Infectious diseases: topical, new and emerging threats to UK equines

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HORSES are second only to humans as the most travelled creatures on the planet, with global competitions and international movement for breeding now commonplace. With such large-scale travel comes the potential for infections and disease to spread. This article reviews three diseases of equines – west Nile disease, equine infectious anaemia and equine herpes myeloencephalopathy – covering clinical signs, prevention strategies and risk factors for the UK.

HORSES are the most travelled animals after humans, including temporary and permanent movements as well as intercontinental movements for competition and breeding.

Such levels of transportation of equines allows for potentially rapid movements of the infections that affect them. This, coupled with climate change causing an increase in the geographical distribution of certain vectors – including some species of mosquitoes – and "old" pathogens finding new biological niches, makes the 21st century the most challenging yet in preventing, recognising and treating exotic diseases.

In this article the author outlines three examples of topical, new or emerging threats to the UK's equine population.

West Nile disease

Disease overview

West Nile virus (WNV) belongs to the *Flaviviridae* family of viruses and is vector-borne, as it is transmitted by mosquitoes (*Culex* species). The primary amplifying non-vector hosts are birds, for instance, house sparrows (passerines), crows and birds of prey. Horses and humans are dead-end hosts and do not contribute to the propagation of disease – acting, instead, as sentinels for the virus.

WNV is a seasonal virus, with cases occurring during peak mosquito activity. In northern, temperate climates, peak activity occurs in the summer, particularly July and August. WNV encephalitis has been one of the leading causes of neurological disease in horses in the US since the disease's introduction in 1999.

WNV is an important zoonosis and causes neurological disease in humans. However, disease is spread because the bird reservoir maintains the virus in an endemic life cycle, allowing transmission by mosquitoes to humans. Little risk of disease by direct contact with an infected horse exists, except during postmortem examination whenever infected tissues are inappropriately handled.

Clinical signs

The majority of WNV infections in horses are subclinical. It is estimated only 10 per cent of infected horses go on to develop clinical signs. The virus causes a wide variety of clinical signs symptomatic of the encephalomyelitis (diffuse inflammation of the brain and spinal cord):

- Pyrexia (>38.5C), anorexia and depression.
- Usually abrupt onset of neurological disease.
  - Changes in behaviour and mentation: hyperexcitability, apprehension and sometimes aggression with intervals of somnolence.
  - Spinal cord abnormalities – stiff, stilted gait (which can be mistaken for lameness), ataxia (two or more limbs asymmetric or symmetric), flaccid paralysis and paresis, resulting in some cases being recumbent.
  - Cranial nerve abnormalities, including tongue weakness, muzzle deviation, head tilt and/or difficulty balancing and difficulty swallowing.

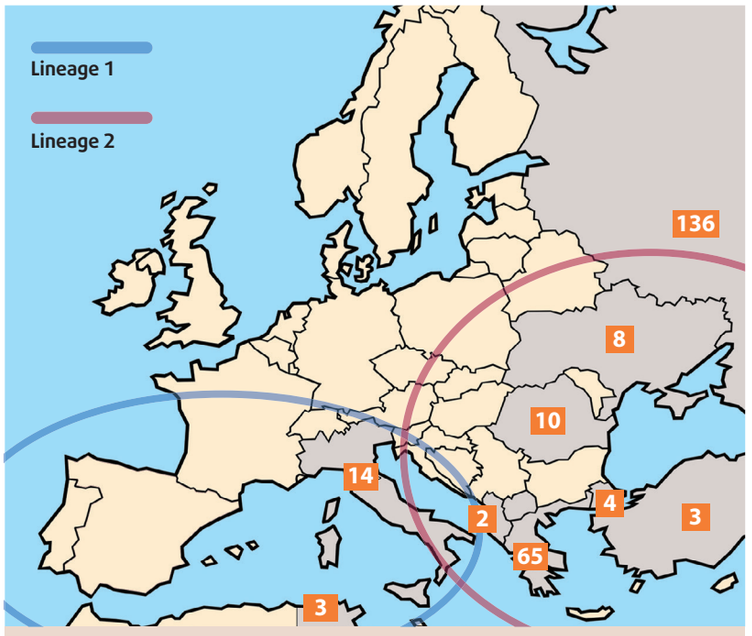

Figure 1. Map showing the distribution of west Nile disease lineage 1 and lineage 2 reported to the OIE in 2011. Numbers in orange boxes show the number of west Nile cases occurring in humans in the period 26 July and 24 November, 2011. Not shown on map: Israel [**33**].
(Source: World Organization for Animal Health, 2011; European Centre of Disease Prevention and Control).

Outbreaks in mainland Europe

Two lineages are circulating in mainland Europe (**Figure 1**):

- Lineage 2, previously confined to Africa, emerged in 2004 and established itself in Hungary, with the first equine case in the east of the country in 2007. The virus had not been expected to survive the cold winter, but it did and proved the establishment of a successful infection cycle in Europe of the previous African lineage.
- Lineage 1 has made sporadic incursions into southern Europe. In 2015 the disease re-emerged in France's Camargue region with a substantial clinical impact on horses. This was the first WNV incursion into France in nearly a decade. In total, 30 horses were clinically affected, with 5 dying or requiring euthanasia. No human cases were reported and bird mortality was rare.

UK prevention strategy

The UK has been found to have the correct species of mosquitoes to act as the bridge vector and an abundance of bird wildlife to act as the amplifying host.

It obviously also has large populations of dead-end hosts – horses and humans. Therefore, many infectious disease experts believe it is a question of when, not if, WNV comes to the UK.

After lobbying by members of the equine veterinary profession, rules about testing for WNV were changed. WNV is a notifiable disease so, previously, if a clinician wanted to rule it out from a differential diagnosis list, testing triggered immediate Defra restrictions on the horse and the premises it was housed in. It was argued the effect of this was counterproductive, leading to reduced surveillance and early detection. This was potentially based on the misconception of the human zoonosis risk from horses.

Now, though, clinicians can request WNV serology in suspected cases, or to rule out from a differential diagnosis list, without triggering a premises restriction. This will now only come into force if the results come back consistent with WNV infection.

Vaccination against WNV is available in the UK and owners of horses travelling to or through Europe should be advised to vaccinate ahead of time. Vaccination can be performed with Proteq West Nile (from five months) or Equip WNV (from six months). A primary course of two vaccinations (four-to-six or three-to-five weeks apart) is followed by an annual booster and immunity is established four weeks after the first dose of the primary vaccination. To achieve full protection the full primary course must be given.

Equine infectious anaemia

Disease overview

Equine infectious anaemia (EIA), also known as "swamp fever", is caused by an equid-specific *Lentivirus* related to Maedi-visna virus, feline immunodeficiency virus and HIV-1, among others. All *Lentivirus* types cause persistent infections and most cause slowly progressive disease that frequently results in death.

In contrast, EIA virus infection results in an acute phase, followed by recurrent clinical disease episodes that eventually subside in most horses. These horses become persistently infected, lifelong, inapparent carriers.

The virus is transmitted by mechanical transmission on the proboscis on blood-feeding insects such as horseflies and deer flies. Iatrogenic transmission with needles, syringes and veterinary instruments is also possible. Aerosol transmission over short distances can occur.

Clinical signs

The following list is in descending order of occurrence frequency:

- fever
- depression
- weakness
- weight loss
- haemorrhagic diarrhoea
- haemorrhagic nasal discharge

Clinicopathology often reveals an anaemia and thrombocytopenia. After the initial disease episode, the majority of infected horses experience recurrent episodes of viraemia, fever, lethargy, inappetence, thrombocytopenia and anaemia.

Disease in eastern Europe

The disease is endemic in certain European states, including Romania and Italy, with periodic sporadic outbreaks in western Europe, including France, Germany and Poland in 2015.

In 2006, Ireland suffered a high-profile outbreak caused by use of equine plasma imported from Italy, without a licence, to treat foals. In 2010, EIA was reported in the UK in two out of six horses shipped from Romania via Belgium. Later that year a horse that had come to the UK from the Netherlands tested positive.

The conclusion is movement of horses and equine biological products is a significant risk to equine health. Pre-export testing and certification is a vital prevention tool. Adequate border controls and enforcement are in place with the added value of post-import surveillance and testing.

Equine herpes myeloencephalopathy

Disease overview

Equine herpesvirus-1 (EHV-1) and EHV-4 are associated with three clinical disease syndromes:

- respiratory disease
- abortion
- neurological disease, namely equine herpes myeloencephalopathy (EHM)

Clinical signs

EHM is not restricted by pregnancy, age or gender and occurs in foals, yearlings,

geldings, stallions and both barren and pregnant mares. Transmission is assumed to be through the respiratory route and contagious transmission occurs from clinical cases, so it produces potential for large outbreaks of the disease to occur. Neurological clinical signs appear during or towards the end of the viraemic phase of infection. The interval between infection and subsequent onset of neurological disease is usually between 6 and 10 days, but may be as short as a day.

Invariably, no premonitory clinical signs of respiratory disease are seen, and pyrexia is likely to be the only warning clinical sign. The presentation and severity of clinical signs are highly variable and depend on the extent and location of the neurological lesions. The spinal outflow to the caudal and sacral plexus is affected most often:

- Pelvic limbs are usually most severely affected – temporary ataxia and paresis to complete paralysis is seen. Quadriplegia is observed.
- Bladder dysfunction – atony with incontinence or urinary retention.
- Cutaneous perineal and limb sensory deficits from sacral nerve involvement.
- More cranial signs may be present: some affected horses develop a head tilt.

Latest outbreaks

In early 2016, a case of EHM was diagnosed in a four-year-old maiden filly that had not long arrived to stud from overseas. The mare was placed in isolation, as was routine on this stud, before clinical signs occurred that included ataxia and bladder dysfunction.

Appropriate measures were implemented in accordance with the Horserace Betting Levy Board's (HBLB) codes of practice (www.hblb.org.uk) and continued until a clear status was achieved. The case highlights the use of isolation and active screening for disease in preventing the ubiquitous virus EHV-1 from causing EHM cases in more than one animal – and effectively preventing an outbreak to occur.

Isolation and biosecurity

EHV-1 disease control programmes have three goals, as outlined in the HBLB codes of practice

- prevention of disease entry to premises
- limiting the spread and severity of disease
- limiting the spread to adjacent properties.

Prevention of disease entry to premises

- Preventing disease from entering is difficult because the majority of horses carry latent EHV infections. To reduce the risk of disease entry, new arrivals should, ideally, have been vaccinated before arrival and should be kept isolated from other horses until sufficient time has passed for disease to become apparent.
- On studs, newly arrived and "walk-in" mares should be kept strictly separate from resident in-foal mares for 56 days after covering. Mares arriving at studs to foal should be transported at least 28 days before the foaling due date.
- Horses that have arrived from sales or markets are high risk and should have more stringent isolation and biosecurity measures. In yards with no pregnant mares, an isolation period of at least 21 days is advised because viral shedding may occur after reactivation of the virus induced by the stress of moving.
- Minimising stress in resident horses, including while being transported, keeping disruption of established social groups as low as possible and preventing stress at weaning should assist in reducing the frequency of reactivation of the virus from the latent state.

Limiting spread and disease severity

- Different age groups should not be mixed.
- Group size should be kept as small as practicable.
- Pregnant mares should be separated from other horses and kept in small groups to minimise the risk of a large-scale outbreak.
- Ideally, mares in their last trimester should be housed and managed individually.
- Isolation areas should be geographically separate and rigorously maintained.
- If a suspect case occurs, the horse should be isolated immediately and appropriate samples should be taken.
- Any in-contacts should be isolated and monitored for disease (temperatures should be taken twice daily).
- If the in-contact group is large, it should be subdivided – if it is practical to do so.
- Environmental contamination is an issue. The virus can survive for limited periods depending on the surface and prevailing weather conditions. All discharges from affected horses should be removed and the area disinfected with approved disinfectant. Bedding should be burned.
- All movements should be stopped.
  - Isolate aborted mares for 28 days and do not mix with pregnant mares for 56 days.
  - EHM horses should be kept isolated for a minimum of 14 days and sometimes for up to 28 days to account for the maximum possible duration for viraemia. Testing of viral shedding can be undertaken to shorten the isolation period.
  - Movement of all horses on and off the premises should cease for a period of 28 days, unless active surveillance allows the time frame to be shortened.

Limiting spread to adjacent properties

- Efficient communication between attending vets, owners of premises and other parties working with the affected premises.
- Care with personnel and fomites – easy and clear biosecurity measures should be implemented.

> "Vaccination against west Nile virus is available in the UK, and owners of horses travelling to, or through, Europe should be advised to vaccinate ahead of time."

PHILIP IVENS qualified from the University of Cambridge in 2003, working initially in mixed/equine practice in Norfolk and Dorset. He joined the team at the RVC's equine referral hospital in 2006 as senior clinical training scholar in equine medicine and equine infectious disease and gained his RCVS certificate in equine internal medicine in 2008. In 2011 he gained the European Diploma in Equine Internal Medicine (DipECEIM) and became a European specialist in equine internal medicine. This year, he became an RCVS specialist in equine internal medicine. He is founder and director of Buckingham Equine Vets and part of its ambulatory team. He has a specialist interest in equine infectious diseases, respiratory medicine and oncology. He acts as a medicine consultant in the practice and heads up Buckingham Equine Medicine Referrals. He has lectured on infectious diseases in the UK and aboard, and has published on equine infectious diseases and written several chapters in veterinary textbooks.

Conclusion

Equine infectious disease is a constant threat and one can argue more so now than ever.

A clear understanding of the diseases involved and up-to-date knowledge of the local, national and international disease states can greatly aid recognition of diseases, and mean prompt diagnosis and the implementation of control measures.

Further reading

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Veterinary Times Equine

ISSN 2059-9463

Veterinary Times Equine is a twice yearly supplement to Veterinary Times and is sent free to selected veterinary professionals. Readers should note Veterinary