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Equine Quarterly Disease Surveillance Report

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Highlights in this issue:

- Focus Article - Equine Herpes Virus-1 (EHV-1) Abortion Outbreak Management

Important note:

The data presented in this report must be interpreted with caution, as there is likely to be some bias in the way that samples are submitted for laboratory testing. For example they are influenced by factors such as owner attitude or financial constraints or are being conducted for routine screening as well as clinical investigation purposes. Consequently these data do not necessarily reflect true disease frequency within the equine population of Great Britain.

Animal Health Trust
Department for Environment Food & Rural Affairs

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Introduction

Introduction

Welcome to the fourth quarterly equine disease surveillance report for 2016 produced by Department for Food, Environment and Rural Affairs (Defra), British Equine Veterinary Association (BEVA), Animal & Plant Health Agency (APHA) and the Animal Health Trust (AHT).

The national disease data is collated through multiple diagnostic laboratories and veterinary practices throughout the United Kingdom, providing a more focussed insight to the prevalence of equine infectious disease. Due to the global mixing of the equine population through international trade and travel, collaboration on infectious disease surveillance between countries occurs on a frequent basis to inform and alert. Both national and international information will be summarised within this report.

Current national and international disease outbreaks from 1st January 2017

National disease occurrence

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

On 5th January 2017, the Animal Health Trust confirmed a case of EHV-1 abortion that occurred on 4th January on a stud premises in Cambridgeshire, England. The affected animal was a non-vaccinated Thoroughbred mare epidemiologically linked to an index case that occurred on 28th December 2016. This secondary case was in direct contact with one other pregnant mare. Appropriate biosecurity measures, in accordance with HBLB Codes of Practice, have been implemented and will continue as required. The positive diagnosis was confirmed through qPCR on placental and fetal tissues.

On 10th February 2017, Rossdales Laboratories, Newmarket confirmed a case of EHV-1 abortion on premises in Suffolk. The affected animal was an 11-year-old vaccinated Thoroughbred mare at nine months gestation. This case was in contact with one gelding only. The positive diagnosis was confirmed on 7th February 2017 on post-mortem examination, histopathology and qPCR on fetal and placental tissues.

On 20th February 2017, the Animal Health Trust confirmed a case of EHV-1 abortion on a stud premises in Gloucestershire. The affected animal was a vaccinated Thoroughbred mare, in direct contact with youngstock only. The positive diagnosis was confirmed by qPCR on fetal tissues.

EQUINE HERPES VIRUS-1 (EHV-1) RESPIRATORY DISEASE

During January and February, the Animal Health Trust confirmed three separate cases of EHV-1 respiratory disease. For one of these cases, there was a concurrent infection with *Streptococcus equi*. The positive diagnoses were confirmed by qPCR on nasopharyngeal swabs.

International disease occurrence

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

Belgium

On 6th February 2017, Equi Focus Point, Belgium (EFPB) reported a case of EHV-1 abortion on premises in Antwerp, Belgium. This affected animal was not vaccinated and aborted on 1st February 2017. The positive diagnosis was confirmed by PCR on fetal tissues.

France
During February, *Réseau d'Epidémio-Surveillance en Pathologie Equine* (RESPE) reported two separate cases of EHV-1 abortion on premises in Nièvre and Seine-et-Marne, France. The positive diagnoses were confirmed by PCR on fetal tissue conducted by LABEO-Frank Duncombe, Normandy.

EQUINE HERPES VIRUS-1 (EHV-1) NEUROLOGICAL DISEASE

Belgium
On 21st February 2017, Equi Focus Point, Belgium (EFPB) reported a case of EHV-1 neurological disease on premises in Doonik, Belgium. This affected animal was not vaccinated. Five other susceptible animals are on the premises. Biosecurity measures, including quarantine have been implemented. The positive diagnosis was confirmed on 21st February 2017 by PCR on whole blood.

USA
As of 13th January 2017, 40 horses at the New Orleans Fairgrounds Racetrack have tested positive for EHV-1. The affected animals have presented with varying clinical signs, consisting of pyrexia and mild neurological deficits. The entire premise has been placed under quarantine with additional biosecurity support being provided by the Racing Commision and Louisiana State Police.

On 10th January 2017, a case of EHV-1 neurological disease was confirmed in Los Angeles County, California. Because of the severity of neurological signs, the mare had to be euthanased. All appropriate biosecurity measures were implemented on the affected premises.

EQUINE INFECTIOUS ANAEMIA (EIA)

Germany
On 19th January 2017, the World Organisation for Animal Health (OIE) reported a clinical case of EIA in Bayern, Germany. This affected animal was in contact with four susceptible individuals. The source of the outbreak is not currently known, but control measures including movement restrictions, quarantine and surveillance have been implemented throughout the country. The positive diagnosis was confirmed on a Coggins (AGID) test on 11th January 2017 by Friedrich Loeffler Institute (FLI).

USA
On 13th January 2017, two cases of EIA were reported on premises in Illinois. The index case was removed from the premises prior to results being returned and has been lost to follow up. USDA Investigative and Enforcement Services are investigating the case. The premises were placed under quarantine and the secondary case euthanased. The remaining animals on the premises were negative for EIA.

Further details on the above outbreaks can be found at http://www.aht.org.uk/cms-display/international-breeders-meeting.html

FOCUS ARTICLE

In this report we are pleased to include a focus article on Equine Herpes Virus-1 (EHV-1) abortion by Ian Cameron BSc BVM&S CertEM(StudMed) MRCVS from Rossdales LLP. We reiterate that the views expressed in this focus article are the author's own and should not be interpreted as official statements of APHA, BEVA or the AHT.

Access to all of the equine disease surveillance reports can be made on a dedicated page on the recently updated Animal Health Trust website at http://www.aht.org.uk/cms-display/DEFRA_AHT_BEVA_equine_reports.html or via the BEVA website at https://www.beva.org.uk/Home/News-Views/Latest-News .

We would remind readers and their colleagues that a form is available on the AHT website for registration to receive reports free of charge, via e-mail, on a quarterly basis. The link for this registration form is available via: http://www.aht.org.uk/cms-display/equine_disease_registration.html

Virology

disease report for the fourth quarter of 2016

The results of virological testing for October to December 2016 are summarised in Table 1 and include data relating to Equine Viral Arteritis (EVA), Equine Infectious Anaemia (EIA) and West Nile Virus (WNV) from the Animal & Plant Health Agency (APHA), Weybridge. The sample population for the APHA is different from that for the other contributing laboratories, as the APHA's tests are principally in relation to international trade (EVA, EIA and WNV). APHA now also provides testing for WNV as part of clinical work up of neurological cases, to exclude infection on specific request and provided the local regional APHA office has been informed.

Table 1: Diagnostic virology sample throughput and positive results for the fourth quarter of 2016

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Serological Tests			
EVA ELISA	1579	14#	8
EVA VN	189	16#	4
APHA EVA VN	857	10#	1
EHV-1/-4 CF test	593	1*	1
EHV-3 VN test	0	0	1
ERV-A/-B CF test	189	0	1
Influenza HI test	245	4*	2
EIA (Coggins)	115	0	5
EIA ELISA	450	0	8
APHA EIA (Coggins)	1592	0	1
APHA WNV (cELISA)	9	0	1
Virus Detection			
Coronavirus PCR	39	1	3
EHV-1/-4 PCR	398	22	6
EHV-2/-5 PCR	31	4	2
Influenza NP ELISA	15	0	2
Influenza Directigen	8	0	2
Influenza PCR	194	5	4
APHA Influenza PCR	179	0	1
Influenza VI in eggs	5	2	1
EHV VI	93	8	1
EVA VI/PCR	1	0	1
APHA EVA VI/PCR	9	0	1
Rotavirus	3	0	7

ELISA = enzyme-linked immunosorbent assay, VN = virus neutralisation, VLA = Animal Health Veterinary Laboratories Agency, CF = complement fixation, HI = haemagglutination inhibition, Coggins = agar gel immuno diffusion test, PCR = polymerase chain reaction, NP = VI = virus isolation, EVA = equine viral arteritis, EHV = equine herpes virus, ERV = equine rhinitis virus, EIA = equine infectious # = Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera

NATIONAL VIRAL DISEASE OCCURRENCE

Time period: 1st October to 31st December 2016

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

On 16th December 2016, the Animal Health Trust confirmed a case of EHV-1 abortion on private premises in Wiltshire. The affected animal was an 11-year-old Thoroughbred mare who aborted whilst on barn turnout on 6th December 2016. This vaccinated animal was in direct contact with two animals. There are no other pregnant mares on these premises. The positive diagnosis was confirmed by qPCR on an endometrial swab on 8th December 2016.

On 28th December 2016, the Animal Health Trust confirmed a case of EHV-1 abortion that occurred on 27th December 2016 on a stud premises in Cambridgeshire, England. The affected animal was a non-vaccinated eight-year-old Thoroughbred mare in the ninth month of gestation, with four direct paddock contacts. Appropriate biosecurity measures, in accordance with HBLB Codes of Practice, have been implemented and will continue as required. The Animal Health Trust confirmed the positive diagnosis through post mortem examination and PCR on placental and fetal tissues.

On 30th December 2016, the Animal Health Trust confirmed a case of EHV-1 abortion that occurred on 29th December 2016 on a stud premises in Powys, Wales. The affected animal was a non-vaccinated 12-year-old, Thoroughbred mare in the seventh month of gestation, which had been in contact with one other pregnant mare. The positive diagnosis was made by the Animal Health Trust through post mortem examination and PCR on fetal tissues.

EQUINE HERPES VIRUS-1 (EHV-1) NEUROLOGICAL DISEASE

On 27th October 2016, the AHT made a presumptive serological diagnosis of EHV-1 neurological disease on premises in North Yorkshire. The clinically affected animal was a 15 year old unvaccinated mare. This animal, recumbent with bladder dysfunction on initial presentation on 15th October, continued to show signs of improvement. This presumptive positive diagnosis was made using the complement fixation (CF) test, which indicated elevated titres on a single sample. The titre levels were 640 for EHV-1. On CF testing, titre levels of 40 and below indicate no evidence of viral infection just prior to or at time of sampling. Control measures included isolation and further clinical, virological and serological monitoring of this index case and the two animals in direct contact, which were also not vaccinated. These two in-contacts showed no evidence of EHV-1 infection.

On 27th October 2016, the Animal Health Trust (AHT) reported a case of EHV-1 neurological disease on premises in Bedfordshire. Seven further cases of EHV-1 have since occurred on the same premises, of which five presented with neurological signs and two with respiratory signs. These secondary cases were in contact with the index case. The index case and three secondary cases have been euthanised due to clinical deterioration. None of the cases were vaccinated. Biosecurity measures, including serological monitoring have been implemented and will be continued as necessary. The positive diagnoses have been confirmed by qPCR on nasopharyngeal swabs and the CF test on serum by Rossdales Laboratories and the AHT. As of 30th November 2016 no further cases have been reported.

On 30th December 2016, the Animal Health Trust reported a presumptive case of EHV-1 neurological disease affecting a non-vaccinated, 25-year-old horse on a livery yard in Oxfordshire, England. The affected animal presented with severe ataxia on 23rd December 2016 and was euthanised the following day. The presumptive diagnosis was made on the basis of raised serum antibody titres against EHV-1 and EHV-4 using the CF test with no history of recent vaccination. The yard was closed with further clinical and laboratory testing conducted to indicate no further evidence of recent infection.

EQUINE INFLUENZA (EI)

On 13th October, the Animal Health Trust confirmed a case of EI on premises in Stirlingshire, Scotland. The affected animal was a five month old unvaccinated filly, imported from overseas ten days previously. Clinical signs were first noted on 7th October and consisted of a harsh cough, mucopurulent nasal discharge and pyrexia. The animal was examined and sampled on 12th October and had a co-infection with *Streptococcus equi*. It had been in indirect contact with two other vaccinated animals, who also presented with signs of respiratory disease. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab. Control measures were implemented and no further cases have since been reported.

On 30th November 2016, the Animal Health Trust confirmed a case of EI on premises in Gloucestershire. The affected animal was a six-year-old unvaccinated mare who presented with mucopurulent nasal discharge, pyrexia and coughing on 28th November and was sampled on 29th November. This index case was in direct contact with eight other horses of which six were not vaccinated. These six animals also presented with signs of coughing and mucopurulent nasal discharge, of which two of these were sampled and confirmed with EI infection. The positive diagnoses were confirmed by qPCR on nasopharyngeal swabs. Control measures have been implemented, including serological monitoring of in-contact animals.

For the above confirmed cases, the strain identified was from the Florida clade 2 sub-lineage.

In the case of an outbreak, notification will be reported by the text alert service (**Tell-Tail**) for UK equine practitioners sponsored by Merial Animal Health. This free of charge service alerts practitioners to outbreaks of equine influenza in the UK via text message. Equine veterinary practitioners can sign up for this scheme by registering at the following website http://www.merial.co.uk. This service has also been offered to the members of the National Trainers Federation (NTF).

If you would like more information regarding outbreaks of equine influenza virus or would like to sign up for our sentinel practice scheme, please contact: equiflunet@aht.org.uk or follow the link to www.equiflunet.org.uk for more information on equine influenza.

INTERNATIONAL VIRAL DISEASE OCCURRENCE

Time period: 1st October to 31st December 2016

AFRICAN HORSE SICKNESS (AHS)

Swaziland

On 21st November 2016, the World Organisation for Animal Health (OIE) reported a case of AHS on premises in Swaziland. This index case presented with clinical signs on 3rd November 2016, two weeks after AHS vaccination. There are 36 susceptible animals on the premises which are regularly vaccinated against AHS. Control measures continuously implemented include vector control, with mosquito nets in stables and insecticides. Movement restrictions, quarantine, and vaccination are further measures to be implemented in response to this outbreak. The positive diagnosis was confirmed by PCR by Onderstepoort Veterinary Institute (OVI), South Africa (OIE Reference Laboratory) on 15th November 2016. Epidemiological investigations will be continued and reported on as necessary.

South Africa

Isolated cases of AHS were reported from Gauteng Province in October 2016 and from Gauteng Province and North West Province in December 2016. Gauteng and the North West Province are in the AHS endemic area of South Africa.

ATYPICAL MYOPATHY

Various countries

On 23rd December 2016 the University of Liege, Belgium reported that it had collated data from 212 clinical cases in six European countries that were compatible with diagnoses of atypical myopathy. These cases were recorded in France (143 cases), Belgium (43 cases), Germany (14 cases), Switzerland (six cases), Great Britain (five cases) and The Netherlands (one case). To register to receive alert messages on atypical myopathy via the official website run by researchers at the University of Liege visit http://www.myopathie-atypique.be.

EASTERN EQUINE ENCEPHALOMYELITIS (EEE)

USA

Fifteen cases of EEE were recorded during the fourth quarter of 2016. The disease was confirmed in five states of which the majority (nine) were in Wisconsin.

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

France

On the 28th and 30th of December 2016, two outbreaks of EHV-1 abortion were confirmed in Orne and were epidemiologically linked. Positive diagnoses were confirmed by PCR on fetal tissues.

Germany
Labor Dr. Böse GmbH, Harsum confirmed a case of EHV-1 abortion on one premises during the fourth quarter of 2016. The positive diagnosis was confirmed by PCR on lung puncture aspirate (fetus) and endometrial swab (mare).

Japan
EHV-1 abortion was confirmed in seven horses on seven separate premises between 31st October 2016 and 30th December 2016. Both Thoroughbreds and non-Thoroughbreds were affected with two of the animals being vaccinated. Positive diagnoses were confirmed by Hokkaido Hidaka Livestock Hygiene Service Center, Hokkaido Iburi Livestock Hygiene Service Center and Hokkaido Kusiro Livestock Hygiene Service Centre.

EQUINE HERPES VIRUS-1 (EHV-1) NEUROLOGICAL DISEASE

France
On 21st of October 2016, one outbreak of EHV-1 neurological disease was confirmed in Pas-de-Calais. The affected animal was an eight-year-old male. The positive diagnosis was confirmed by PCR.

On 23rd of November 2016, one outbreak involving nine horses out of sixty in a sport facility was confirmed in Meurthe-et-Moselle. The affected horses showed neurological signs including ataxia, pyrexia and lethargy. Positive diagnoses were made by PCR on nasopharyngeal swabs. This outbreak lead to a high awareness in the area towards EHV-1 infection, but no other linked outbreak was confirmed. All prevention measures were implemented as soon as cases were suspected.

USA
California and Florida recorded outbreaks of EHV-1 neurological disease. There were two disease events in California, the first in an equestrian centre involving six neurological horses one of which was euthanased, the second on a high desert ranch involving two neurological cases, both of which survived. A fatal case of the disease was confirmed in a third outbreak on premises in Florida.

EQUINE HERPES VIRUS-1 (EHV-1) RESPIRATORY DISEASE

France
Two outbreaks of EHV-1 respiratory disease were confirmed in October and one in December. Affected animals presented with varying clinical signs, consisting of lethargy, pyrexia, anorexia and nasal discharge. Positive diagnoses were confirmed by PCR on nasopharyngeal swabs.

EQUINE HERPES VIRUS-4 (EHV-4) RESPIRATORY DISEASE

France
Fifteen outbreaks of EHV-4 respiratory disease have been confirmed (eleven outbreaks with one case, three outbreaks with two cases and one outbreak with three cases), including one on a French Saddlebred. These outbreaks occurred in Calvados, Dordogne, Gard, Maine-et-Loire, Manche, Moselle, Nièvre, Oise, Orne and Vendée. Affected horses showed clinical signs of pyrexia and nasal discharge in one outbreak. For fourteen of these outbreaks, positive diagnoses were confirmed by PCR on nasal swabs. One outbreak was confirmed by PCR on tracheal washes.

EQUINE INFECTIOUS ANAEMIA (EIA)

Canada
Between 1st October and 31st December 2016, there has been one EIA positive equine identified on premises in the province of Saskatchewan. This was a newly affected premises and it was reported that the horse had been tested because of previous contact with an infected animal. Diagnosis was confirmed positive on a Coggins (AGID) test.

USA
In December, an isolated case of EIA was diagnosed in Utah. This horse was subsequently euthanased. No further cases related to this index case have since been reported.

EQUINE INFLUENZA (EI)

USA
Equine influenza is endemic in the USA. Disease outbreaks were confirmed in several states during the fourth quarter of 2016.

HENDRA VIRUS

Australia
On 23rd December 2016 New South Wales (NSW) Department of Primary Industries (DPI) quarantined a property near Casino in northern NSW following the death of one horse from Hendra virus. The case is the first Hendra case in NSW in 2016.

The infection was confirmed in an unvaccinated horse that died around 15th December 2016 after being ill for several weeks. The 22-year-old stock horse gelding, which had been in a paddock in an area which has regular flying fox activity, was sampled on 27th November 2016. The owner reported the horse to have been presenting vague signs of illness for a few weeks previously. These initial clinical signs observed included failure to graze, nasal discharge, mild ataxia, mild disorientation, weight loss and oral discomfort. Further behavioural abnormalities were seen prior to death.

All six samples tested negative to Hendra virus by PCR but on 22nd December 2016 the Australian Animal Health Laboratory, Geelong advised NSW DPI that testing of the serum samples had detected antibodies to Hendra virus consistent with natural infection and supporting a convincing history that this animal was not vaccinated. It is believed that virus was not detected initially because this animal was sampled a few weeks after becoming unwell and had already mounted a strong immune response.

Additional samples were collected from the carcass several days after death with one weak PCR positive result to Hendra virus and two negative results. Although it is likely that the horse was not infectious or shedding little virus from approximately late November, the property has been quarantined to prevent any possibility of spread of infection to people or animals from this case. A focus article on Hendra can be found at http://www.aht.org.uk/skins/Default/pdfs/equine_vol6_1_focus.pdf

WEST NILE VIRUS ENCEPHALITIS (WNVE)

USA
A total of 20 cases of WNVE were reported in six states, eleven alone in Oklahoma. Florida confirmed a case in a donkey. The vast majority of cases involved horses without a prior history of vaccination against the disease.

FOCUS ARTICLE

Title: Equine Herpes Virus-1 (EHV-1) Abortion Case Based Epidemiology – Lessons Learned?
Ian J. Cameron BSc, BVM&S, CertEM(StudMed), MRCVS

Virus Classification: Genus: Varicellovirus Family: Herpesviridae Group: I, double-stranded (ds) DNA

Transmission: Direct and Indirect contact

Clinical signs: Abortion, stillbirth, early neonatal death

Laboratory Diagnosis: RT-PCR assay or virus isolation on nasal swabs and/or paired serology using CF test.

Geographic Distribution: Endemic, worldwide

Control: Biosecurity and vaccination

Notifiable: No

Zoonotic Risk: None

Equine Herpes Virus is a common virus that is present in horse populations worldwide. EHV-1 is known to cause respiratory disease, abortion in pregnant mares and paralysis in horses of all ages. EHV-4 is also recognised to produce respiratory disease and can occasionally cause abortion.

EHV abortion can occur from two weeks to several months following infection with the virus reflecting either recent infection or recrudescence (reactivation of latent infection in a carrier horse). Abortion usually occurs in late pregnancy but can happen as early as four months. Sub-clinical respiratory spread of EHV-1 can allow transmission of the virus throughout a group. The proportion of horses that are latent carriers is unknown, but reports suggest that it will be somewhere upward of 25-65% of horses. Recrudescence of the infection is more likely to happen following a stressful event such as transport or changes of groups.

This report details an outbreak of EHV-1 abortion on a well-managed 1200 acre stud farm, with the capacity for approximately 200 animals, which led to eight abortions and two neo-natal deaths.

Initial Outbreak

On the 22nd February 2016, two mares were brought in from a paddock containing a group of eight mares. The two mares were placed in an American barn that already housed seven pregnant mares and four mares with foals at foot. A second group of eight mares were in a paddock approximately 50 metres from the barn. At 06.00 on the 23rd February 2016, one of the mares brought in from the paddock aborted. The mare remained in the stable within the American barn. The foetus and placenta were sent for post mortem examination. Immediate biosecurity protocols consisted of protective clothing for handling this mare and placement of disinfectent foot dips. The remaining pregnant mares in this barn were turned out as usal, as were the mares with foals at foot. A confirmed diagnosis of EHV-1 positive was achieved by 16:00 on 23rd February 2016, at which time this index case was placed into isolation and the remaining mares were brought back into the barn. This barn and the mares in the surrounding

paddocks were placed in strict isolation as per the HBLB Codes of Practice Appendix 6. Three further barns, within close geographical proximity to the index barn that also shared staff were placed into a "restricted area". The remaining areas of the stud, staffed separately as per usual premises protocol and separated by a road with separate entrances were considered unrestricted.

Progression

Within five days of the index case abortion, four in-contact pregnant mares within the American barn at the time of the abortion developed pyrexia. Four mares had filled hindlimbs - vasculitis. The mare stabled opposite the index case developed the highest temperature, had a marked inflammatory profile, swollen distal limbs, nasal discharge and reduced appetite. Two mares had nasal swabs taken (day five and seven after the abortion) and both were negative on qPCR to EHV-1. Twelve days after the index case abortion, two in contact mares aborted. The first of these secondary cases aborted in the paddock where the index case had resided prior to abortion and the second mare housed in the stable opposite the index abortion in the American barn. Thirteen days after the index case, further abortions occurred out in the same paddock. Between the 12th to the 15th March, four further abortions occurred, three from the mares housed within the American barn at the time of the first abortion and one from the paddock where the original aborting mare had been brought in from. Further to that a foal was born on the 14th March from the group within the American barn that was healthy and unaffected. On the 25th March a mare foaled a weak foal that was able to stand but could not suck. Following confirmation of EHV-1 positive status this foal was subsequently euthanased. The final EHV-1 positive case (39 days after the index case) was a very sick foal that was alive at birth but euthanased due to overt clinical signs and extremely guarded prognosis. The three remaining mares that had been out in the paddock that the initial aborting mare had been brought in from and the mare that accompanied the original aborting mare into the barn on the night of the initial abortion, all successfully foaled live and unaffected foals. The eight mares in the paddock within close proximity to the American barn all foaled successfully.

Management of Mares Outwith the Isolated Area

Three barns were considered a "restricted area" which included the foaling unit and two American barns housing mares with foals at foot. Serological monitoring was implemented at day one, day 15 and day 28 post index case abortion using the CF test. Retrospective comparison with stored serum samples taken in January (for EVA and EIA) was also undertaken. No evidence of seroconversion was found within all horses in this group. Nasopharyngeal swabs were taken from a selection of these horses for EHV qPCR, of which all results were negative. Following discussions with local breeding authorities and covering studs, mares from within this restricted area were permitted to be covered 28 days after the index abortion on the basis that all the isolation procedures had been put in place and there was no evidence of clinical disease or seroconversion. Those horses that were within the isolated area required a total of 28 days of isolation from the time of the last abortion case.

Discussion

The application of prompt and extensive isolation procedures did appear to be effective at restricting the spread of virus to the isolated area. During the stud season, there were 75 normal foalings. Had this outbreak of EHV-1 not been contained within the isolated area, there would have been the potential for even greater losses.

The biggest disappointment during the outbreak was the number of mares that aborted within the isolated area and our inability to affect the course of disease once the initial abortion had occurred despite all pregnant mares being fully vaccinated. The group containing the index case had been residents on the premises for at least two years. The group had been together since September and had moved paddocks but the individuals had not changed. There was no obvious explanation

for recrudescence of latent infection. All the interventions with this group had been routine, for example farriery, veterinary vaccinations and general care.

All the abortions occurred in horses that were in direct contact to the index case either just prior to the abortion i.e. out in the paddock that she came in from, or from the group of horses that were close to the abortion in the American barn. It is notable that the sequence of abortions in the American barn largely appeared to be related to the proximity of the mares to the original abortion, with the nearest horse aborting first and the furthest mare aborting last. Only two pregnant mares that were in the barn at the time of the abortion had a live and healthy foal.

Lessons Learned

EHV abortions can occur without an obvious instigating cause. In this outbreak, it would appear that EHV-1 spread by respiratory aerosol through the group in the paddock, as those mares did not have direct contact with the abortion, only contact with the index case prior to abortion. It would appear that being out in the paddock was partially protective compared to being within the American barn. Four of eight mares in the paddock aborted compared to six of seven mares within the American barn. The American barn allows the virus to be contained in an enclosed, shared airspace. It would appear that the initial dose of virus that the mares within the barn were exposed to following the initial abortion was extremely high, sufficient to overcome vaccinal immunity. Although treatment such as anti-virals, immune stimulators and extra vaccinations were put in place, this did not appear to have a positive effect on protection of the affected mares. It would appear important to avoid housing pregnant mares in areas with contained, shared airspaces.

The management of the mares within the barn following the initial outbreak was difficult. Several of the mares were due to foal relatively imminently, and as a result required constant supervision, so continued to come into the barn at night. When further abortions occurred at night within the barn, they were supervised, but the mares within the barn were likely to face a further EHV challenge following each abortion. All mares that aborted or foaled did so without complication, and most abortions and all foalings were supervised. However, to maintain the degree of supervision and to avoid the risk of further EHV challenge within a shared airspace, we would consider splitting the group that were housed in the barn into smaller groups and managing them in small paddocks near the barn that were floodlight to encompass this.

Regarding vaccination, the number of vaccines administered to pregnant broodmares has been increased and all horses on the stud (youngstock, stallions, teasers, barren and maiden mares) are vaccinated against EHV. We have had discussions with the drug companies with regards to the effectiveness of Equip EHV1,4 versus Pneumabort-K+1b. There is no evidence based veterinary medicine that one vaccine is more effective than the other. However, we have elected to use Pneumabort-K as the standard vaccination for pregnant mares. This vaccine contains two strains of EHV-1 only. We continue to use Equip EHV-1,4 on the remaining non-pregnant horses on the stud.

The affected aborting mares and those from within the isolated area have been kept separate from the main group of mares and will foal in isolation in 2017.

Conclusion

The actions taken by the stud immediately after identification of a problem were highly effective in containing the outbreak to a relatively small number of in-contact horses. However the effect on the mares within the isolated area was severe and our management, should we face a similar situation again, would involve preventing heavily pregnant mares from being housed within a shared airspace. We do not consider that housing pregnant mares in American barns increases the risk of abortion, but should an abortion occur within an American barn, the dose of virus that those mares in close proximity are exposed to would appear increased

compared to other management strategies (i.e. out in a paddock or in separate stables).

It would be of great benefit if the industry could identify a more effective vaccine. There is no doubt that there is good evidence that the EHV vaccines available reduce the likelihood of a clinical outbreak and reduce viral shedding but, as this outbreak identifies, there is a significant limitation of the vaccine. Further research and development of increased vaccinal efficacy and effectiveness would be welcomed.

Reference

HBLB Code of Practice - (also EquiBioSafe App)

BACTERIOLOGY

disease report for the fourth quarter of 2016

A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 2. For Contagious Equine Metritis (CEM), 24 HBLB approved laboratories in the UK contributed data.

Table 2: Diagnostic bacteriology sample throughput and positive results for the fourth quarter 2016

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
CEM (HBLB) PCR	330	0	6
CEMO (HBLB)	1333	0	24
CEMO (APHA)	1948	0	1
Klebsiella pneumoniae culture	1252[1]	0[#]	24
Klebsiella pneumoniae PCR	162[1]	1	5
Pseudomonas aeruginosa PCR	158[1]	0	5
Pseudomonas *aeruginosa* culture	1514[1]	8	24
Strangles culture*	1103	44	18
Strangles PCR	2090	95	3
Strangles ELISA[2]	4133	473	4
Salmonellosis	337	19	15
APHA Salmonellosis	23	23	1
MRSA**	218	9	13
Clostridium perfringens	95	0	7
Clostridium difficile (toxin by ELISA or munochromatography)	107	9	10
Borrelia (by ELISA)	18	8	5
Rhodococcus equi culture/PCR	27	7	6
APHA *Burkholderia mallei* (Glanders)	1051	0[3]	1
*Lawsonia intracellularis*** culture/PCR*	143	53	5

CEM = contagious equine metritis (Taylorella equigenitalis); HBLB = HBLB accredited laboratories; # =capsule type 1,2,5; APHA = APHA reference laboratory; *Streptococcus equi subsp. Equi **MRSA = methicillin resistant Staphylococcus aureus. ***Lawsonia intracellularis identified using PCR applied to faeces or serum for Immunoperoxidasa monolayer (IPMA) and/or ELISA assay; 1 reproductive tract samples only; 2 seropositivity may be attributed to disease exposure, vaccination, infection and carrier states. 3One non-negative Glanders CFT result was disclosed from a horse for export that had not travelled abroad previously.

APHA CEM data for the period October to December 2016

We are again pleased to include data relating to CEM testing from the APHA, in this quarterly report. The sample population for the APHA is different from that for the other contributing laboratories as the APHA tests are principally in relation to international trade and/or outbreak investigations.

Strangles

Strangles remains endemic in the UK, especially among parts of the non-Thoroughbred horse population. Diagnoses are confirmed in the UK based on traditional culture of *S. equi* and qPCR on respiratory samples and/or seropositivity using a serological ELISA for two antigens.

Burkholderia mallei (Glanders)

Glanders is a notifiable disease in the UK. The APHA laboratory test used for screening (pre-export testing) and diagnosis in live animals is the complement fixation (CF) test, which may occasionally produce low level positive reactions and therefore non-negative results. These are followed up by

an on-site official veterinary inquiry by the APHA, restrictions placed on the affected animal and further confirmatory testing using a Western Blot assay, with high specificity to clarify the health status of the animal.

During this fourth quarter, one non-negative Glanders CF test result was disclosed from a horse for export that had not travelled abroad previously. Due to the notifiable status of Glanders, this resulted in statutory disease control restrictions being served. Official veterinary and laboratory investigations were conducted by APHA. Disease was not confirmed and restrictions were lifted. Further information on Glanders can be found at: http://www.aht.org.uk/cms-display/DEFRA_AHT_BEVA_equine_reports.html

APHA *Salmonella* results

Twenty-three samples were submitted this quarter to the Animal and Plant Health Agency (APHA) and all of these were positive for *Salmonella*. From the incidents involving isolates typed by the APHA, the serovars/phagetypes reported were *S*. Typhimurium (5 samples; 2 DT104, 1 DT1 and 2 RDNC), *S*. Oslo (7 samples from two premises), *S*. Agama (5 samples), *S*. Newport (3 samples), *S*. Ajiobo (2 samples) and a single incident of *S*. Enteritidis PT9a. *Salmonella* Typhimurium DT104 is likely to be of human or cattle origin whereas *S*. Typhimurium DT1 can be linked to wild birds. *S*. Enteritidis PT9a is likely to be of duck origin and *S*. Newport and *S*. Agama are often associated with badgers. For more information from APHA about *Salmonella* in Great Britain, please see the recently published 2015 *Salmonella* in livestock surveillance report https://www.gov.uk/government/publications/salmonella-in-livestock-production-in-great-britain-2015 or click here for an APHA paper on 'Better control of *Salmonella* in horses'.

INTERNATIONAL BACTERIAL DISEASE OCCURRENCE

Time period: 1st October to 31st December 2016

Nothing to report.

TOXIC AND PARASITIC

disease report for the fourth quarter of 2016

A summary of diagnostic toxicosis and parasitology testing undertaken by contributing laboratories is presented in Tables 3 and 4, respectively. Results for toxicosis are based on histopathologically confirmed evidence of disease only (where applicable).

Table 3: Diagnostic toxicosis sample throughput results for the fourth quarter 2016

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Grass Sickness	16	3	6
Hepatic toxicoses	42	8	8
Atypical myopathy	1	1	7

Table 4: Diagnostic parasitology sample throughput and positive results for the fourth quarter 2016

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Endoparasites			
Ascarids	3651	59	18
Cyathostomes	847	120	14
Dictyocaulus	124	2	3
Strongyles	3844	1574	20
Tapeworms (ELISA based testing)	257	41	9[1]
Tapeworms (Faecal exam)	1938	15	13
Strongyloides	3586	179	17
Oxyuris equi	370	7	13
Fasciola	231	11	11
Coccidia	511	1	12
Cryptosporidia	73	0	9
Theileria equi (cELISA)	126	1	3
Babesia caballi (cELISA)	126	2	3
APHA *Theileria equi* (CFT)*	226	2	1
APHA *Theileria equi* (IFAT)**	345	23	1
APHA *Theileria equi* (cELISA)***	360	0	1
APHA *Babesia caballi* (CFT)*	226	0	1
APHA *Babesia caballi* (IFAT)**	345	22	1
APHA *Babesia caballi* (cELISA)***	360	0	1
Ectoparasites			
Mites	249	1	15
Lice	264	1	10
Ringworm	273	26	15
Dermatophilus	138	18	13
Candida	135	5	7

*Complement Fixation Test; CFT suspect/positive samples are tested in IFAT test
**Indirect Fluorescent Antibody Test; ***competitive Enzyme-linked immunosorbent assay; positive cELISA results are not undergoing confirmatory testing, [1]=all labs refer this test to a non-contributing laboratory

Various countries

On 23rd December 2016 the University of Liege, Belgium reported that it had collated data from 212 clinical cases in six European countries that were compatible with diagnoses of atypical myopathy (AM). These cases were recorded in France (143 cases), Belgium (43 cases), Germany (14 cases), Switzerland (six cases), Great Britain (five cases) and The Netherlands (one case). To register to receive alert messages on atypical myopathy via the official website run by researchers at the University of Liege visit http://www.myopathie-atypique.be

Research update

The Royal Veterinary College (RVC) have recently developed and validated a serological test that allows for a rapid detection of hypoglycin A and its toxic metabolite, methylenecyclopropylacetic acid (MCPA), both linked to AM. This test is now commercially available through the RVC. Further information can be found through the link provided below:
http://www.rvc.ac.uk/research/laboratories/comparative-neuromuscular-diseases-laboratory/diagnostic-services

Grass sickness surveillance data
(http://www.equinegrasssickness.co.uk/)

The nationwide EGS surveillance scheme was established in spring 2008 to facilitate the investigation of changes in geographical distribution and incidence of the disease in Great Britain. Data gathered by this scheme is collated in a strictly confidential database.

There were a total of six cases of equine grass sickness (EGS) reported during the fourth quarter of 2016 (October - December). The majority of cases occurred during October (n=4/6), with single cases in November and December.

Four of the equine grass sickness cases occurred in England (66.7%) with the remaining two cases (33.3%) in Scotland. Overall, 83% (n=5) of the premises had reported having a prior history of EGS cases, with one case reporting losing the stallion of the reported horse on the same premises in May 2016 to EGS. The cases comprised 50% mares/fillies (n=3) and 50% geldings (n=3), with an average age of 2.6 years (range 1 – 6 years). Affected breeds were Cob/Cob cross (n=2/6), Miniature Shetland (n=1/6), Highland (n=1/6), Fell (n=1/6) and a Warmblood (n=1/6). Of the reported cases, one-third (n=2/6) were reported to have acute EGS, one-third (n=2/6) sub-acute EGS and one-third (n=2/6) chronic EGS. Both the chronic cases are reported to have survived.

Diagnostic information was provided for all six cases, with veterinary assessment and diagnosis based on clinical signs used as the sole method in 33.3% (n=2/6) of cases which was then followed by laparotomy in 66.7% (n=4) of cases.

Please note that the Equine Grass Sickness Surveillance Scheme receives data from a wider population in comparison to the data presented in Table 3, alongside different diagnostic criteria being used.

POST-MORTEM EXAMINATIONS

report for the fourth quarter of 2016

East Anglia

A total of 97 cases were examined including 77 aborted fetuses and fetal membranes.

Of the 77 aborted fetuses examined, umbilical cord torsion was identified in 37 cases, and with concurrent bacterial placentitis in three cases, placentitis in three cases, EHV-1 in two cases, premature placental separation in three cases and placental insufficiency in four cases. Single cases examined identified the following; body implacentation with secondary umbilical cord torsion, a chronic inflammatory process affecting placental tissue, moderate multifocal mineralisation of allantois and autolytic changes of fetal tissue suggestive of death prior to abortion, hydrops amnion, distal left hind fracture, hypoxia, hepatitis due to leptospira infection, cranial malformation, ischaemic necrosis of the cervical pole and maternal infection resulting in subsequent abortion. The exact cause of abortion could not be determined in 15 cases, however an infectious disease process was ruled out.

Case summary: Leptospira abortion

Gross post-mortem findings:
Main lesion of severe, chronic necrotising hepatitis with mild funisitis and amnionitis

Laboratory diagnostics:
qPCR strongly positive for pathogenic Leptospira spp. on placental and internal tissues, however this qPCR is not serovar specific. MAT serology on samples from the mare showed highest titres to L.hebdomadis (1:3200), although L.sejroe was 1:1600

Four cases of gastrointestinal disease were examined, identifying peritonitis and terminal sepsis due to foreign body perforation of the jejunum, jejunal volvulus, epiploic foramen entrapment and caecal rupture.

Four musculoskeletal cases were examined, identifying pelvic fractures in two cases, multifocal, metaphyseal and epiphyseal idiopathic osteonecrosis in one case and a partial tear of the cranial meniscal tendon in the right stifle in one case. For the latter case, the horse had clinically presented with acute onset episodes of collapsing at walk, however a neurological cause was not identified on examination.

Two cases of neurological disease, which identified one case of intracranial bleeding from previous trauma, and one case of meningitis and neuritis (from tooth root abscessation).

A single respiratory disease case was examined, identifying aspiration pneumonia.

A single urogenital disease case was examined, identifying nephropathy and urolithiasis.

Six welfare cases were examined, confirming emaciation and parasitism in one, sustained blunt force trauma in one, electrocution in one and cyathostominosis in three.

The cause of mortality could not be determined in two cases.

Home Counties

A total of eight cases were examined.

One cardiovascular case was examined, identifying thickening of the aortic valves and multifocal areas of fibrosis in the epicardium and myocardium.

Four cases of gastrointestinal disease were examined, identifying single cases of segmental ileal congestion, with acute haemorrhages consistent with venous infarction, small intestinal obstruction due to a pedunculated lipoma, extensive oedema of the large colon and rupture of the left ventral colon, and serofibrinous peritonitis associated with a site of surgery.

A single musculoskeletal case was examined, which identified a linear bony defect (3 cm) in the right superior facet of seventh cervical vertebra (C7) with concurrent mild gliosis in the cervical spinal cord.

A single case of neurological disease. The case had a history of seizures however no macroscopic findings were identified.

A single respiratory disease case was examined due to peri-anaesthesia death. Severe, acute, multifocal haemorrhage of the lungs was identified.

Northern England

Nothing to report.

Scotland

A single case was examined.

A single gastrointestinal case was examined, however due to severe decomposition, a diagnosis was unable to be made.

Southern England

Nothing to report.

Northern Ireland

Three cases were examined.

Two cardiovascular cases were examined, identifying fibrinous pericarditis and hydrothorax in one case and abdominal haemorrhage in one case.

A single case of neoplasia, which identified squamous cell carcinoma of vulval tissue.

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All laboratories contributing to this report operate Quality Assurance schemes. These schemes differ between laboratories, however, all the contagious equine metritis testing reported was accredited by the Horserace Betting Levy Board with the exception of the AHVLA, which acts as the reference laboratory. We would also like to acknowledge the contribution of the Horserace Betting Levy Board CEMO-scheme.
Agri-Food and Biosciences Institute of Northern Ireland
Animal Health Trust Diagnostic Laboratory Services
Animal and Plant Health Agency
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Axiom Veterinary Laboratory
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Bushy and Willesley (B & W) Equine Group Ltd.
CAPL LTD Laboratory
Capital Diagnostics, Scottish Agricultural College
Carmichael Torrance Diagnostic Services
Chine House Veterinary Hospital
Dechra Laboratories
Donkey Sanctuary
Donnington Grove Veterinary Group
Endell Veterinary Group Equine Hospital
Hampden Veterinary Hospital
IDEXX Laboratories
JSC Equine Laboratory
Lab Services Ltd
Liphook Equine Hospital
Minster Equine Veterinary Clinic
Newmarket Equine Hospital
Oakham Veterinary Hospital
Rossdales Laboratories
The Royal Veterinary College
Three Counties Equine Hospital
Torrance Diamond Diagnostic Services (TDDS)
University of Edinburgh
University of Glasgow
Valley Equine Hospital
All laboratories contributing to this report operate Quality Assurance schemes, which differ between laboratories. However, all contagious equine metritis (CEM) testing reported was accredited by the Horserace Betting Levy Board (HBLB) with the exception of APHA, which acts as the reference laboratory.
The Animal Health Trust (AHT) is extremely grateful to the Horserace Betting Levy Board (HBLB), Racehorse Owners Association (ROA) and Thoroughbred Breeders' Association (TBA) for their continued combined contribution to the AHT's Equine Infectious Disease Service.

EQUINE owners breeders betting levy infectious disease service

HORSERACE BETTING HBLB LEVY BOARD

We would welcome feedback including contributions on focus articles and/or case reports to the following address:

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