Emerging Equine Diseases: A Perspective on International Prevention and Control

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Animal Health Trust, Newmarket, UK
Overview

• Concept of disease prevention and control
  – Disease ‘surveillance’ and ‘horizon scanning’
• Horizon scanning of exotic disease threats
  – Why, What, How
• Several topical and significant examples
  – West Nile Virus
  – African Horse Sickness
  – Equine Infectious Anaemia
Equine infectious diseases

- Infectious diseases are important to the global horse industry
  - Infections move with horses & horse based commodities
  - Horses/commodities frequently move internationally
- Disease prevention is better than ‘cure’ (control)
  - Aim to prevent international disease transmission
- Effective prevention and control require
  - Good knowledge of disease epidemiology & ecology
  - Effective disease ‘surveillance’ and ‘horizon scanning’
Epidemiology

• The study of disease behaviour in populations
• Need to consider:
  – Sources and routes of infection
  – Mechanisms of spread incl. non-equine aspects
  – Biosecurity (indirect vs direct transmission)
• But keep an open mind with respect to potentially novel aspects of epidemiology!
Maintaining awareness

- **Surveillance** and **horizon scanning** are key to knowing what is going on now and what might happen in the future.

- **Surveillance** = Close observation of disease occurrence
  - Important at the national, regional & local level
  - International trade relies on health certification

- **Horizon scanning** = identification of potential threats; more distant than surveillance
  - Especially important at the international level
UK equine surveillance

• Passive/Scanning
  – **Endemic** equine disease monitoring
  – Defra/AHT/BEVA quarterly disease reports
    • Collation of data from network of laboratories
    • Reports on Virology, Bacteriology, Toxic & Parasitic Disease and *Post Mortem* Examinations

• Active/Targeted
  – AHT-based equine *influenza* surveillance
Maintaining awareness

- **Surveillance** and **horizon scanning** are key to *knowing* what is going on *now* and what *might happen* in the *future*

- **Surveillance** = Close observation of disease occurrence
  - Important at the national, regional & local level
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- **Horizon scanning** = identification of potential threats; more distant than surveillance
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Global horizon scanning: **WHY**

- Threats from new & emerging diseases
  - Vector borne diseases

- **Vector borne diseases…..**
  - Diseases arising from **transfer** of infective agents **indirectly** to horses **via** non-equine **vectors**

- **Insect** vectors important for emerging diseases
  - Rare to date in UK but common elsewhere in the world
  - AHS, EIA, WNV............
  - Beware two-legged vectors too!!
Global horizon scanning: WHAT

Awareness needed of:

• Where the threats are coming from
  – Global distributions of disease and infection

• How the threats are coming
  – Transmission mechanisms
  – Infected hosts and/or vectors / Other routes……..

• Possibility for long-term persistence (endemicity)
  – Determinants for competent transmission via vectors & hosts

• Methods available for control & eradication
  – Contingency planning / Vaccines / Vector control……..
Global horizon scanning: HOW

- ProMED Mail
- ICC (AHT)
  - International Collating Centre
- RESPE
  - Réseau d’Épidémio-Surveillance en Pathologie Equine
- Defra
  - Preliminary outbreak assessments/Qualitative RAs
- WAHID Interface
  - World Animal Health Information Database
WEST NILE VIRUS - EURASIA (10): SPAIN, EQUINE

A ProMED-mail post

http://www.promedmail.org

ProMED-mail is a program of the
International Society for Infectious Diseases
http://www.isid.org

Date: Thu 21 Oct 2010
Source: Diario Cordoba [in Spanish; trans. Mod JG, edited]
http://www.diariocordoba.com/noticias/noticia.asp?pkid=591575

Eight horses have died since the presence of West Nile virus [WNV] has been detected. This virus is the causative agent of a disease that has affected 34 of the 30,000 registered horses in Cadiz Province, as reported by the Andalucia Agriculture and Fishing Council.

On the basis of this information, Judit Anda, General Director of Agriculture and Livestock Production, issued a "reassuring message" to the community representatives pointing out the "low incidence" of WNV infection in the equine population.

Ms. Anda said this after meeting with representatives of livestock associations, health advocacy groups, agricultural producer organizations and members of the Faculty of Veterinary Medicine, Cordoba. During the meeting, she explained that until this day, only 34 horses in Cadiz Province had become affected by the disease, out of a total number estimated as 30,000 registered animals, 8 of the affected animals died.

In this 2nd coordination meeting that included representatives of the Ministry and the sector, Anda pointed out that this outbreak is restricted mainly to the province of Cadiz; there are also 2 pockets...
INTERIM REPORT – October 2010 #3 (18.10.10)

FRANCE

Contagious Equine Metritis (CEM)
On 18th October 2010 the Réseau d’Épidémio-Surveillance en Pathologie Equine (RESPE) reported CEM in a 16 year old French Trotter breeding stallion in Mayenne, France. The affected horse was not showing clinical signs and the diagnosis of CEM was made on the basis of laboratory confirmation of infection by Laboratoire Frank Duncombe on 15th October 2010.

EHV-1 abortion
On 18th October 2010 RESPE reported EHV-1 abortion in a single Thoroughbred mare in Ome, France. The diagnosis was made on the basis of laboratory confirmation of infection using PCR applied to fetal organs by Laboratoire Frank Duncombe on 12th October 2010.

Equine Infectious Anaemia (EIA)
On 18th October 2010 RESPE reported a case of EIA in a single female French Trotter pleasure horse in Gironde, France. The affected horse, which was one of six horses on the premises, was not showing clinical signs and the diagnosis of EIA was made on the basis of laboratory confirmation of infection on 13th October 2010. The infected horse was euthanased and isolation and screening of the other animals on the premises is being conducted. Movement restrictions and an epidemiological investigation have been implemented. The animal was traced through the epidemiological investigations carried out following the EIA outbreak reported in Dordogne in March 2010.

Equine Influenza
On 18th October 2010 RESPE reported a case of equine influenza in a seven year old Arabian mare on a premises in Ardeche, France. The diagnosis was made on the basis of laboratory confirmation of infection using PCR applied to a nasopharyngeal swab sample by Laboratoire Frank Duncombe on 11th October 2010.

Regards
International Collating Centre
Un foyer d'anémie infectieuse équine en Bavière - Allemagne

nardi 19 octobre 2010

**Foyer de Anémie infectieuse équine - Bavière - Allemagne**

<table>
<thead>
<tr>
<th>Maladie</th>
<th>Anémie infectieuse équine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nombre de prél.</td>
<td>1</td>
</tr>
<tr>
<td>Type prél.</td>
<td>sang</td>
</tr>
<tr>
<td>Date confirmation</td>
<td>18/10/2010</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>Laboratoire / Sérologie</td>
</tr>
<tr>
<td>Date appar. symp.</td>
<td>14/10/2010</td>
</tr>
<tr>
<td>Nb chevaux affectés</td>
<td>1</td>
</tr>
<tr>
<td>Effectif total</td>
<td>108</td>
</tr>
<tr>
<td>Mesure(s) de contrôle</td>
<td>interdiction de mouvements des animaux sensibles autour de(s) l'exploitation(s) infectée(s), reconstitution des mouvements vers et en dehors de(s) l'exploitation(s)</td>
</tr>
</tbody>
</table>

Sources : Ministère de l'Éc肤tion, de l'Agriculture et de la Pêche (FR)
 Diagnostic test results

<table>
<thead>
<tr>
<th>Laboratory name and type</th>
<th>Veterinary Laboratories Agency (VLA), Weybridge (National laboratory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests and results</td>
<td><strong>Species</strong></td>
</tr>
<tr>
<td></td>
<td>Equidae</td>
</tr>
</tbody>
</table>

Future Reporting

The event is continuing. Weekly follow-up reports will be submitted.

Map of outbreak locations

Location of current outbreaks

[Map of outbreak locations showing the United Kingdom and surrounding countries with indicated outbreak locations]
West Nile Virus
West Nile virus

- **Arbovirus** = **arthropod-borne virus**
West Nile virus • Arbovirus = arthropod-borne virus

WNV: situation circa 1999

Legend:
- St. Louis
- Rocio and St. Louis (Brazil)
- West Nile
- Japanese
- Japanese and Murray Valley
- Murray Valley and Kunjin

CDC
Centers for Disease Control and Prevention
West Nile virus isolation and antibody detection and outbreaks reported from horses, wild birds and humans in 2008
WNV

• **Horse** is a dead end/incidental host
  – Not the threat!

• **Birds** are amplifying hosts
  – Birds are a potential threat
  – Migration from endemic to non-endemic region
  – More local (continental) movement
  – But require vectors & appropriate ecology

• **Mosquitoes** are vectors for infection
  – Mosquitoes are a potential threat
  – International transfer of infected mosquitoes??
WNV

- **Birds** are amplifying hosts
  - Local ‘waves’ of transmission
  - Explains the westerly spread in USA?

- **Mosquitoes** are vectors for infection
  - International transfer of infected mosquitoes!
  - ‘Jet setting’ mosquitoes
  - International trade in used tyres
    - Mosquito infested stagnant water
‘Jet-setting’ mosquitoes

• Malaria occurs near UK airports
• First human WNV case in California was an airport worker
• Mosquitoes on US flights recognised as main risk of introducing WNV to Hawaii
• Entry route of Israeli WNV into USA in 1999??
  – Or was it something else?
Mosquito breeding in tyre disposal sites in the West Midlands region of the UK

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² Australian Institute of Marine Science, PMB 3, Townsville MC, Queensland, 4810, Australia
³ Killgerm Group

WNV USA 1999-2010: endemic?

Map showing the distribution of WNV in the USA from 1999 to 2010, with the year 2010 highlighted.
WNV in Italy, 2008-9: endemic?
Since 2001 in USA

Since 2004 in USA

Since 2006 in USA

Since 2009 in EU
## WNV equine vaccines protect?

Data available for California in 2004 from:

<table>
<thead>
<tr>
<th>Vaccination Status</th>
<th>Confirmed WNV cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>No vaccination</td>
<td>110 (65%)</td>
</tr>
<tr>
<td>Partial/lapsed vaccination</td>
<td>48 (29%)</td>
</tr>
<tr>
<td>Full vaccination</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Unknown vacc. status</td>
<td>5 (3%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>168 (100%)</strong></td>
</tr>
</tbody>
</table>
WNV equine vaccines protect?

Data available for North Dakota in 2002 from Schuler et al. (2004) JAVMA, 225, 1084-9

<table>
<thead>
<tr>
<th></th>
<th>Non-fatal cases</th>
<th>Fatal cases</th>
<th>Adjusted OR for survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>No vaccination</td>
<td>207</td>
<td>102 (33%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Partial/lapsed</td>
<td>107</td>
<td>20 (16%)</td>
<td>3.1</td>
</tr>
<tr>
<td>vaccination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full vaccination</td>
<td>24</td>
<td>1 (4%)</td>
<td>16.1</td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
<td>123 (27%)</td>
<td></td>
</tr>
</tbody>
</table>
African Horse Sickness
African horse sickness

- Orbivirus with 9 serotypes (types 1-9)
  - Related to Bluetongue virus (BTV)
- Endemic in sub-Saharan Africa
- Transmission by biting insects
  - *Culicoides* biting midges
- Horse is most susceptible equine species
AHS Worldwide 2005-8

Countries officially reporting African Horse Sickness Outbreaks during 2005-2008 and EU-Approved Third Countries for Equidae Imports to EU

Legend
- EU Approved
- Disease Reported

Map prepared by IAH
a) **AHS infected zone** – territory outside the Western Cape Province. Import of horses and equidae from this zone to the EU is prohibited.

b) **AHS control area** – the whole of Western Cape Province.
Bluetongue (BTV) in Europe
What does BTV teach us?

- Predictable incursions with global warming
  - From north Africa and south/east Europe
  - But long distance transfers of *Culicoides* spp.
- Sudden ‘parachuting’ into new regions
  - Northern Europe and BTV-8
  - Initial routes of introduction unknown
  - Ecological determinants unknown
  - But rapid adaptation in new vectors possible
Dealing with the threat of AHS

- **Strategy and allied legislation for the control of African Horse Sickness in Great Britain**
  - Developed by the joint Defra/UK equine industry AHS Working Group
  - Also recognises importance of
    - Early recognition of first case
    - Education of horse owners & veterinary surgeons
    - Better vaccines for effective control
Dealing with the threat of AHS

STATUTORY INSTRUMENTS

2010 No.

ANIMALS, ENGLAND

ANIMAL HEALTH

The African Horse Sickness Regulations 2010

Made - - - - ***
Laid before Parliament ***
Coming into force - - ***

A Strategy for the Control of an Outbreak of African Horse Sickness in Great Britain

A draft document describing the control of African horse sickness.

This document was prepared by the joint industry-government Working Group on African horse sickness under the Chairmanship of The Horse Trust.
AFRICAN HORSESICKNESS VACCINE

Namibia: NSR 0586

Freeze-dried, polyvalent, live attenuated horsesickness virus strains for the prophylactic immunisation of horses, mules and donkeys against horsesickness.
Equine Infectious Anaemia (EIA)
Equine infectious anaemia (EIA)

- Caused by a type of Lentivirus
  - Related to HIV (AIDS)
  - No vaccine
  - No treatment
- 3 different clinical presentations
  - Acute, Chronic, Subclinical
- Blood borne infection
  - Biting insect transmission
  - Iatrogenic transmission
EIA in Europe 2004-6
EIA in Europe 2007-10
EIA in Europe 2010

Equine Infectious Anaemia outbreaks in Europe, 2010

Current Disease Event:
- **Outbreaks**
- **EIA - resolved**
- **Premises under restriction**

Affected regions
EIA – Ireland 2006

- Outbreak features

- 38 cases June - December 2006

Fig 1: The number of confirmed EIA cases during 2006, by month date of diagnosis. No diagnostic testing was conducted on the 3 unconfirmed cases (U1, U2, U3).
Outbreak features
– 38 cases June – December 2006
– Meath (n=21) & Kildare (n=17) clusters

EIA – Ireland 2006
EIA – Ireland 2006

• Outbreak features
  – 38 cases June – December 2006
  – Meath (n=21) & Kildare (n=17) clusters
  – EIAV in hyperimmune plasma as source
  – Transmission routes included:
    • Iatrogenic (n=14)
    • Close contact (n=4)
    • Vector borne (n=3)
    • Other – hospital acquired (night overstay with primary case) (n=13)
EIA – UK January 2010

Department for Environment, Food and Rural Affairs
Veterinary Science Team

Equine Infectious Anaemia, Wiltshire, January 2010
Situation at 4th February 2010
EIA – UK January 2010

- 02/10/2009: EIA tests negative in Romania
- 01/10/2009: Movement of 1 horse to premises in Warwick
- 19/01/2010: CVO confirms EIA
- 20/01/2010: Slaughter of the two EIA confirmed cases
- 23/01/2010: Serosurveillance of Group 1 on IP completed
- 28/01/2010: Serosurveillance of Group 2 completed
- 15/01/2010: Restrictions & resampling
- 11/01/2010: Post-import check: Sampling
- 29/12/2009: Post-import check: Identification
- 01/12/2009: Importation into GB
- 22/12/2009: Importation into Belgium
- 22/10/2009: Importation into Belgium
Learning lessons and reacting…

Official Journal of the European Union

COMMISSION DECISION
of 18 June 2010
on protective measures with regard to equine infectious anaemia in Romania
(notified under document C(2010) 3767)
(Text with EEA relevance)
(2010/346/EU)
Acknowledgements