AHT / BEVA / DEFRA
Equine Quarterly Disease Surveillance Report
Volume: 7, No.1:
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Highlights in this issue:

- Surveillance of viral, bacterial and other causes of equine abortion in the UK: 2006-2011
- Equine Anaplasmosis: a tick-borne threat?!

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 and Rural Affairs

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Introduction

Welcome to the first quarterly equine disease surveillance report for 2011 produced by Department of Environment, Food and Rural Affairs (Defra), British Equine Veterinary Association (BEVA) and the Animal Health Trust (AHT). Regular readers will be aware that this report collates equine disease data arising from multiple diagnostic laboratories and veterinary practices throughout the United Kingdom giving a unique insight into equine disease occurrence on a national scale.

Defra news

Animal Health and the Veterinary Laboratories Agency (VLA) merged on 1 April 2011 to create the Animal Health and Veterinary Laboratories Agency (AHVLA). Both agencies work to combat animal diseases, and bringing together their services, expertise and scientific capability will create a stronger organisation capable of providing a range of vital services to the livestock farming industry and related sectors. Importantly, the merger will increase the resilience of the combined agency's operations in a difficult financial climate. Joining the two organisations creates new and wider opportunities to identify more cost effective, flexible and robust ways of working. AHVLA will work across Great Britain on behalf of Defra, the Welsh Assembly Government, and the Scottish Government. It will also have some UK functions and many international roles - for example as the international reference laboratory for important farm animal diseases such as avian influenza, bovine tuberculosis, classical swine fever and TSEs. For more information, click here.

A new Animal Health and Welfare Board for England will bring experts including farmers, veterinarians, welfare experts and others from outside Government together with the Chief Veterinary Officer and civil servants to make direct policy recommendations on policy affecting the health and welfare of all kept animals such as farm animals, horses and pets. For more information, click here.

A new AHS Regulations and Control Strategy are in the final drafting stages and going through a process of scrutiny. Defra hopes to publish this summer.

Following the three cases of EIA in 2010, Defra published epidemiological reports which detail how the cases were handled in Northumberland click here and Devon click here. Defra also published a lessons learnt click here which confirmed that the current outbreak response models are fit for purpose but highlighted some areas for improvement. It also identified some issues associated with operational response to equine diseases and the trade in horses that would improve preparedness for future equine disease outbreaks and highlighted a number of areas where communication could be improved.

Olympics 2012 - Defra and AHVLA are working closely with LOCOG on contingency plans and standard operating procedures for the 2012 Olympics and Paralympics.

National disease occurrence

Equine Herpesvirus-1 (EHV-1)

Several outbreaks of EHV-1 causing abortion or paralytic disease have been reported in the United Kingdom this quarter. In addition to these outbreaks, which are outlined in the Virological Diagnoses for the First Quarter 2011 of this report, on 4th April 2011 two single cases of EHV-1 abortion were confirmed in a vaccinated Thoroughbred mare in Norfolk and a non-vaccinated Thoroughbred mare in Surrey respectively. EHV-1 infection was confirmed by PCR on fetal tissues and placenta performed at the Animal Health Trust, Newmarket. The abortion in Surrey was the second abortion among 4 pregnant mares grouped together with 4 further pregnant mares due to foal separately. Disease control measures in accordance with the Horserace Betting Levy Board Code of Practice have been implemented among the remaining foaling mares. Another two cases of EHV-1 abortion were confirmed on 28th April in non-vaccinated Warmblood mares on one premise in Fife, Scotland. The diagnoses were confirmed by PCR at the Animal Health Trust. To date three mares among 13 on the premises have aborted, with one abortion not investigated. Following an outbreak of EHV-1 causing neurological disease and multiple abortions on a stud in Oxfordshire in January, another mare that was in contact with one of the mares that aborted in January subsequently aborted on the same premises at the beginning of April 2011, and EHV-1 infection was confirmed as the cause of that abortion on the basis of positive PCR in mixed fetal tissues. All necessary precautions were taken and the HBLB Codes of Practice were followed.

International disease occurrence

Equine Herpesvirus-1 (EHV-1) neurological disease

As of 19th May 2011, cases/outbreaks of equine herpesvirus-1 neurological disease or myeloencephalopathy (EHM) have been reported from a number of Western states in the US. Outbreaks of neurological disease, presumed though not in the majority of instances yet confirmed to be EHM, have been reported in California, Colorado, Idaho, Utah, Nevada, Washington State, New Mexico, Arizona, and Oregon. It is known that at least 7 severely affected horses have been euthanased. Based on initial epidemiological investigation, there is a history of affected horses having attended the National Cutting Horse Association's Western National Championships in Ogden, Utah, that was held between April 28th and May 8th 2011, where it would appear spread of EHV-1 took place. Many of the horses that competed at the National Championships in Ogden subsequently competed at a Cutting Horse show in Bakersfield, California where several animals became ill during that event. At this time, while the number of affected states involved in the current disease event has not been fully determined, reports of clinical cases of neurological disease have only come from Western states in the US. It should also be emphasised that the cases of neurological disease have so far been restricted to Quarter horses. There is very little evidence that horses from states east of the Mississippi River competed in the Cutting Horse events at Ogden or Bakersfield. At this time, the number of cases of confirmed EHM though limited is increasing. At least 11 equine EHV-1 isolates are of a neuropathogenic genotype.

At the request of the American Horse Council and the American Association of Equine Practitioners, the US government veterinary services (USDA, APHIS, VS) has assumed responsibility for obtaining, compiling and disseminating information on numbers of outbreaks and cases of confirmed/suspect EHM from all states. It is expected more definitive information on the geographic extent of this disease event will be available very shortly. In view of the seriousness of the current disease situation, various Cutting Horse events/shows have been cancelled for the time being in an effort to restrict the risk of possible further spread of the infection. For more information about this outbreak, click here and here.

Contagious Equine Metritis (CEM)

An imported stallion was released from post-arrival quarantine in the State Quarantine Station in Johannesburg, South Africa on 22nd February 2011 and went directly to a private equine semen collection and embryo transfer centre where semen was collected from the stallion for artificial insemination of mares for embryo transfer. A total of eight mares were inseminated with semen collected from the stallion and at the time of embryo collection mucoid fluid was obtained during the embryo flushing procedure. Swabs were collected from the stallion and one of the mares and submitted to a private laboratory (IDEXX Laboratory, Johannesburg) for bacteriological examination which revealed colonies suspicious of *Taylorella equigenitalis* and which also conformed to the biochemical characteristics of *Taylorella equigenitalis*. The isolates were sent for confirmation to the OIE CEMO Reference Laboratory at the Animal Health and Veterinary Laboratories Agency, Bury St Edmunds, UK. The isolate was subsequently confirmed as being *Taylorella equigenitalis*. Trace forward investigations, laboratory testing and treatment are ongoing and South Africa intends to eradicate this disease. For more information about this outbreak, click here.

As previously reported, on 12th July 2010 CEM was reported in Evora, Portugal. This outbreak is resolved as of 14th March 2011. The treatment of the affected animals was determined according to an official protocol. The biosecurity measures were increased in the holding and only artificial insemination was used. All the susceptible animals were tested with negative results, and another 287 animals were tested with negative results during routine surveillance in 2010 in the country. For more information about this outbreak, click here.

As of 25th February 2011 CEM was reported in a 15 year-old French Trotter mare in Eure, France. The mare was diagnosed by means of culture from a uterine swab. No further horses have been reported on the premises. For more information about this outbreak, click here.

African Horse Sickness (AHS)

Five outbreaks of clinical AHS have been reported this quarter in the area of the town of Mamre, City of Cape Town Local Municipality in Western Cape Province, South Africa. The outbreaks occurred in the surveillance zone of South Africa's African horse sickness control zone and nine horses were affected of which eight died. Several horses in the area were vaccinated against AHS during December 2010. As of 24th May the situation is as follows: 26 further outbreaks have been reported in the same area in the last two with 42 fatal cases among 597 susceptible horses in total on these premises. Diagnosis was made by RT-PCR by the Agricultural Research Council-Onderstepoort Veterinary Institute OIE Reference Laboratory. Disease control measures are still in place and 352 horses have been vaccinated. For more information about these outbreaks, click here.

Equine Infectious Anaemia (EIA)

Following the 22 outbreaks seen in Germany in 2010, the number of ongoing EIA outbreaks had declined to five by the end of first quarter of 2011. This included one new EIA outbreak, which was identified on 1st March 2011 in the administrative district of Rottweil in the Federal State of Baden-Württemberg. Two positive cases were reported on a premises with pleasure horses. The affected horses were euthanased and the premises have been quarantined. There is no apparent epidemiological link between this outbreak and the illegal movements of affected horses from Romania into Germany, which was the case for the majority of the other outbreaks seen in or since 2010. Another EIA outbreak which was identified on 12th May 2011 in Sundern (Sauerland), Hochsauerlandkreis, Nordrhein-Westfalen involving a single positive horse has been linked to the illegal movement of horses in 2010. The affected horse has been euthanased and the premises have been quarantined. For more information about these outbreaks, click here.

As reported by d'Epidémio-Surveillance en Pathologie Equine (RESPE) on 20th January 2011 following a report from the Ministère de l'Alimentation, de l'Agriculture et de la Pêche (France), EIA has been reported in Hadju-Bihar, Hungary. Following the screening of 700 horses under an epidemiological investigation for EIA, one horse tested positive and has subsequently been euthanased. Another EIA outbreak in Hungary has been reported by RESPE on 3rd February 2011 with EIA confirmed in a single horse in Gyõr-Moson-Sopron, Hungary, following the screening of 400 horses under an epidemiological investigation for EIA. All horses except for one horse tested negative. The positive horse, which was standing on premises with another 10 horses, has subsequently been euthanased. Restrictions have been placed on the affected premises. For more information on these outbreaks, click here.

Two horses were confirmed positive for EIA on a premise in northeast Missouri, USA in this quarter. The first case was a Belgian horse that was quarantined upon confirmation of infection and subsequently euthanased. Testing of the remaining horses on the premises turned up a second seropositive animal, which was also euthanased. State animal health officials tested 696 other horses in the vicinity of the affected farm of which a number had contact with the 2 infected animals but found no additional cases of infection. The source of virus for the two cases of EIA has not been determined.

On 16th March 2011, a single horse in Miyazaki Prefecture, Kyushu, southern Japan, was confirmed to be positive for EIA with AGID by the National Institute of Animal Health (also OIE Reference Laboratory). Another outbreak involving 5 positive horses in a susceptible population of 110 in contact horses was confirmed on 15th April in Miyazaki Prefecture, Toimisaki, Kusima City, southern Japan. The five affected animals were detected as a result of the epidemiological survey and were part of the wild flock of animals related to the first outbreak in Miyazaki prefecture. Regarding the first outbreak in Miyazaki prefecture, the other 41 horses kept in the same farm were tested negative on 5th April 2011. All affected horses have been euthanased and the epidemiological survey is continuing. For more information on these outbreaks, click here.

On 29th March 2011 the RESPE reported an EIA outbreak in the province of Comitat de Karlovac, Croatia, which was confirmed by serology on 17th March 2011. One horse was affected and no other horses were resident on the premises. It is not clear whether the affected horse has been euthanased but restrictions are in place. On 8th April 2011, RESPE, following notification by the French Ministry of Food, Agriculture and Fisheries, reported an EIA outbreak in the province of Comitat de Primorje-Gorski Kotar, Croatia, which was

confirmed by serology on 28th March 2011. One horse was affected and two other horses were resident on the premises. It is not clear whether the affected horse has been euthanased but restrictions are in place. For more information on these outbreaks, click here.

Equine Piroplasmosis (EP)

Regarding the equine piroplasmosis (EP) outbreaks in the US.Tracing and testing of horses for serologic evidence of *Theileria equi (T. equi)* or *Babesia caballi (B. caballi)* infection has continued through the first quarter of 2011. It is estimated that approximately 100,000 horses resident in the USA have been tested since late 2009. Since November 2009, a total of 74 horses, independent of the number found seropositive on the index premises in Texas, tested antibody positive in the c-ELISA, the vast majority for antibodies to *T. equi*. Most of the seropositive animals identified were racehorses belonging to the Quarter Horse breed; these were located in 18 states. A significant percentage of these horses had originally been imported into the USA, many from countries known to be endemic for EP. EP testing of horses to compete in sanctioned horseracing events is currently required by the following states: New Mexico, Texas, Oklahoma, Colorado, Iowa, Louisiana, Arkansas, Florida, Kentucky, Minnesota, and Indiana. Epidemiological tracing and investigation of seropositive horses suggested that transmission of infection was in the vast majority of cases by iatrogenic means. Infected horses are either managed under state imposed quarantine, have been euthanized, or otherwise, enrolled in an experimental treatment study.

On 16th February 2011 the OIE has reported the first occurrence of Equine Piroplasmosis in Zeeland, the Netherlands. Following an epidemiological survey conducted on the prevalence of EP in the Netherlands 300 horses were screened and 7 tested positive by indirect fluorescent antibody (IFA) test in August 2010. The outbreak was resolved on 9th September 2010.

On 7th March 2011 an abortion associated with *B. caballi* was reported in Ireland. A mare that had been living previously in France and was known to be seropositive to *B. caballi*, aborted her pregnancy in Ireland. The fetus was found to be PCR positive for *B. caballi* on post mortem examination and there was no evidence found of any other cause of the abortion.

West Nile Virus (WNV)

As of 12th May 2011 the first case of West Nile Virus encephalitis for this year has been recorded in the USA. The horse was located in Southeast Georgia. Because of the unseasonal heavy rainfall experienced in many states aside from the Southwest, it is anticipated the mosquito and tick season will start earlier and activity will be greater than recent years past. It remains to be seen whether this will result in a higher than average incidence of both tick-borne and mosquito-borne diseases.

As of 25th March, the outbreaks of West Nile Virus (WNV) in equids in Portugal, initially reported in September 2010, have been resolved. The horse from outbreak 02/WNF/10 fully recovered after treatment and the last test showed negative results for IgM. Clinical and serological surveillance of horses in the risk area was conducted in more than 490 horses, all with negative results. A vaccination plan was implemented in the risk area on a voluntary basis. Passive surveillance of wild birds was conducted in more than 264 dead birds, all with negative test results. For more information about this outbreak, click here.

Focus articles

In this report we are pleased to include two focus articles. In our first focus article, given the importance of abortion for the equine industry, Catherine Butler in collaboration with Arno Werners (Cambridge University) and Richard Newton from the Animal Health Trust, present data of the last five years of equine abortion surveillance activity.

For our second focus article, Catherine Butler from the AHT gives an overview on Equine granulocytic anaplasmosis (EGA), an emerging tick-borne zoonoses caused by Anaplasma phagocytophilum.

We reiterate that the views expressed in this focus article are the authors' own and should not be interpreted as official statements of Defra, BEVA or the AHT.

Access to all of the equine disease surveillance reports can be made on a dedicated page on the Animal Health Trust website at http://www.aht.org.uk/equine_disease.html or via the BEVA and Defra websites:

http://www.beva.org.uk/
http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/vetsurveillance/reports/listing.htm

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/equine_disease_registration.html.

Virology Disease Report for the First Quarter of 2011

The results of virological testing for January to March 2011 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 Veterinary Laboratories Agency (VLA), Weybridge. The sample population for the VLA is different from that for the other contributing laboratories, as the VLA's tests are principally in relation to international trade (EVA and EIA). VLA now provides testing for WNV as part of clinical work up of neurological cases on specific request and provided the local DVM has been informed.

Table 1: Diagnostic virology sample throughput and positive results for the first quarter 2011

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Serological Tests			
EVA ELISA	5787	166#	6
EVA VN	2501	126#	4
VLA EVA VN	654	19#	1
EHV-1/-4 CF test	460	19*	1
EHV-3 VN test	1	1	1
ERV-A/-B CF test	255	5*	1
Influenza HI test	275	9*	1
EIA (Coggins)	1691	0	3
EIA ELISA	4598	0	6
VLA EIA (Coggins)	670	0	1
VLA WNV (PRNT)	0	0	1
Virus Detection			
EHV-1/-4 PCR	94	13	2
EHV-2/-5 PCR	36	8	1
Influenza NP ELISA**	261	0	2
Influenza Directigen	127	0	1
Influenza VI in eggs	0	0	0
EHV VI	98	13	1
EVA VI/PCR	0	0	1
VLA EVA VI/PCR	9	0	1
Rotavirus**	43	24	7

ELISA = enzyme-linked immunosorbent assay, VN = virus neutralisation, VLA = Veterinary Laboratories Agency, CF = complement fixation, HI = haemagglutination inhibition, Coggins = agar gel immuno diffusion test, PCR = polymerase chain reaction, NP = nucleoprotein, VI = virus isolation, EVA = equine viral arteritis, EHV = equine herpes virus, ERV = equine rhinitis virus, EIA = equine infectious anaemia
# = Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera
** = Testing methods for Rotavirus detection included an ELISA and a Latex Agglutination test, both performed on faecal samples
** = The relatively high number of NP ELISA tests performed is largely due to requirements for international equine movement. All horses travelling to Australia must have 2 NP ELISA tests performed prior to travel. The figures abov include tests performed for international trade purposes.

Of the 19 EVA VN positives detected by the VLA, 10 were export samples, 3 were serum samples from stallions for artificial insemination (AI) certification, and 6 samples were submitted for diagnosis from overseas.

The 670 agar gel immuno diffusion tests for EIA (AGID; Coggins) were conducted for international trade purposes and they were all negative.

Virological Diagnoses for the First Quarter of 2011

EHV-1 Abortion

Three single cases of EHV-1 abortions in two Thoroughbred mares and one Irish Draught mare and one outbreak of EHV-1 abortion following EHV-1 paralytic disease were reported in this quarter. In all cases EHV-1 infection was confirmed on the basis of positive PCR and/or virus isolation for EHV-1 in mixed fetal tissues. One further case (a weak neonatal foal) from an affected stud with a confirmed single EHV-1 abortion in Cheshire was reported on 25th February and confirmed as positive for EHV-1 by PCR on the placenta from the mare. The stud also reported another abortion within this period which was not investigated.

EHV-4 Abortion

A single EHV-4 abortion in a Suffolk Punch mare was reported in this quarter. EHV-4 infection was confirmed on the basis of positive PCR in fetal tissues. No further cases have been reported on the affected stud. All necessary precautions were taken and the HBLB Codes of Practice were followed.

EHV-1 causing paralytic disease and multiple abortions

On 17th January 2011 a barren Thoroughbred mare in Oxfordshire presented with neurological disease and was euthanased. Following the post mortem examination and histopathology revealing focal haemorrhages in sections from the spinal cord, EHV-1 was suspected to be the cause of disease. There were 9 mares in total on the premises, and 3 of them (pregnant mares) had shared airspace with the affected mare. These three mares showed pyrexia, and eventually all three aborted. Only one of these abortions was investigated and EHV-1 has been confirmed to be the cause of abortion on the basis of positive PCR in mixed fetal tissues. Following this EHV-1 outbreak, another mare that was in contact with one of the mares that aborted in January subsequently aborted on the same premises at the beginning of April 2011, and EHV-1 infection was confirmed as the cause of that abortion on the basis of positive PCR in mixed fetal tissues. All necessary precautions were taken and the HBLB Codes of Practice were followed.

EHV-1 causing paralytic disease

On 16th March 2011 EHV-1 was isolated from a nasopharyngeal swab taken from a 12-year-old Thoroughbred-cross gelding with a history of recent hindlimb ataxia and weakness among a group of 30 horses. Initial serological screening of this horse by complement-fixation test (CFT) showed a titre of 1:320/1:640 for EHV-1/EHV-4, which was consistent with response to recent exposure to EHV in the absence

of recent vaccination. The remainder of the yard did not show overt clinical signs. Restrictions were placed until further notice and an epidemiological investigation was undertaken including laboratory screening by means of virological and paired serological testing. The affected horse has clinically improved and remained in isolation with restriction in place until proven negative by virus isolation from a nasopharyngeal swab.

Equine Herpes Virus-3

One case of EHV-3 infection was confirmed in a Zebra in this quarter

Focus Article: Surveillance of infectious and non-infectious causes of equine abortion in the United Kingdom: 2006-2011

Catherine Butler, DVM, MRCVS, Animal Health Trust; in collaboration with Arno Werners, DVM, PhD, DipECVPT, Department of Veterinary Medicine, University of Cambridge and Richard Newton, BVSc, MSc, PhD, DLSHTM, DipECVPH, FRCVS, Animal Health Trust.

Introduction

Following the focus articles published in the first quarter and last quarter in 2009 in which Equine Viral Arteritis (EVA) and Contagious Equine Metritis (CEM) were assessed respectively, and in order to gain insights into the UK equine surveillance trends over time, here we review the data collated and reported by Defra, AHT and BEVA over the period from 2006 to 2011 (including this quarter) for infectious and non-infectious causes of equine abortion.

Overview

Abortion and stillbirth are major causes of equine mortality and have the potential to cause severe economic loss to the equine industry. There are many causes of abortion including infections with Equine Herpes Virus (EHV-1, and much less commonly EHV-4), Equine Arteritis Virus (EAV), *Streptococcus zooepidemicus*, *Leptospira spp.*, *Escherichia coli*, and *Aspergillus spp.*. Non-infectious causes of abortion include twinning and stillbirths associated with dystocia, congenital-, placental-, and umbilical cord abnormalities.

This report provides the most recent findings on several of the more prevalent infectious and non-infectious causes of equine abortion and stillbirth in the UK.

History of equine abortions

In the mare, as in other species, many pregnancies fail for reasons which, at present, are not clear. However, a definitive diagnosis of the cause of equine abortion is possible in the majority of cases where the whole fetus and placenta are submitted for post mortem examination. In a survey of equine abortion, stillbirth and neonatal death (n=1150) occurring in the UK from 1988-1997, conducted by Ken Smith and colleagues at the Animal Health Trust, problems associated with the umbilical cord were the most common diagnosis, followed by miscellaneous causes, intra partum stillbirth, placentitis, EHV infection and twinning. In a minority of the cases (n=81; 7%) in this survey no diagnosis could be reached. Continuous surveillance of equine abortion is fundamental in establishing current disease trends and identifying disorders requiring immediate and specific attention, as evidenced by the emergence of Mare Reproductive Loss Syndrome (MRLS) in the USA in 2001.

Graphical presentation of equine abortion data: 2006-2011

Figure 1 and 2 represent a summary by year and quarter for 2006-2011 of the different causes of equine abortion confirmed at post mortem examination conducted by a network of UK-based diagnostic labs and vet practices participating in the Defra/BEVA/AHT surveillance scheme. The data for the first quarter of 2011 is preliminary and has been adjusted to the average percentage of cases occurring in the first quarters of year 2006-2010.

Figure 1: Equine abortion data by year for 2006-2010 for several laboratories.

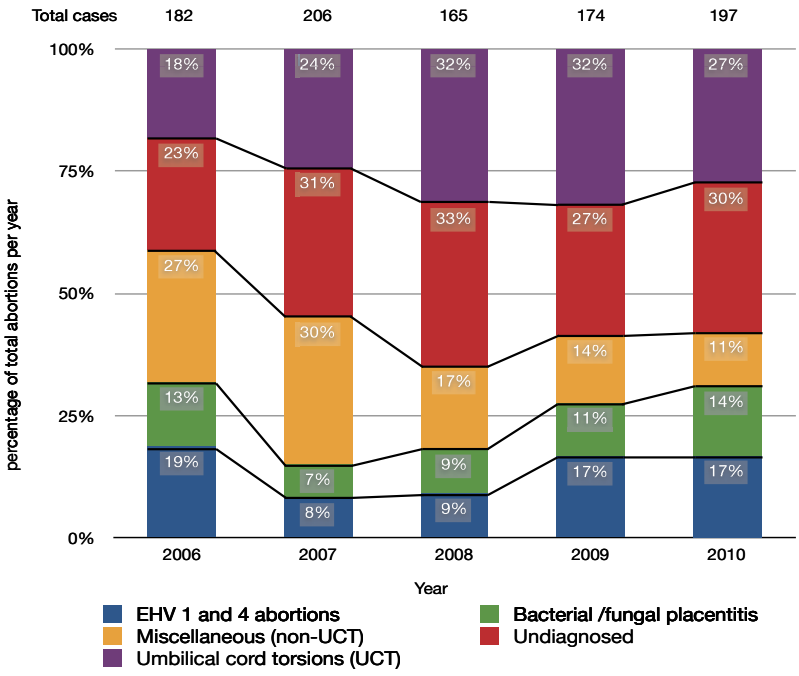
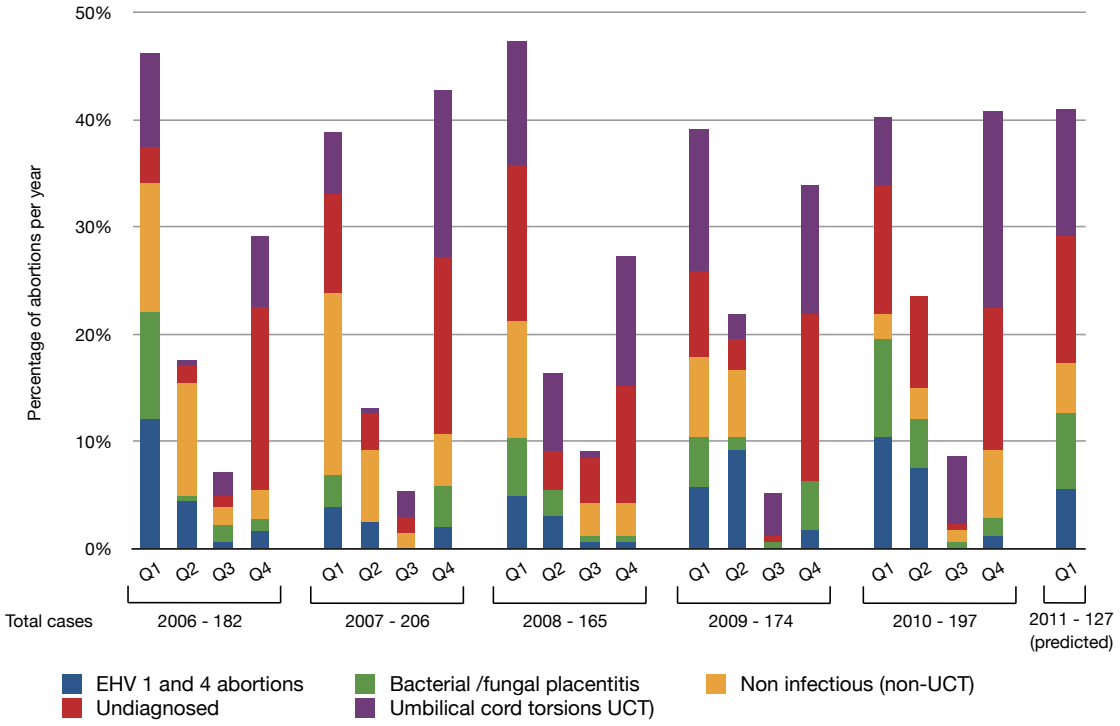


Figure 2: Equine abortion data by quarter for 2006-2011 for several laboratories.



The results of note in this summary for equine abortion from 2006 to 2011 are:

- 976 fetuses/mixed fetal membranes were examined in the period 2006-2011, with the cause of abortion being established in 71.1% of cases (n=694).
- Umbilical cord abnormalities comprising umbilical cord torsion and over-long cord/cervical pole ischaemia, were the most common diagnoses, representing 26.4% (n=258) of the total cases examined.
- Miscellaneous causes, comprising lethal congenital anomalies, premature placental separation, dystocia associated stillbirths, and twins represented 19.6% (n=191) of the cases
- An infectious cause was confirmed in 25.0% (n=244) of the total cases, with EHV infection related abortions representing 13.8% (n=135) and bacterial/fungal placentitis representing 11.2% (n=109). The majority of herpesvirus abortions (n=135) were caused by EHV-1 (92.6%: n=125) with some occurring as outbreaks involving multiple cases, with only occasional, always i individual cases being attributed to EHV-4 infection (7.4%: n=10) during the period.
- Considerable variation in causes of abortion has been detected in the different quarters. Umbilical cord torsions have been predominantly diagnosed in the first and last quarter of the year. EHV abortions predominantly in the first two quarters of the year and bacterial placentitis in the first quarter, in late stage pregnancy. Umbilical cord abnormalities showed a yearly variation in prevalence of 17.8% to 31.6%, undiagnosed cases varied between 23.1% and 33.3%, miscellaneous cases varied between 11.1% and 30.1% yearly, bacterial/fungal placentitis varied between 6.7% and 14.2%, and EHV infection related abortions showed a yearly variation in prevalence of 9.0% to 18.6%.

In conclusion, the data in this overview indicate that umbilical cord torsion, detected in 26.4% of the examined cases, is still the most important cause of equine abortion in the UK. However, it should be noted that the overall prevalence of confirmed EHV abortions (13.8%) in this overview for 2006-2010 is higher than the figure of 6.5% found by Smith et al. (2003) in their study for the period 1988-1997. It might be argued that this difference might be explained by the 'recent' introduction of PCR as a routine diagnostic method in EHV abortion testing, however, positive test results from at least two different tests (e.g. positive PCR + characteristic histopathology or positive immunohistochemistry + characteristic histopathology) have conventionally been required to confirm a diagnosis of fetal EHV infection. In 282 cases (28.9%) no diagnosis could be reached in this series, which is a much higher proportion than the figure of 7% reported by Smith et al. (2003). We speculate that this might be due an increase in selective sampling performed for EHV-1 clearance testing of an aborted fetus but which makes establishment of final diagnoses in case of a negative EHV-1 result very much more difficult in the absence of the whole fetus and placenta.

Further reading

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Sebastian M, Gantz M, Tobin T, Harkins J, Bosken J, Hughes C, Harrison L, Bernard WV, Richter D and Fitzgerald TD: The Mare Reproductive Loss Syndrome and the eastern tent caterpillar: A toxicokinetic/statistical analysis with clinical, epidemiologic, and mechanistic implications. Vet Ther, 4(4):324-339, 2003.

Bacteriology Disease Report for the First Quarter 2011

A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 2. For contagious equine metritis (CEM) all 30 HBLB approved laboratories in the UK contributed data.

VLA CEMO Data for the period January to March 2011

We are again pleased to include data relating to CEM testing from the Veterinary Laboratories Agency (VLA), in this quarterly report. The sample population for the VLA is different from that for the other contributing laboratories as the VLA 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 seroconversion using a serological ELISA.

Table 2: Diagnostic bacteriology sample throughput and positive results for the first quarter 2011

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
CEMO (HBLB)	11830	1****	30
CEMO (VLA)	542	0	1
Klebsiella pneumoniae#	11843	3	30
Pseudomonas ruginosa	11766	39	30
Strangles*culture	1397	131	18
Strangles PCR	863	86	2
Strangles ELISA	844	157	1
Salmonellosis	625	37	18
MRSA	429	5	11
Clostridium perfringens	103	9	6
Clostridium difficile (toxin by ELISA or imunochromatography)	112	17	9
Borrelia (by ELISA)	13	6	1
Rhodococcus equi	345	2	7
*Lawsonia intracellularis***	71	20	4

CEMO = contagious equine metritis organism (*Taylorella equigenitalis*); HBLB = HBLB accredited laboratories; # =capsule type 1,2,5; VLA = VLA reference laboratory; **Streptococcus equi* subsp. *equi*; MRSA = methicillin resistant *Staphylococcus aureus*. ** *Lawsonia intracellularis* identified using PCR applied to faeces; 1 reproductive tract samples only ****= an overseas sample from Italy

VLA Salmonella results

From the 19 strains typed by the VLA the serotypes reported were S. Enteritidis (1 isolate), S. Typhimurium (9 isolates), S. Anatum (2 isolates), Newport (2 isolates), 4,5,12:I:-193 (2 isolates), S. Agama, Dublin and Kottbus (1 isolate respectively). These 19 positive samples represent 16 incidents.

The following definition of an incident applies: "An incident comprises the first isolation and all subsequent isolations of the same serovar or serovar and phage/definitive type combination of a particular *Salmonella* from an animal, group of animals or their environment on a single premises, within a defined time period (usually 30 days)."

For more information from Defra about *Salmonella* in the UK, please click here.

Toxic and Parasitic Disease Report for the First Quarter 2011

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 and positive results for the first quarter 2011

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Grass Sickness	11	2	2
Hepatic toxicoses	15	0	4
Atypical myopathy	-	-	-
Tetanus	-	-	-

Table 4: Diagnostic parasitology sample throughput and positive results for the first quarter 2011

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Ascarids	2101	32	16
Cyathostomes	1621	485	13
Dictyocaulus	514	10	8
Strongyles	3323	1027	21
Tapeworms (ELISA based testing)	7	7	3
Tapeworms (Faecal exam)	1695	29	13
Trichostrongylus	60	4	2
Strongyloides	1938	381	16
Oxyuris equi	237	2	7
Fasciola	145	13	3
Coccidia	266	2	4
Cryptosporidia	0	0	0
VLA *Theileria equi* (CFT)*	112	1	1
VLA *Theileria equi* (IFAT)**	470	18	1
VLA *Theileria equi* (cELISA)***	126	3	1
VLA *Babesia caballi* (CFT)*	112	1	1
VLA *Babesia caballi* (IFAT)**	470	0	1
VLA *Babesia caballi* (cELISA)***	126	1	1
Ectoparasites			
Mites	527	9	16
Lice	427	16	16
Ringworm	611	74	20
Dermatophilus	445	20	15
Candida	71	1	2

*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

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

A total of six equine grass sickness (EGS) cases have been reported for the first quarter (January to March 2011), of which four cases occurred in England, one case occurred in Scotland, and the location of one case was not reported. The median age of affected horses was 3.5 years (range 11 months – 16 years), with 50% geldings (n=3) and 50% (n=3) mares/fillies. Breed was recorded for all cases, of which five were purebreds (two Welsh section D, one cob, one Eriskay and one Dales) and the remaining horse was a crossbred.

Of the six cases reported, three sub acute cases (50%) were euthanased, two horses reported to have chronic EGS (33%) had survived and the clinical presentation of EGS was not reported for one fatal case that was euthanased.

Diagnosis was based on clinical signs alone for both cases of chronic EGS. Two horses underwent surgery with diagnostic confirmation obtained by biopsy examination, with one of these cases also having a subsequent post-mortem examination. Post-mortem examination was performed in a further two horses, of which one had biopsy samples obtained for confirmation of diagnosis by histopathology.

The Animal Health Trust (AHT) established the nationwide surveillance scheme for equine grass sickness (EGS) in spring 2008, in collaboration with the Universities of Edinburgh and Liverpool and the Equine Grass Sickness Fund. Since its launch, the scheme has recorded details of over 1500 cases of EGS occurring between 2000 and the present day. This project is ongoing, and information regarding the incidence of EGS will be invaluable in the development of the proposed vaccine trial against Clostridium botulinum. To report any cases of EGS from 2000 onwards, please contact Jo Ireland at the Animal Health Trust on 01638 751000 Ext: 1239 or email jo.ireland@aht.org.uk. Further information is also available at www.equinegrasssickness.co.uk where questionnaires, collecting data on both affected premises and individual cases, can be viewed and completed online.

Focus Article: Equine Granulocytic Anaplasmosis: a tick-borne threat?

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Introduction:

Equine anaplasmosis is likely to be unfamiliar to the majority of UK equine practitioners as it is a relatively new tick-borne disease which was first described in the United States (US) in 1969, but has since become increasingly recognised in both the US and Europe. Ticks are the most important vectors of diseases to domestic animals and human beings worldwide and *Ixodes ricinus* (sheep tick), the main vector tick in Europe, is known to transmit a variety of pathogens including *A. phagocytophilum*. The purpose of this focus article is to raise awareness of this disease and improve monitoring of the situation in horses by providing a brief overview.

Etiology:

The causative agent of equine granulocytic anaplasmosis (EGA) is *Anaplasma phagocytophilum*, a unique obligatory intracellular bacterium that survives and replicates in neutrophils and other granulocytes. *A. phagocytophilum* can elicit febrile disease in animals and human beings, and is transmitted in Europe predominantly by *I. ricinus* ticks (fig1). Ticks of the *I. ricinus* complex also act as vectors in the spread of *Borrelia burgdorferi* (the causative agent of Lyme disease) from one animal to another, and co-infections of *A. phagocytophilum* and *B. burgdorferi* have been confirmed in horses. The vector role for *Dermacentor reticulatus* (fig 1; vector for *Theileria equi* and *Babesia caballi)* in the transmission of *A. phagocytophilum* has been postulated but is still uncertain.

I. ricinus life cycle and seasonal activity:

The life cycle of *I. ricinus* includes four stages, the embryonated egg and three active instars, the larva, the nymph and the adult. Each of the active instars needs to take a blood meal before continuing development with larvae and nymphs usually feeding on smaller animals and adults feeding on large animals. However, the adult male *I. ricinus* does not need to feed. After a blood meal, the female finds a suitable sheltered microhabitat, lays several thousand eggs within one to four weeks, and dies. The entire life cycle of *I. ricinus*, depending on climatic conditions and the availability of hosts, lasts between two and six years. The developmental cycle of *I. ricinus* consists of spring and autumn feeding populations which are independent of each other. Tick activity starts when the average daytime temperature reaches 7 C or more, quickly reaches a peak in May or early June, and declines over the summer to reach a second smaller peak in autumn. In France, double as many ticks collected from pastures than ticks from woods carried *A. phagocytophilum* DNA and in the U.K., a significantly higher prevalence was found in upland than in woodland ticks.

Clinical signs of A. phagocytophilum infection in horses:

Following an incubation period of approximately 10 days, infected horses may experience subclinical disease or develop overt signs including pyrexia (>39.5 Celsius), depression, anorexia, reluctance to move, limb oedema and ataxia. Mild to severe morbidity and occasionally even mortality has been seen in EGA cases. The disease is often self-limiting, and clinical signs usually last seven to 14 days. Anaemia, leucopenia and thrombocytopenia are typically found in clinical cases of EGA.

Diagnosis:

Demonstration of granulocytic inclusions, either initial bodies or morulae (fig 2), in Wright-Giemsa- or haematoxylin and eosin-stained blood smears can confirm a clinical diagnosis, and is a sensitive diagnostic tool in the acute pyretic phase of the disease. PCR is another rapid and sensitive tool for detection, identification and phylogenetic analysis of *A. phagocytophilum* from blood, skin biopsy specimen and ticks.

Differential diagnosis:

Clinical signs in infected horses are not pathognomonic for the disease, and could be caused by infections with other pathogens such as *B. burgdorferi, Babesia caballi, Theileria equi*, equine herpes virus, equine infectious anaemia virus and equine arteritis virus.

Treatment and prevention:

Although most horses recover spontaneously after infection with *A. phagocytophilum*, treatment with oxytetracycline (7mg/kg/q24h/3-5 days) is indicated in horses showing severe- or persistent signs of infection. Even though licensed products with proven efficacy against ticks are currently unavailable for horses, careful inspection of horses after possible tick exposure and prompt removal of attached ticks will diminish the change of pathogen transmission. In areas with high tick burdens also nymphs that usually feed on smaller animals quest horses causing sometimes severe skin reactions (fig 3). Extraction of these nymphs prior to feeding is very difficult and often results in incomplete removal and a higher risk of pathogen transmission.

Conclusion:

It is likely that EGA in horses is under diagnosed in European countries, because the clinical signs are similar to those caused by infections with other pathogens and most horses recover without treatment. However, with tick-borne infections becoming more prevalent due to climatic change and changing epitopes, the identification and determination of questing ticks on horses and the recognition of tick-borne diseases in horses is imperative.

Fig 1: Left: fully engorged adult Ixodes ricinus. Right: fully engorged Dermacentor reticulatus.

Fig 2: Microscopic view of a stained blood smear with an A. phagocytophilum morula (as indicated by arrow) visible in a neutrophil.

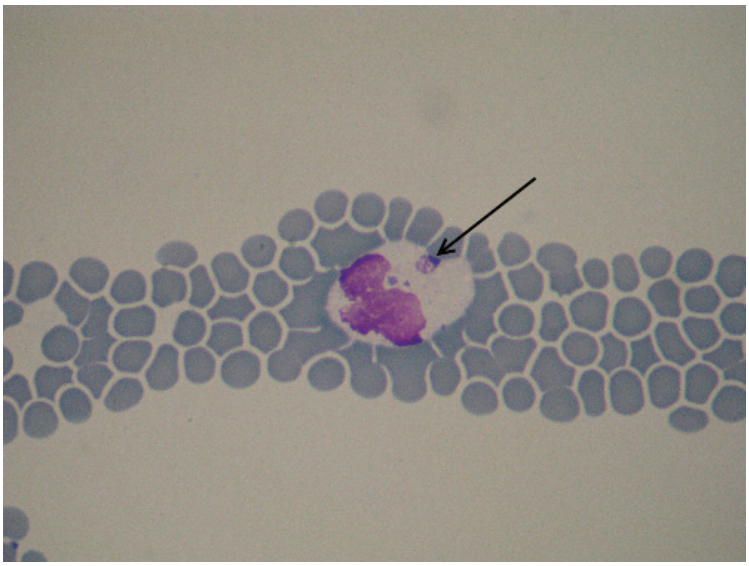

Fig 3: Clearly visible skin reactions located on the front legs in a horse covered with Ixodes ricinus nymphs after a ride in the forest. A fipronil containing fluid was administered locally and the nymphs fell of the next day.

Courtesy Dr Linda van de Wollenberg

further reading

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Report on Post-mortem Examinations for the First Quarter 2011

East Anglia

A total of 54 cases were examined including 49 aborted fetuses.

Of the aborted fetuses examined this quarter, umbilical cord torsion was suspected as the precipitating cause in 14 of 49 cases. Premature placental separation was found to be the cause of 5 abortions, whereas placental insufficiency was the underlying cause in one case of abortion. Placentitis was found to be the cause of 8 abortions, whereas EHV-1 was confirmed by virus isolation and PCR in placenta and fetal tissues in six abortions. No definitive cause was determined for fourteen cases of abortion, however infectious agents were excluded.

There were five cases of neonatal death reported in this quarter. Three cases were associated with dystocia and the remaining two cases presented a congenital anomaly (a ventricular septal defect and a congenital pericardial diaphragmatic defect with small intestinal herniation).

Following neurological disease a mare was euthanased and EHV-1 was confirmed by PCR and virus isolation in spinal cord samples.

Eight horses were examined following gastrointestinal disease. Causes of death were as follows: single cases of epiploic foramen strangulation, intestinal herniation due to diaphragmatic rupture, peritonitis due to caecal base rupture following foaling, inflammatory bowel disease, colon torsion, and typhlocolitis.

Following respiratory signs, a horse was euthanased and diagnosed with pleuropneumonia associated with oesophageal choke.

The two cardiac cases reported in this quarter include a case of vegetative endocarditis and cardiomegaly with pulmonary artery rupture.

Other cases reported include four welfare/neglect cases (one of them presented with laminitis, two were emaciated of which one was unable to rise, and one case presented with severe osteoarthritis of the left carpal joint).

Home Counties

Fifteen cases were examined in this quarter.

One neonatal death was examined in this quarter, and associated with wry nose and hermaphroditism.

One neurological case that was euthanased was reported in this quarter; the cause of disease was equine neuroaxonal dystrophy.

The seven cases of gastrointestinal disease reported include three cases of colic (within these a case of diaphragmatic rupture, a case of peritonitis, and a colic case without a definite diagnosis, one case of caeco-colon intussusception, one case of ileus, and one case of gastric rupture with associated peritonitis.

One respiratory case that was euthanased was reported in this quarter; the cause of disease was aspiration pneumonia and colic.

There was only one case of neoplasia reported in this quarter; a horse with a lymphoma.

Two musculoskeletal cases were reported: one presented a C6 cervical stenosis whereas the second presented with multiple skeletal malformation.

One euthanased neglect case was reported

The cause of death for the last case reported in this quarter was bleeding associated with hepatic capsule rupture and vena cava thrombosis.

South West

Eight cases were examined in this quarter.

One case was examined following gastrointestinal disease. This case presented with diarrhoea of undetermined cause.

Three cases of musculoskeletal disease were reported; post-mortem examination revealed one fractured right ilium, and two chronic laminitis cases

Following respiratory signs, two horses were euthanased; one was diagnosed with pulmonary fibrosis and the other case revealed a bilateral guttural pouch mycosis.

Hepatic disease due to hydatid cysts in the liver (and the lung) was reported to be the cause of death in a case following post-mortem examination.

One euthanased neglect case with poor bodily condition, ventral oedema and hindquarter faecal staining was reported

Northern England

Seven cases including 1 abortion were examined in this quarter.

One aborted fetus was examined this quarter; umbilical cord torsion was suspected as the precipitating cause.

Four gastrointestinal cases were reported in this quarter. The causes of death were as follows: one ileocaecal intussusception, two right dorsal displacements of the left colon, and one pedunculated lipoma.

A single musculoskeletal case was reported and it was diagnosed with laminitis.

One hepatic disease case was examined this quarter and diagnosed with hyperlipaemia.

West Midlands

No cases were examined in this quarter.

Scotland

Sixteen post-mortem examinations were reported in this quarter.

Two gastrointestinal cases were reported in this quarter, including a case of mural abscess and ulceration of the left colon, and a case of gastric ulceration.

Two respiratory cases that were euthanased were reported in this quarter; one case was diagnosed with suppurative pleuropneumonia and nephrosis, and the other case was diagnosed with fibrino-suppurative pleuropneumonia.

Twelve musculoskeletal cases were reported in this quarter; including degenerative joint disease and a fractured radius.

Northern Ireland

Three post-mortem examinations were examined in this quarter including two aborted fetuses.

Two aborted fetuses were examined this quarter; Leptospires were detected by immunofluorescence in the kidney of one case. No definitive cause of abortion was determined in the other case.

One case of gastrointestinal disease in a horse with a history of unresponsive colic was reported this quarter; strangulated small intestine which had prolapsed through the omentum was detected with associated fibrinous peritonitis.

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Endell Veterinary Group
Hampden Veterinary Hospital
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IDEXX
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Lab Services Ltd
Liphook Equine Hospital
Minster Equine Veterinary Clinic
NationWide Laboratories
NationWide Laboratories Leeds
Newmarket Equine Hospital
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University of Edinburgh
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We would welcome feedback including contributions on focus articles and/or case reports to the following address:

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