



Animal &
Plant Health
Agency

Equine Infectious Anaemia in Cornwall and Devon (Case EIA 2012/01 & Case EIA 2012/02)

**National Emergency Epidemiology Group
Epidemiology Report**

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Executive Summary

1. Equine Infectious Anaemia (EIA) was confirmed on 3rd October 2012 in a single horse ('Horse A') on premises in Cornwall (designated as the Infected Premises EIA 2012/01, 'IP-A').
2. The owner first noticed clinical signs of illness in Horse A on 22nd September 2012. A blood sample submitted to APHA by her private veterinary surgeon returned a positive result to the Agar Gel Immunodiffusion ('Coggins') Test on 1st October. Following testing of an officially collected sample submitted by APHA staff EIA was confirmed on 3rd October.
3. Horse A was humanely destroyed on 3rd October and the carcass removed for secure disposal by APHA. Horses remaining on the premises and horses that had moved from the premises during the likely period of infectiousness were restricted and subjected to clinical and laboratory surveillance (including an immediate Coggins test for EIA which was repeated after a period of at least 90 days).
4. Documentation from TRACES indicated that Horse A was imported from Belgium on 16th April 2008 to premises in Devon on a health certificate with 14 other horses, and sharing a lorry with a further 3 horses traveling on a different health certificate. The documentation also indicated that Horse A was imported in the same consignment, but on a different health certificate, as the last previously confirmed EIA case in Great Britain (Devon, Sept 2010, EIA 2010/03). The epidemiology report for this case can be found on the archive Defra website at the following link:
<http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/eia/latest/index.htm>
5. An extensive tracing exercise undertaken by APHA to locate and investigate the EIA status of the remaining horses from the imported consignment located nine horses; none had clinical evidence of EIA. These were blood sampled for Coggins testing for EIA. Eight horses returned negative results and a single horse on a premises in Devon (Horse B) gave a positive result. The exercise also established that two horses were reported to have died and four remain untraceable as all possible leads have been followed up, and horse movements within the country are not regulated.
6. EIA was confirmed in Horse B on 18th October (EIA 2012/02). Horse B showed no clinical signs and was humanely destroyed and the carcass removed for secure disposal by APHA on 19th October and a programme of clinical and laboratory surveillance put in place.
7. Epidemiological investigations were undertaken into potential routes of source and spread of infection. No evidence of further spread of infection from either infected premises was identified by either this work or the surveillance programme.
8. All statutory disease control restrictions for horses identified for surveillance sampling in relation to EIA 2012/01 were lifted on 9th January 2013 and those in relation to EIA 2012/02 had all been lifted by 30th January, following negative test results.

9. Although some uncertainty remains as to whether the untraceable horses are alive, and if so, whether they are infected with EIA; a qualitative risk assessment has concluded that there is a low but not negligible risk that one of the missing horses is infected, has not died, and could at some point present as a clinical case, or pose a transmission risk (if it is sub clinically infected) in the unlikely event that it is used to donate blood/plasma. This risk is similar to that from other horses imported prior to the tightening of the import processes following the EU decision (2010/346/EU) in June 2010. Similar uncertainty also remains as to whether or not the two horses that had died were infected.

Case EIA 2012/01: CORNWALL ('Horse A')

Detection of disease

10. Suspicion of disease in a single horse ('Horse A', a 10 year old gelding) on premises in Cornwall was reported to the Veterinary Exotic Notifiable Diseases Unit (VENDU) of the Animal & Plant Health Agency (APHA) on 1st October 2012 by APHA's laboratory at Weybridge on detection of a positive result for Equine Infectious Anaemia (EIA) following testing by the 'Coggins' (AGIDT) test of a single blood sample received from a Private Veterinary Surgeon (PVS) on 28th September 2012.
11. The owner had first noticed signs of ill health in Horse A on 22nd September and reported these to her PVS on 24th September. Clinical signs of lethargy and depression, constipation, pale mucous membranes, pyrexia ($>40^{\circ}$ Centigrade), tachycardia, profound anaemia, jaundice and preputial oedema were present. Blood samples collected by the PVS on 24th September for a liver profile & haematology revealed a profound non-regenerative anaemia with a PCV of 10. Auto-immune haemolytic anaemia was initially suspected, but a sample was subsequently sent by the PVS to APHA Weybridge to rule out the presence of EIA.
12. Prior to this the horse was reported by the owner to have been active and normally healthy horse with no history of illness or clinical signs suggestive of infection with EIA.
13. Following receipt of the positive result to the Coggins test on the sample submitted by the PVS, APHA operational staff attended the premises on the same day, served statutory disease control restrictions and re-sampled the suspect horse along with 23 other horses out of an additional 25 that were present. Two horses that could not be safely handled at that time were sampled on the 2nd October.
14. Results of the officially collected samples submitted to APHA Weybridge by APHA operational staff also gave a positive result to the Coggins test for EIA and disease was confirmed by the CVO on 3rd October 2012 (EIA 2012/01).
15. Horse A was humanely destroyed on 3rd October and its carcase securely transported to APHA Weybridge for disposal. Cleansing and disinfection of potentially contaminated areas (e.g. stabling used by Horse A) was undertaken by APHA staff.

Overview of Infected premises

16. The infected premises (IP-A) comprised a farm consisting of approximately 125 acres of which 65 acres were down to permanent grassland, with the remainder consisting of woodland. The farm's owner had 19 beef cattle, 2 goats, 5 dogs & 3 cats on the premises. The owner also ran a 'Do It Yourself' livery yard on the premises with stabling and grazing available. Most horses were grazed out in set paddocks and within defined groups. Many owners rode their horses along adjacent lanes around the local area. Most tack and equipment was not shared. Some, but not all, of the horses (including Horse A) were stabled at night or during periods of inclement weather.

Numbers infected and at risk

17. In addition to Horse A, a further 25 horses and ponies belonging to a total of ten different owners were also present on the premises. These animals showed no clinical evidence of EIA, were sampled by APHA to test for the presence of sub-clinical infection with EIA between 1st and 2nd October and remained under statutory disease restrictions pending repeat testing after an interval of at least 90 days.

18. Two further premises, each containing two horses, that were located within 200 metres of areas of the infected premises that had been utilised by Horse A for grazing were identified, placed under statutory restrictions and subjected to sampling to test for evidence of sub-clinical infection with EIA on two occasions separated by at least 90 days.

19. A single horse that had been in relatively close contact with Horse A had moved off the infected premises shortly before disease was confirmed. This horse was traced to premises in Cornwall where it was restricted (along with a further four horses on the same premises) and subjected to sampling to test for evidence of exposure to EIA on two occasions at least 90 days apart.

20. The owner of the infected premises reported that a relatively low number of horses (1-2 per week) were ridden along a public road that bisected the premises. A similar number were also reported to be ridden through woodland on the infected premises. However, expert advice obtained was that the risk of exposure to infection of horses simply passing the infected premises would be considered to be very low (see Appendix C for definitions).

Hypotheses for source and estimated date of infection or introduction to premises

a. Potentially infected prior to / during import into Great Britain (considered most likely)

21. Export Health certification and associated records from the TRACES database indicated that Horse A was imported from Belgium on 16th April 2008 to premises in Devon on a separate health certificate, but in the same lorry as the previously confirmed case of EIA at other premises in Devon in 2010 (EIA 2010/03).

22. Information obtained from the importing premises suggests that almost all of the 18 horses on the lorry were sold on within a period of 3-6 weeks after importation.

Investigations to attempt to establish the current locations of the remaining 16 horses from this consignment in order to investigate their EIA status were undertaken (see below).

The consignor of these horses was reported to be part of a network of horse dealers, transporters and premises involved in other outbreaks of EIA within the European Union and had also been linked with previous EIA cases in Great Britain. This network is known to have links to and trade in horses originating from Romania where EIA is considered endemic.

23. Additionally, the passports which accompanied the horses within this consignment were issued on 14th April 2008 (i.e. two days before importation into Great Britain) to the Belgian consignor by a passport issuing organisation in Belgium, subsequently discovered (in 2009) to be unapproved by the Belgian authorities with the passports being non-compliant with EU and Belgian statutory requirements.

24. Whilst there is considerable uncertainty surrounding the precise origin of these horses, the possibility that some (or all) may have previously been consigned out of Romania or another high risk area cannot be excluded.

25. These horses were not subject to post-import testing for EIA on arrival in Great Britain as they were imported prior to the introduction of checks on all consignments of four or more equidae listed on a single TRACES notification with a requirement for imposition of movement restrictions and sampling for EIA if any irregularities in animal identification are found or if there is reason to suspect that the animals may have originated from a high risk region.

b. Potentially infected within Great Britain but prior to arriving on the infected premises

26. Horse A's ownership and clinical history since importation in 2008 were investigated.

The horse was sold by the importing premises in Devon in April/May 2008 to riding stables in Cornwall before being purchased by the final owner on 4th June 2008. After purchase by the final owner Horse A was then kept on other premises in Cornwall before moving to IP-A on 15th July 2010.

27. Information obtained during visits to the importing premises and the riding stables on his clinical health status whilst in their ownership was that he had not been observed to display any clinical signs of ill health whilst on either of these premises.

28. Information obtained about his health status whilst in his final ownership (from the owner and both her current and previous private veterinary surgeons) does not suggest that he had any observed illness suggestive of clinical episodes of EIA prior to the observed onset of clinical signs on 22nd September 2012.

29. Given that two other horses from the consignment imported in April 2008 were confirmed as being infected with EIA it is not possible to rule out the possibility that Horse A could have been infected by either of these whilst on the importing premises. However, given that they were only present there for a short period at a time of year when biting fly activity was likely to be low and given the information available on the horses before entry to the UK this would be considered to be less likely than the hypothesis that they had been infected prior to importation into Great Britain.

c. Potentially infected whilst resident on the infected premises

30. Information on the origin of, and any observed episodes of clinical illness since 1st August 2012 (a precautionary period to allow for possible incubation of disease if recent infection had occurred whilst on these premises) was obtained from the owners of all other horses remaining on the IP.

31. Only two of the remaining 25 horses on the infected premises were believed to have been imported – both from Ireland.

32. Two horses that were resident on the infected premises prior to suspicion of disease in Horse A were known to have died during 2012:

- A 12 year old mare was found dead at pasture on 4th August without any observed preceding signs of clinical illness. Investigations established that this horse had not been imported and had been continually resident within Great Britain. There were no reasons to suspect that its death was related to infection with EIA.
- Another horse with a history of collapsing and inco-ordination was diagnosed as having neurological problems, possibly 'Wobbler' syndrome, by a private veterinary surgeon in August 2012. There were no clinical signs to suggest the possibility of infection with EIA and the horse was humanely euthanased on 5th September after becoming unsafe to handle. This horse was originally imported from Ireland.

33. Apart from the two horses that died, only two others were observed to have clinical signs during this period:

- One horse suffered a unilateral nosebleed for 48 hours following blood sampling for EIA testing on 1st October – no pyrexia was noted, the horse recovered without any need for treatment and it is considered most likely that the bleed was due to trauma as the horse was very agitated during sampling.
- Another 30 year old horse had pre-existing Cushing's disease (a hormonal disorder) and was, understandably, not in the best of health at the time of the investigations.

34. Both of these horses, along with all others remaining on the IP, subsequently gave negative results to two AGIDT tests performed at least 90 days apart.

35. Overall there had been a relatively stable population of horses on the livery yard. The owner of the IP recalled that two owners and their horses had left the livery approximately 12 months previously, although no further details were available to allow further investigation of these and so an element of uncertainty around their EIA status remains (in particular as a possible source of infection for Horse A) however infection before entry to the UK remains the most likely scenario.

36. However, the fact that Horse A had not shown any clinical signs prior to 22nd September 2012 (and expert opinion was that in the absence of such clinical signs he would have been unlikely to have been potentially infectious prior to 15th September) and that the remaining horses on the IP that had had closer and more prolonged contact with him all tested negative for EIA on two occasions at least 90

days apart provides some reassurance that these two horses were unlikely to have constituted a source or risk of spread of disease and there is no further evidence of onward spread.

37. Based on the previous clinical history of Horse A, results of epidemiological investigations and the results of AGIDT testing of the other horses on the IP it is considered that hypothesis 'a' is most likely, although it is not possible to provide conclusive evidence to support this.

Potential and probability of spread from the premises and infected horses while in the UK

38. The spread of infection depends on the successful transmission of the virus from an infectious animal to a susceptible animal.

39. The EIA virus can be transmitted by mechanical transfer of blood by large biting flies such as horseflies (tabanid species) or stable flies (*Stomoxys calcitrans*) and also by equipment such as grooming, tack, dental, obstetric, farriery, tattooing and veterinary instruments e.g. needles and scalpels, especially if there is contamination with blood, milk or maternal/placental fluid. It may also be spread by saliva, nasal secretions, faeces, semen, ova and embryos. However, the risk from these routes is low and can be mitigated by good hygiene measures. Transplacental transmission is also possible.

40. The incubation period (time from infection to onset of clinical disease) for EIA typically varies between fourteen and forty two days (with a minimum of five days) although it may be considerably longer. In some cases of EIA, horses may not demonstrate any overt clinical signs of disease at all.

41. The time from first infection to the onset of infectivity to other horses is at least seven days but can be considerably longer. In the absence of clinical signs of disease infected horses appear to be non-viraemic and experimentally infection has not been transmitted even with as much as 250 ml of their blood. In such cases most tests will fail to detect the presence of virus in the blood unless a horse shows clinical signs.

42. In the absence of showing clinical signs, horses are not considered to be infectious under normal circumstances and are likely to pose a negligible threat for spread of disease to other equines. Horse A showed no clinical signs suggestive of EIA until 22nd September 2012 so the probability that it was infectious before this was considered to be very low.

43. Expert advice obtained suggests that infected horses may be potentially infectious for a period of up to seven days before clinical signs are manifested. The tracing window for potential spread of infection from Horse A was therefore set as 15th September to 3rd October (when Horse A was destroyed, the carcass removed for disposal and preliminary cleansing and disinfection of the site by APHA, thus removing any known further source of virus).

44. The following potential spread transmission routes were considered:

Movement of live horses

45. Horse A visited the PVS surgery premises for examination and treatment on 24th and 25th September whilst showing signs of clinical disease. He was examined in one of their stables which was then disinfected after use. There were no other horses on the premises at the time. One other horse has visited the practice since then, but it was examined in its own transport. The risk of spread of infection via this route is considered to be negligible.

46. A single horse that Horse A's owner had taken on trial with a view to purchase had been present on the IP and grazed with and stabled next to Horse A for a period of three days (15th to 17th September) in the week before clinical signs consistent with EIA were observed in the Horse A. A potential risk of transmission of disease by biting flies and/or other mechanical means could therefore have conceivably existed during this period. This horse was subsequently thought to be a 'windsucker' and was returned to its original premises (also in Cornwall). This horse was traced, restricted (along with 4 other horses there), isolated along with one of the other 4 horses (with advice to use separate feeding and handling equipment for the two groups), treated with fly repellent and subjected to two AGIDT tests performed at an interval of 90 days both of which gave negative results.

47. As previously mentioned the owner of the infected premises recalled that two owners and their horses had left the livery approximately 12 months before disease was confirmed in Horse A. However, as already discussed the risk of spread of infection via this route is considered to be negligible.

48. A number of horses were reported to be ridden along the public road that bisects the IP and also within woodland on the IP on a fairly regular basis. Expert opinion is that the risk of spread to horses simply passing the infected premises would be very low. The fact that the remaining higher risk contact horses on the IP, as well as the horses located on the two premises within 200 metres of the IP, all gave negative results to two AGIDT tests performed at an interval of 90 days provides further reassurance that this risk is negligible.

Spread by biting flies

49. The adult forms of the biting flies responsible for the potential transmission of the virus are active between May and October and so could have posed a risk of transmission of disease during the spread tracing window, although anecdotal evidence from the owner of the IP was that there had been fewer flies around than in previous years (and this observation was further supported by expert entomological opinion that the 2012 season had been generally poor for fly populations). It is considered that approximately 99% of horse flies would be expected to return to their original host to feed again after interruption of feeding if they were released when alternative hosts were at a distance of up to 160 metres. Therefore, a distance of 200 metres between infected and susceptible horses is generally accepted to adequately reduce the potential for transmission of EIA virus by horseflies.

50. It has been estimated that for a horse that is not showing clinical signs suggestive of a viraemic EIA episode only one out of every 6 million flies that bite it is likely to become a vector.

51. Following confirmation of EIA in Horse A owners of the remaining horses were given advice to use fly repellents on their horses to mitigate against the risk of transmission by insect vectors.

52. Repeat AGIDT testing of the 25 horses remaining on the IP, as well as those on the two premises located within 200 metres of the IP gave negative results and thus demonstrated that there had been no transmission of disease from Horse A to in-contact and neighbouring horses.

53. Risk of spread via this route is therefore considered to be negligible.

Reproductive Infection

54. Reproductive infection through natural or artificial service or via the transplacental route is possible, but has rarely been demonstrated outside experimental conditions. Horse A was a gelding and there was no reported breeding activity on the infected premises since it arrived.

55. The risk of spread of infection within or off the premises by this route is judged to be negligible.

Mechanical Transmission

56. Mechanical transmission of the EIA virus by iatrogenic means or management practices that may allow the contact of infected blood with exposed mucosa and/or broken skin of susceptible horses is possible (e.g. shared use of hypodermic needles or syringes, tattooing and acupuncture needles, farriery, dental and other surgical equipment). However, normal standards of good practice in cleaning and disinfection will reduce this likelihood to negligible due to the labile nature of the virus and the need for infected blood to gain entry.

57. Some very limited sharing of tack, grooming and other equipment such as feed buckets between small numbers of horses (including Horse A) on the IP was known to have taken place. However, the other horses that could have access to this equipment were all still present on the IP and serological testing demonstrated no onward transmission of disease via this route.

58. The PVS attending Horse A also confirmed that a policy of single use of hypodermic needles and syringes was practised.

59. Infected animals with bleeding or open wounds are also a potential hazard. Clinical inspections and enquiries found no evidence of these. The likelihood of transmission attributable to this route is negligible.

60. Transmission may occur by means of the administration of contaminated blood or plasma products or hyperimmune serum. There are no reports of the use of such products in this case and the risk attributable to this route is negligible.

61. Manure is considered to represent a negligible risk of transmission unless contaminated with blood or placenta/placental fluids.

62. Horse A had been subject to teeth rasping in June 2009, corrective farriery in November 2011, treatment for a foot abscess in January 2012 and was shod at the same time as three other horses in August 2012. However, all these interventions took place outwith the likely risk period for him being infectious (15th September – 3rd October 2012) and for horses with inapparent infections (i.e. in the absence of clinical signs) up to 250ml of blood have been necessary to transmit the EIA virus experimentally. The three other horses that were shod at the same time as Horse A

all remained on the IP and were included in the programme of surveillance sampling with negative results for EIA. The likelihood of transmission attributable to this route is negligible.

Surveillance strategy and summary of results

63. The need for tracing and surveillance was assessed to be required for all horses having contact with Horse A since 15th September 2012, which was considered to be the earliest date at which it may have become infectious, and any premises containing equidae that were located within 200 metres of areas of the IP that had been used by Horse A.

Table 1. Summary of EIA surveillance activity for EIA 2012/01

Surveillance target	Clinical inspections	EIA AGIDT – immediate. Date of sampling and result	EIA AGIDT – 90 day. Date of sampling and result
On IP-A – one infected horse	Disease suspected	Official APHA sample collected 01/10/2012; Positive	Not applicable – horse humanely destroyed.
On IP-A – 25 in-contact/potentially exposed horses	Disease not suspected	01/10/2012 & 02/12/2012: Negative	02/01/2013 & 04/01/2013: Negative
Tracing from IP-A – one horse moved off within spread tracing window.	Disease not suspected	05/10/2012: Negative	03/01/2013: Negative
200m surveillance zone – premises 1: Two horses	Disease not suspected	03/10/2012: Negative	02/01/2013: Negative
200m surveillance zone – premises 2: Two horses	Disease not suspected	06/10/2012: Negative	04/01/2013: Negative

Tracing of other horses imported into Great Britain in the same consignment as the infected horse

64. An extensive tracing exercise was undertaken by APHA staff to attempt to locate the remaining horses from the same consignment imported from Belgium into Great Britain in April 2008. Tracing activities included interviews with the owner of the original importing premises, discussions with a number of local authority trading standards departments, contact with PVS practices across Devon and Cornwall, contact with local horse sales organisations, interrogation of the former National Equine Database dataset and requests to all national passport issuing organisations to search their records for evidence of the microchip numbers of the imported horses.

65. All horses that could be located were subjected to veterinary clinical examination, samples were collected for AGIDT testing for evidence of infection with EIA and they were placed under statutory disease restrictions until negative results were received.

66. Several horses had been renamed since importation into Great Britain but identification of those that were located was confirmed by means of verifying their implanted microchip numbers.

67. Following this exercise 14 of the 18 horses originally imported in April 2008 could be accounted for as described below.

68. A total of three horses from this consignment were confirmed as being infected with EIA and humanely destroyed and disposed of by APHA:

- one in Devon in 2010 (EIA 2010/03);
- Horse A in Cornwall (EIA 2012/01); and
- Horse B in Devon (EIA 2012/02) – further description provided later in this report.

69. Nine horses were located on different premises in the South West of England and gave negative results when tested for evidence of infection with EIA by the AGIDT test. One of these horses had been previously sampled on two occasions 90 days apart as part of the sampling programme undertaken following confirmation of EIA on premises in Wiltshire in 2010 (EIA 2010/01). The remaining eight were sampled between 10th October and 9th November. The AGIDT ('Coggins') test, the gold standard for international trade, is optimised to identify seroconversion in horses between 35 to 45 days after infection and the vast majority of horses seroconvert within this period. However the OIE recognise that a few can take longer and set a period of 90 days before the second test to minimise the risk of missing such horses. Given the time that had elapsed between importation in April 2008 and the dates of sampling reassurance was provided that these nine horses were not infected with EIA.

70. Two horses were ascertained to have died from causes not giving rise to suspicion of being related to EIA infection; one died on the original importing premises in May 2009 following complications after foaling (treatment for a retained placenta was provided by the PVS and the cause of death attributed to toxæmia), the other was reportedly euthanased in July 2008 after contracting tetanus.

71. In the absence of any statutory requirements to update registration details or keep movement records for horses the tracing investigations were based on very limited documentary evidence and relied heavily on the co-operation and reliability of information provided by those people contacted. Despite the best endeavours of APHA staff and others providing assistance with this exercise between October and December 2012, the whereabouts or fate of the remaining four horses could not be established.

Assessment of extent of spread beyond IP-A

72. The risk of spread of disease beyond IP-A is considered to be negligible based on the absence of any clinical signs of disease suggestive of EIA in the infected horse before 22nd September (and the absence of reports of ill health at previous premises that Horse A had resided on before moving to the IP which could have been suggestive of viraemic episodes during which it could have potentially been infectious), the absence of infection among the highest risk contacts on the IP, the single traced horse and horses on the two neighbouring premises following testing on two occasions separated by a period of at least 90 days, the risk mitigation measures put in place and the results of field epidemiological investigations.

73. Restrictions on the IP, the traced premises and the two equine premises located within 200 metres of the IP were lifted on 9th January 2013.

Case EIA 2012/02: DEVON ('Horse B')

Detection of disease

74. Horse B had been traced to premises in Devon as part of the tracing exercise to investigate the EIA status of other horses imported into Devon on 16th April 2008 as part of the same consignment containing two previously confirmed EIA cases (EIA 2010/03 & EIA2012/01).

75. Horse B was sampled by APHA on 16th October 2012 and returned positive results to the AGIDT (Coggins) test. Disease was confirmed on 18th October (EIA 2012/02).

76. Horse B was humanely destroyed on site on 19th October, the carcass removed for secure disposal at APHA Weybridge and preliminary cleansing and disinfection of potentially contaminated areas of the IP was undertaken by APHA, thus removing all currently known infection.

77. At the time of sampling the horse was found to be in good health and not showing any clinical signs suggestive of EIA. Horse B had been in the current ownership since purchase from the importing premises in May 2009 and the owner reported that in that time there had been no clinical signs observed that may be suggestive of EIA.

78. Veterinary investigations to attempt to fully establish the horse's clinical history since importation were undertaken. There was no recollection by the importer of any of the imported consignment showing signs of illness that could be suggestive of EIA whilst on the importing premises (a single mare was recalled to have been lame and unfit for sale and was put in foal on the importing premises – this is one of the horses confirmed to have died following foaling).

79. Anecdotal information from the current owner was that she was under the impression that Horse B may have been sold by the importing premises to a riding school/centre for the disabled for a period of time before being returned to the importing premises. However, it was not possible to substantiate this.

80. As far as could be ascertained there was no available evidence to suggest Horse B had previously exhibited any episodes of clinical signs suggestive of EIA whilst in Great Britain.

Overview of Infected premises (IP-B)

81. The infected premises (IP-B) comprised a livery yard and associated grazing paddocks, located on an arable farm, on which there were 11 horses in total (including Horse B) belonging to six owners. There was housing used for overwintering of a third party's cattle but it was empty at the time of disease confirmation. Horses on the livery were often grazed together. Individual stabling was present for housing horses.

Numbers infected and at risk

82. Following the destruction and removal of Horse B ten horses remained on IP-B. These were subject to ongoing restrictions and a programme of clinical inspection and surveillance sampling (immediate sampling for Coggins testing followed by repeated testing after at least 90 days).

83. Two horses had been moved off the infected premises on 16th October prior to service of statutory disease restrictions. These were traced, restricted and subjected to the same surveillance strategy.

84. Two horses had reportedly been moved from the infected premises within a 12 month period prior to confirmation of disease. These movements were outwith the precautionary spread tracing window and given the lack of clinical signs suggestive of previous EIA clinical episodes the risk of transmission to these horses was considered to be negligible.

Otherwise the population of horses on the livery appeared to have been stable.

85. Foot patrols by APHA staff confirmed that there were no other horses situated on land within 200 metres of the livery yard and its associated grazing.

Hypotheses for source and estimated date of infection or introduction to premises

86. Three hypotheses were considered in relation to the potential source of infection:

a. Potentially infected prior to / during import into Great Britain

87. Given the known association of Horse B with two other cases of confirmed EIA in horses imported as part of the same consignment in April 2008, and the reported links of the consignor to a network of dealers and transporters whose trading practices have been associated with other outbreaks of EIA in the EU and Great Britain this hypothesis would appear to be most likely.

b. Potentially infected between importation in April 2008 and May 2009, prior to the horse arriving on the infected premises.

88. Uncertainty remains around the location and clinical history of Horse B between importation in April 2008 and purchase by the current owner in May 2009. However the likelihood of the horse contracting EIA whilst in the UK is assessed as negligible given the disease picture in the UK during this time.

c. Potentially infected whilst resident on the infected premises

89. Given the relatively stable nature of the equine population on the IP and the absence of infection in horses that had been in contact with Horse B whilst on the IP (since May 2009) this hypothesis is considered unlikely.

90. It was not possible to attribute a definitive source or date of infection, but the evidence of association with the previous cases EIA 2010/03 & EIA 2012/01 strongly suggests that infection is likely to have occurred prior to, or around the time of, import.

Potential and probability of spread from the premises

91. Horse B had not exhibited any clinical signs suggestive of a clinical viraemic episode of EIA whilst in the current ownership and it was therefore considered highly unlikely that she would have been infectious to other horses whilst on the infected premises. A precautionary spread tracing window was set as being from 7 days prior to humane destruction and disposal of the carcass (i.e. 12th – 19th October).

92. The following potential transmission routes were considered:

Movement of live horses

93. Two horses had been moved off the infected premises on 16th October 2012 to two other premises in Devon prior to service of statutory disease control restrictions. These horses were traced, restricted, clinically examined and subjected to immediate AGIDT testing followed by repeat testing after at least 90 days (with negative results received on both occasions). Other horses on these two premises were also subject to restrictions until a period of seven days had elapsed since the traced horses were separated from others on the premises and provided that no clinical evidence suggestive of EIA was seen in either of the traced horses.

94. Two further horses were reported to have been moved off the IP during the 12 month period prior to confirmation of disease in Horse B. However, given that Horse B had not shown any clinical signs suggestive of a previous EIA viraemic episode during which it could potentially have been infectious these horses were considered to be of negligible risk.

Spread by biting flies

95. Foot patrols by APHA staff confirmed that there were no other horses situated on land within 200 metres of the livery yard and its associated grazing. Given the absence of clinical signs suggestive of an EIA viraemic episode in Horse B and the absence of infection in all in-contact and traced horses the risk of transmission by this route was considered negligible.

Reproductive Infection

96. A Certificate of Veterinary examination issued by the PVS at the time of purchase by the current owner contained an opinion that Horse B 'had bred a foal'. However, there was no history of any breeding activity whilst Horse B was in the current ownership (since May 2009). Notwithstanding some remaining uncertainty around Horse B's full clinical history between importation into Great Britain and purchase by the current owner the risk of transmission by this route was considered very low.

Mechanical Transmission

97. The risk of transmission to other horses on site through shared equipment, tack or manure was considered very low due to the labile nature of the virus and the need for infected blood to gain entry. Some sharing of saddles between Horse B and other horses on site may have occurred, but not other tack and all horses used individual bits.

98. Common farriery and tooth rasping were identified as potential risk activities. However, these activities were only common to Horse B and her owner's other horses, and not with other separately owned horses on site. The owner had reported that a few weeks prior to confirmation of disease Horse B had sustained a minor leg

wound that drew blood. This healed quickly with minor treatment not requiring veterinary intervention. However, given the absence of clinical signs suspicious of EIA at any point and the very low likelihood of this wound or blood having any contact with other horses, the risk of transmission via these routes was considered very low.

99. No other surgical interventions were carried on Horse B and the private veterinary surgeon has confirmed their policy of single use of needles and syringes for treatments and vaccinations.

100. Given the absence of observed signs suggestive of any clinical episodes of EIA the risk of transmission from Horse B to other horses whilst on these premises was assessed as being very low. Opinion expressed by the private veterinary surgeon is that the owner would have been likely to notice even mild clinical signs of illness.

Surveillance strategy and summary of results

Table 2. Summary of EIA surveillance activity for EIA 2012/02

Surveillance target	Clinical inspections	EIA AGIDT – immediate. Date of sampling and result	EIA AGIDT – 90 day. Date of sampling and result
On IP-B – one confirmed exposed horse	Disease not suspected	16/10/2012; Positive	Not applicable – horse humanely destroyed.
On IP-B – 10 in-contact/potentially exposed horses	Disease not suspected	24/10/2012: Negative	22/01/2013: Negative
Tracing from IP-B* – one horse moved off within spread tracing window.	Disease not suspected	24/10/2012: Negative	22/01/2013: Negative
Tracing from IP-B – one horse moved off within spread tracing window.	Disease not suspected	26/10/2012: Negative	28/01/2013: Negative

*This horse was subsequently licensed back onto the infected premises and was re-sampled along with the original 10 in-contact horses that had remained there following removal of the infected horse.

Assessment of extent of spread beyond the IP

101. As far as could reliably be established the infected horse showed no clinical signs suggestive of EIA at any time whilst in Great Britain and the probability that it was infectious while in Great Britain was considered to be very low.

102. Horses with no clinical signs are generally considered not to be infectious under normal circumstances (outside of the risk factors listed previously) and pose a negligible risk for spread of disease to other equines. Given the very low probability

that the infected horse was infectious while in Great Britain, together with the limited number of equidae identified as being at risk between 3rd and 11th September 2010, the absence of infection among the highest risk contacts, the risk mitigation measures put in place and the results of field epidemiological investigations, the likelihood of transmission of infection from Horse B to other horses whilst it was resident in Great Britain is considered to be negligible.

103. Restrictions on IP-B were lifted on 24th January 2013 and restrictions on the single remaining traced premises were lifted on 30th January 2013.

Conclusions (EIA 2012/01 and EIA 2012/02)

104. Whilst it has not been possible to confirm definitive sources and timings of infection for cases EIA 2012/01 and EIA 2012/02 it is considered highly likely that they were originally infected with EIA prior to importation into Great Britain in 2008.

105. This conclusion is based on:

a) The known levels of endemic EIA in parts of continental Europe and the absence of detected infection in the UK between 1975 and 2010;

b) The only confirmed incidents of EIA in Great Britain in 2010 and 2012 were all closely linked with imports of horses from continental Europe that were associated with a network of horse dealers (including the consignor responsible for supplying both horses and the previous case EIA 2010/03) and transporters known to have clearly identifiable links to areas where EIA is endemic.

106. There were no records or recollections from the current and (as far as could be ascertained) previous owners to suggest that they had shown clinical signs suggestive of or consistent with clinical episodes of EIA until Horse A became ill on 22nd September 2012.

Summary of remaining uncertainties

107. In the absence of any statutory requirements to update registration details or keep movement records to provide traceability for horses the tracing investigations to follow up the remaining horses in the consignment imported in April 2008 were based on extremely limited documentary evidence and were heavily reliant on the co-operation and reliability of information provided by those people contacted, in particular the owner of the original importing premises in Devon.

108. Following the best endeavours of APHA staff and others providing assistance with this exercise the whereabouts of a further 10 of the 18 horses imported in 2008 in the same consignment as the two clinical report cases (EIA 2010/03 and EIA 2012/01) were established, and their infection status investigated. This led to the detection of one further EIA positive horse (EIA 2012/02) and provided reassurance that the other nine horses were not infected.

109. It was ascertained that a further two horses from the 2008 consignment had died in July 2008 and May 2009 respectively. There is no evidence to suggest they

were infected with EIA, but some uncertainty remains as to their disease status while Great Britain.

110. However the fate of the remaining four horses could not be established. An uncertain degree of risk therefore remains that undetected disease exists in one or more of these horses, if still alive. A qualitative risk assessment see (Appendix D) has concluded that there is a low but not negligible risk that one of the missing horses is infected, has not died, and could at some point present as a clinical case, or pose a transmission risk (if it is sub clinically infected) in the unlikely event that it is used to donate blood/plasma. This risk is similar to that from other horses imported prior to the tightening of the import processes following the EU decision (2010/346/EU) in June 2010. Similarly, uncertainty also remains as to whether or not the two horses that had died were infected.

112. The owner of IP-A recalled that two owners and their horses had left the livery approximately 12 months previously, however no further details were available to allow further investigation of these and so an element of uncertainty around their EIA status remains. Following epidemiological investigations into this case this risk would however, be considered to be very low.

113. Uncertainty remains around the location and clinical history of Horse B between importation into Great Britain in April 2008 and purchase by the final owner in May 2009.

NEEG
May 2014

Appendices:

A: Risk mitigation measures applied to both cases

Risk factor	Risk source/target	Mitigation measures
Transmission of virus by insect vector or direct contact	Infected premises: Horse A and Horse B	<p>Infected horses isolated and fly repellent applied between detection of disease and removal.</p> <p>Destruction and disposal of EIA antibody positive horses.</p> <p>Owner obligations to report any clinical suspicion of disease to APHA.</p> <p>Owners provided with information (e.g. EIA extract of HBLB Codes of Practice).</p> <p>Insecticide treatment applied to in-contact horses.</p>
Indirect transmission	Infected premises: Horse A and Horse B	Secure controlled disposal of EIA positive carcasses with cleaning and disinfection of stabling.
Transmission by mechanical or iatrogenic spread	Horses remaining on the infected premises	<p>Statutory disease restrictions applied to the infected premises mitigated against the risk of spread by prohibiting surgical interventions (unless officially authorised) or the use of any equipment which may become contaminated with blood unless it was immediately destroyed, autoclaved or cleansed and disinfected.</p> <p>The virus itself is fragile and is easily and quickly destroyed when outside the body.</p>

Transmission by movements of live horses from infected premises during potential infectious period	Horses moved off the infected premises	Restrictions on movements of in-contact horses pending completion of programme of clinical and laboratory surveillance with negative results at immediate and +90 day sampling. Tracing and sampling of horses moved off.
Potential undetected infection in other horses imported into GB as part of the same consignment as Horses A & B	Remaining 15 out of consignment of 18 horses imported in April 2008.	Tracing of remainder of imported consignment – 9 of remaining 15 located and sampled with negative results, 2 reported dead, 4 untraceable.
Vector transmission from IP	Equidae resident on other premises within 200 metres of Horse A during the period of clinical illness (not applicable for Horse B)	All equidae within 200 metres identified, clinically inspected, restricted and subjected to clinical and laboratory surveillance.

B: Risk terminology used in this report (derived from EFSA AI risk assessment, 2006)

‘Risk’ in this report follows the epidemiological definition of likelihood or probability, and does not include the impact or consequences of infection. References to levels of risk in this report refer to probability outcomes, and follow this terminology:

Negligible	So rare that it does not merit to be considered
Very low	Very rare but cannot be excluded
Low	Rare but does occur
Medium	Occurs regularly
High	Occurs very often
Very high	Events occur almost certainly

C: Abbreviations / glossary

AGIDT	Agar Gel Immunodiffusion Test
APHA	Animal & Plant Health Agency
Coggins’ test	Specific AGIDT for EIA
EIA	Equine Infectious Anaemia
IP	Infected Premises
OIE	The World Organisation for Animal Health

D: Risk Assessment: the risk of one or more of the four untraced horses being infected with EIA

As regards the risk of finding further horses infected among the 4 that could not be traced - this is difficult to estimate and can be seen in three parts:

1. The likelihood one or more is infected. The starting point is to recognise that 3 of the 12 horses we found and whose status we could confirm, were infected - which is 25%, so at that rate the best estimate is that 25% of the four missing horses are also infected which equals one horse. However the true probability is likely a bit lower due to the fact that clinical signs may develop in infected horses (as in two of the three that we found) and if this had occurred in one of the missing horses we may have been notified.
2. The likelihood, if infected, they will develop disease and become a report case. It is not clear how likely horses are to develop clinical signs, however if they do so, they are likely to have some signs at the start and/or over time will have repeated episodes. The report cases that we have had suggest that when this occurs there is probably sufficient awareness among practitioners that suspicion of disease is notified when clinical signs become severe, however this is hard to assess and quantify as clinical signs may vary in their severity and duration.
3. The likelihood, if infected, they will pose a transmission risk. The main risk of transmission is during periods of higher levels of viraemia, normally associated with clinical signs, which is discussed in point 2 above. As long as infection remains truly subclinical, the highest transmission risk is likely to be transmission in donated blood/plasma if an infected horse is used as a blood/plasma source. The frequency of this, or whether such horses are routinely tested has not been established.

There is also the possibility that one or more of these horses has died - if the same risk is applied to them as the horses on the consignment that we do know of, 2 of 14 had died, so at the same rate the probability is about 14% that one of the missing horses has died, reducing all of the above risks. Further to this, one or more of the missing horses may have been exported and no longer in the country.

In summary there is a low but not negligible risk that one of the missing horses is infected, has not died, and could at some point turn up as a report case, or pose a transmission risk if it is sub clinically infected and used to donate blood/plasma. It is worth noting that other horses imported prior to the tightening of the import processes could pose a similar low but not negligible risk.

Transmission from infected horses has been shown to be a very rare event in GB, as demonstrated by the number of exposed horses that have been restricted and tested in relation to the cases found in recent years, none of which were infected. This suggests there need be less concern about the true status of the two horses that died.