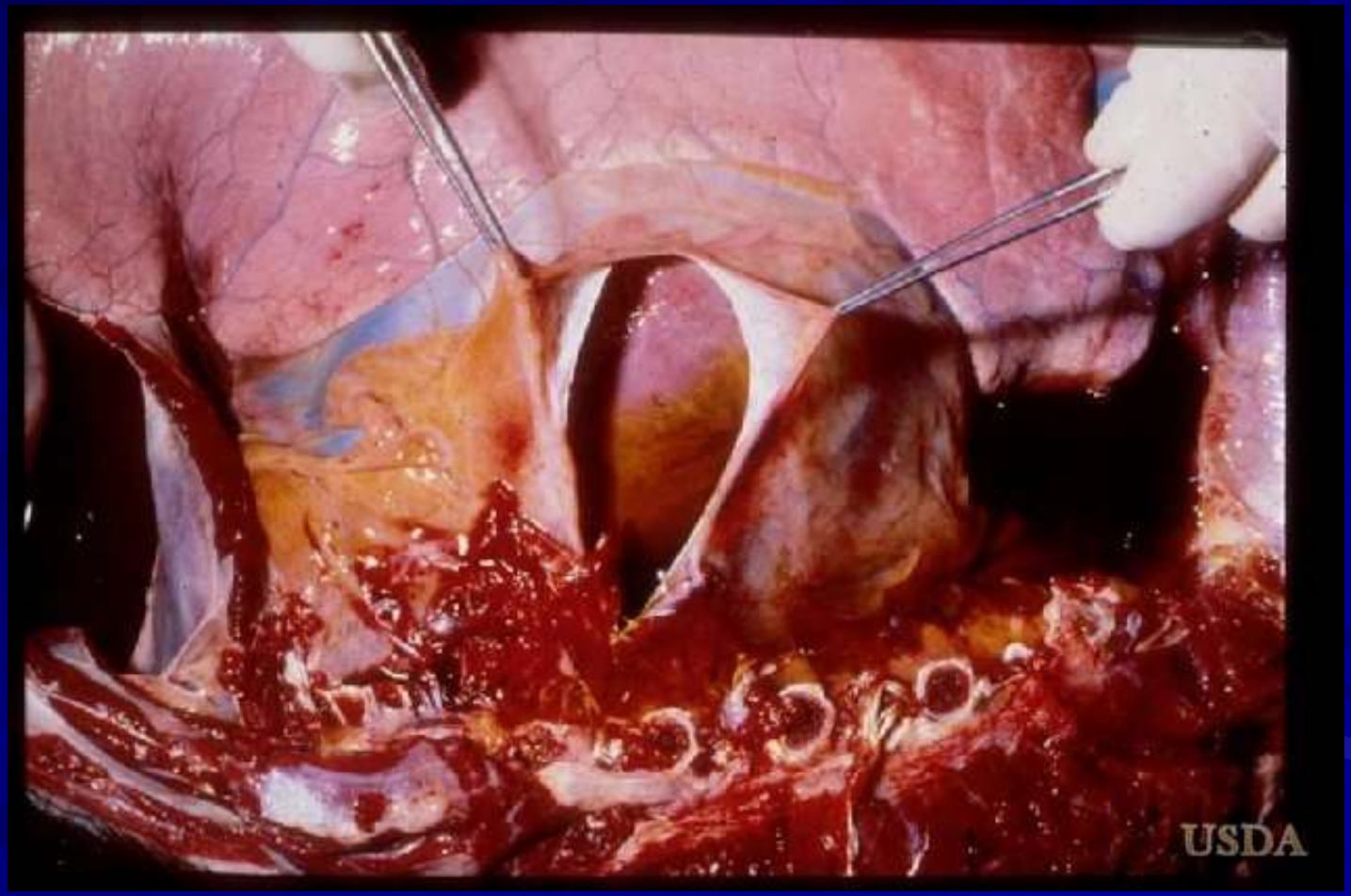
Pulmonary edema



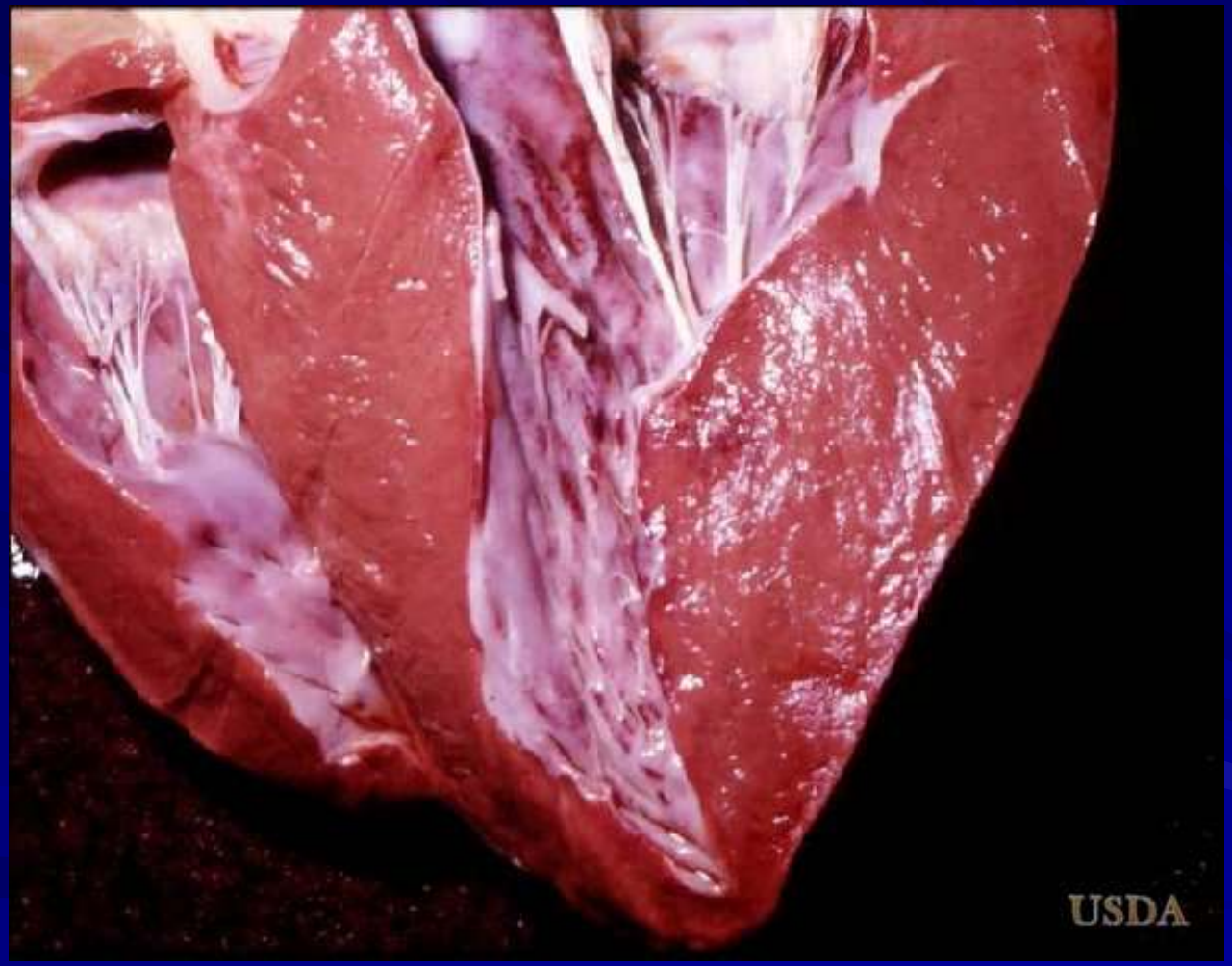
Hydropericardium



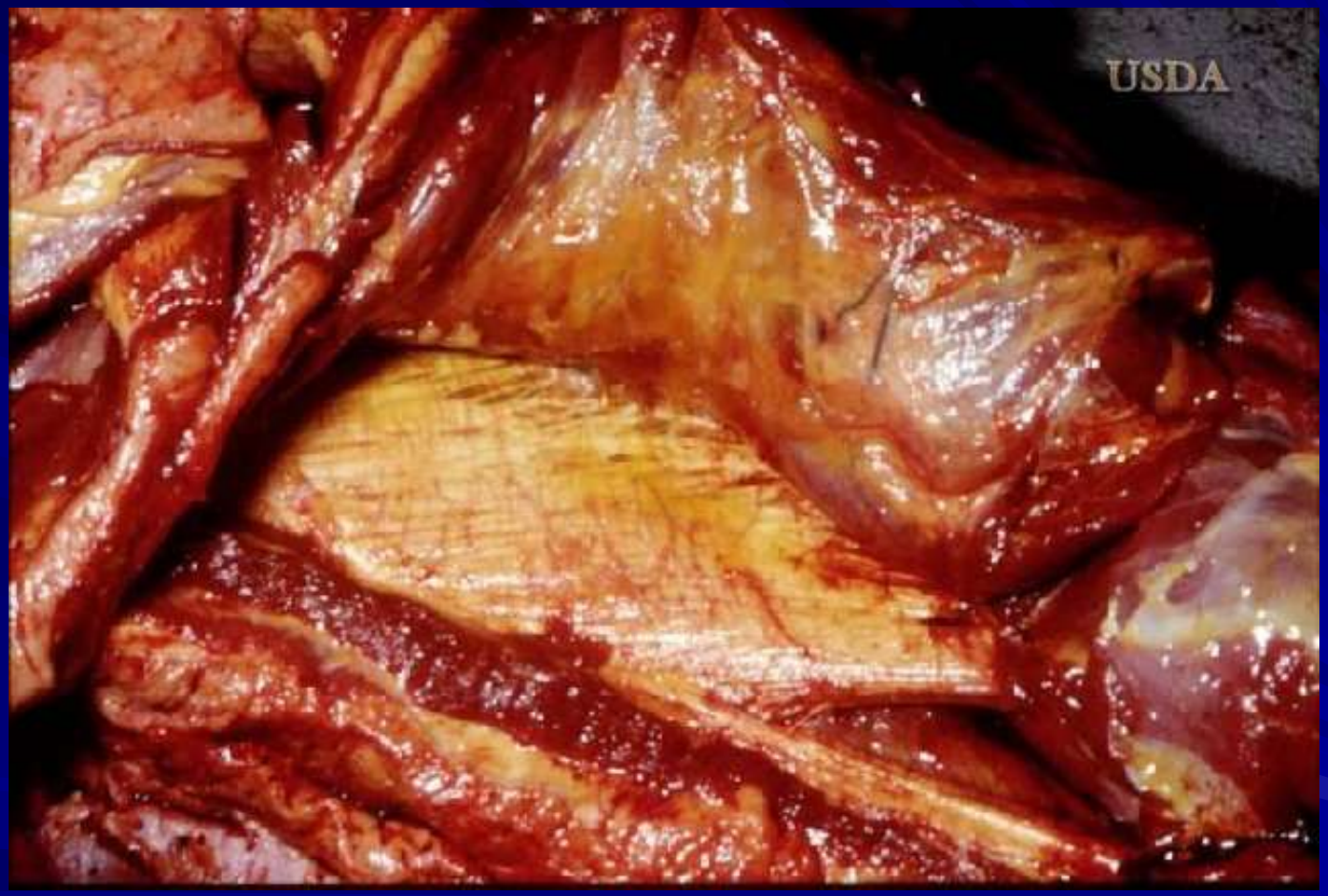
Hydropericardium



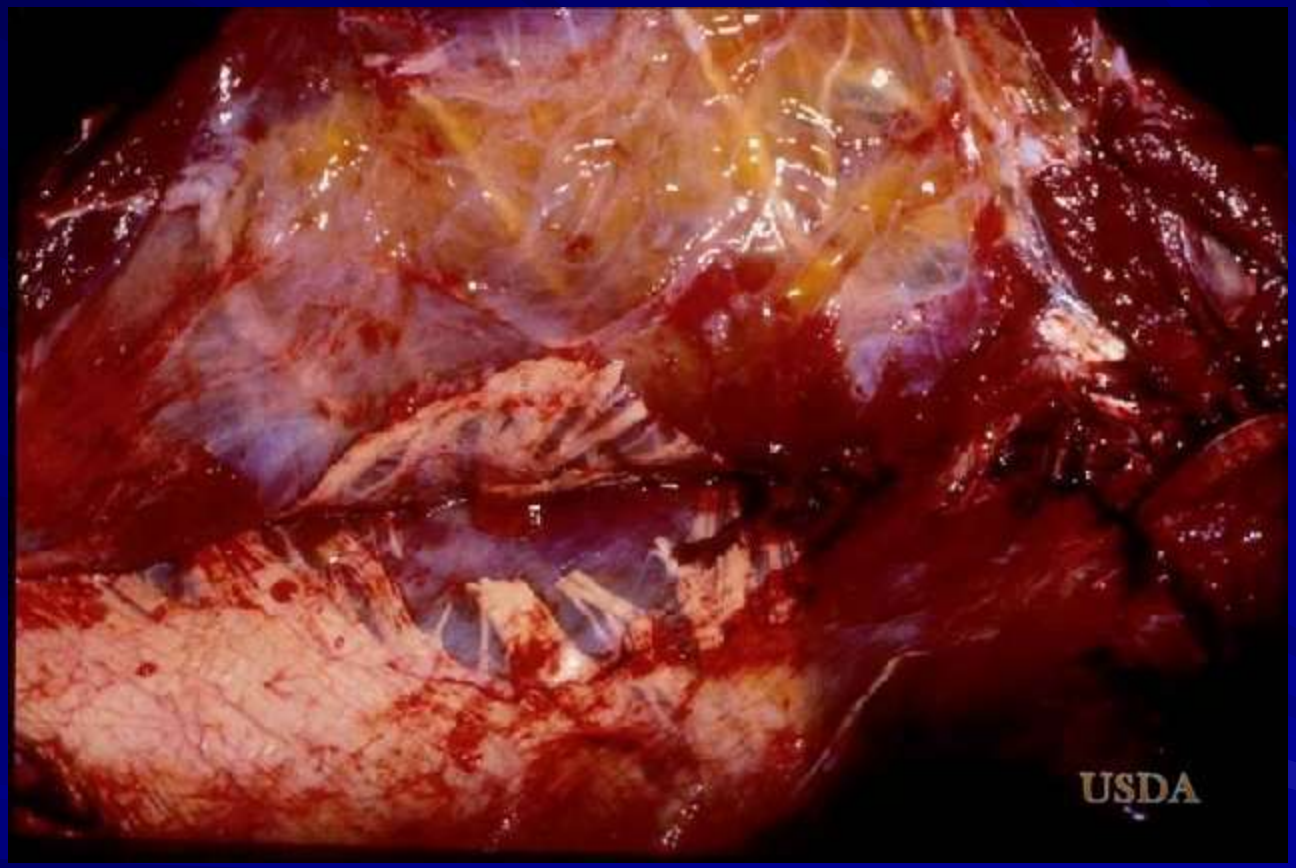
Myocardial necrosis



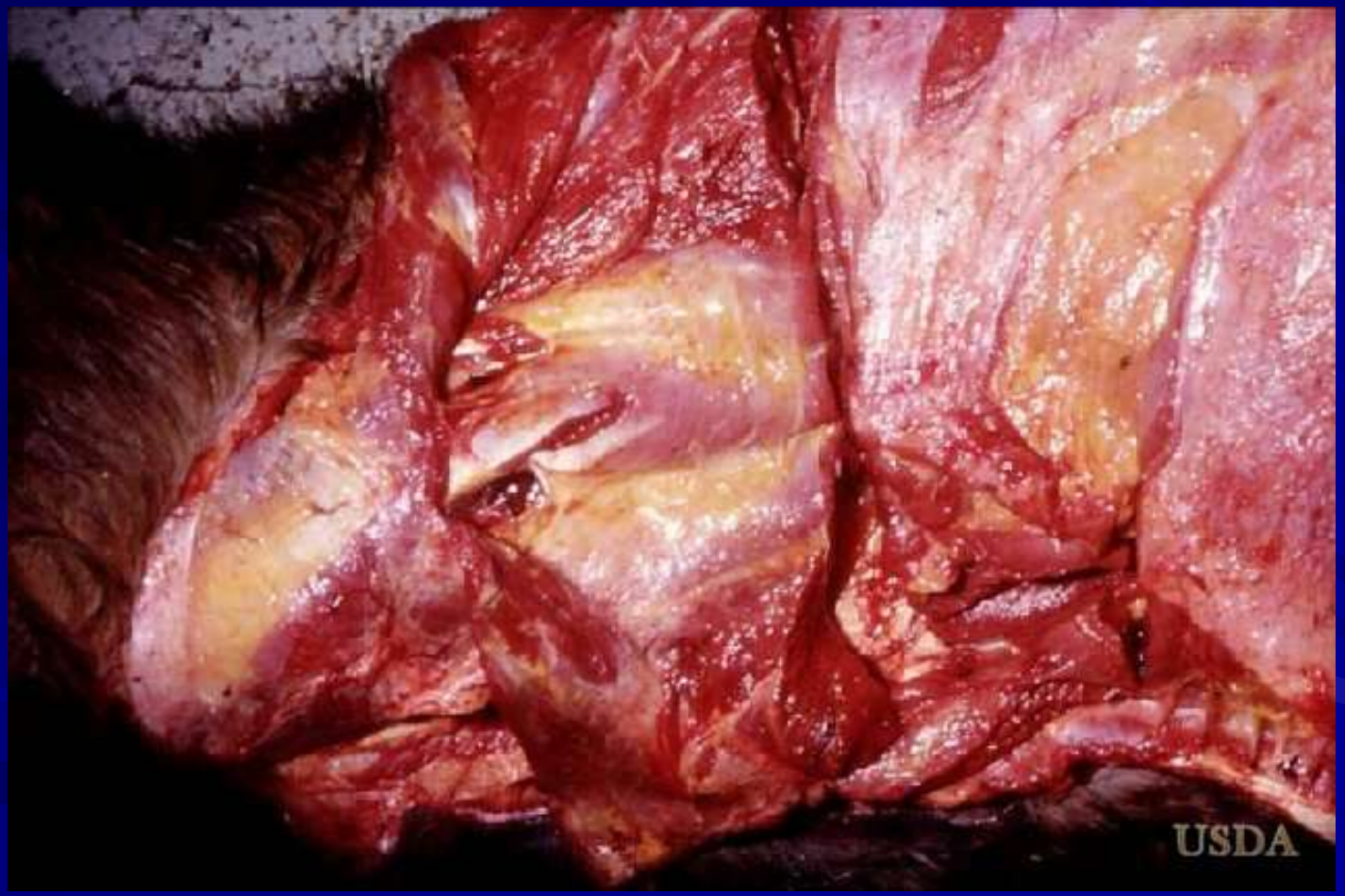
Edema elsewhere



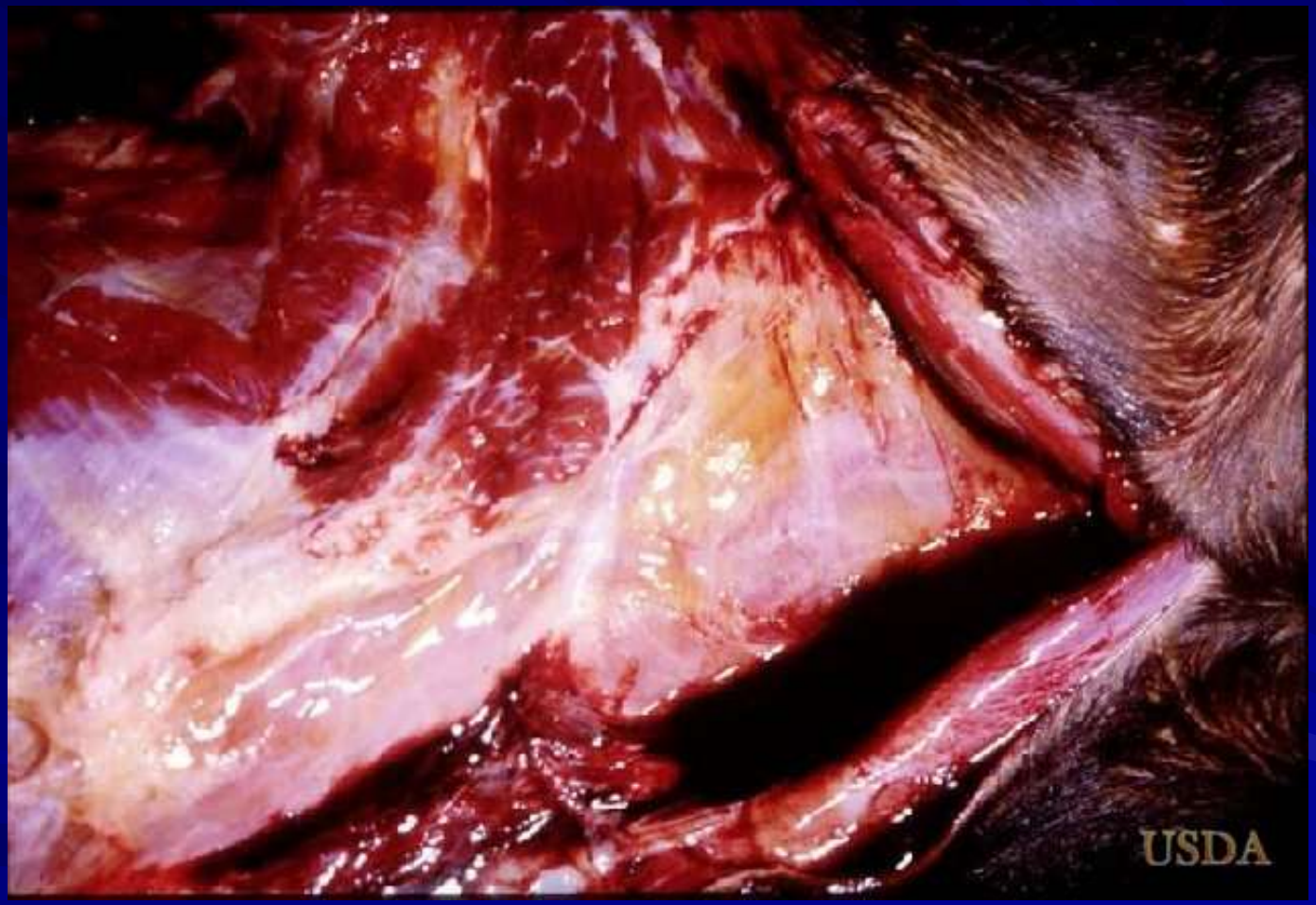
Edema elsewhere



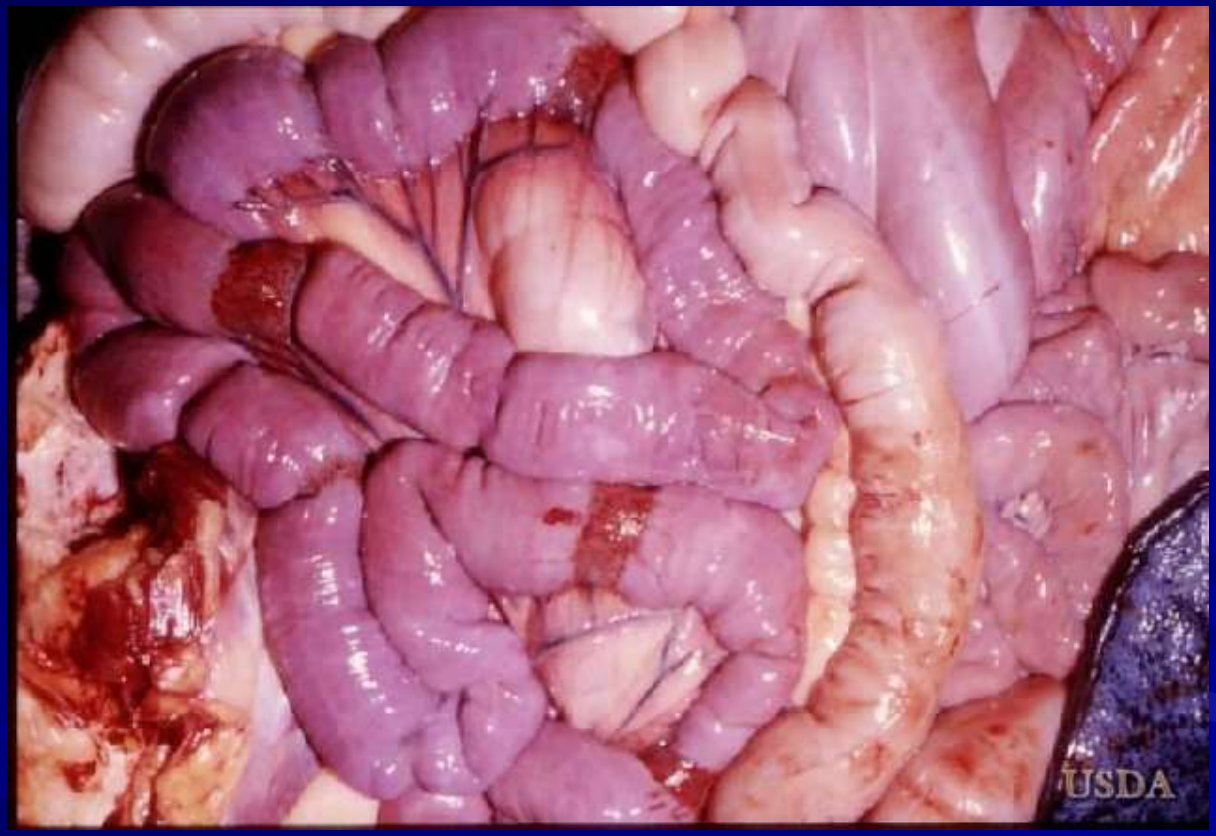
Edema elsewhere



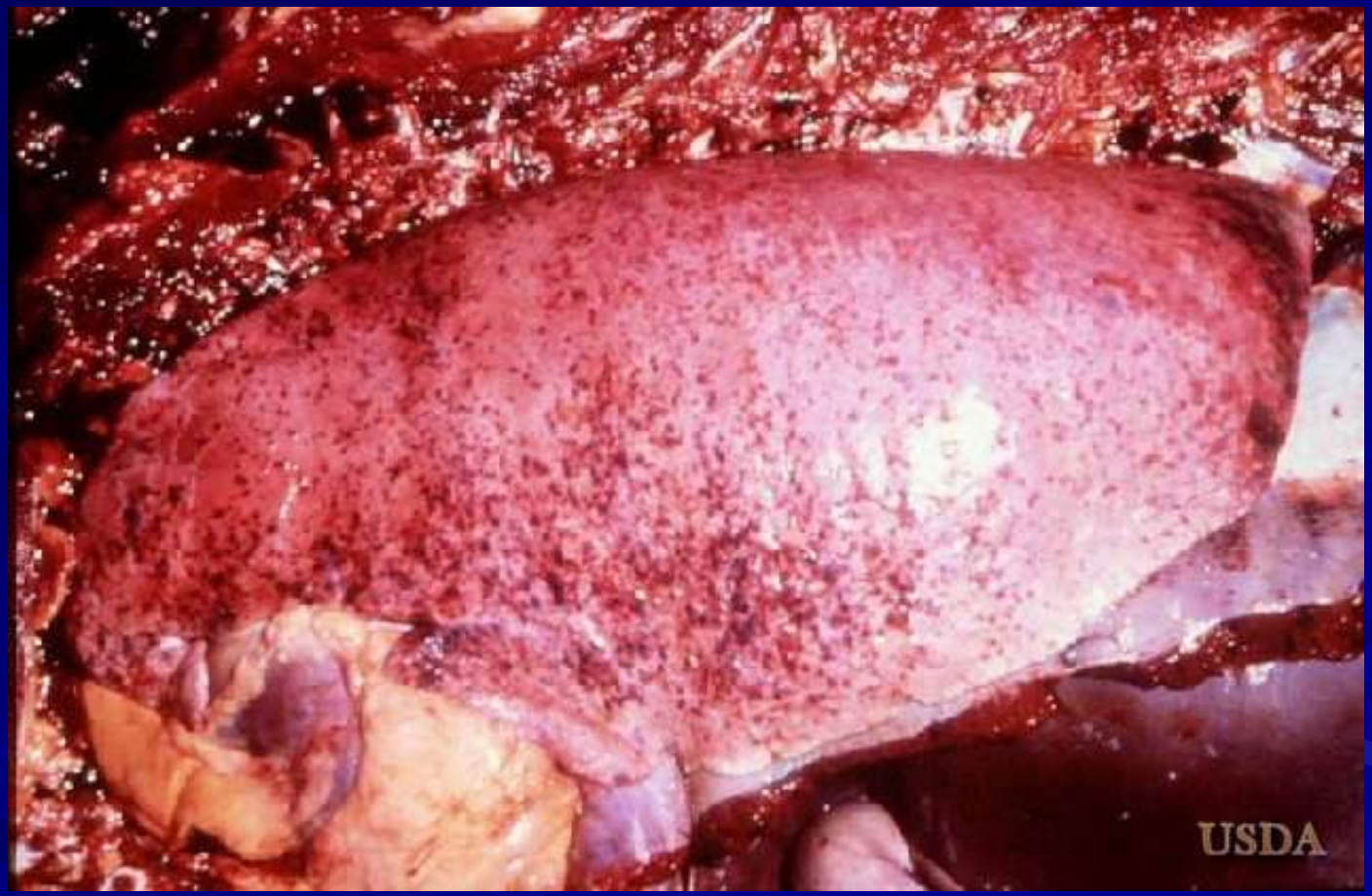
Edema elsewhere



Hemorrhages

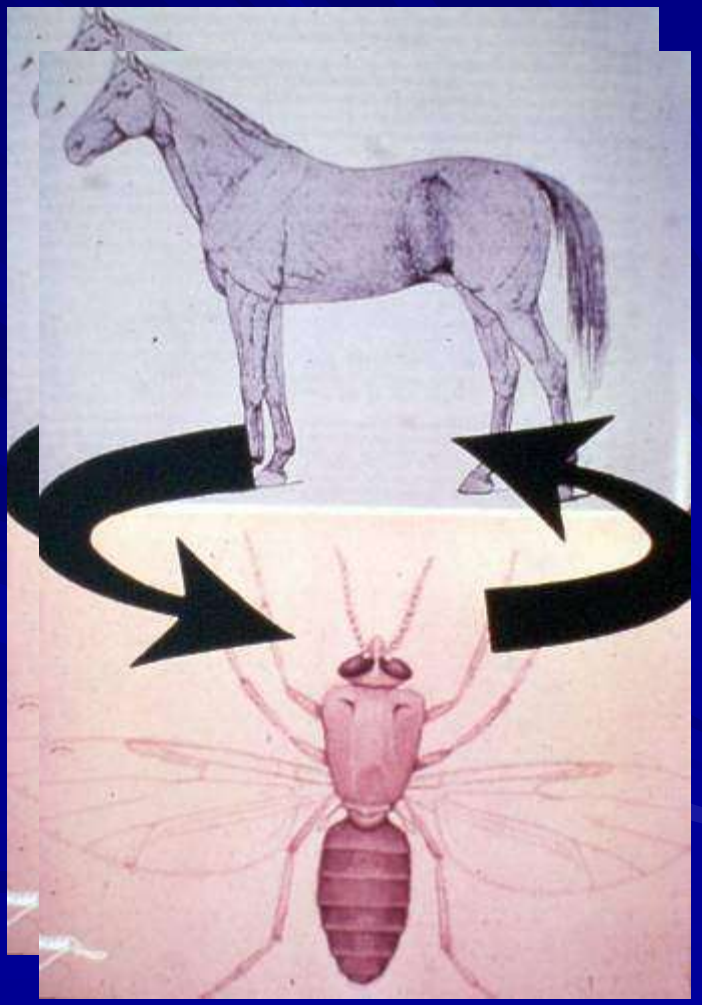


Hemorrhages



Transmission

http://www.iah.bbsrc.ac.uk/images/Culicoides.jpg



Transmission

- AHSv is spread primarily by *Culicoides* (ex: biting flies and mosquitoes) by transfer of blood
  - *Culicoides* are biological vectors because the disease can replicate in the midge
  - *Culicoides* are most active at sunset and about sunrise

Transmission

- African Horse Sickness is non-contagious, but the horse is an amplifier of AHS virus and source of virus for arthropods.

- Arthropods other than *Culicoides* may spread the virus as mechanical vectors

- This particular virus favors warmer conditions, when it has a preferred vector available. It may move best in moist, mild conditions and travel long distances on the wind-borne vectors.

Diagnosis

- AHS is difficult to pinpoint in early febrile stages
- Suspect the disease during the season when there are insect vectors

Diagnosis

- Suspect when horses develop the following:
  - Fever
  - Dyspnea
  - Edema of the supraorbital fossa
  - Subcutaneous edema of head/neck areas
  - Pulmonary edema
  - Death

Laboratory diagnosis

- Virus isolation – blood from live animal; spleen from dead animal
  - Vero cells, embryonating eggs, suckling mouse brain
- Serology – CF test, ELISA
- Real Time PCR for detecting viral RNA,

Virus is closely associated with erythrocytes

Differential Diagnosis

- Anthrax
- Equine infectious anemia
- Equine viral arteritis
- Trypanosomosis
- Piroplasmosis
- Purpura haemorrhagica

Control

- Movement restriction
- Vector control
- Test and slaughter
- Vaccination
  - MLV
  - Inactivated virus

African Horse Sickness