Highlights in this issue:

- Focus Article - Theiler’s disease

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.
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## ACKNOWLEDGEMENTS
Introduction

Welcome to the third 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 October 2016

National disease occurrence

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

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 humanely euthanised due to 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 complement fixation (CF) test on serum by Rossdales Laboratories and the AHT. As of 30th November 2016, no further cases have been reported.

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 was recumbent with bladder dysfunction on initial presentation on 15th October has 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 have shown no evidence of EHV-1 infection.

EQUINE INFLUENZA (EI)

During October and September, the AHT confirmed two separate cases of EI on premises in Stirlingshire and Lancashire. Both cases were five month old unvaccinated animals. The positive diagnoses were confirmed by qPCR on nasopharyngeal swabs.

International disease occurrence

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

France

On 21st October 2016, Réseau d’Epidémio-Surveillance en Pathologie Equine (RESPE) reported a case of EHV-1 neurological disease on premises in Pas-de-Calais, France. The positive diagnosis was confirmed by PCR on whole blood by LABEO-Frank Duncombe, Normandy. As of 30th November 2016, no further cases epidemiologically linked to this index case have been reported.
USA
During November, two separate outbreaks of EHV-1 neurological disease have occurred in the USA. As of 30th November 2016, the outbreak in California consists of five confirmed cases, of which four displayed neurological signs. In Florida, a single case has been reported with all other horses on the premises appearing clinically normal.

Further details on the above outbreaks can be found at [http://www.aht.org.uk/cms-display/international-breeders-meeting.html](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 Theiler’s disease written by Ben Sturgeon BSc BVM&S Cert E.P. Cert E.S.M. BAEDT MRCVS of Greenside Veterinary Surgeons, Scotland, which coincides with a suspected case of the disease reported among the post mortem examinations from East Anglia this quarter. Ben Sturgeon is also a member of BEVA Council. 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.


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.
The results of virological testing for July to September 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 and EIA). APHA now provides testing for WNV as part of clinical work up of neurological cases on specific request and provided the local regional APHA office has been informed.

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

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Number of Samples Tested</th>
<th>Number Positive</th>
<th>Number of Contributing Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serological Tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVA ELISA</td>
<td>422</td>
<td>13*</td>
<td>8</td>
</tr>
<tr>
<td>EVA VN</td>
<td>99</td>
<td>34*</td>
<td>4</td>
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<tr>
<td>APHA EVA VN</td>
<td>521</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>EHV-1/-4 CF test</td>
<td>370</td>
<td>2*</td>
<td>2</td>
</tr>
<tr>
<td>EHV-3 VN test</td>
<td>5</td>
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<td>1</td>
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<tr>
<td>ERV-A/-B CF test</td>
<td>117</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Influenza HI test</td>
<td>160</td>
<td>1*</td>
<td>3</td>
</tr>
<tr>
<td>EIA (Coggins)</td>
<td>61</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EIA ELISA</td>
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<td>3¹</td>
<td>8</td>
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<tr>
<td>APHA EIA (Coggins)</td>
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<tr>
<td>APHA WNV (cELISA)</td>
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<td>1</td>
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<td><strong>Virus Detection</strong></td>
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<tr>
<td>Coronavirus PCR</td>
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<td>0</td>
<td>2</td>
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<tr>
<td>EHV-1/-4 PCR</td>
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<td>14</td>
<td>5</td>
</tr>
<tr>
<td>EHV-2/-5 PCR</td>
<td>29</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>EHV-3 VN test</td>
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<td>1</td>
</tr>
<tr>
<td>Influenza NP ELISA</td>
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<td>1</td>
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<tr>
<td>Influenza Directigen</td>
<td>12</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Influenza PCR</td>
<td>166</td>
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<td>1</td>
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<tr>
<td>APHA Influenza PCR</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Influenza VI in eggs</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>EHV VI</td>
<td>31</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>EVA VI/PCR</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>APHA EVA VI/PCR</td>
<td>7</td>
<td>1²</td>
<td>1</td>
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<tr>
<td>Rotavirus</td>
<td>22</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

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 = nucleoprotein, VI = virus isolation, eVA = equine viral arteritis, EHV = equine rhinitis virus, EIA = equine infectious anaemia, # = Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera ** = Seropositive due to vaccination, ¹ = False positives, confirmed negative on Coggins, ² = Positive result detected from a non-UK origin sample
EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

On 6th July 2016, the Animal Health Trust, Newmarket confirmed a case of EHV-1 early abortion on a Thoroughbred stud farm in Berkshire, England. The affected animal was vaccinated and aborted whilst on field turnout. Prior to abortion, the animal was in direct contact with three other pregnant animals. Appropriate biosecurity measures have been implemented in accordance with the HBLB Codes of Practice and will continue as required. The positive diagnosis was confirmed by qPCR on fetal tissues. As of 30th November 2016, no further cases of EHV-1 abortion have occurred on this premises.

EQUINE INFLUENZA (EI)

On 30th September 2016, the Animal Health Trust confirmed a case of EI on premises in Fife, Scotland. The affected animal was a three-year-old unvaccinated filly, which presented with mucopurulent nasal discharge and mild cough on 24th September. The filly was sampled on 28th September. The case was in direct contact with two other vaccinated horses. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab. Control measures were implemented and no further cases were reported.

For the above confirmed case, 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.
AFRICAN HORSE SICKNESS (AHS)

Mozambique
On 25th July 2016, the World Organisation for Animal Health (OIE) reported a case of AHS on premises in Maputo, Mozambique. This index case was a nine-year-old mare that presented with clinical signs on 11th July 2016, and was in direct contact with 31 susceptible animals. This herd has been regularly vaccinated against AHS. Control measures implemented included movement restrictions, quarantine, vector control and surveillance within and outside the protection zone. The positive diagnosis was confirmed by PCR by Onderstepoort Veterinary Institute (OVI), South Africa (OIE Reference Laboratory) on 19th July 2016.

South Africa
Isolated cases of AHS, confirmed by group specific qPCR, occurred in the endemic infected area of South Africa in July, August and September 2016. There were no outbreaks of AHS in the AHS Controlled Area in the Western Cape Province of South Africa during the same period in 2016.

EASTERN EQUINE ENCEPHALOMYELITIS (EEE)

USA
A total of 49 cases of EEE were recorded during the period under review. The greatest numbers of cases were confirmed in Florida and South Carolina, the vast majority of which had no vaccination history against EEE.

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

France
Two separate cases of EHV-1 were confirmed in September on premises in Calvados and Isère. Both affected animals were pyrexic. The positive diagnoses were confirmed by qPCR on nasopharyngeal swabs.

South Africa
There was an EHV-1 outbreak, confirmed by qPCR performed at the Veterinary Genetics Laboratory, University of Pretoria, from Pretoria East, Gauteng, in July 2016. Clinical details and the vaccination status are unknown.

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

Ireland
One case of EHV-1 abortion was reported during the third quarter of 2016 in Munster. No further details were made available.

South Africa
Veterinary Genetics Laboratory, University of Pretoria, confirmed a case of EHV-1 abortion in a Thoroughbred by qPCR on fetal tissue from the Free State Province.

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

France
On 3rd August 2016, one case of EHV-1 neurological disease was confirmed in Yonne. The affected animal was a 16 year-old French Saddlebred male competition horse. The animal showed clinical signs of lethargy, ataxia, pyrexia and stiffness. This vaccinated animal was in contact with 34 other horses. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.
South Africa
A case of EHV-1 neurological disease was diagnosed by qPCR in a horse that presented with ataxia in KwaZulu Natal in July 2016.

USA
A case of EHV-1 neurological disease was confirmed in a horse admitted to the Veterinary Teaching Hospital in Washington State. The index case was an 18 year-old Quarter horse and was subsequently humanely euthanised.

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

France
Seven outbreaks of EHV-4 respiratory disease have been confirmed (five outbreaks with one case, one outbreak with two cases, and one outbreak with four cases). These outbreaks occurred in Allier, Calvados, Drôme, Orne, Seine-et-Marne and Vendée. Affected horses showed clinical signs that included pyrexia, nasal discharge, coughing and dyspnoea. For all these outbreaks, positive diagnoses were confirmed by PCR on nasopharyngeal swabs.

South Africa
In July 2016, EHV-4 respiratory disease was confirmed by qPCR on lung and spleen samples by the Veterinary Genetics laboratory, University of Pretoria. AHS was suspected due to fatality and respiratory distress; however the AHS virus and Equine Encephalosis virus (EEV) qPCR results for this case were negative.

Switzerland
One case of EHV-4 was reported during the third quarter of 2016. Clinical signs included pyrexia and respiratory signs. The positive diagnosis was confirmed by paired serum samples with significant rise in antibody titre between samples.

USA
Evidence of EHV-4 was widespread in USA, primarily implicated in respiratory disease in young foals.

EQUINE INFECTION ANAEMIA (EIA)

Canada
Between 1st July and 30th September 2016, there have been a total of nine EIA positive equines identified on three separate premises in the province of Saskatchewan. Two of the affected premises were epidemiologically linked. One premises had a 100% infection rate and on another premises, a single case of acute clinical disease occurred which resulted in the animal’s death.

USA
Infection with EIA virus was diagnosed in two horses in New York State and two in Oklahoma during this period.

EQUINE INFLUENZA (EI)

Germany
On 12th August 2016, Labor Dr. Böse GmbH, Harsum, confirmed a case of EI on premises in Lower Saxony, Germany. The affected animal presented with nasal discharge and had not been vaccinated. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

USA
On 27th July, a horse admitted to a veterinary hospital in California for elective surgery was confirmed positive for EI. A total of seven in-contact horses have also been diagnosed with the disease. The confirmed cases of the EI were moved to an isolation unit that was physically separate from the main barns. All appropriate biosecurity precautions were implemented with certain restrictions placed on horses admitted to the hospital until the outbreak was confirmed over.
Equine influenza is endemic in the USA. Outbreaks of the disease were also confirmed in Delaware, Florida, Kentucky, New Jersey and New York during the third quarter of 2016.

GETAH VIRUS

Japan
Getah Virus was confirmed in eight horses (seven two-year-olds and one three-year-old) on one premises between 2nd August 2016 and 17th September 2016. Five of the eight animals had not completed their vaccination programme. Clinical signs included pyrexia, oedema and rash with all horses. The positive diagnoses were made by PCR by the Equine Research Institute, Japan Racing Association.

EQUINE PIROPLASMOsis (EP)

USA
Two outbreaks of EP involving _Theileria equi_ were confirmed in Tennessee, one involving 17 horses under the care of the same trainer. A further outbreak of this same infection was diagnosed more recently in Wyoming and Utah. All confirmed cases of infection were in Quarter horse racehorses engaged in unsanctioned racing.

WEST NILE VIRUS ENCEPHALITIS (WNVE)

USA
WNVE was reported in 17 states with some 88 cases diagnosed. The vast majority had to be humanely euthanised or died. The majority of cases had incomplete vaccination histories against the disease.
Introduction

Theiler’s disease is an acute hepatic necrosis, and is a devastating disease affecting adult horses. It is associated with administration of equine biologic products (1,2) and is one of the commonest causes of acute hepatitis in horses (3). It was first reported by Arnold Theiler in 1919, after clinical signs of acute hepatopathy were found following vaccination using live virus and equine antiserum against African horse sickness (4). A number of outbreaks of Theiler’s disease have been reported in Europe and North America typically following the administration of hyperimmune equine plasma or serum to horses with various infectious (e.g. Western equine encephalitis virus, Bacillus anthracis, Streptococcus equi, Clostridium perfringens, and equine influenza virus) or toxic processes (e.g. tetanus). It has also been observed following administration of plasma in horses with colitis or following surgical correction of intestinal strangulation (5–8) and in horses receiving tetanus antitoxin routinely post-partum (7).

Aetiology

A previously unknown and highly divergent member of the Flaviviridae family (Genus: pegivirus) has been identified in serum from clinical cases of hepatitis and from equine plasma products administered to horses contracting the disease (9). A quantitative reverse transcription–PCR (qRT-PCR) assay was developed and applied to explore the epidemiology of infection. The kinetics of infection and disease symptoms in horses experimentally inoculated with equine plasma products were also examined. These studies provided evidence that this previously undescribed virus, designated “Theiler’s disease-associated virus” (TDAV), is the likely causative agent of Theiler’s disease (9).
The Flaviviridae include two genera, Hepacivirus and Pegivirus. These genera include 3 newly discovered equine viruses, Non-primate hepacivirus (NPHV), Equine Pegivirus (EPgV) and TDAV. Screening, for viraemia and for past exposure, through serological assays (10) demonstrated evidence of widespread and enzootic infection of NPHV and EPgV in the study horse population although no association with hepatopathy was found (10) and their clinical significance remains undetermined (11). Other than those infected where equine blood products had been administered, no evidence of systemic viraemia, or horizontal transmission has been identified for TDAV (10).

**Epidemiology**

Outbreaks have been identified in North America (7,12) and Europe (8). The incidence appears to be low.

**Clinical Signs**

Horses typically exhibit a rapid onset of signs indicative of widespread and acute hepatic insufficiency, usually progressing to hepatic failure. Signs include lethargy, anorexia, jaundice and photodermatitis. Fever, additional central nervous system signs (cortical blindness, ataxia, aggressive behavior, or coma), colic, (8) and abortion (7) have also been recorded. Morbidity rates associated with Theiler's disease outbreaks vary from slightly more than 1% to as high as 18%. Among clinically affected horses, Theiler's disease results in mortality rates between 50% and 90% (1,3,13). Foals appear to be resistant to the disease (14).

**Diagnosis**

Typically serum levels of liver enzymes (gamma-glutamyltransferase and aspartate transaminase), direct and indirect bilirubin, and bile acids are markedly elevated. Ultrasonographic imaging reveals a homogeneous pattern in most cases and sometimes a significant reduction in liver size as the condition progresses. In some cases, the damage is so severe that liver size will decrease in size within 24 hours of onset due to the level of necrosis (14).

These findings may occur from ten days to two to three months following administration of blood products. Subclinical cases exhibiting elevated liver enzymes but no overt clinical signs of hepatitis have also been observed (7). Postmortem studies of Theiler's disease cases have identified significant necrosis and degeneration in the liver.

A diagnosis of Theiler's disease is made on the basis of clinical findings, biochemical abnormalities characteristic of the disease, no known exposure to plant or chemical toxins, and knowledge that horses have been treated with equine biological products.

**Prevention and Control**

Currently no prevention or control is in place. The obvious association between the condition, the use of equine blood products, and the finding of TDAV within these products may necessitate screening of these products before future use. In the absence of screening of products and due to the idiosyncratic nature of the disease it is recommended that horses receiving equine biological products are monitored for clinical signs and abnormal clinicopathologic profiles (14).
Use of equine biological products, for example hyperimmune plasma or tetanus anti-toxin must come from a reputable source and have been screened for any infectious disease agents prior to marketing and use. It is a Veterinary Medicines Directorate (VMD) requirement that any of these extemporaneous products comply with the principles of Good Manufacturing Practice (GMP).

References

4. Theiler A. Acute Liver-Atrophy and Parenchymatous Hepatitis in Horses. Union of South Africa Dept of Agriculture 5th and 6th Repts of the Director of Veterinary Research. 1918;7–164.
A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 2. For CEM, 24 HBLB approved laboratories in the UK contributed data.

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

<table>
<thead>
<tr>
<th></th>
<th>Number of Samples Tested</th>
<th>Number Positive</th>
<th>Number of Contributing Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM (HBLB) PCR</td>
<td>333</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>CEMO (HBLB)</td>
<td>507</td>
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<td>24</td>
</tr>
<tr>
<td>CEMO (APHA)</td>
<td>1605</td>
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<tr>
<td><em>Klebsiella pneumoniae</em> culture</td>
<td>657¹</td>
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<tr>
<td><em>Klebsiella pneumoniae</em> PCR</td>
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<td><em>Pseudomonas aeruginosa</em> PCR</td>
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<td><em>Pseudomonas aeruginosa</em> culture</td>
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<td>Strangles culture*</td>
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<td>Strangles ELISA²</td>
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<td>Salmonellosis</td>
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<td>APHA Salmonellosis</td>
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<tr>
<td><em>Clostridium difficile</em> (toxin by ELISA or monochromatography)</td>
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<td>Borrelia (by ELISA)</td>
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<tr>
<td><em>Rhodococcus equi</em> culture/PCR</td>
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<tr>
<td>APHA <em>Burkholderia mallei</em> (Glanders)</td>
<td>977</td>
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<td>1</td>
</tr>
<tr>
<td>Lawsonia intracellularis culture/PCR</td>
<td>118</td>
<td>54</td>
<td>5</td>
</tr>
</tbody>
</table>

*CEMO = 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.

**APHA CEM data for the period July to September 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. These are followed up by an on-site official veterinary inquiry by the APHA, restrictions on the affected horse and repeat testing to clarify the health status of the horse.
APHA Salmonella results
Nine 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 (3 samples; 2 DT104 and 1 DT193) and single incidents of monophasic Salmonella Typhimurium 4,5,12:i:- DT193, S. Enteritidis PT9a, S. Agama, S. Bovismorbificans, S. Newport and S. Oslo. Salmonella Typhimurium DT193 (including the monophasic variant) and S. Bovismorbificans are associated primarily with pigs and DT193 is also found in cattle. S. Enteritidis PT9a is likely to be of duck origin. 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

Time period: 1st July to 30th September 2016

Contagious Equine Metritis (CEM)

Germany
CEM was confirmed by Labor Dr. Bose GmbH, Harsum in nine horses on eight premises during the third quarter of 2016 including in Icelandic horses (five stallions and one mare) and in three stallions of unknown breed. Positive diagnoses were made by culture and PCR on genital swabs.
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 third quarter 2016

<table>
<thead>
<tr>
<th></th>
<th>Number of Samples Tested</th>
<th>Number Positive</th>
<th>Number of Contributing Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass Sickness</td>
<td>16</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Hepatic toxicoses</td>
<td>61</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Atypical myopathy/ Seasonal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasture Associated Myopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Number of Samples Tested</th>
<th>Number Positive</th>
<th>Number of Contributing Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endoparasites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascarids</td>
<td>4731</td>
<td>88</td>
<td>17</td>
</tr>
<tr>
<td>Cyathostomes</td>
<td>1408</td>
<td>272</td>
<td>14</td>
</tr>
<tr>
<td>Dictyocaulus</td>
<td>116</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Strongyles</td>
<td>4878</td>
<td>2049</td>
<td>19</td>
</tr>
<tr>
<td>Tapeworms (ELISA based testing)</td>
<td>190</td>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td>Tapeworms (faecal exam)</td>
<td>3571</td>
<td>33</td>
<td>14</td>
</tr>
<tr>
<td>Strongyloides</td>
<td>4699</td>
<td>197</td>
<td>15</td>
</tr>
<tr>
<td><em>Oxyuris equi</em></td>
<td>539</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Fasciola</td>
<td>220</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Coccidia</td>
<td>470</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Cryptosporidia</td>
<td>17</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Theileria equi (cELISA)</td>
<td>56</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Babesia caballi (cELISA)</td>
<td>56</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>APHA Theileria equi (CFT)*</td>
<td>244</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>APHA Theileria equi (IFAT)**</td>
<td>303</td>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>APHA Theileria equi (cELISA)**</td>
<td>360</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>APHA Babesia caballi (CFT)*</td>
<td>244</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>APHA Babesia caballi (IFAT)**</td>
<td>303</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>APHA Babesia caballi (cELISA)**</td>
<td>360</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Ectoparasites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mites</td>
<td>288</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Lice</td>
<td>343</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Ringworm</td>
<td>314</td>
<td>53</td>
<td>12</td>
</tr>
<tr>
<td>Dermatophilus</td>
<td>126</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Candida</td>
<td>117</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

*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
(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.

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.

A total of 13 cases of equine grass sickness (EGS) were reported during the third quarter of 2016 (July - September), of which 46% occurred during July (n=6), 30% in August (n=4) and 23% in September (n=3). The majority occurred in England 85% (n=11) and the remaining 15% in Scotland (n=2). Just over thirty percent (n=4) of affected premises reported having a prior history of EGS cases.

The cases comprised 54% mares/fillies (n=7) and 46% geldings/stallions (n=6), with a median age of 6 years (range 2 – 23 years). Affected breeds were Cob/Cob cross (n=5), Welsh/Welsh cross (n=1), Native/Native cross (n=2) Warm-blooded horses (n=2) and other/not reported (n=3).

Over 60% of cases were reported to have acute EGS (n=8), 15% were reported to have sub-acute EGS (n=2) and 23% of cases were diagnosed with chronic EGS (n=3), of which all were reported to have survived to date. Diagnostic information was provided for 12 cases, of which the majority (83%, n=10) were diagnosed based on veterinary assessment of clinical signs alone. One was diagnosed via post mortem examination and one was made at laparotomy with diagnostic confirmation obtained by histopathological examination of an ileal biopsy sample.
East Anglia

A total of 28 cases were examined including 13 aborted fetuses and fetal membranes.

Of the 13 aborted fetuses examined, umbilical cord torsion was identified in nine cases. The cause of abortion could not be determined in four cases.

One cardiovascular case was examined which identified chronic pyogranulomatous and ulcerative mitral and aortic valvular endocarditis.

Two gastrointestinal cases were examined, in which a duodenal rupture was identified in one case, and a colonic torsion with haemorrhagic infarction and inguinal hernia of distal colon in the second case.

One case of hepatic disease was examined, in which Theiler’s disease was suggestive, but not confirmed as the inciting cause.

Seven musculoskeletal cases were examined. Of these, there was a single case of right bipartite and left tripartite navicular bones, of which fetal vascular disturbance has been hypothesised as the underlying pathomechanism for this condition. There were two fracture cases of which one identified a ventral skull fracture. One case of chronic septic synovitis of the left fore proximal interphalangeal joint, one case of erosive ulcerative osteoarthritis of the carpometacarpal joint, one case of chronic osteoarthritis of the distal interphalangeal joint of the left forelimb and one case of a full thickness fracture of the right (T14 - T15) and left (T13 - T14) ribs and dislocation and dislocation and fracture of the wings of T14. For this latter case, the pathology resulted in laceration of the caudal vena cava.

Three cases of neoplasia were examined, which identified one case of T-cell lymphoma, one case of multicentric mediastinal lymphoma and one case of a right frontal sinus adenocarcinoma with associated sinusitis and osteomyelitis.

A single case was examined where the cause of death was not determined, however there was no evidence of neoplastic proliferation or infectious disease.

Home Counties

A total of 14 cases were examined.

Nine cases of gastrointestinal disease were examined; single cases of gastric rupture, chronic small intestinal enteritis, large colon torsion, large colon impaction, grass sickness, peritonitis and ileal intussusception were diagnosed. Two cases identifying presumptive mesenteric aneurysm in the left cranio-ventral abdomen and a foreign body granuloma within the mesentery were also diagnosed.

One case of hepatic disease was examined, in which findings were compatible with chronic pyrrolizidine alkaloid toxicity.

One musculoskeletal case, which identified compression of the spinal vertebral canal at C3-C4 and C4-C5.

Two neurological cases were examined; a single case of neutrophilic meningitis with diffuse oedema and necrosuppurative myositis of the facial muscles with coagulase negative Staphylococcus identified on culture. And a single case of epilepsy, with no macroscopic or microscopic findings.
A single case, where the cause of death was not determined on post mortem, due to poor preservation and severe autolytic changes.

**Northern England**

*One case was examined.*

One musculoskeletal case was examined, identifying a pelvic fracture.

**Scotland**

*A total of four cases were examined.*

Two cases of gastrointestinal disease were examined which identified one case of equine grass sickness and one case of oesophageal hypertrophy and rupture.

One case of hepatic disease was examined, identifying fibrosis.

One musculoskeletal case was examined, identifying a fracture of the proximal phalanx.

**Southern England**

*One case was examined.*

One musculoskeletal case of an extensive comminuted fracture of the ischium with associated sacro-iliac instability. Secondary caecal dysfunction led to euthanasia under BEVA humane grounds.

**Northern Ireland**

*One case was examined.*

A single gastrointestinal case, which identified a small intestinal torsion and antemortem rupture of the stomach.
This report was compiled by the Animal Health Trust. We are extremely grateful to the following laboratories for contributing data for this report.

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
Arundel Equine Hospital
Axiom Veterinary Laboratory
Biobest Laboratories
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

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.

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

Animal Health Trust
Lanwades Park, Kentford, Newmarket, Suffolk CB8 7UU
Telephone: 01638 750659  Fax: 01638 555659
Email: equinesurveillance@aht.org.uk  Website: www.aht.org.uk