DEFRA / AHT / BEVA

EQUINE QUARTERLY DISEASE SURVEILLANCE REPORT

Volume 5, No.1: January – March 2009

Highlights in this issue:

- **Equine Encephalosis – an emerging threat**
- **Surveillance of Equine Viral Arteritis (EVA) in the UK: 2005-2008**

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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Introduction

Welcome to the first quarterly equine disease surveillance report for 2009 produced by Department of Environment, Food and Rural Affairs (Defra), British Equine Veterinary Association (BEVA) and the Animal Health Trust (AHT). Regular readers will be aware that this report collates equine disease data arising from multiple diagnostic laboratories and veterinary practices throughout the United Kingdom giving a unique insight into equine disease occurrence on a national scale. We would like to acknowledge the contribution of four laboratories which have reported their data for the first time to us.

International disease occurrences

Equine Encephalosis – an emerging threat?

There is evidence of a new emerging disease in the Middle East. A total of 42 outbreaks including about 150 cases (exact number unknown) of Equine Encephalosis (EE) have been reported from October to December 2008 in Israel. EE seems to be yet another vector borne disease which is spreading north from Sub-Saharan Africa. Equine Encephalosis virus (EEV), the causative agent, belongs to the genus of orbiviruses (like Blue Tongue Virus (BTV) and African Horse Sickness Virus (AHSV)) and is mostly recognized in southern Africa. Seropositive animals have also been previously identified in the Middle East and in other countries in Africa, including Nigeria and Egypt. EE should not be confused with the mosquito-borne viral disease Equine Encephalitis (Venezuelan, Western or Eastern). Despite its name EE shares more features with AHS than with any form of Equine Encephalitis.

In the Israel outbreak, clinical signs were reported to last between two and seven days and were reported to include fever, muscular pain, anorexia and weakness. Ninety percent of animals recovered without complications. The event is reported to the OIE as resolved. EEV is transmitted by Culicoides midges. Virus isolation on cell cultures and serum neutralization revealed uncertain results (Kimron Veterinary Institute). Definitive diagnosis was made at the VLA Weybridge by Polymerase Chain Reaction (PCR) (OIE reference laboratory) (Click here and Click here). Due to the topicality of the subject Franziska Wohlfender, MRCVS from the Animal Health Trust's Epidemiology and Disease Surveillance Unit has prepared a focus article on EE.

In the United States, as of 19 May 2009, a total of nineteen stallions and five mares have been confirmed as positive for *Taylorella equigenitalis* (CEMO). Four CEMO positive horses (now determined negative for CEMO) are on the initial CEMO identified premises in Kentucky, three (now determined negative for CEMO) are located in Indiana, eight are in Wisconsin, two are in California (one determined negative for CEMO), five are in Illinois, one is in Georgia, and one is in Texas (now determined negative for CEMO). The event is ongoing as reported by the OIE and the source of the outbreak is still unknown (Click here, please see also previous report Vol. 4, No. 4).

At the end of March 2009 a case of Equine Infectious Anemia (EIA) was diagnosed by Coggins's test in a non-racing horse in Carces, South of France. A second outbreak with two cases of EIA has been reported in April 2009 in Plan de la Tour not far away from the first outbreak. There is a direct epidemiological link between the two outbreaks as all the six horses living on the farm in Plan de la Tour originally came from the farm in Carces between September 2008 and April 2009. The three affected animals have been destroyed and an epidemiological investigation is currently being carried out. So far, in 2009 additional cases of EIA have been reported in Slovenia, Romania and Italy (Click here and Click here)

It was reported that in South Africa (Kwazulu-Natal) an outbreak of African Horse Sickness with over 140 cases including 100 deaths since December 2008 is ongoing. This is reported to be the highest incidence of the disease in the country for many years (Click here and Click here).

In April 2009 four new outbreaks of equine influenza were reported in the North and North West of India, giving a total of 22 outbreaks throughout India since July 2008 (see also previous report Vol. 4, No. 4).

For the first time, Equine Herpes Virus 1 (EHV-1) has been diagnosed in Croatia. As of 10th April 2009 a total of two outbreaks have been reported including 15 cases. EHV-1 was diagnosed by PCR and virus neutralisation test (VNT) by the Croatian Veterinary Institute (CVI) in Zagreb. In both outbreaks abortions have been reported and samples from aborted fetuses were tested. Applied measures included quarantine, movement control inside the country, screening and disinfection of infected premises. Vaccination was not used.

Defra news

At the National Equine Forum in March 2009, Defra launched new information leaflets about African Horse Sickness (AHS). The leaflets were produced in collaboration with the industry-government working group on AHS which is chaired by Brigadier Paul Jepson of the Horse Trust. The leaflets include general information about AHS and advice on mitigation measures. The leaflets are aimed at raising awareness about the disease although the risk of incursion of the disease into the UK is considered very low. The information leaflets can be found at: Click here (scroll down to pdf links).
Defra's risk assessment on AHS incursion can be found at: Click here

The public consultation on the new regulations for equine identification closed in February. Consultation responses are currently being considered prior to the introduction of the new regulations later this year. Details about the consultation can be found at: Click here

Equine Grass Sickness

The Animal Health Trust's Equine Grass Sickness Surveillance Scheme is experiencing an increasing amount of new EGS cases as the year moves towards the disease's peak season. The scheme would therefore like to remind all those involved to be extra vigilant for signs of the disease at this high risk period, and to report any new cases either directly to **Georgette Kluiters**, BSc (VetSci) MSc, at the Animal Health Trust via email at georgette.kluiters@aht.org.uk, or via the scheme's website Click here. The website is currently being updated to allow veterinarians to submit cases to the scheme online along with EGS case owners who can already do so. The scheme has also introduced a quarterly newsletter, which highlights information about the disease as well as analyses undertaken that quarter on the surveillance data. Those interested in receiving a copy of it can sign up for one on the website, where a PDF copy of the newsletter each quarter can also be found.

Focus articles

In this report we are pleased to include two focus articles. As mentioned above, Franziska Wohlfender from the Animal Health Trust has prepared an overview on Equine Encephalosis and Barbara Tornimbene, a visiting vet at the Animal Health Trust, in collaboration with Richard Newton and Franziska Wohlfender from the Animal Health Trust, presents data of the last four years of EVA surveillance activity. We reiterate that the views expressed in these focus articles are the authors' own and should not be interpreted as official statements of DEFRA, BEVA or the AHT.

Access to all of the equine disease surveillance reports can be made on a dedicated page on the Animal Health Trust website at http://www.aht.org.uk/equine_disease.html or via the BEVA and Defra websites:
http://www.beva.org.uk/
http://www.defra.gov.uk/animalh/diseases/vetsurveillance/species/horses/index.htm

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

Virology Disease Report for the First Quarter of 2009

The results of virological testing for January to March 2009 are summarised in Table 1 and include data relating to Equine Viral Arteritis (EVA), Equine Infectious Anemia (EIA) and West Nile Virus (WNV) from the Veterinary Laboratories Agency (VLA), Weybridge. The sample population for the VLA is different from that for the other contributing laboratories, as the VLA's tests are principally in relation to international trade (EVA and EIA), although with recent Defra concessions VLA now provides testing for WNV as part of clinical work up of neurological cases on specific request and provided the local DVM has been informed.

Table 1: Diagnostic virology sample throughput and positive results for the first quarter 2009

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Serological Tests			
EVA ELISA	6363	104#	5
EVA VN	4081	654#	3
VLA EVA VN	1027	27#	1
EHV-1/-4 CF test	812	30*	1
EHV-3 VN test	5	4	1
ERV-A/-B CF test	462	6*	1
Influenza HI test	525	18*	1
EIA (Coggins)	4031	0	4
EIA ELISA	3561	0	4
VLA EIA (Coggins)	919	0	1
VLA WNV (PRNT)	1	0	1
Louping ill	0	0	0
Virus Detection			
EHV-1/-4 PCR	124	16	1
EHV-2/-5 PCR	3	1	1
Influenza NP ELISA**	252	2	1
Influenza Directigen	109	0	1
Influenza VI in eggs	2	2	1
EHV VI	133	11	1
EVA VI/PCR	1	0	1
VLA EVA VI/PCR	11	0	1
Rotavirus	65	28	6

ELISA = enzyme-linked immunosorbent assay, VN = virus neutralisation, VLA = Veterinary Laboratories Agency, CF = complement fixation, HI = haemagglutination inhibition, Coggins = agar gel immuno diffusion test, PCR = polymerase chain reaction, NP = nucleoprotein, VI = virus isolation, EVA = equine viral arteritis, EHV = equine herpes virus, ERV = equine rhinitis virus, EIA = equine infectious anaemia

= Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera

** = The relatively high number of NP ELISA tests performed is largely due to requirements for international equine movement. All horses travelling to Australia must now have 2 NP ELISA tests performed prior to travel. The figures above include tests performed for international trade purposes.

Of the 27 EVA VN positives detected by the VLA, six were export samples, seven were AI samples and 14 were private requests. The 11 semen samples received for virus isolation were all negative for EVA virus isolation after three passages in RK13 cell culture and negative for EVA by the one-tube RT-PCR. Seven of these were diagnostic samples for private testing, two were import tests and two were submitted for pre-export testing.

The 919 agar gel immuno diffusion tests for EIA (AGID; Coggins) were conducted for import or export purposes and they were all negative. The one sample tested for WNV using plaque reduction neutralisation test (PRNT) was negative. No testing for other equine viral encephalitides was performed.

Virological Diagnoses for the First Quarter of 2009

EHV-1 Abortion

Two larger outbreaks and five single cases of EHV-1 abortions have been reported. An abortion storm including five abortions in vaccinated thoroughbred mares occurred on one stud farm. On another stud farm a foal which was born alive but died soon afterwards was diagnosed as infected with EHV-1. Subsequently the two in-contact mares aborted within the following two weeks. All the mares had been vaccinated against EHV-1, but had been in contact with young stock.

EHV-4 Abortion

One abortion in a thoroughbred mare was diagnosed due to EHV-4 infection.

EHV-4 Respiratory Disease

EHV-4 was isolated from nasal pharyngeal swabs taken from two horses on two separate yards. Clinical signs included respiratory signs (including coughing, nasal discharge), pyrexia and lethargy. One of these horses was a 14 year old mare.

Equine Influenza

One outbreak of equine influenza (EI) was reported in this quarter in two unvaccinated horses from Cheshire which showed respiratory signs. The horses tested positive by nucleoprotein ELISA on nasopharyngeal swabs. Subsequently influenza virus was isolated and sequenced. Both isolates belonged to clade 1 of the Florida sublineage of the American lineage of H3N8 equine influenza viruses. This is only the second isolation of a clade 1 virus in Europe (beside Lincolnshire 07). The two influenza positive horses showed high titres for H3N8 on the HI-test.

EHV-3

A thoroughbred stallion which presented typical clinical signs for equine coital exanthema seroconverted to EHV-3 on the virus neutralisation test. The infection was confirmed by isolation of EHV-3 from penile lesions. A donkey mare was seropositive on the EHV-3 VN test and showed typical clinical signs.

FOCUS ARTICLE: Equine Encephalosis – an emerging threat

Franziska Wohlfender, DipVMS(Berne), Dr.med.vet.(Berne), FVH (equine), MRCVS, Animal Health Trust, UK

Aetiology: The causative agent is Equine Encephalosis Virus (EEV), an orbivirus related to African Horse Sickness Virus (AHSV) and Blue Tongue Virus (BTV) from the family of Reoviridae. It was first isolated in 1967 in South Africa from blood and tissues of an affected horse. Seven non-cross reactive serotypes have been isolated so far (http://www.reoviridae.org/dsRNA_virus_proteins/ReoID/EEV-isolates.htm).
Epidemiology: Equine Encephalosis (EE) originates from southern Africa. EE is a vector borne disease which is transmitted by *Culicoides* midges, similar to AHS and BT and no vaccine is available. EEV appears to infect all equidae, but clinical signs are only seen in horses. Transmission depends on vector activity, which is seasonal in southern Africa (December - July). Studies have shown that around 50 - 60% of donkeys, zebras and horses are seropositive for EEV in South Africa. Serotype 1 seems to be predominant. Antibodies against EEV can be found rarely in elephants too.
Incubation period: Two to six days.
Clinical signs: The name Equine Encephalosis is misleading as it is not a primarily neurological disease.
Clinical signs consist of one to five days of fluctuating fever, accompanied by varying degrees of listlessness and inappetence; elevated heart and respiratory rates and red-brown discoloration of visible mucous membranes as a result of congestion and mild icterus. Most infections are subclinical and affected horses usually show only mild clinical signs and recover uneventfully. Mortality is generally less than 5% of infected animals. Less common but more serious signs can include various degrees of facial swelling; respiratory distress, sometimes with petechial haemorrhages in the conjunctivae and clear or blood-tinged nasal discharge; and signs of chronic heart failure. Pregnant mares may also abort during the first five to six months of gestation. Neurological signs including ataxia (particularly of the hindquarters), depression, frenzy, hyperexcitability and convulsions have been described in single cases but are more likely to be attributable to a cause other than EE (Equine Viral Encephalomyelitis, acute plant (e.g. leukoencephalomalacia following *Fusarium moniliforme* poisoning or chronic seneciosis) or chemical poisoning, Borna disease etc.).
Pathology: Post mortem findings can include lung oedema, hydropericardium, slight hepatomegaly and splenomegaly, petechiae in serosal surfaces (mainly intestines), hyperaemia of the glandular part of the stomach and in some cases congestion and oedema of the brain. Lesions are attributable to severe endothelial damage. There is no encephalitis.
Diagnosis: As infection with EEV is usually subclinical, most cases are confirmed by seroconversion in paired serum samples. Serological tests used include CF test (complement fixation), serotype specific SNT (serum neutralization test) and ELISA. In clinical cases virus can be isolated from heparinized blood and tissues (e.g. spleen, liver, thymus, lung and brain). The most recent outbreak in Israel 2009 was diagnosed by PCR (developed at Onderstepoort, South Africa).
Differential diagnoses: Non-specific febrile diseases, babesiosis, purpura haemorrhagica, AHS (mild form) and in the case of abortion Equine Herpes Virus 1, Equine Viral Arteritis, *Streptococcus. zooepidemicus*, *Klebsiella pneumonia* and others.
Control: Vector control and minimising exposure to infected *Culicoides* (stabling from before sunset to after sunrise, insect repellents).

EEV is not a notifiable disease in the UK or EU or to the OIE.

Importation of horses from affected area:
The rules for the movement and importation of horses into the UK is harmonised through the European Union and subject to European legislation (for further information Click here). EU legislation allows the import of live horses and their germplasm from approved Third Countries or their territories. EU rules require that all imported equidae from Third Countries are immediately checked (i.e. documentary, physical and identity checks) at the port of entry to the EU (Border Inspection Post - BIP) approved for the species. Currently the whole territory of Israel is authorised for imports of all categories of equidae and germplasm. According to TRACES (EU electronic notifications system) there have been no imports of horses from Israel in the recent months.

Literature:
(1) J.A.W. Coetzer and R.C. Tustin (2004) *Infectious Diseases of Livestock* Vol 2, 2nd Edition, Oxford University Press, Equine Encephalosis, p1247-1251.

(2) W.A. Geering, A.J. Forman and M.J. Nunn (1995) *Exotic Diseases of Animals: a field guide for Australian veterinarians*. Australian Government Publishing Service, Canberra, p93-95.

(3) A.J. Guthrie, A.D. Pardini and P.G. Howell (2009) Equine Encephalosis, Equine Veterinary Education Infectious Diseases Manual, in press

(4) Mellor P, Hamblin C, unpublished data

FOCUS ARTICLE: Surveillance of Equine Viral Arteritis (EVA) in the UK: 2005-2008

Barbara Tornimbene, Animal Health Trust; in collaboration with Richard Newton and Franziska Wohlfender, Animal Health Trust

Introduction

Since the first equine disease surveillance report published for the fourth quarter of 2004, Defra, AHT and BEVA have been collating and reporting data for a broad range of equine diseases submitted from a network of UK-based diagnostic laboratories and veterinary practices. Although these data have provided a regular insight into equine disease occurrence on a national scale across the UK, they have not previously been examined longitudinally. To gain insights into UK equine surveillance trends over time data accumulated over the past four years (2005-2008) have begun to be examined and will hopefully form a more regular feature in future reports. The first disease to be assessed in this way is equine viral arteritis (EVA).

EVA overview

EVA is an infectious disease of equidae caused by equine arteritis virus (EAV). Clinical signs include pyrexia and depression, frequently accompanied by marked conjunctivitis ("pink eye"). Swelling of the area around the eyes, the lower limbs, brisket, mammary glands in mares and sheath or scrotum in males is seen. EAV may cause abortion if it infects pregnant mares and can kill young foals. Spread is by both respiratory and venereal routes and persistent infection may occur that can be maintained for several years in the accessory glands of carrier stallions. Serological surveys in the USA, Australia, New Zealand and the UK during the last two decades all showed a markedly higher percentage of seropositive Standardbreds than Thoroughbreds, particularly among breeding Standardbreds more than racing horses. Recent EVA outbreaks in the USA, France, Israel and Croatia highlight the potential significance of this disease to horse breeding industries across the word and the need to remain vigilant to changing circumstances.

The UK situation

The first confirmed outbreak of EVA in the UK occurred in 1993 after which there was heightened awareness about control and prevention of the disease. EVA is specifically dealt with by the HBLB Codes of Practice (Click here) and the infection has been notifiable in stallions under the Equine Viral Arteritis Order (Click here) since 1995. The principal means of control in the UK are based on establishment of freedom from infection, achieved by pre-breeding serological testing of stallions and mares and vaccination of stallions. An inactivated whole virus vaccine (Artervac; Fort Dodge Laboratories) became available following the outbreak in 1993 and has since been used since then, especially in Thoroughbred stallions. The vaccine is generally not used in mares, however.

EVA testing data

During the period 2005-2008 data on serological testing of antibodies to EAV have been supplied by the Veterinary Laboratories Agency (VLA) and several commercial laboratories, including the AHT (together referred to as "non-VLA" laboratories). The VLA conduct serological testing principally for international trade purposes based on the OIE prescribed virus neutralization (VN) test. Following the emergence of problems with widespread use of the VN test for routine screening, especially among recently EHV-1 vaccinated mares, non-VLA laboratories now conduct testing using a screening ELISA,

followed where necessary by a confirmatory VN test conducted by a limited number of laboratories.

A reverse transcriptase polymerase chain reaction (RT-PCR) assay is used for detection of EAV in clinical and *post-mortem* specimens and has been used principally by the VLA and AHT to detect EAV in the semen of stallions. Samples tested by RT-PCR also undergo confirmatory virus isolation (VI) using rabbit kidney cell culture (RK-13). All 135 PCR/VI tests performed by VLA and AHT during 2005-2008 were negative for EAV.

Graphical representation of EVA data: 2005-2008

Figure 1 represents a summary by quarter for 2005-2008 of the total number of serological tests conducted by VLA and non-VLA laboratories (green and blue bars) and the two quarter rolling average proportion of positives identified among these tests (yellow and red lines).

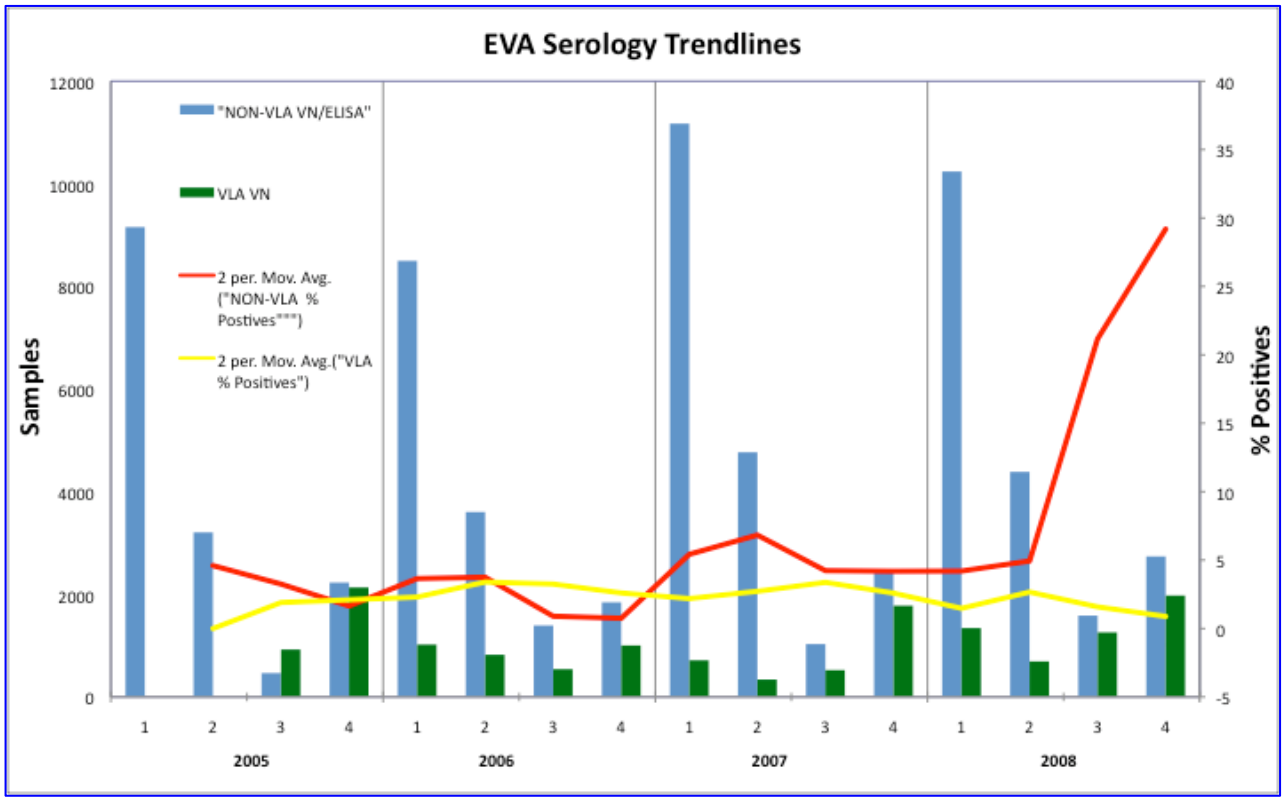

Figure 1: EVA serological tests and two period moving average proportion positive tests by quarter for 2005-2008 for VLA and non-VLA laboratories*

*No truly positive animals have been identified during this time period. All VN-positive animals were followed up according to a standard protocol to differentiate between seropositivity due to previous infection, vaccination or active infection/carrier status (stallions).

Features of interest to note in this summary for 2005-2008 are:

- The consistent seasonal pattern of numbers of tests conducted within each year, which was somewhat different between VLA and non-VLA laboratories. The pattern among non-VLA laboratories demonstrated a peak and subsequent decline from 1st to 3rd quarters with a pick up in numbers for the 4th quarter. This was consistent with pre-breeding testing in the first two quarters, with a predominance of Thoroughbred samples tested early in the first quarter. The fourth quarter increase represented pre-autumn sales testing as required by the major sales companies. VLA testing showed lower numbers of tests overall with a less pronounced peak

usually in the final quarter, consistent with less seasonally variable international trade testing requirements.

- The higher proportion of positive results seen in the first half of the year among the non-VLA samples during 2005-2007 was consistent with pre-breeding serological testing of stallions that had been vaccinated using Artervac EVA vaccine, in addition to testing of serologically positive mares, predominantly imported from other parts of the EU.
- For the period between the 2nd quarter 2005 and the 2nd quarter 2008, the proportion of positive results for both VLA and non-VLA samples were reasonably closely matched.
- In the second half of 2008 there was a marked rise in proportion positive among non-VLA samples that was not reflected among VLA samples. However, the explanation for this apparent peak of EVA positivity is largely artefactual related to changes in EVA testing practice during this period. Transfer of screening testing to in-house commercial ELISA-kits at several large veterinary practice laboratories that previously sent samples to specialist non-VLA laboratories, resulted in notably increased proportions of positive samples tested by confirmatory VN test at the specialist laboratories.

In conclusion, the data summarised in Figure 1 represent the considerable effort made among parts of the equine industry in the UK to maintain its vigilance against EVA. This is done in accordance with the recommendations that are outlined consistently each year in the HBLB Codes of Practice for annual serological retesting of breeding stock and re-vaccination of stallions and for the requirements also to test horses going through the sales ring. The data demonstrate consistent and predictable seasonal patterns of sample submission and seropositivity but also highlight the need when interpreting surveillance outputs for awareness about changes in practices that might notably influence underlying patterns in data.

Bacteriology Disease Report for the First Quarter 2009

A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 2. For contagious equine metritis (CEM) 22 of 28 HBLB approved laboratories contributed data.

VLA CEMO Data for the period January to March 2009

We are again pleased to include data relating to CEM testing from the Veterinary Laboratories Agency (VLA), in this quarterly report. The sample population for the VLA is different from that for the other contributing laboratories as the VLA tests are principally in relation to international trade.

No isolates were identified as CEMO positive by HBLB laboratories.

Strangles

Strangles remains endemic in the UK, especially among parts of the non-Thoroughbred horse population. Diagnoses are confirmed in the UK based on traditional culture of *S.equi* and qPCR on respiratory samples and/or seroconversion using a blood-based ELISA.
An outbreak has been reported in a Newmarket training yard with four affected horses and about 45 in-contacts. Appropriate measures have immediately been taken at the beginning of the outbreak and further spread was prevented.

Table 2: Diagnostic bacteriology sample throughput and positive results for the first quarter 2009

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
CEMO (HBLB)	11188	0	22
CEMO (VLA)	1248	0	1
***Klebsiella pneumoniae*#**	10938[1]	25	18
Pseudomonas aeruginosa	10929[1]	48	17
Strangles*culture	3105	147	17
Strangles PCR	919	114	1
Strangles ELISA	1112	190	1
Salmonellosis	1335	18	16
MRSA	190	2	6
Clostridium perfringens	75	6	4
***Clostridium difficile* (toxin by ELISA or immunochromatography)**	75	7	3
Borrelia (by ELISA)	12	1	1
Lawsonia intracellularis**	7	3	2

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

VLA Salmonella results

Of 13 samples testing positive for Salmonella spp. in a non-VLA laboratory, the serotype of 12 isolates is known after further testing by the VLA. The VLA tested a total of 24 samples of which 17 were positive (including the 12 positive samples sent to VLA by the isolating laboratory). From the strains typed by the VLA there were 11 of *S. typhimurium*, 2 of *S. enteritidis*, 1 of *S. agama* and 3 of *S. newport*.

Toxic and Parasitic Disease Report for the First Quarter 2009

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

Table 3: Diagnostic toxicosis sample throughput and positive results for the first quarter 2009

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Grass Sickness	9	2	2
Hepatic toxicoses	35	4	2
Atypical myopathy	2	0	2
Tetanus	1	1	1

Table 4: Diagnostic parasitology sample throughput and positive results for the first quarter 2009

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Endoparasites			
Ascarids	1045	31	10
Cyathostomes	1315	397	8
Dictyocaulus	556	0	8
Strongyles	3150	625	16
Tapeworms (ELISA based testing)*	1063	718	4
Tapeworms (Faecal exam)	1301	28	7
Trichostrongylus	79	14	1
Strongyloides	1349	6	10
Oxyuris equi	51	0	2
Fasciola	83	3	2
Ectoparasites			
Mites	543	6	10
Lice	284	7	11
Ringworm	410	31	16
Dermatophilus	85	16	6
Candida	16	1	1

Grass sickness surveillance data (www.equinegrasssickness.co.uk):
A total of five Equine Grass Sickness cases were submitted to the surveillance scheme between January and March this year. Of these five cases, three were reported from England with two (including one chronic case) from Scotland. One subacute case and one acute case were confirmed via post-mortem examinations while a further two cases (one acute and one subacute) were diagnosed clinically. The affected horses included two geldings and three fillies, with three horses aged between four and eight years and the remaining two horses both greater than eight years of age.

It should be noted that the grass sickness surveillance scheme receives data from a wider population in comparison to the data presented in Table 3 and different diagnostic criteria were used. For more information about the grass sickness surveillance please refer to previous reports published in Vol.4 No.2 and Vol.2 No.4.

Report on Post Mortem Examinations for the First Quarter 2009

East Anglia

Eighty cases were examined including 59 aborted fetuses.

Of the aborted fetuses examined this quarter, acute or chronic umbilical cord torsion was suspected as the precipitating cause in 21/59 cases.

Equine Herpes Virus 1 (EHV-1) was found to be the cause for nine abortions and the death of one foal which was born alive but died soon afterwards. Histology in this foal revealed a mild neutrophilic bronchopneumonia due to EHV-1. Diagnosis of EHV in general was based on positive PCR and typical histopathologic changes, in some cases including immunohistochemistry. One aborted fetus was submitted for EHV clearance only and was negative.

A thoroughbred foal was born three weeks premature. It was very weak and died shortly afterwards. The placenta was massively enlarged and associated with abundant fluid. Histology revealed chronic changes in the placenta, with subsequent development of severe cystic allantoic degeneration. There was also vascular compromise of the umbilicus. Acute umbilical vascular torsion and severe fetal distress and hypoxia may have led to the abortion. There were no signs of an inflammatory disease.

A six year old thoroughbred mare aborted six weeks prior to the due date. The fetal death was found to be associated with a recent *E.coli* septicaemia. The histological findings indicated that there had been a (microscopic) chronic, very low grade focal chorionitis (placentitis) at the cervical star which was suspected to be the source of the fetal infection.

Placentitis due to infection with *S. zooepidemicus* was found to be responsible for abortion in two thoroughbred mares at a gestational age of 298 and 240 days respectively. Additionally, fetal septicaemia was confirmed in the first case.

A male thoroughbred fetus was aborted at approximately 290 days of gestation. Histology revealed locally extensive neutrophilic and mononuclear placentitis with intracellular bacteria and secondary mild to moderate bronchopneumonia. Growth of *E. coli* was isolated from the liver, lung, and placenta.
A small thoroughbred foal was born alive but was euthanized due to weakness. This case was associated with an ascending fungal placentitis. A second case of fungal placentitis was diagnosed and suspected to be the reason for a stillbirth.
Placentitis was found to be the cause for pre-term abortion in two mares, but the infectious agent could not be identified.

One case of premature placental separation and subsequent fetal malperfusion/malnutrition was reported in a thoroughbred mare.

A six year old thoroughbred mare aborted very suddenly. Many changes in the fetus (e.g.agonal intussusceptions, congestion and focal haemorrhages in the internal organs) were likely to reflect terminal hypoxia. The foal was not unduly large, had no limb deformities and the internal organs showed no primary defects, so the cause of its stillbirth was unclear. Failure to prepare for the birth and its sudden nature suggested that inappropriate sudden PG release may have been a factor.
Three other neonatal deaths due to hypoxia were reported.

A one day old male foal was euthanized after deteriorating overnight and showing a wobbly gait. At post mortem examination a subluxation of the upper cervical spinal cord (C2-C3) was discovered. The histological changes were compatible with a prolonged foetal/placental malperfusion that might have resulted from an incomplete, premature separation of the foetal and maternal placenta. The deteriorating condition of the foal may have been due to compromised intrauterine oxygen supply and hypoxic ischemic brain damage. The annulus fibrosus of the C2-C3 transition exhibited confluent, acute haemorrhages in between the concentrically oriented collagen bundles. The injury of the annulus fibrosus between C2 and C3 reflected an intra-vital or immediately postmortal tear injury due to unphysiological ventro-flexion of the vertebral column. Apparently there was enough space for the overlying spinal cord segment to escape from contusion injury.

No exact cause was detected for eight abortion or stillbirths, but in seven an infectious cause could be excluded.

A thoroughbred foal was delivered dead after a cesarean section. It was a full term dystocic parturition associated with marked knee contracture. The undernourished appearance of the fetus was associated with poor chorionic villus development, and placental oedema.
Nine dystocias were reported resulting in dead born foals.

A three year old American Miniature Horse died due to larval cyathostomiasis of the large intestine.

A seven year old thoroughbred mare died of severe cellulitis and myonecrosis in the right forelimb following an injury.

The clinical signs and death of a one year old thoroughbred filly were attributable to an unusual and serious traumatic fracture of thoracic vertebral bodies 8 and 9, which had deviated ventrally involving rupture of intercostal arteries with consequent haemothorax.

A grey adult mare was sent for post mortem examination as a welfare case. At multiples sites in the skeletal muscles mild to marked intra-fascial haemorrhage with coalgulative myofibre necrosis and multifocal mineralization was found. The changes in these sections were most consistent with an immune-mediated type vasculitis, such as purpura haemorrhagica. This type of disease arises after sub-clinical or clinical bacterial infection, which then results in auto-antibody production, vascular compromise, and extensive haemorrhage throughout. The myofibre degeneration was most likely subsequent to compression and ischemia secondary to intrafascial haemorrhage. No clostridial agents were identified on H&E, and no bacteria were cultured.

The carcass of a ten year old thoroughbred cross gelding which collapsed and died 20 minutes after intravenous injection of Equipalazone was examined post mortem. On histology severe, diffuse, acute, renal cortical and medullary necrosis with intralesional bacteria (morphology consistent with Clostridia spp.) was found in the left kidney. The changes in the kidney indicated likely ischemic necrosis and bacterial infection. The underlying cause of ischemia was not found on gross or histologic examination, and local trauma to this area may have resulted in similar findings. This animal most likely succumbed to endotoxaemia, and may have suffered from terminal disseminated intravascular coagulation.

Polyneuritis equi was diagnosed post mortem in an adult mare.

In two adult horses showing neurological signs, sub-acute meningoencephalitis and generalized non –suppurative encephalomyelitis respectively was found post mortem. No aetiological agents could be identified.

Single cases of musculoskeletal trauma, vaccine anaphylaxis, cervical vertebral malformation, meningoencephalomyelitis, aortic valve endocarditis, profound anaemia due to suspected myelophthisis and peritonitis with adhesions in the small intestine were also reported.

Home Counties

Sixteen cases were examined this quarter.

In one aborted fetus the cause of death was undetermined and one neonatal death was due to isoerythrolysis.
Eight gastrointestinal cases were examined post mortem. They included a case each of suppurative enteritis, intestinal rupture, intussusception with peritonitis, gastric impaction, small intestinal volvulus, stomach rupture and two cases of colic with no further diagnoses known.
Two neurological cases were examined including an animal with cholesteatoma and another with head trauma and brain haemorrhage.
One respiratory case with suppurative bronchopneumonia due to *S. equi* was reported.
In a musculoskeletal case arthritis of unknown origin was diagnosed.
A case of neoplastic disease was reported and diagnosed histologically to be a leiomyosarcoma of the large intestine.
One welfare case was diagnosed as having been suffering from parasitism and emaciation.
A last case was reported as suspected intoxication. The cause was not determined.

South West

Thirteen cases were examined during this quarter.

Post mortem examination of a neonatal foal revealed a ruptured bladder, multifocal hepatic necrosis and/or hepatitis and multifocal pneumonia and pulmonary oedema.
Two gastrointestinal cases were examined post mortem. A donkey was diagnosed with colitis and typhlocolitis, while in a second donkey a colonic torsion was found.
In another donkey pulmonary fibrosis was diagnosed post mortem.
Seven other post mortem diagnoses in donkeys included four case of laminitis, one with dental problems, one with a sarcoid and one with haemoperitoneum.

In a welfare case colonic impaction, cyathostomiasis, hepatic lipidosis and hepatic fibrosis were reported post mortem.

Lead poisoning was diagnosed in a thoroughbred mare from a local race yard from blood and hair samples. Lead levels were elevated in both samples. The mare was showing laryngeal and oesophageal dysplasia and bilateral ptosis. This case belonged to a group of three horses in a field near a Roman lead mining centre. Environmental contamination by lead from ancient mines was suspected as a likely source. Two out of the three died, one possibly from secondary aspiration pneumonia. The third horse was asymptomatic but had slightly raised blood lead levels.

West Midlands

A case of Equine Protozoal Myeloencephalitis (EPM) caused by *Sarcocystis neurona* was diagnosed in an ataxic mare imported from the USA. A Western Blot analysis gave a low positive result. The mare responded well to treatment.
EPM is said to be the most commonly diagnosed equine infectious neurologic disease in the U.S. Sarcocystis neurona is a single celled parasite belonging to the group of coccidia (Apicomplexa). Opossums are reported to be the definitive hosts of *S. neurona* while horses, among other mammals, can be aberrant intermediate hosts. For more information about EPM please refer to Click here or "Equine infectious diseases" by Debra C. Sellon, Maureen T. Long, published by Elsevier Health Sciences, 2007

Northern England

Eight post mortem examinations were reported in this quarter.
The cases examined included one aborted fetus with umbilical cord torsion, one case of aborted twins, four cases of gastrointestinal ruptures, one gastrointestinal case with adhesions and a case with a great vessel rupture.

Scotland

Six horses for post mortem examination and 40 biopsies were submitted in this quarter. Please note that only the significant biopsy findings are reported in the following paragraph.

A six year old Irish sport horse gelding was presented with right dorsal colitis consistent with a history of NSAID administration.
A 15 year old Thoroughbred-cross gelding presented with multifocal ulcerative and fibrino-haemorrhagic colitis and multifocal submucosal haemorrhage, predominantly in the left ventral and left dorsal colon, supportive of thromboembolism, ischaemia and reperfusion injury, the cause of which was not established. Strongyle parasite migration, infectious processes such as vegetative endocarditis or other hypercoagulable states such as disseminated intravascular coagulation (DIC), sepsis or protein-losing enteropathy/nephropathies were suggested.
A nine year old Thoroughbred gelding was diagnosed with chronic grass sickness of 18 month duration. This horse had returned to racing after recovery and had performed well until recently developing recurrent colic. Post mortem examination revealed marked dilation of the terminal ileum and histopathological examination confirmed severe depletion of neurons in the autonomic ganglia, particularly in the enteric plexus of the ileum.

A 14 year old Clydesdale stallion was presented for post mortem examination with severe gastric impaction and mild, multifocal, acute gastric ulceration the aetiology of which remains undetermined. Physical obstruction and grass sickness were excluded based on gross and histological examination, respectively.

A bay adult thoroughbred type horse was presented for post mortem examination following sudden death on the racetrack. A 2 x 2 cm area of haemorrhage was present in the myocardium of the interventricular septum with disruption of myofibres. Multifocal areas of haemorrhage were present on the intima of the thoracic and abdominal aorta, lungs, liver and mesentery. The proximity to the conduction apparatus may have resulted in a fatal dysrythmia. The cause of the more generalized haemorrhages was not clear although common in such cases and they may result from terminal alterations in blood pressure.
A 13 year old obese Cob mare with solitary hepatic mass in the left side of the liver with adhesions to diaphragm, adjacent right dorsal colon and omental/small intestinal mesentery was examined post mortem. The nature of these changes remains unknown.

Seven muscle biopsies were examined: Diagnoses included two cases of equine motor neurone disease, one case of steatitis and four with no significant pathology.
The histopathological diagnosis of the other biopsies included one each of eosinophilic colitis, lymphoplasmacytic enteritis, granulomatous enteritis, squamous cell carcinoma on the third eye lid, eosinophilic granuloma and three cases with equine sarcoids.

Northern Ireland
Nine cases were examined this quarter including five fetuses and one stillbirth.

Significant cases included a fetus which was aborted six weeks before term due to a possible fetal abnormality. At post mortem examination there was severe abdominal hemorrhage associated with a ruptured cyst-like structure. The cyst was approximately 14cm in diameter, was attached to the liver and contained friable red material. There was also a fracture of the spine at the thoraco-lumbar junction.

Two foetuses from different premises were submitted for post mortem examination. In both cases a profuse growth of *Streptococcus zooepidemicus* was recovered from the tissues cultured.

A two year old horse with a history of sudden death was submitted for post mortem examination. There was an acute fibrinous peritonitis with free digesta within the abdominal cavity. Full 360 degree torsion of the small intestines with a partial torsion of the large intestine and caecum was present. The source of the digesta was not identified.
A two year old horse with a history of swollen lymph nodes was submitted for post mortem examination. A large abscess containing purulent material, surrounding the tracheal cartilages at the level of the thoracic inlet, was present. The position of the abscess at this point was causing compression of the trachea. A pure growth of *Streptococcus equisimilis* was isolated from abscess swabs.
Yew tree poisoning was diagnosed in an eleven year old horse which had previously broken out of its enclosure into a neighboring paddock which contained a yew tree. Post mortem examination showed numerous fragments of yew tree leaves to be present in its stomach.

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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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