

# AFRICAN HORSE SICKNESS

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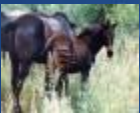




## Introduction: History of AHS

- 1327 - Yemen - Arabic document
- 1569 - East Africa - Portuguese Explorers
- 1719 - South Africa - Cape Colony



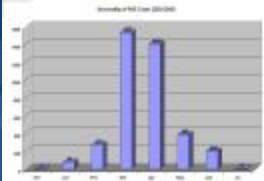


## Introduction: AHS

- Incubation period - 7 to 14 days
- Different forms of disease
  - Peripheral = “Dikkop”
  - Central (Pulmonary) = “Dunkop”
  - Mixed
  - Horse sickness fever
- Mortality
  - 70 - 95% of infected horses
  - Zebras or African donkeys – Asymptomatic
  - Mules and hybrids - Intermediate

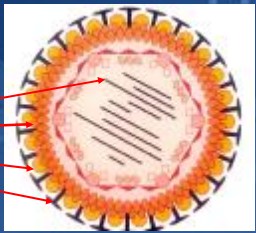

## Introduction: AHS

- Not contagious
- Transmitted by biting midges (*Culicoides* spp)
- Strictly seasonal in southern Africa
- Introduction invariably associated with movement of infected animal



## Aetiology: AHS virus (AHSV)

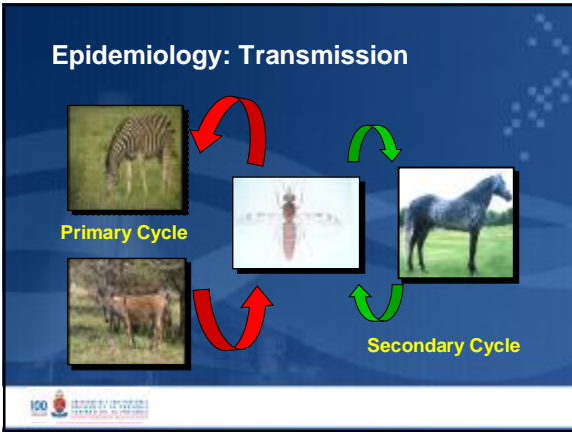
- Orbivirus
- BTV, EHDV and EEV
- 10 dsRNA gene segments
- AHS Group – VP7
- AHS Strain – VP2 (+VP5)

## Aetiology: AHSV Serotypes

- Nine strains of AHSV
- Variable cross protection between strains (partial to no cross protection)
- Polyvalent vaccines require inclusion of multiple relevant strains



### Epidemiology: Endemic Area

- Tropical Africa
- All nine strains in varying proportions

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- Tropical Africa
- All nine strains in varying proportions
- Southern and East Africa – all 9 strains
- Northern parts - Strain 9 predominates?
- Reservoir – probably Zebra + African Donkey

### Epidemiology: Epizootics

- Egypt - 1928

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- Yemen - 1930



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- Egypt - 1928
- Yemen - 1930
- Egypt - 1943



## Epidemiology: Epizootics

- Egypt - 1928
- Yemen - 1930
- Egypt - 1943
  - 1944 - Further spread to Palestine, Syria, Lebanon, Jordan



## Epidemiology: Epizootics

- Egypt - 1953



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- Egypt - 1953
- Egypt - 1958
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### Epidemiology: Epizootics

- Egypt - 1953
- Egypt - 1958
  - 1959 – SE Iran
  - 1960 – 1961 – Iraq, Syria, Lebanon, Jordan, Palestine, Turkey, Cyprus, Afghanistan, India



### Epidemiology: Epizootics

- Egypt - 1953
- Egypt - 1958
  - 1959 – SE Iran
  - 1960 – 1961 – Iraq, Syria, Lebanon, Jordan, Palestine, Turkey, Cyprus, Afghanistan, India
  - 300 000 equids died
- 1964 – World Organisation for Animal Health (OIE) Code for AHS Adopted



### Epidemiology: Epizootics

- 1965 – Libya, Tunisia, Algeria, Morocco



### Epidemiology: Epizootics

- 1965 – Libya, Tunisia, Algeria, Morocco
- 1966 - Spain



### Epidemiology: European Epizootic 1987/90

- 2 June 1987 – 10 Zebra from Windhoek via Walvis Bay
- 16 June 1987 – Arrived in Lisbon
- 18 June 1987 – Arrived at safari park just south of Madrid



### Epidemiology: European Epizootic 1987

- 16 July 1987 – Equids died at Safari Park and on adjacent properties
- 14 September 1987 – AHS Confirmed
- Infected zone
- Protection zone ~ 100 km
- Vaccination with Onderstepoort Live Polyvalent bottle 1 (AHSV 1, 3, 4 and 5) in both zones
- Vaccination with Onderstepoort Live Monovalent AHSV 4



### Epidemiology: European Epizootic 1988

- No cases in 1987 infected or protection zones
- Cases in south of Spain
- Vaccination – Onderstepoort Live Monovalent AHSV 4



### Epidemiology: European Epizootic 1989

- Cases in south of Spain
- More extensive than 1988
- Moved west into Alentejo region of Portugal
- Moved south into Morocco
- Large protection zone with vaccination in Portugal and Spain
- Protection zone with vaccination in Morocco
- Onderstepoort Live AHSV 4



### Epidemiology: European Epizootic 1990

- Cases in Malaga region of Spain and Morocco
- All equids in Portugal and Morocco vaccinated
- Vaccination zone in Spain increased
- Equipest® (Merial) inactivated AHSV 4 vaccine used extensively



### Epidemiology: European Epizootic 1987/90

- AHS Overwintered in Europe
- Cost at least \$30M to eradicate
- Barcelona Olympics 1992 – OIE Regionalisation for AHS
- EU Harmonised import conditions for Wildlife including Zebras
- ONLY epizootic associated with "legal" trade in equids



### Epidemiology: Epizootics

- 1997 – Saudi Arabia and Yemen



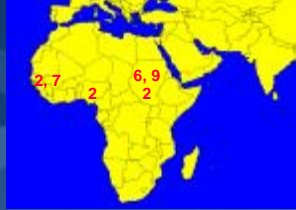
### Epidemiology: Epizootics

- 1997 – Saudi Arabia and Yemen
- 1999 – Cape Verde Islands



## Epidemiology: Northern Africa

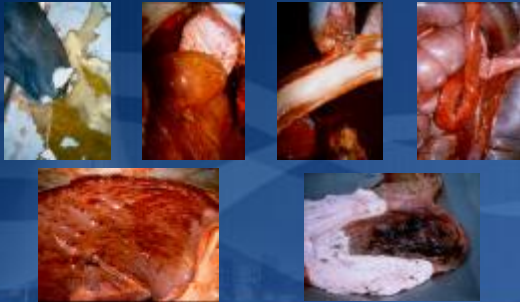
- 2003 – Ethiopia – Types 6 + 9
- 2007 – Nigeria – Type 2, Senegal – Types 2 + 7, The Gambia – Type 7?
- 2008 - Ethiopia – Type 2



## Diagnosis of AHS: Clinical



## Diagnosis of AHS: Post Mortem



## Diagnosis of AHS: Laboratory

- Clinical signs and post mortem findings
- Virus Isolation - days
  - Suckling mice
  - BHK or Vero
- Serotyping – Virus Neutralisation - weeks
- Antigen Capture ELISA
- RT-PCR
- RT-qPCR - hours
- Serotype specific RT-PCR



## Treatment of AHS

- No specific treatment!!!
- Supportive symptomatic treatment



## Prevention of AHS

- Endemic Areas
  - Polyvalent Live Vaccines
- Southern Africa
  - Onderstepoort Biological Products Vaccine
  - includes 7 strains
- Vaccinate as weanling and yearling and annually thereafter



## Prevention of AHS

- Stabling of horses
- Vector protection of stables
- Insecticides and insect repellents
- Other species as decoys around stables
- Management of potential midge breeding sites



## Control of AHS Outbreaks

- STOP ALL MOVEMENTS OF EQUINES!!!!
- Stabling of horses
- Vector protection of stables
- Insecticides and insect repellents
- Other species as decoy around stables
- Management of potential midge breeding sites
- VACCINATE – Live Vaccine?
- Euthanize cases???



## The Future?

- International controls – OIE
- EU AHS Controls (92/35/EEC)
- Contingency plans
- AHS Diagnostic Laboratories, EU Reference Laboratory, OIE Reference Laboratories
- Rapid PCR based Diagnostics
- EU AHS Vaccine Bank
- Increased awareness – Veterinarians and Horse Industry

COUNCIL DIRECTIVE 92/35/EEC  
of 28 April 1992  
laying down control rules and measures to combat African horse sickness



## New Vaccine

- Recombinant
- AHS Genes
- Increased Safety
- Effective (AHS4)
- Rapid immunity
- DIVA
- Other strains?

Protective immunisation of horses with a recombinant coarctopox virus vector vaccine co-expressing genes encoding the outer capsid proteins of African horse sickness virus

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## Issues for Consideration

- Do we have appropriate diagnostics in place to rapidly detect AHS?  
– YES
- Do we have appropriate contingency plans in place to manage AHS?  
– YES
- Are the currently available vaccines suitable for use in AHS epizootics?  
– Live – debatable  
– Recombinant - probable

