

AHT / BEVA / DEFRA Equine Quarterly Disease Surveillance Report



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HIGHLIGHTS IN THIS ISSUE

News Articles

- A call for increased Equine Influenza vigilance
- An update on the availability of Equip Artervac vaccine
- Amendment to Equine Infectious Anaemia testing for imported horses

Information Article

- Equine Influenza Classification

Focus Article

- *Salmonella* and salmonellosis – an overview

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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Welcome to the first quarterly equine disease surveillance report for 2018 produced by the 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 focused insight into the occurrence 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.

To receive reports free of charge, via e-mail, on a quarterly basis, register your details at: http://www.aht.org.uk/cms-display/DEFRA_AHT_BEVA_equine_reports.html

Current national and international disease outbreaks since 1st April 2018

National Disease Occurrence

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

On 1 April 2018, Rosssdales Laboratories, Newmarket confirmed a third case of EHV-1 abortion on a premises in Suffolk, on which previous cases had been confirmed on 7 and 26 March 2018 (see page 11 of this report). The affected animal was a vaccinated Thoroughbred mare. The positive diagnosis was confirmed by post mortem examination and PCR on fetal and placental tissues.

On 1 April 2018, the Animal Health Trust (AHT) confirmed a case of EHV-1 abortion on a premises in Sussex. The affected animal was a vaccinated non-Thoroughbred mare. On 7 April, AHT confirmed a second case of EHV-1 abortion on this premises. The affected animal was a vaccinated non-Thoroughbred mare. Another abortion was reported on 11 April at the premises but no confirmatory testing has been performed. On 13 April, AHT confirmed another case involving a congenitally infected foal that died at 36 hours old. The dam was a vaccinated non-Thoroughbred mare. On 26 April, a congenitally infected foal died at one-hour-old. For all four confirmed cases, the positive diagnoses were made by post mortem examination and PCR on fetal and placental tissues. In summary, the premises has had three abortions and two neonatal foal deaths.

On 17 April 2018, AHT confirmed a case of EHV-1 neonatal infection on a premises in Staffordshire. This case is linked to an EHV-1 neurological case reported on 27 March 2018 (see page 11 of this report). The affected animal was a 48-hour-old foal born to an unvaccinated dam. Two other mares on the premises have foaled healthy foals since the index neurological case and there is one mare yet to foal. The positive diagnosis was confirmed by post mortem examination and PCR on tissues.

On 24 April 2018, AHT confirmed a case of EHV-1 abortion on a premises in Berkshire. The affected animal was an unvaccinated non-Thoroughbred. The positive diagnosis was confirmed by PCR on fetal and placental tissues. No further details are available at this time.

For all above outbreaks, appropriate biosecurity measures, in accordance with HBLB Codes of Practice, have continued to be implemented and will continue as required.

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

On 6 April 2018, AHT confirmed two cases of EHV-4 respiratory infection on separate premises. The first case was confirmed in Sussex. The affected animal was a seven-year-old cob that presented with pyrexia and nasal discharge. The second case was confirmed in Yorkshire. The affected animal was an unvaccinated four-year-old that presented with pyrexia and nasal discharge. The positive diagnoses were confirmed by PCR on a nasopharyngeal swab and the affected animals have been isolated.

EQUINE INFLUENZA (EI)

On 17 April 2018, AHT confirmed a case of EI on a single premises in Oxfordshire. The affected animal was a vaccinated 13-year-old Warmblood gelding that presented with a cough and mild serous nasal discharge but was non-pyrexic. There are a total of 50, asymptomatic in-contacts at the premises, with six direct in-contacts testing negative by qPCR on nasopharyngeal swabs. Biosecurity measures have been implemented, including isolation of the affected animal and voluntary movement restrictions. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab which demonstrated a low positive result.

Please see page 7 for further information on EI, page 8 for an news update on EI and page 13 for information on EI classification

International Disease Occurrence

AFRICAN HORSE SICKNESS (AHS)

Swaziland

On 12 April 2018, the World Organisation for Animal Health (OIE) reported a case of AHS on a premises in Hhohho region, Swaziland. This index case presented with clinical signs on 15 March 2018 and was amongst a group of 46 susceptible animals. The premises is located in a game reserve where the horses are in close proximity to wild equids. The last reported occurrence of AHS in this region was 31 August 2017. Control measures implemented include; movement restrictions within the country, quarantine and vector control. The positive diagnosis was confirmed by ELISA on 4 April 2018 by Onderstepoort Veterinary Institute (OVI), South Africa (OIE Reference Laboratory).

EASTERN EQUINE ENCEPHALOMYELITIS (EEE)

USA

On 17 April 2018, The Florida Department of Agriculture and Consumer Services confirmed a case of EEE in a three-year-old American Paint Horse mare in Baker County. The horse became ill on 11 March 2018 and had to be euthanased the following day. The animal's vaccination history is unknown.

On 18 April 2018, it was reported that a horse in Hamilton County, Florida tested positive for EEE. The disease was diagnosed in an unvaccinated 17-year-old Welsh Pony that became clinically ill on 3 April 2018 and had to be euthanased the following day.

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

Table 1: International EHV-1 abortion cases reported for the first quarter 2018

<i>Location</i>	<i>Report Date</i>	<i>Vaccinated</i>	<i>Total affected</i>	<i>In-contact</i>	<i>Sample and diagnostics</i>	<i>Source</i>
Aisne, France	9 April	NK	1	NK	PCR on fetal tissues	RESPE
Calvados, France	12 April	Yes	3	6	PCR on fetal tissues	RESPE
Calvados, France	24 April	NK	1	NK	PCR on placental tissues	RESPE
Calvados, France	25 April	NK	1	NK	PCR on fetal tissues	RESPE
Zealand, Denmark	27 April	NK	2	NK	PCR on fetal tissues	Chief Veterinary Surgeon for Charlottenlund Trotting Track & Klampenborg Racing Track, Denmark

NK= not known, PCR = polymerase chain reaction

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

Belgium

On 7 April 2018, Equi Focus Point Belgium (EFPB) reported a case of EHV-1 respiratory infection on a premises in Anvers, Belgium. The affected animal was an unvaccinated 12-year-old that presented with nasal discharge, pyrexia, coughing and dysphagia. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab on 5 April 2018.

On 10 April 2018, EFPB reported two separate cases of EHV-1 respiratory infection. The first was on a premises in Gent, Belgium. The affected animal was unvaccinated and presented with nasal discharge and coughing. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab on 6 April 2018. The second case was on a premises in Bruges, Belgium. The affected animal was vaccinated and presented with a cough and nasal discharge. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab on 9 April 2018.

France

On 6 April 2018, Réseau d'Épidémiologie-Surveillance en Pathologie Equine (RESPE) reported a case of EHV-1 respiratory infection on a premises in Calvados, France.

On 9 April 2018, RESPE reported two separate outbreaks of EHV-1 respiratory infection. The first was on a premises in Gironde, France, where there were two affected animals. The second outbreak was on a premises in Paris, France, where there have been four confirmed cases, with a total of six animals at the premises.

On 13 April 2018, RESPE reported a case of EHV-1 respiratory infection on a premises in Mayenne, France.

For all the above outbreaks in France, positive diagnoses were confirmed by PCR on nasopharyngeal swabs by LABEO-Frank Duncombe, Normandy, France.

USA

On 23 April 2018, The California Department of Agriculture and Consumer Services confirmed an outbreak of EHV-1 respiratory infection. There were two affected animals that both presented with pyrexia. They were housed in a quarantine barn in Orange County. Both horses have been placed in separate isolation stabling on the property. Exposed horses on the facility have been placed under quarantine and are continuing to be monitored closely.

On 23 April 2018, The Georgia Department of Agriculture confirmed a case of EHV-1 respiratory infection in a miniature mule located in Cherokee County. The mule died as a result of complications related to pneumonia. Quarantine restrictions have been placed on the property. Other exposed equines on the facility are being monitored for any clinical signs.

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

Denmark

On 27 April 2018, the Chief Veterinary Surgeon for Charlottenlund Trotting Track & Klampenborg Racing Track, Denmark, reported an outbreak of EHV-1 neurological disease affecting three separate premises. An outbreak was confirmed on a riding school in Funen with around 30% of the horses on the premises presenting with transient pyrexia and of these, two developed neurological signs. Quarantine restrictions have been put in place at two separate private stables after some of the horses presented with pyrexia after attending an event at the index premises. An equine hospital in Funen has been treating two cases of EHV-1 neurological disease and these have been isolated. The premises of origin for these two cases have not been confirmed.

France

On 24 April 2018, RESPE reported a case of EHV-1 neurological disease on a premises in Sarthe, France. The positive diagnosis was confirmed by PCR on spinal cord tissue by LABEO-Frank Duncombe, Normandy. No further details about this case are currently available

USA

On 3 April 2018, The Michigan Department of Agriculture confirmed the first case of EHV-1 neurological disease in the state in 2018. The affected animal was a five-year-old Standardbred gelding located in Washtenaw County that presented with sudden onset of neurological signs, weakness in the hind limbs and difficulties in urination. The horse was placed in isolation and is currently under veterinary care.

On 12 April 2018, The South Dakota Board of Animal industry has confirmed EHV-1 neurological disease in a horse in Lincoln County, South Dakota. The affected animal presented with neurological signs including incoordination and difficulty walking. The horse has been treated in a local veterinary clinic.

On 13 April 2018, the California Department of Agriculture and Consumer Services confirmed a case of EHV-1 neurological disease in a 17-year-old Thoroughbred gelding on a facility in Orange County. The horse was exhibiting neurological signs and has been isolated in an offsite location.

On 23 April 2018, the office of the Colorado State Veterinarian reported a case of EHV-1 neurological disease in a horse exhibiting neurological signs in Weld County. The horse is currently undergoing treatment and is making a recovery. A quarantine has been imposed on the premises and the management have suspended all activities until further notice.

On 26 April 2018, The North Dakota Department of Agriculture has confirmed a case of EHV-1 neurological disease in a barrel-racing horse in Bowman County. The horse was ill on 19 April, following which the disease rapidly progressed, necessitating euthanasia.

For all above outbreaks, facilities have been placed under quarantine restrictions and all horses are being closely monitored.

EQUINE HERPES VIRUS–4 (EHV-4) ABORTION

France

On 9 April 2018, RESPE reported a single case of EHV-4 abortion on a premises in Ardennes, France. The positive diagnosis was confirmed by PCR on fetal tissues by LABEO-Frank Duncombe, Normandy, France.

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

France

On 19 April 2018, RESPE reported three separate outbreaks of EHV-4 respiratory infection. The first was on a premises in Orne, France and there are no further details regarding the case. The second outbreak was on a premises in Mayenne, France. There has been one confirmed case, which is a vaccinated Thoroughbred that presented with pyrexia and ataxia, with a further 17 of 70 animals on the premises displaying signs of pyrexia but no neurological signs. The third case is on a premises in Maine-et-Loire, France. The affected animal presented with pyrexia and nasal discharge. The positive diagnoses were confirmed by PCR on a nasopharyngeal swab by LABEO-Frank Duncombe, Normandy.

On 27 April 2018, RESPE reported a case of EHV-4 respiratory infection on a premises in Calvados, France. The affected animal is a three-year-old French Saddlebred that presented with pyrexia, nasal discharge, coughing and lethargy. There are a total of 50 horses on the premises. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

EQUINE INFLUENZA (EI)

Argentina

On 5 April 2018, the OIE reported an outbreak of EI in Argentina. The outbreak was confirmed in Mendoza on 20 March and further reports confirmed outbreaks in San Isidro, La Plata and Palermo. Further investigation into the outbreak in Mendoza identified a link with cases that occurred at the beginning of March 2018 in the locality neighbouring El Barreal, in the province of San Juan, Argentina. The contact of equines (mules and horses) with animals from Chile is frequent in San Juan during the moves to summer pastures that happen in areas of the Andes Mountains. The temporary association suggests an epidemiological relationship with the ongoing EI outbreaks in Chile reported in January 2018. Positive diagnoses were confirmed by PCR by the National Laboratory (SENASA).

EQUINE INFECTIOUS ANAEMIA (EIA)

Germany

On 4 April 2018, the competent local authorities of Landkreis Ludwigslust-Parchim have officially reported a case of EIA in a horse on a premises in the area of the city of Hagenow, Mecklenburg-Vorpommern, Germany. The positive test result was confirmed by the Friedrich-Loeffler-Institute, the National Reference Laboratory for EIA in Germany. According to the official notification, this is the first confirmed case of EIA in Mecklenburg-Vorpommern for several decades. Control measures, such as movement restrictions and epidemiological investigations have been implemented according to the Animal Disease Regulation applicable for EIA outbreaks in Germany.

Greece

On 13 April 2018, the OIE reported a case of EIA on a premises in Macedonia, Greece. The affected animal was not displaying any clinical signs and was tested after transport of animals in the Regional Unit of Kastoria. The positive diagnosis was made by antibody detection ELISA on 21 March 2018 by the Directorate of Athens Veterinary Center (National laboratory). There are three in-contacts at the premises. Control measures implemented include; movement restrictions and tracings. The last confirmed occurrence of EIA in the country was March 2016.

USA

On 12 April 2018, The Texas Animal Health Commission (TAHC) confirmed a case of EIA in a horse in Liberty County, Texas. The horse has been euthanased and the premises placed under quarantine restrictions until further notice.

On 17 April 2018, The Iowa Department of Agriculture confirmed EIA in two horses in Polk County, Iowa. Both horses have been euthanased. The premises has been placed under quarantine restrictions which will remain in force until the requirements for release have been met.

A look at: Equine Influenza (EI)

Virus classification: Genus: orthomyxoviridae. Enveloped, single-stranded RNA

Transmission: Highly infectious. Incubation of one-3 days after infection. Horizontal transmission; predominantly by aerosolisation, also by fomites

Clinical signs: Harsh, dry cough. Pyrexia (up to 41°C). Inappetance. Serous nasal discharge, which may become mucopurulent if secondary bacterial infection occurs. Conjunctivitis. Swollen limbs. Lymphadenopathy. Signs may be mild in vaccinated horses and EI should be suspected in any vaccinated case demonstrating non-specific respiratory signs

Laboratory diagnosis: Testing infectious status – nasopharyngeal swab for PCR. Serology for immune status – haemagglutination inhibition test, if high titre; demonstrates previous exposure or vaccination. If seroconversion on paired samples; demonstrates recent vaccination or infection

Control in an outbreak: Early detection of clinical cases. Isolation of infected animals. Symptomatic treatment of infected animals including; anti-inflammatories and nursing care. Antibiotics only indicated if secondary bacterial infection develops. Testing of in contacts to determine infectious status. Vaccination of in contacts in an outbreak (despite vaccination status)

Geographic distribution: Present worldwide

Prevention: Vaccination. Preventative biosecurity measures on and off home premises.

Notifiable in the UK: No

Zoonotic Risk: None recognised but confirmed transmission to canines in certain circumstances

For more information visit <http://equiflunet.org.uk/>

News Articles

An increased risk for Equine Influenza (EI) in the UK following an outbreak in Argentina and Chile

The Argentinian authorities have notified the OIE of an increase in morbidity and geographic distribution of Equine Influenza H3N8 (see page 6 for the detailed report), possibly related to the recent outbreaks in Chile (see page 17 for the detailed report) through the movement of equines during the summer to pastures around the Andes. Argentinian horses stabled at hippodromes in Mendoza, Buenos Aires, Chubut and San Juan regions were affected.

Experts at the Animal Health Trust have not been able to ascertain whether this is a vaccine delivery or vaccine efficacy problem. The most likely virus is a H3N8 Florida sublineage Clade 1 which is represented in some but not all EU EI vaccines currently in use (for details of UK flu vaccine strains please see http://www.aht.org.uk/cms-display/equiflunet_vaccine_strains.html or page 13 of this report).

This clade of EI viruses has not been detected circulating in the UK since 2009. However, this year, two unvaccinated, yearling, non-Thoroughbreds that had just been imported from Europe to the UK tested positive for EI. The horses presented with pyrexia, nasal discharge and coughing and were isolated. The positive diagnoses were confirmed by qPCR on a nasopharyngeal swab (see page 12 for the detailed report). Both samples were confirmed for **Florida Clade 1** in February 2018.

On the basis of the information from Argentina, the number of recent consignments of polo ponies and the start of the polo competition season, we would like to remind you about the **risk of equine influenza** and the benefits of vaccination for the health and welfare of animals.

To test suspect cases **FREE OF CHARGE**, sign up to the HBLB Surveillance Scheme, which enables the Animal Health Trust to test a nasopharyngeal swab and paired blood samples. Enter your details at http://www.aht.org.uk/cms-display/equiflunet_register.html to sign up and AHT will send you sampling kits, including swabs and submission forms.

An update on the availability of Equip Artervac vaccine for Equine Viral Arteritis (EVA)

We are pleased to report that Zoetis' Equip Artervac EVA vaccine is **now available again** and veterinary surgeons can obtain supplies from their wholesalers.

We therefore recommend that all stallions that were booster vaccinated or completed their primary vaccine course in November 2017 are **booster vaccinated again now** before they lapse beyond their six-month booster interval, which is a manufacturer's requirement for this vaccine. In this situation where the booster will be administered within six months of the last vaccination there **is no need for further serological testing** prior to vaccination.

The Animal Health Trust's (AHT) serological monitoring scheme (see http://www.aht.org.uk/cms-display/Equip_Artervac%20.html) was initiated as a precautionary measure. If, for whatever reason, stallions were last vaccinated **more than six months ago**, they will have 'lapsed' according to the manufacturer's recommendations. In this situation, stallions will need to continue with the AHT's blood sampling schedule to further investigate their EAV status, **prior to recommencement of vaccination**.

Zoetis, the vaccine manufacturer, have indicated to the AHT that they will be happy to help interpret each situation individually in order to find the best resolution.

If veterinary surgeons wish to discuss any of these points further, to help advise their clients, they are welcome to contact:

Dr Richard Newton, FRCVS, Director of Epidemiology and Disease Surveillance at the Animal Health Trust, Newmarket. E-mail: richard.newton@aht.org.uk; telephone: 01638 751000

Dr Wendy Talbot, MRCVS, Zoetis (UK) National Equine Veterinary Manager has agreed that she may be contacted, where appropriate, at their customer support number 0845 300 8034.

Equine Infectious Anaemia (EIA) testing for horses imported from countries outside of EU member states

Correspondence from the Directorate General for Health and Food Safety, European Commission, summarised the animal health and veterinary certification conditions for the entry into the Union of equidae from countries outside EU member states. These conditions were adopted on 12 April 2018 and will apply as of 1 October 2018.

These entry conditions now foresee **equivalence** between Agar Gel Immunodiffusion (AGID) Coggins test and the ELISA for EIA testing and this has been recommended by the World Organization for Animal Health (OIE).

The laboratory in the United States which performs the tests for export certification has migrated the testing for EIA from AGID to ELISA. In a recent consignment of horses arriving from the USA, this was correctly recorded in the accompanying certificate by amending the relevant attestation set out in Annex II (C) to Decision 93/197/EEC.

In order to avoid trade problems, please be aware of this revision. Consignments in which the test for EIA is indicated as 'ELISA' and the 'Coggins test' is deleted are valid conditions for entry.

VIROLOGY

disease report for the first quarter 2018

The results of virological testing for January to March 2018 are summarised in Table 2 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. No equine viral notifiable diseases have been confirmed in the UK during this first quarter of 2018.

Table 2: Diagnostic virology sample throughput and positive results for the first quarter of 2018

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Serological Tests			
EVA ELISA	4649	92	6
EVA VN	1051	276#	4
APHA EVA VN	668	28#	1
EHV-1/-4 CF test	439	48*	3
EHV-3 VN test	2	0	1
ERV-A/-B CF test	74	3*	1
Influenza HI test	185	1*	1
EIA (Coggins)	651	0	5
EIA ELISA	3867	0	6
APHA EIA (Coggins)	755	0	1
APHA WNV (cELISA)	2	0	1
Rotavirus ELISA	44	1	4
Virus Detection			
Coronavirus PCR	13	0	1
EHV-1 PCR	636	12	5
EHV-4 PCR	636	15	5
EHV-2 PCR	58	1	2
EHV-5 PCR	58	23	2
EHV VI	29	14	1
Influenza PCR	255	1	3
APHA Influenza PCR	164	0	1
Influenza VI in eggs	1	1	1
EVA VI/PCR	3	0	1
APHA EVA VI/PCR	2	0	1

ELISA = enzyme-linked immunosorbent assay, VN = virus neutralisation, CF = complement fixation, HI = haemagglutination inhibition, Coggins = agar gel immune diffusion test, PCR = polymerase chain reaction, VI = virus isolation, EVA = equine viral arteritis, EHV = equine herpes virus, ERV = equine rhinitis virus, EIA = equine infectious anaemia, WNV = West Nile Virus, # = Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera

Time period: 1 January to 31 March 2018

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

There were a total of five confirmed cases from four outbreaks

On 2 January 2018, AHT confirmed a case of EHV-1 abortion on stud premises in Suffolk. The affected animal was a vaccinated Thoroughbred mare that was grouped with four other mares on the premises. Appropriate biosecurity measures, in accordance with The Horserace Betting Levy Board (HBLB) Codes of Practice, were implemented. The positive diagnosis was confirmed by post mortem examination and qPCR on fetal and placental tissues. An update three weeks later confirmed no further EHV-1 abortions had occurred.

On 2 March 2018, Rossdales Laboratories, Newmarket confirmed a case of EHV-1 abortion on a premises in Yorkshire, affecting a vaccinated, 12-year-old Thoroughbred mare, with six other in-contact broodmares at the time of the abortion. Another mare on the premises foaled a live foal on the same day that then died at one day old and testing on this case by Rossdales Laboratories also confirmed EHV-1 infection as the cause of neonatal foal death. A further two mares aborted and a presumptive diagnosis of EHV-1 abortion was made. The premises separately accommodates racehorses in training with a reported history of pyrexia and respiratory signs in some of the younger horses over the preceding few weeks. The British Horseracing Authority (BHA) have been informed with race entries stopped until further laboratory testing has been conducted to demonstrate there is no active EHV-1 infection. On 27 March 2018, the outbreak was confirmed to be resolved.

On 4 March 2018, AHT confirmed a case of EHV-1 abortion on a premises in Suffolk, affecting a vaccinated Thoroughbred mare. This outbreak is epidemiologically linked to the above Yorkshire outbreak. The mare had been resident at the stud in Yorkshire and was moved prior to the first abortion there, she had been kept in isolation following the outbreak confirmation and thus aborted in isolation.

On 7 March 2018, Rossdales Laboratories, Newmarket confirmed a case of EHV-1 abortion on a premises in Suffolk, England. The affected animal was a vaccinated Thoroughbred mare. On 26 March 2018, Rossdales Laboratories confirmed a second case of EHV-1 abortion on this premises. The affected animal was a vaccinated Thoroughbred mare. Please see the current national disease outbreak section for an update (page 3 of this report).

For all above outbreaks, positive diagnoses were confirmed by post mortem examination and PCR on fetal and placental tissues. Appropriate biosecurity measures, in accordance with HBLB Codes of Practice, were implemented and continued as required.

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

On 27 March 2018, AHT confirmed a case of EHV-1 neurological disease on a premises in Staffordshire, affecting a single isolated pregnant non-Thoroughbred mare that initially presented with pyrexia but subsequently developed ataxia and became recumbent. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab. Please see the current national disease outbreak section for an update (page 3 of this report).

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

There were a total of four confirmed cases from two outbreaks

On 19 January 2018, AHT confirmed a case of EHV-1 respiratory infection in Sussex. The affected animal was an unvaccinated eight-year-old Warmblood that presented with poor performance and chronic lower airway disease. The diagnosis of EHV-1 infection is considered of undetermined clinical significance in this chronic case. The positive diagnosis was obtained by PCR on a bronchoalveolar lavage sample. Quarantine restrictions were imposed at the premises. On 23 January 2018, the Animal Health Trust confirmed two further cases of EHV-1 respiratory infection linked to this case. The affected animals were direct in-contacts with the first reported case. They were unvaccinated and displayed no clinical signs. The positive diagnoses were obtained by qPCR on nasopharyngeal swabs. There are 30 horses on the premises, with five in the direct in contact group. The total number of positive cases in this group is three, with the two others in this group testing negative by qPCR on nasopharyngeal swabs. Quarantine restrictions are continuing at the premises and all horses are being closely monitored.

On 8 March 2018, AHT confirmed a single case of EHV-1 respiratory infection in Lincolnshire, England. The affected animal was a 10-year-old unvaccinated non-Thoroughbred that presented with serous nasal discharge. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab and the affected animal was isolated.

EQUINE HERPES VIRUS-4 (EHV-4) ABORTION

On 4 January 2018, AHT confirmed a case of EHV-4 abortion on a premises in Suffolk, England. The affected animal was an unvaccinated four-year-old non-Thoroughbred mare that presented with pyrexia and premature lactation one week prior to aborting. There is only one in contact gelding at the premises. The positive diagnosis was confirmed by post mortem examination and qPCR on fetal and placental tissues.

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

Table 3: EHV-4 respiratory disease cases reported in the UK for the first quarter 2018 (source – AHT)

<i>Location</i>	<i>Report Date</i>	<i>Clinical signs</i>	<i>Vaccinated</i>	<i>Total affected</i>	<i>In-contacts</i>	<i>Sample</i>	<i>Diagnostics</i>
Northern England	8 Jan	Nasal discharge	No	1	7	NP swab	PCR
Suffolk	15 Jan	Pyrexia	No	1	NK	NP swab	PCR
Herefordshire	23 Jan	Mucopurulent nasal discharge Lymphadenopathy	No	1	NK	NP swab	PCR
Sussex	26 Jan	Pyrexia Nasal discharge	NK	1	NK	NP swab	PCR
Lincolnshire	14 Feb	Pyrexia Serous nasal discharge Inappetence	NK	1	NK	NP Swab	PCR
Gloucestershire	22 Feb	Pyrexia	No	1	NK	NP swab	PCR
Gloucestershire	5 Feb	Pyrexia Nasal discharge	No	2	30	NP swab	PCR

NK= not known, NP = nasopharyngeal, PCR = polymerase chain reaction

EQUINE INFLUENZA (EI)

On 26 February 2018, AHT confirmed an outbreak of EI on a single premises in East Lothian, Scotland. The two affected animals were unvaccinated, recently imported non-Thoroughbreds aged one and two-years-old respectively. They presented with pyrexia, nasal discharge and coughing. The positive diagnoses were confirmed by qPCR on nasopharyngeal swabs.

Sequence analysis by the Animal Health Trust showed that the H3N8 virus belonged to Florida Clade 1 sublineage. This is a significant finding as Florida Clade 1 viruses have not been reported to have been isolated in the UK since 2009 and in Europe since 2011 (Sweden).

Please see the next page for information regarding EI classification. Also see page 7 for further information on EI and page 8 for a news update on EI.

Equine Influenza Classification

Isolates of equine influenza virus are classified by subtype, the location and year of isolation. The subtype is based on the envelope glycoproteins; haemagglutinin (HA) and neuraminidase (NA).

There are two subtypes of equine influenza. The H7N7 subtype was first identified in the 1950s (prototype strain: A/eq/Prague/1/56) and has not been isolated in over 20-30 years. The H3N8 subtype was first seen in the 1960s (prototype strain: A/eq/Miami/1/63) and is the only currently circulating subtype.

As the virus circulates, it undergoes antigenic drift, which involve a series of mutations that enable the virus to evade host immunity. In the 1980s, the H3N8 subtype diverged and this is when the American and Eurasian lineages arose. The American lineage has diverged further into Kentucky, South American and Florida sublineages. The Florida sublineage has further divided into two separate clades; Clade 1 and Clade 2.

Current OIE vaccine strain recommendations

Required strains include Florida Clade 1 strain (South Africa/03 or Ohio/03-like) AND Florida Clade 2 strain (Richmond/1/07-like)

Strains no longer required include the H7N7 strain and the Eurasian strain

A summary of the currently available vaccines in the UK:

Equip F

European H3N8 - Borlänge/91
American H3N8 - Kentucky/98
H7N7 - Newmarket/77

Equilis Prezenza

European H3N8 - Newmarket/2/93
Florida Clade 1 H3N8 - South Africa/4/03

ProteqFlu

Florida Clade 1 H3N8 -Ohio/03
Florida Clade 2 H3N8 -Richmond/1/07

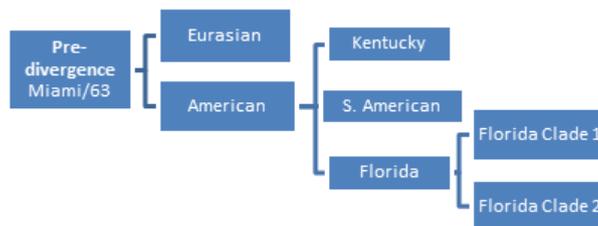


Figure 1: The evolution of Equine Influenza H3N8 subtype from 1963 through to 2018

Florida **Clade 1** strains are predominantly found in the **Americas**, whereas **Clade 2** strains are predominantly found in **Europe and Asia**.



HBLB Surveillance Scheme

Animal Health Trust can test a nasopharyngeal swab and paired blood samples from suspected cases of equine influenza **FREE OF CHARGE** in our diagnostic laboratories, funded by the HBLB. Enter your details at http://www.aht.org.uk/cms-display/equiflunet_register.html to sign up and AHT will send you sampling kits, including swabs and submission forms.



Tell-Tail Text Message Alert Scheme

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, equine herpes abortion and equine herpes neurological disease in the UK via text message. Sign up to receive alerts at <http://diseaseoutbreaks.merial.co.uk/>

INTERNATIONAL VIRAL DISEASE OCCURRENCE

Time period: 1 January to 31 March 2018

EASTERN EQUINE ENCEPHALITIS (EEE)

USA

There were a total of two confirmed cases from two outbreaks

On 1 February 2018, The Florida Department of Agriculture and Consumer Affairs confirmed a case of EEE in a two-year-old Miniature Horse gelding in St. Johns County. The gelding exhibited clinical signs on 10 January and was euthanased on 16 January. Vaccination status was unknown.

On 28 February 2018, a horse in Nassau County, Florida, was confirmed positive for EEE. The seven-year-old Quarter Horse mare became clinical on 31 January and was euthanased. Vaccination status was unknown.

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

Table 4: International EHV-1 abortion cases reported for the first quarter 2018

Location	Report Date	Breed	Vaccinated	Total affected	In-contact	Sample and diagnostics	Source
Nordrhein Westfalen, Germany	9 Jan	Thoroughbred	Yes	1	100, including 12 in-foal	NK	University of Hannover
Orne, France	29 Jan	NK	NK	1	NK	PCR on fetal and placental tissues	RESPE
ID, USA	9 Feb	Quarter Horse	Yes	1	NK	NK	EDCC
Ain, France	16 Feb	NK	NK	1	NK	PCR on fetal and placental tissues	RESPE
Calvados, France	22 Feb	French Trotter		2	7	PCR on fetal and placental tissues	RESPE
Gironde, France	21 March	Thoroughbred	NK	1	60	PCR on fetal and placental tissues	RESPE
Calvados, France	23 March	NK	NK	1	NK	PCR on fetal and placental tissues	RESPE
Orne, France	26 March	Thoroughbred	NK	1	130	PCR on fetal tissues	RESPE
Meurthe-et-Moselle, France	26 March	French Saddlebred	No	4	30	PCR on blood (2), PCR on fetal tissues (1) presumptive (1)	RESPE
Calvados, France	26 March	NK	NK	NK	NK	PCR on fetal and placental tissues	RESPE

NK= not known, PCR = polymerase chain reaction

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

France

On 22 March 2018, RESPE reported an outbreak of EHV-1 neurological disease in Ille-et-Vilaine, France. There have been eight confirmed cases by PCR on nasopharyngeal swabs, with a total of 80 animals at the premises. Affected animals presented with pyrexia and neurological signs. Control measures include isolation of affected animals and quarantine of the premises.

USA

Table 5: EHV-1 neurological disease outbreaks reported in USA for the first quarter 2018 (source – Equine Disease Communication Center)

<i>Location</i>	<i>Report Date</i>	<i>Clinical signs</i>	<i>Vaccinated</i>	<i>Outcome</i>	<i>Total affected</i>	<i>In-contacts</i>
New Bolton Center, PA	18 Jan	Pyrexia Neurological signs	NK	Euthanased	1	NK
Albemarle County, VA	24 Jan	Pyrexia	NK	NK	1	NK
Portland Meadows Racetrack, OR	30 Jan	NK	NK	NK	1	NK
Jerome County, ID	31 Jan	Ataxia Loss of tail tone Urine dribbling	Yes	Euthanased	1	60
Chesterfield County, VA	2 Feb	Pyrexia Neurological signs	NK	NK	1	NK
Boone County, KY	5 Feb	Neurological signs	NK	Euthanased	1	NK
Campbell County, WY	6 Feb	Ataxia Weakness Recumbency	NK	Euthanased	2	10
Gooding County, ID	9 Feb	Ataxia	NK	Euthanased	1	NK
Campbell County, WY	12 Feb	NK	NK	NK	1	17
Campbell County, WY	12 Feb	NK	NK	NK	1	9
Washington County, PA	12 Feb	NK	NK	NK	2	NK
Maricopa County, AZ	13 Feb	Neurological signs	NK	NK	1	NK
Bannick County, ID	14 Feb	Pyrexia Ataxia Neurological signs	NK	Euthanased (2 cases)	3	NK
Chester County, PA	19 Feb	Ataxia	NK	NK	1	NK
Belmont Park, NY	19 Feb	Neurological signs	NK	Euthanased	1	NK
Los Alamitos, CA	22 Feb	Neurological signs	NK	Euthanased	1	NK
KY	26 Feb	Neurological signs	NK	NK	1	NK
Maricopa County, AZ	27 Feb	Pyrexia Ataxia	NK	NK	1	NK
Washington County, PA	27 Feb	NK	NK	NK	2	NK
Fredericksburg, VA	1 Mar	NK	NK	NK	1	NK
Powhatan County, VA	1 Mar	NK	NK	NK	1	NK
Queen Creek, AZ	5 Mar	Neurological signs	NK	NK	1	NK
Union County, NJ	21 Mar	NK	NK	NK	1	NK

NK= not known. There is no further information regarding the tests performed to confirm a positive diagnosis

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

France

There were a total of three confirmed cases from three outbreaks

On 2 February 2018, RESPE reported a case of EHV-1 infection in Essonne, France. The affected animal is a French Trotter that presented with pyrexia.

On 27 March 2018, RESPE reported three cases of EHV-1 respiratory infection on a premises in Maine-et-Loire, France.

On 29 March 2018, RESPE reported a single case of EHV-1 infection on a premises in Sarthe, France.

For all cases, the positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

USA

There were a total of six confirmed cases from six outbreaks

On 12 January 2018, the New York Racing Association reported a single case of EHV-1 infection in Belmont Park, New York. The affected animal presented with pyrexia and respiratory signs.

On 24 January 2018, The Pennsylvania Department of Agriculture reported a case of subclinical EHV-1 infection in a Standardbred horse at The Meadows Racetrack, Washington, Pennsylvania. All exposed horses are being monitored daily for signs of disease.

On 6 February 2018, The Ohio Department of Agriculture confirmed EHV-1 infection in four horses at separate locations around the state. Multiple premises have been placed under quarantine restrictions and investigations are on-going into where these animals have been and what other animals might have been exposed. Two of the animals raced at Meadows Racetrack and Casino in Washington, Pennsylvania. Neither of these horses is reported to have exhibited clinical signs of illness. The remaining two horses are at the University of Findlay and these also have not so far presented with signs of illness. The equine facilities at Findlay have been placed under quarantine restrictions.

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

France

Table 6: EHV-4 respiratory disease outbreaks reported in France for the first quarter 2018 (source – RESPE)

<i>French department</i>	<i>Report Date</i>	<i>Clinical signs</i>	<i>Vaccinated</i>	<i>Total affected</i>	<i>In-contacts</i>	<i>Sample</i>	<i>Diagnostics</i>
Calvados	18 Jan	NK	NK	1	NK	NP swab	PCR
Charente	24 Jan	NK	NK	1	70	NP swab	PCR
Calvados	31 Jan	NK	NK	1	NK	NP swab	PCR
Pas-De-Calais	31 Jan	NK	NK	1	NK	Tracheal wash	PCR
Var	31 Jan	NK	NK	1	NK	Blood	PCR
Calvados	2 Feb	Pyrexia ND	NK	1	NK	NP swab	PCR
Orne	5 Feb	Pyrexia ND	NK	2	NK	NP swab	PCR
Calvados	26 Feb	Subclinical	NK	1	NK	NP swab	PCR
Pas-De-Calais	1 March	NK	NK	1	NK	NP swab	PCR
Seine-et-Marne	8 March	Pyrexia ND Coughing	NK	1	NK	NP swab	PCR
Orne	26 March	NK	NK	1	NK	NP swab	PCR
Cher	29 March	Pyrexia	Yes	1	15	NP swab	PCR
Landes	29 March	NK	NK	NK	NK	NP swab	PCR

NK= not known, ND = nasal discharge NP = nasopharyngeal, PCR = polymerase chain reaction

EQUINE INFECTIOUS ANAEMIA (EIA)

Canada

On 21 February 2018, The Canadian Food Inspection Agency reported a case of EIA on a premises in Strathcona County, Alberta. At the time of sampling, the affected animal exhibited clinical signs consistent with those of EIA. It was euthanased shortly afterwards. Quarantine restrictions were imposed on the premises and any on-premises contacts were followed up in accordance with current program policy.

France

On 2 January 2018, RESPE reported a case of EIA in Alpes Maritimes, France. The affected animal presented with clinical signs consistent with the disease and was euthanased. Appropriate prevention and control measures were instigated for the two in contacts.

On 18 January 2018, RESPE reported a case of EIA in Var, France. The outbreak is epidemiologically linked to the above outbreak reported on 2 January 2018. The infected horse, a Saddlebred, has been euthanased and appropriate prevention and control measures will be instigated for the one in contact. The positive diagnosis was confirmed on 12

January 2018 by Ministère de l'Alimentation et de l'Agriculture et de la Pêche, France.

Slovakia

On 13 February 2018, the OIE reported a case of EIA in Banska Bystrica, Slovakia. The affected animal was not showing any clinical signs and the positive diagnosis was confirmed by Veterinary Institute in Zvolen (national laboratory). Quarantine restrictions were put in place.

USA

On 6 February 2018, The Texas Animal Health Commission (TAHC) confirmed EIA in one Quarter Horse in Wilson County and in another in Walker County, Texas.

On 8 March 2018, TAHC confirmed a case of EIA in a Quarter Horse in Bastrop County, Texas. The positive horse has been euthanased and the premises will remain under quarantine restrictions until requirements for release have been met.

EQUINE INFLUENZA (EI)

Chile

On 23 January 2018, the OIE reported an outbreak of EI in Metro. De Santiago, Chile. The index case presented on 8 January 2018. Affected animals are unvaccinated and the subtype was confirmed as H3N8. Positive diagnoses were confirmed by PCR on nasopharyngeal swabs by Lo Aguirre (national laboratory). Surveillance and control measures are ongoing. Please see page 7 for further information on EI, page 8 for a news update on EI and page 13 for EI classification information.

USA

On 12 January 2018, EI was confirmed in a group of approximately 50 horses in Cochise County, Arizona. Personnel involved have been requested to place affected barns under quarantine. Vaccination status of exposed horses is unknown.

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

BACTERIOLOGY

disease report for the first quarter of 2018

A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 7. For Contagious Equine Metritis (CEM), 22 of the 23 BEVA approved laboratories in the UK contributed data.

No equine bacterial notifiable diseases have been confirmed in the UK during this first quarter of 2018.

Table 7: Diagnostic bacteriology sample throughput and positive results for the first quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
CEMO (HBLB) PCR	2293	0	11
CEMO (HBLB) culture	10328	0	22
CEMO (APHA) PCR	0	0	1
CEMO (APHA) culture	1082	0	1
<i>Klebsiella pneumoniae</i> PCR ¹	2293	3	11
<i>Klebsiella pneumoniae</i> culture ¹	10395	4#	22
<i>Pseudomonas aeruginosa</i> PCR ¹	1373	6	11
<i>Pseudomonas aeruginosa</i> culture ¹	11310	40	23
Strangles* PCR	1496	134	9
Strangles* culture	951	70	16
Strangles ELISA ²	4506	370	4
Salmonellosis	394	0	12
APHA Salmonellosis ³	6	6	1
MRSA	303	5	10
<i>Clostridium perfringens</i> (toxin by ELISA or immunochromatography)	168	10	8
<i>Clostridium difficile</i> (toxin by ELISA or immunochromatography)	188	5	8
<i>Borrelia burgdorferi</i> (by ELISA)	18	4	4
<i>Rhodococcus equi</i> (culture, PCR or immunochromatography)	8	0	2
<i>Rhodococcus equi</i> (by ELISA)	10	9# ¹	1
APHA <i>Burkholderia mallei</i> (Glanders)	242	0	1
<i>Lawsonia intracellularis</i> ** (culture/PCR)	30	3	2
<i>Lawsonia intracellularis</i> (IPMA)	34	21# ²	1

CEM = contagious equine metritis (*Taylorella equigenitalis*), HBLB = HBLB approved laboratories, # = capsule type 1,2,5, PCR/culture¹ = reproductive tract samples only, Strangles* = *Streptococcus equi*, Strangles ELISA² = seropositivity may be attributed to disease exposure, vaccination, infection and carrier states, Salmonellosis³ = Under the Zoonoses Order 1989, it is a statutory requirement to report and serotype positive cases for *Salmonella spp.* and a positive case may have repeat sample taken, MRSA = methicillin resistant *Staphylococcus aureus*, *Lawsonia intracellularis*** = *Lawsonia intracellularis* identified using culture/PCR applied to faeces, IPMA = Immunoperoxidase monolayer assay, #¹ = seropositives include exposure to the virulent form of *Rhodococcus equi* or the presence of maternally derived antibodies, #² = seropositives include vaccinated animals

APHA *Salmonella* results

Six 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/phageotypes reported were *S.* Newport (2 isolates), *S.* Bovismorbificans (2 isolates) and single incidents of *S.* 4,12:i:- DT193 and *S.* Typhimurium RDNC. *Salmonella* Typhimurium RDNC is likely to be of wild bird origin, monophasic *S.* Typhimurium 4,12:i:- and *S.* Bovismorbificans are primarily found in pigs and *S.* Newport is often associated with badgers. For more information from APHA about *Salmonella* in Great Britain, please see the 2016 *Salmonella* in livestock surveillance report

Salmonella – All isolations of *Salmonella* from horses are reportable to APHA.

Under the Zoonoses Order 1989, the responsibility for reporting the isolation of *Salmonella* was placed on the laboratory carrying out the examination. In practice, reports of *Salmonella* isolations must be made to the Nominated Officer at one of the Veterinary Investigation Centres of the APHA or to a Regional Veterinary Lead in Scotland. A culture of the organism must be made available on request. Samples are typed by the APHA to classify serovars/phageotypes.

For more information from APHA about *Salmonella* in Great Britain, please see the 2016 *Salmonella* in livestock surveillance report <https://www.gov.uk/government/publications/salmonella-in-livestock-production-in-great-britain-2016>

INTERNATIONAL BACTERIAL DISEASE OCCURRENCE

Time period: 1 January to 31 March 2018

CONTAGIOUS EQUINE METRITIS (CEM) (*TAYLORELLA EQUIGENITALIS*)

France

On 30 January 2018, Réseau d'Epidémiologie-Surveillance en Pathologie Equine (RESPE) reported a confirmed case of contagious equine metritis (CEM) on a premises in Calvados, France. The subclinical infection was detected by bacteriology on a pre-mating genital swab taken from a 15-year-old Andalusian stallion. The positive result was confirmed by the Dozulé Laboratory for Equine Diseases. The affected animal was imported to France in 2007 and has not been used for natural covering during that time. Treatment has been instigated and sampling will be repeated upon completion of treatment.

GLANDERS

Indonesia

On 30 January 2018, the Directorate General of Livestock and Animal Health Services of Indonesia reported a single case of Glanders (*Burkholderia mallei*) in Dki Jakarta, Indonesia (Cengkareng Timur, Cengkareng, West Jakarta). The affected animal displayed no clinical signs and was confirmed seropositive to Glanders by Western Blot by the Reference Laboratory in Jena, Germany. The animal has been euthanased and bacteriological investigations to isolate the agent are underway. The affected premises is under quarantine and surveillance will continue. Please note that Melioidosis (*Burkholderia pseudomallei*) has been reported in Indonesia and could be a possible differential diagnosis. This case was tested as part of a serological survey being performed in this region in Indonesia with 600 out of 1157 horses being randomly sampled in July 2017.

FOCUS ARTICLE

***Salmonella* and salmonellosis – an overview (Part I)**

Francesca Martelli, Sue Kidd and Joanna Lawes, Animal and Plant Health Agency

Introduction

Infection of horses with non-host adapted *Salmonella* serovars is not uncommon. Carriage of *Salmonella* can occur in the absence of clinical signs and carrier horses are a common source of infection for other horses (Bryans et al., 1961). Carriers can develop clinical signs in the presence of predisposing factors such as stress, illness or immune depression. Foals and young horses are more likely to develop disease than adult animals. Hospitalisation, gastrointestinal surgery, transportation and overcrowding are some of the factors that have been associated with the onset of clinical salmonellosis (Timoney, 2013). Nosocomial outbreaks of salmonellosis in equine hospitals are extensively reported in the literature and the closure of affected premises for intensive decontamination may be the only effective strategy to break the cycle of infection (Schott et al., 2001; Tillotson et al., 1997; Dallap Schaer et al., 2010).

A look at: *Salmonella*

Bacteria classification: Family: Enterobacteriaceae Genus: Salmonella. Gram-negative, facultative, rod-shaped.

Transmission: Fecal-oral route. Direct contact from infected animals including clinical and subclinical cases, contaminated personnel and equipment, ingestion of contaminated feedstuffs or water, ingestion of infected rodent, bird or livestock feces. Can persist in the environment for months. Horses can be subclinical carriers and become clinical in response to external factors. Risk factors for development of disease include; young animals, stress, transportation, surgery, feed change, antimicrobial treatment and antiparasitic treatment

Clinical signs: possible clinical presentations include; subclinical shedding, mild pyrexia, toxic enterocolitis and sepsis. Possible gastrointestinal signs include ileus resulting in gastric impaction/reflux and/or large/small colon impaction. Diarrhoea (acute or chronic). Colic signs. Pyrexia. Inappetance. Depression

Laboratory diagnosis: Detection of organism by fecal culture. False negatives are possible as there may be low concentration of organism in the fecal sample, due to this, multiple samples taken consecutively are advised. All isolations of *Salmonella* from horses are reportable to APHA. Under the Zoonoses Order 1989, the responsibility for reporting the isolation of *Salmonella* was placed on the laboratory carrying out the examination. In practice, reports of *Salmonella* isolations must be made to the Nominated Officer at one of the Veterinary Investigation Centres of the APHA or to a Regional Veterinary Lead in Scotland. A culture of the organism must be made available on request. Samples are typed by the APHA to classify serovars/phagetypes.

Control in an outbreak: Isolation of suspect or confirmed infected animals

Geographic distribution: Present worldwide

Prevention: Preventative biosecurity measures on and off home premises.

Reportable in the UK: All isolations of *Salmonella* from horses are reportable to APHA under the Zoonoses Order 1989

Zoonotic Risk: Yes

For more information from APHA about *Salmonella* in Great Britain, please see the 2016 *Salmonella* in livestock surveillance report <https://www.gov.uk/government/publications/salmonella-in-livestock-production-in-great-britain-2016>

Infection with the sole host adapted serovar of horses, *S. Abortusequi*, causative agent of equine paratyphoid, is associated with abortion in mares and neonatal septicaemia and polyarthritis. This serovar is commonly reported in parts of Asia and Africa, but is only sporadically reported in Europe, South America and the United States (Grandolfo et al., 2018). *S. Abortusequi* has not been reported from horses in Great Britain since 1989. Serum agglutination tests (SAT) for *S. Abortusequi* are required to demonstrate freedom from disease for horses to be exported to some countries. Infection with any *Salmonella* serovar occurs through the faecal oral route, by ingestion of feed or water contaminated by faeces or, in the case of *S. Abortusequi*, fetal membranes and fluids of aborted fetuses (Timoney, 2013). Multidrug resistant strains of *Salmonella* in horses are reported with increasing frequency, in particular in hospitalised horses, and might result from exposure to therapeutic antibiotic selection pressure (Cummings et al, 2016; Walther et al., 2018).

Clinical signs

Many infections in horses remain subclinical or cause mild disease (Cummings et al., 2016). However, the severity of the disease can increase dramatically resulting in invasive septicaemia with high mortality. *Salmonella* replicates in the colon and causes damage to the intestinal mucosa, resulting in major and rapid fluid loss, with distension of the bowel and signs of colic that may precede the onset of diarrhoea. The damage to the intestinal mucosa can lead to the entry of *Salmonella* bacteria in the bloodstream. Equids are particularly sensitive to the endotoxic activity of the *Salmonella* cell wall lipopolysaccharide, and the endotoxaemia leads to signs such as reduced activity and responsiveness, anorexia and neutropenia. The peracute form of the infection, most common in foals, is characterised by high fever, lethargy, severe diarrhoea and death in 2-3 days unless effective treatment is instigated at an early stage. Horses that develop acute salmonellosis are febrile and anorexic and develop diarrhoea and abdominal pain for a period of 1 to 2 weeks, followed by recovery or death (Astorga et al., 2004). Horses that survive the acute phase of the disease can progress to a chronic form of persistent diarrhoea (Timoney, 2013). Equine paratyphoid normally does not cause disease in non-pregnant adult horses. In pregnant mares, abortion normally occurs in the later stages of pregnancy, and infection is often unapparent until a day or two before the mare aborts. Foals born alive usually have pneumonia and enteritis (Timoney, 2013).

Diagnosis

Definitive diagnosis requires isolation of *Salmonella* from faeces, blood or tissue. *Salmonella* is most commonly isolated from faecal samples, but tissues or blood samples can also be culture-positive in invasive septicaemic cases, especially in young animals. Direct microscopic examination of stained faecal smears in acute cases reveals large number of neutrophils (Timoney, 2013). Not all horses shedding *Salmonella* may be detected by bacterial culture of faecal samples. Culture of several faecal samples collected over a period of days is required to reliably identify intermittently shedding horses (Ward et al., 2005). SAT is used to detect antibodies against flagellar and somatic antigens in serum samples of horses, and is particularly used in horses for *S. Abortusequi* exposure screening. The SAT is relatively insensitive, and many older animals have low levels of cross-reacting agglutinins in their sera caused by Enterobacteriaceae other than *Salmonella*. Repeat samples might be necessary in case of positive reactions in horses that are unlikely to have been exposed to *S. Abortusequi* (OIE, 2016).

Prevention and control

Detection of *Salmonella* in healthy horses is not uncommon, and can derive from contact with carrier horses, wildlife or people. Wild bird strains (such as *S. Typhimurium* definitive phage type (DT) 1, 40, 41) or wildlife related serovars (such as *S. Agama* and *S. Anatum*) are commonly isolated from horses and can result from contact between horses and wildlife at the stables or outdoors. Due to the close contact between horses and their owners, horses can also become infected with *Salmonella* carried by people. Mixing of horses (for example at events or indirectly within equine hospitals due to carry-over of contamination) represents a risk factor for acquisition of *Salmonella* infection, and should be carefully managed, for example by limiting direct contact between horses, not sharing equipment, wearing dedicated clothing and washing hands.

New horses should be quarantined on arrival and effective cleaning and disinfection of housing and equipment carried out between use for different animals. In healthy adult animals, *Salmonella* infections are normally subclinical and self-limiting, but might result in clinical disease in foals and immune compromised horses. In case of an outbreak of clinical salmonellosis, the source of infection might be unclear and it is therefore important to keep clinically suspicious animals isolated. Outbreaks of salmonellosis on horse farms are more likely to occur in the summer months, mostly because of the presence of young foals that are more receptive to infection (Timoney, 2013). Change of clothes and footwear between clinically ill animals and the rest of the herd is recommended. Rodents can carry *Salmonella* and distribute the infection within and between yards, favouring the persistence of the infection on the premises. Vermin control, and in particular reducing the access of rodents and wild birds to the feed in store or manger, is therefore very important. Nosocomial outbreaks with *Salmonella* are not infrequent and can be difficult to control (Schott et al., 2001; Tillotson et al., 1997; Dallap Schaer et al., 2010). Often the premises have to be shut down to facilitate an aggressive cleaning and disinfection programme. In the UK, Defra maintains a list of approved disinfectants that are suitable in outbreak situations (http://disinfectants.defra.gov.uk/DisinfectantsExternal/Default.aspx?Module=ApprovalsList_SI). The Defra General Orders concentration of approved disinfectants should be used for contaminated premises. In general, glutaraldehyde-based disinfectants are best for buildings and equipment and chlorocresol products are best for foot dips and wheel baths. It is important to remove organic matter as much as possible during an initial washing stage, and allow surfaces to dry before applying the disinfectant.

The control of the zoonotic risk is also important. Staff should be aware of the risks of infection with *Salmonella* and the importance of personal hygiene measures (such as handwashing, change of clothing) to avoid infection.

References

References are available on request, please contact maire.o'brien@aht.org.uk

Part II: In the second quarterly DEFRA report we will include surveillance data for *Salmonella* in Great Britain in the last decade and antimicrobial resistance in *Salmonella* isolates from horses, from Francesca Martelli, Sue Kidd and Joanna Lawes, Animal and Plant Health Agency

Important note

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.

TOXIC AND PARASITIC

disease report for the first quarter of 2018

A summary of diagnostic toxicosis and parasitology testing undertaken by contributing laboratories is presented in Tables 8 and 9, respectively. Results for toxicosis are based on histopathologically confirmed evidence of disease only (where applicable).

Table 8: Diagnostic toxicosis sample throughput results for the first quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Labs
Grass Sickness	10	3	1
Hepatic toxicoses	23	7	2
Atypical myopathy/Seasonal Pasture Associated Myopathy	0	0	0

Table 9: Diagnostic parasitology sample throughput and positive results for the first quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Labs
Endoparasites			
Ascarids	3124	67	15
Strongyloides	3104	153	13
Strongyles (large/small)	4041	1653	22
Tapeworms (ELISA serum)	346	167	1
Tapeworms (ELISA saliva)	2039	607	1
Tapeworms (Faecal exam)	2350	23	10
<i>Dictyocaulus arnfieldi</i>	51	6	1
<i>Oxyuris equi</i>	305	3	8
<i>Fasciola hepatica</i>	250	6	9
Coccidia	454	0	6
Cryptosporidia	60	7	7
<i>Theileria equi</i> (cELISA)	62	5	1
<i>Babesia caballi</i> (cELISA)	62	5	1
APHA <i>Theileria equi</i> (CFT)	139	3	1
APHA <i>Theileria equi</i> (IFAT)	138	9	1
APHA <i>Theileria equi</i> (cELISA)	114	5	1
APHA <i>Babesia caballi</i> (CFT)	139	1	1
APHA <i>Babesia caballi</i> (IFAT)	138	2	1
APHA <i>Babesia caballi</i> (cELISA)	114	0	1
APHA Dourine (IFAT)	1	0	1
APHA Dourine (CFT)	405	0	1
Ectoparasites			
Mites	320	3	13
Lice	317	6	12
Ringworm	394	59	16
Dermatophilus	159	23	10
Candida	85	3	5

CFT = Complement Fixation Test - CFT suspect/positive samples are tested by IFAT test, IFAT = Indirect Fluorescent Antibody Test, cELISA = competitive Enzyme-linked immunosorbent assay

Grass sickness surveillance data for the first quarter 2018

A total of six cases of equine grass sickness (EGS) were reported during the first quarter of 2018, of which three cases occurred in January, one case in February and two cases in March. Three cases were reported in England, two in Scotland and one in Wales.

Of the six premises, three premises reported a prior history of EGS; two premises in England and one premises in Wales.

The cases comprised of four mares and two geldings, with a median age of nine years (range 0.6 – 19 years).

Affected breeds were Welsh Cob (n=3), Dutch Warmblood (n=2) and Irish Cob (n=1).

Of the six cases, four were diagnosed with acute EGS (AGS), one with sub-acute EGS (SAGS) and one with chronic EGS (CGS).

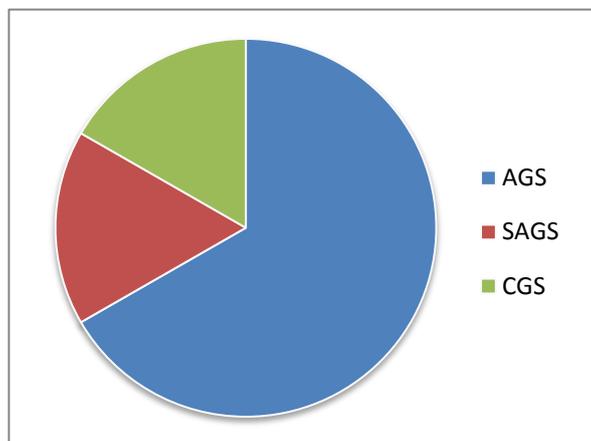


Figure 5: EGS clinical presentations for first quarter 2018

Diagnostic information was provided for all reported cases, of which five were diagnosed based on clinical signs alone and one case was diagnosed at laparotomy with diagnostic confirmation obtained by histopathological examination of an ileal biopsy.

The low numbers of cases reported in this quarter are to be expected and are supported by epidemiological studies. Equine Grass Sickness has a strong seasonal association with the peak of cases being reported in late spring (May), there are less cases of EGS reported over the winter months and at the start of the year.

Further information is available at <http://www.equinegrasssickness.co.uk/>

POST MORTEM EXAMINATIONS

report for the first quarter of 2018

The caseload of post-mortem examinations reported below have been obtained from three UK Veterinary Schools and five of the other contributing laboratories to this report.

East Anglia

A total of 50 cases were examined by post mortem.

A total of 33 aborted fetuses and fetal membranes were examined.

Table 10: Summary of post mortem findings for aborted fetuses in East Anglia for the first quarter 2018.

PCR and histopathology was performed to exclude Equine Herpes Virus infection in all cases.

Post Mortem Diagnosis	Total	Comments
Umbilical cord torsion	8	Vascular compromise associated with cord twisting
Premature placental separation	2	The macroscopic findings, supported by clinical findings, are consistent with this diagnosis
Placentitis	8	Placentitis confirmed to be secondary to bacterial infection in eight cases with aerobic cultures reported in four cases isolating; <i>Enterococcus sp.</i> , <i>Escherichia coli</i> and <i>Bacillus sp.</i> (n=1), <i>Enterococcus sp.</i> and <i>Escherichia coli</i> (n=1), <i>Escherichia coli</i> (n=1) and <i>Staphylococcus aureus</i> (n=1)
Equine Herpes Virus-1	5	Confirmed by histopathology and PCR on fetal and placental tissues
Placentopathy	2	Both with uncertain aetiology. One case concurrently had an excessive umbilical cord length. The other case had mineralisation of chorionic villi, generalised congestion and multifocal petechial haemorrhages of the placenta.
Placental Insufficiency	1	Histological findings supported the gross assessment of villous atrophy
No final diagnosis*	7	Infectious causes ruled out

*Where cases had no final diagnosis reached, hypotheses were made for each case with the intention for interpretation by the submitting veterinarian, relating post mortem findings to concurrent clinical history to affirm the most likely conclusion. For every post mortem, congenital and common infectious causes have been ruled out. Examples of hypotheses included an intrapartum stillbirth of unknown cause, a traumatic event of the cord with secondary agonal changes in the fetus and finally a finding of suspect dystrophic calcification in the placenta, suggestive of a terminal ischemia, but a peracute inflammatory process could not be excluded.

Seven cases of neonatal death (within one week of birth) were examined. Two were associated with dystocia. Another case was found to have rib fractures and secondary perforated pericardium. Another case had a congenital abnormality of bilateral microphthalmia. There were three cases of neonatal death associated with sepsis. Of these, one was confirmed to be septic peritonitis most likely associated with a chronic fungal placentitis confirmed in the dam, one had an acute interstitial pneumonia and interstitial nephritis compatible with sepsis and the final case had peracute severe fibrinonecrotising pneumonia.

One cardiovascular case was examined and found to have focal myocardial necrosis and multifocal mild lymphocytic myocarditis consistent with the clinical diagnosis of third degree AV block.

Four cases of gastrointestinal disease were examined which included a case of parasitic migration resulting in alterations to the mesenteric vasculature and subsequent colic. There was one case of caecal volvulus and secondary

septic shock. There was one case of right dorsal displacement and volvulus of the large colon. The final case was suffering from ill-thrift of no determined cause, with a burden of *Eimeria leuckarti* (equine coccidiosis), presumed incidental.

One musculoskeletal case was examined and a diagnosis of caudal ileal shaft and acetabular fracture was confirmed.

One reproductive case was examined and a diagnosis of full thickness uterine perforation was confirmed.

Two cases of sudden death were examined. The first case was found to have pulmonary haemorrhage and moderate interlobular oedema. The second case had no determined cause.

One vascular case was examined and diagnosed with acute perforation/rupture of the right internal pudendal artery.

Home Counties

A total of 13 cases were examined.

Four cases of gastrointestinal disease were examined. There was one case that had macroscopic segmental mucosal ulcerations of the small intestine, with salmonella isolated from the small intestine, caecum and liver. Two cases were diagnosed with distal jejunum/ileum volvulus secondary to mesenteric pedunculated lipomas. The final case was found to have *Anoplocephala perfoliata* (tapeworm) in the caecum and encysted emerging larval cyathostomes within the large colon.

One hepatic case was examined and diagnosed with multifocal abscessation.

Two musculoskeletal cases were examined. The first was found to have temporal and zygomatic muscle haemorrhage. The second case was diagnosed with severe fibrinosuppurative arthritis of the right fetlock joint.

One neurological case was examined and found to have pituitary enlargement of unknown significance.

Two respiratory cases were examined. One was diagnosed with exercise-associated fatal pulmonary haemorrhage. The other case was found to have a visceral pleura tear and subpleural haemorrhage resulting in severe haemothorax.

Three welfare cases were examined. One case was diagnosed with emaciation and diffuse muscle atrophy. One case was euthanased due to chronic laminitis, confirmed at post mortem. The final case was found to be suffering from dermatitis and was euthanased due to recumbancy and rigid limbs with no final diagnosis obtained.

Scotland

A total of 19 cases were examined.

Eight cases with gastrointestinal disease were examined. Three cases were diagnosed with small intestinal obstruction secondary to a strangulating lipoma. One case was found to have small intestinal devitalization with necrosis and rupture, resulting in peritonitis. The case had recently undergone exploratory laparotomy for a strangulating lipoma. One case was found to have an epiploic foramen entrapment of the small intestine and secondary peritonitis. One case of gastric rupture and secondary peritonitis was examined. One case was found to have a large colon torsion. The final case was diagnosed with emaciation with mild gastric ulceration and mild, multifocal to segmental fibrosis of the small intestinal wall.

One case of neoplasia was examined and found to have sinonasal haemorrhage and erosive gastritis of the glandular stomach. An ante-mortem diagnosis of multiple myeloma (disseminated plasma cell neoplasia) had been made, with a clinical presentation of weight loss and hypergammaglobulinaemia.

One neurological case was examined and found to have cerebellar herniation and a histopathological confirmation of encephalitis.

Five musculoskeletal cases were examined. One case was found to have navicular disease. One case was diagnosed with suspensory ligament desmitis. One case was diagnosed with mandibular cellulitis. One case was found to have an

atlanto-occipital subluxation. The final case was diagnosed with a fractured wing of the left ilium and a dislocated iliosacral joint, with haemorrhage secondary to the fracture.

One case of sudden death was examined and no diagnosis could be reached due to severe autolysis.

One respiratory case was examined and diagnosed with strangles following a positive culture for *Streptococcus equi* subsp. *equi*.

Two welfare cases were examined. One case was found to have very poor dentition. The other case was emaciated and found to have dental disease, intestinal parasitism and mesenteric verminous arteritis.

South West England

A total of two cases were examined.

One case suffering from gastrointestinal disease was examined and diagnosed with colitis and secondary hyperlipaemia, confirmed by a pale, light brown liver.

One respiratory case was examined and diagnosed with suppurative bronchopneumonia.

Northern Ireland

A total of eight cases were examined.

Four aborted fetuses and fetal membranes were examined. In two cases, a diagnosis of placentitis was made with *Streptococcus zooepidemicus* isolated by culture. No final diagnosis could be reached in the two other cases.

One case of gastrointestinal disease was examined and a diagnosis of small intestinal obstruction secondary to a foreign body of woody material was made.

Two musculoskeletal cases were examined. One case was diagnosed with osteoarthritis. The other case was found to have bilateral sub-luxating patellas.

One welfare case was examined and found to be suffering from emaciation.

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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.

Agri-Food and Biosciences Institute of Northern Ireland
Animal Health Trust Diagnostic Laboratory Services
Animal and Plant Health Agency
Austin Davis Biologics Ltd
Axiom Veterinary Laboratories Ltd.
Biobest Laboratories Ltd.
BioTe Veterinary Laboratories.
B & W. Equine Group Ltd.
Carmichael Torrance Diagnostic Services
Chine House Veterinary Hospital
The 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
NationWide Laboratories
Newmarket Equine Hospital
Oakham Veterinary Hospital
Rainbow Equine Hospital
Rosssdales Laboratories
Royal Veterinary College
Sussex Equine Hospital
Three Counties Equine Hospital
Torrance Diamond Diagnostic Services (TDDS)
University of Edinburgh
University of Glasgow
University of Liverpool
Valley Equine Hospital

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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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