

Management of the national programme to eradicate equine infectious anaemia from Ireland during 2006: A review

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Keywords: horse; equine infectious anaemia; EIA; Ireland; eradication; surveillance; resources; government; industry

Summary

Reasons for performing study: Ireland experienced an outbreak of equine infectious anaemia (EIA) during 2006.

Objectives: To present an overview of the outbreak, the national response (control and eradication strategies, resource issues, linkages with industry and the international community) and lessons learned.

Methods: The eradication programme was coordinated by the national Department of Agriculture, Fisheries and Food (DAFF), and included a national response (field operations, central coordination) and laboratory support. During the outbreak, 2 broad control strategies were used, including movement controls on premises and individual horses, and a programme of surveillance of premises and individual horses.

Results: EIA was confirmed in Ireland on 15th June 2006 and, during the 6 month outbreak, a total of 38 cases were identified. Eradication efforts have been successful. The Irish government committed substantial human and financial resources (an estimated 3048 person-days, approximate salary costs of €793,000, additional costs associated with travel and subsistence), and paid €272,000 to support non-DAFF activities. A total of 92,022 serological tests were conducted during the outbreak. DAFF maintained close linkages with industry and the international community.

Conclusions: EIA has been successfully eradicated from Ireland, with the help of substantial commitment from the Irish government. A number of lessons have been learned and future challenges identified. Cooperation was critical to eradication success, across organisations and disciplines and between government and industry. Epidemiological investigations contributed to control efforts during the outbreak. Factors were identified to minimise the risk of further EIA incursions. More generally, the risk of equine infectious diseases to Ireland will continue, highlighting the need for detailed planning in preparedness and response.

Potential relevance: In Ireland and elsewhere, there is a need to evaluate critically the roles and responsibilities of both industry and government in preparedness for, and response following, an exotic equine disease incursion.

Introduction

Equine infectious anaemia (EIA) is a disease of equids, including horses, ponies, donkeys and mules, that is listed with the International Organisation for Animal Health (OIE). It has a worldwide distribution, and is endemic in many countries, including some in Europe. In the 5 years prior to 2006, the OIE received reports (Anon 2006a) of EIA from a number of EU member states (France, Germany, Greece, Italy, Latvia, Lithuania, Romania) and near neighbours (Bosnia and Herzegovina, Croatia, Serbia and Montenegro, Turkey, Ukraine).

Ireland experienced an outbreak of EIA in 2006. The infection was first detected on 15th June 2006, in a mare following euthanasia at a veterinary hospital. During the following 6 months, a total of 38 cases were detected, in 2 distinct epidemiological clusters (centred on counties Meath and Kildare). The outbreak affected horses from 18 separate home premises in 8 Irish counties (Kildare, Meath, Dublin, Wicklow, Wexford, Limerick, Louth and Monaghan) and one county (Derry) in Northern Ireland. EIA had been reported in Ireland on only one previous occasion (Department of Agriculture, Fisheries and Food, unpublished data). In September 1975, EIA was confirmed in 2 mares, on separate studs in Ireland. Each had been present at a stud in Newmarket, UK, during an outbreak of EIA in 1974. During subsequent tracing and widespread surveillance, and despite the long period between infection and detection, there was no evidence of transmission of infection in Ireland from these primary cases.

Ireland has a longstanding equine tradition, and the horse industry (both sport horse and racing) is a very important contributor to Irish society, both economically and socially. The Irish Thoroughbred (TB) industry is the third largest in the world (Anon 2004a) and 86% of yearlings were exported annually (D.P. Leadon, personal communication). In 2004, the stallion and breeding/brood mare sectors employed approximately 4700 people, either full- or part-time, and approximately 42% of all TB foals in the EU were born in Ireland. Further, an estimated 110,000 horses and ponies are used for recreational and competitive activities other than racing, with the number of sport horses per head of population being higher in Ireland than in any other

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[Paper received for publication 22.04.08; Accepted 10.09.08]

European country (Hennessy and Quinn 2007). Freedom from major equine diseases, such as African horse sickness (AHS), glanders and contagious equine metritis (CEM), is critical to ongoing international demand for Irish horses.

Information is available about the management of animal health emergencies in production animals (including cattle and fish), including several volumes in the *OIE Scientific and Technical Review* (Anon 1994, 1999; Bernoth 2008). Key elements in successfully addressing these emergencies include early warning, early reaction, enabling research and coordination (Anon 2008a). There is growing concern about outbreaks in equine populations, noting the potential for global spread as a result of the very substantial increase in the international movement of horses and their biological products (e.g. semen, embryos, plasma) (Timoney 2000a,b; Herholz *et al.* 2008). A number of agents, including equine influenza (EI) (Powell *et al.* 1995; Guthrie *et al.* 1999; Daly *et al.* 2004) and AHS (Mellor and Hamblin 2004), have the potential for rapid spread within equine populations.

As yet, there are limited published examples highlighting issues relating to the national management of equine disease emergencies. In this paper, the national response (control and eradication strategies, programme management, linkages with industry and the international community, resource issues) to the 2006 EIA outbreak in Ireland is presented and lessons learned.

Control and eradication strategies

The national response was initiated on 14th June 2006 following a report from a private veterinary practitioner (PVP). During the following 6 months, cases were identified using active case finding and (in the latter stages of the programme) targeted serosurveillance. Movement controls (restrictions) were applied on premises and individual horses. A detailed chronology of outbreak events and of relevant agencies, is presented in the supplementary material available from www.ucd.ie/cvera (Appendices 1 and 2, respectively).

Active case finding

Throughout the outbreak, control and eradication strategies were achieved primarily through active case detection and targeted movement restrictions. Throughout this investigation, a confirmed case was defined as any animal with serological and/or virological evidence of EIA infection. Note that the OIE definition of an EIA case (only those horses that were positive to the agar gel immunodiffusion [AGID, Coggins] test; Anon 2005a) is a subset of this. Several unconfirmed cases (with clinical and/or epidemiological (but no collaborating serological and/or virological) evidence consistent with EIA infection) were also identified. Detailed epidemiological investigations, including trace-back and trace-forward activities, were conducted on all confirmed and unconfirmed cases as soon as possible following detection. All at-risk horses were identified and then prioritised for immediate and ongoing serological and epidemiological evaluation following a qualitative assessment of risk. Horses with a strong epidemiological association (such as direct contacts) with EIA cases were considered at high risk, and those with a distant epidemiological association (such as co-resident horses but without direct contact with an EIA case) were considered at lower risk. Movement restrictions were imposed, both on horses and premises, again on the basis of risk, as highlighted later.

Targeted serosurveillance

From October 2006, a targeted programme of serosurveillance was conducted focusing on all equine clients of equine veterinary practices with any association to the Meath (More *et al.* 2008a) and Kildare (More *et al.* 2008b) clusters. This programme was coordinated locally, but with central support, by the District Veterinary Offices (DVOs) in Meath (between 17th October 2006 and 13th February 2007) and Kildare (between 23rd November 2006 and 24th January 2007).

Programme management

Central coordination

This outbreak spanned 2 jurisdictions (the Republic of Ireland, Northern Ireland within the United Kingdom) (Menzies and Patterson 2006), and relevant cases were managed independently by the Department of Agriculture, Fisheries and Food (DAFF) in Ireland and Department of Agriculture and Rural Development (DARDNI) in Northern Ireland. Throughout the outbreak and, subsequently, there has been ongoing coordination of investigation and control activities.

There was central coordination of restriction and testing requirements (on both premises and horses), in association with each case. Information from trace-forward and -back investigations was shared centrally and locally. Throughout the outbreak, data were collated centrally, of cases (breed; type; age; clinical history; dates of onset of clinical signs, diagnosis, death or euthanasia; movements; treatments; location; and possible modes of infection) and associated premises (holding size; type of operation; number of equids including name, passport number and type; contiguous holdings; results of forward- and backward-tracing; nature and period of the restriction). The international movement of at-risk animals was notified to the appropriate Competent Authorities.

To assist with eradication efforts, new legislation (The Diseases of Animals Act 1966 [Notification and Control of Infectious Diseases] Order 2006 [S.I. 359 of 2006]) was introduced, revoking and replacing the previous legislation, to reinforce these provisions and provide additional control measures on animals and premises which were subjected to restriction. A summary of regulatory and nonregulatory issues, and of relevant legislation is presented in the supplementary material available from www.ucd.ie/cvera (Appendices 3 and 4, respectively).

Field operations

Field operations were conducted by DAFF staff under the direction of the relevant DVO. These activities were coordinated centrally. During the outbreak, field investigations were initiated on the basis of suspicion or confirmation of infection (e.g. where suspect EIA cases were reported by a PVP on clinical grounds or where a positive or inconclusive EIA result was obtained during serological testing at the Central Veterinary Research Laboratory [CVRL] or the Irish Equine Centre [IEC]). Field investigations focused on forward- and backward-tracing from premises where infection was confirmed or suspected, restriction of premises and individual horses, restriction-associated testing and (from October 2006) a targeted serosurveillance programme.

Based on a report of suspected infection, a Veterinary Inspector (VI) made initial contact with the keeper of the equids by telephone, and a farm visit was arranged for that same day. During the initial interview, information on the size of the holding, type of operation and the number of equids (name, passport number and type) were obtained. All animal movements and the animal remedy record were examined if available, a full clinical history of the suspect animal was recorded, and details of adjoining holdings (those immediately contiguous) that contained equids were requested. Animal movements were emailed to the central coordinating unit where trace-forward and trace-back activities were organised and coordinated. Restriction notices were served on the keeper under the Diseases of Animals Act 1966 (Notification and Control of Animal Diseases) Order 2006 (S.I. No. 359 of 2006). An individual Animal Restriction Notice was served on each suspect animal. In the case of a confirmed positive EIA animal or a high-risk traced animal, an Animal Restriction Notice was served for all resident equids and a Premises Restriction as required, a notice was also served on adjoining premises. Laboratory requests for additional samples from positive cases were then obtained, including clotted and unclotted (lithium heparin) blood and swabs (nasal, ocular and buccal). Arrangement for the euthanasia of confirmed cases was made between the keeper and PVP. The VI assisted in the bio-secure removal and disposal of the carcass. Advice regarding disinfection of equipment and the premises was offered to the keeper.

Movement restrictions remained in place until all remaining horses had tested AGID negative on 2 occasions at least 90 days apart, following the slaughter and subsequent removal of the infected animal. The restriction period recommenced on the restricted premises and its associated adjoining premises whenever a new case was confirmed. Horse restrictions, and associated testing, were determined on the basis of assessed risk. During much of the outbreak, high-risk horses were tested at 10 day intervals for 60 days, then at 90 days, using a range of laboratory tests (ELISA, AGID test, haematology, biochemistry). Following evidence suggesting an extended period to detection (More *et al.* 2008b), high-risk horses were subjected to a further AGID test at 120 days after the last possible exposure. An AGID test was conducted on lower-risk horses at 45 and 90 days after the last possible contact with a potential source of infection.

Laboratory support

Laboratory support was provided by 2 laboratories during the outbreak. During the initial stages of the outbreak, all sera were examined using the AGID (Coggins) test (a commercial kit, LAB-EZ/EIA¹; as described by Cullinane *et al.* 2007), in accordance with the the OIE manual on diagnostic tests (Anon 2005a). Subsequently, sera were monitored by both the AGID test and one or more commercially-available ELISA tests (Equine Infectious Anemia Virus Antibody Test Kit, ELISA²; EIA cELISA³; ViraCHEK/EIA¹). During the programme of targeted serosurveillance, sera were screened solely using the ELISA, although sera that gave an inconclusive or positive result were then examined using the AGID test. Throughout the outbreak, the AGID test was considered the definitive confirmatory test method. In addition to confirmatory testing by AGID, any serum that gave a positive test result by ELISA was retested using all

3 ELISA tests and the horse in question was re-sampled for repeat testing by both ELISA and AGID. Immunoblotting (using methods and reagents from Chuck Issel, Gluck Institute, Kentucky, USA) was utilised on sera that were consistently positive by one or more ELISA method, but negative by AGID. Some additional testing was conducted using quantitative PCR and RT-PCR (as described by Quinlivan *et al.* 2007), a modified AGID test (according to the original description by Coggins *et al.* 1972), and haematological and biochemical analyses, as described elsewhere (More *et al.* 2008a).

Investigative support

Detailed epidemiological investigations were conducted during the outbreak to identify the source of infection and the mode(s) of transmission and spread. This work was conducted by DAFF staff and veterinary epidemiologists from the Centre for Veterinary Epidemiology and Risk Analysis (CVERA) at University College Dublin. Legal investigations were conducted by DAFF's Special Investigation Unit (SIU), with assistance from An Garda Síochána (Ireland's national police force).

Linkages with industry and the international community

During the course of the outbreak, DAFF communicated regularly with a wide range of stakeholders, through national stakeholder meetings, local meetings, press releases and web-based information. A Code of Practice is published by the Irish Thoroughbred Breeders Association (ITBA) setting out voluntary recommendations to help breeders, along with their veterinary practitioners, to prevent and control a range of specific diseases in all breeds of horses and ponies. This was amended to include recommendations in regard to EIA (Anon 2007a). The ITBA recommended that all mares going to stud after 1st January 2007 should have 2 negative EIA tests, the first to be taken in January 2007 and the second within 28 days of first covering. In addition, over 6000 copies of an information note on EIA was produced by the IEC, and published and distributed by DAFF.

On 15th June 2006, the presence of confirmed EIA in Ireland was notified to other parties of the Tripartite Agreement (UK and France) (Reynolds 2006). The OIE, the International Disease Collation Centre and the European Commission were notified on 16th June. Throughout the outbreak, relevant Chief Veterinary Officers were notified of high-risk animal movements once tracing information became available. Tripartite partners were given detailed updates in September 2006 and January 2007.

Resource issues

Programme activity

During the outbreak, 38 cases were identified. Infection was successfully eradicated, with no further cases detected since December 2006. All but the final 2 cases were identified prior to the establishment of the active targeted surveillance programme. It is estimated that 1521 horses were subjected to DAFF restriction and testing. In total, 25 (of the 28) DVOs in Ireland were involved in tracing, restricting and testing horses. Full movement restrictions were imposed on 53 premises, whereby no equine or equine carcass could move onto or off the holding without a license. Further, 76 horses were traced to 5 other jurisdictions,

TABLE 1: Number of tests conducted in Ireland for equine infectious anaemia each month during June 2006 to March 2007. Testing was conducted at the Irish Equine Centre (IEC) and the Central Veterinary Research Laboratory (CVRL)

	Number of tests conducted				Total
	AGID		ELISA		
	IEC	CVRL	IEC	CVRL	
2006					
June	1605	211	3	-	1819
July	1507	367	113	-	1987
August	3569	509	3379	-	7457
September	3805	384	9070	-	13,259
October	5799	449	9404	1908	17,560
November	4816	225	4107	3424	12,572
December	1476	109	2196	1736	5517
2007					
January	2379	765	13,878	848	17,870
February	931	48	6729	210	7918
March	994	4	4909	156	6063
Total	26,881	3071	53,788	8282	92,022

including the Czech Republic, France, Germany, Italy and the UK (including England, Northern Ireland and Scotland). During the targeted surveillance programme, 8593 horses were sampled, from counties Kildare and Meath, and to a lesser extent from Cavan, Dublin, Louth, Monaghan and Kilkenny. Between June 2006 and March 2007, 92,022 EIA tests were conducted in Ireland, including 29,952 AGID tests and 62,070 ELISA tests (Table 1).

Human and financial resources

The Irish government played the lead role in the eradication effort from June 2006 until the EIA outbreak was resolved, including:

- Central coordination* (1491 person-days): DAFF Policy (overall coordination, communication with relevant international and industry bodies; a total of 1150 person-days);
- Field operations*: Disease investigations, disease control; input from 25 of Ireland's 28 DVOs; 1257 person days;
- Laboratory support* (300 person-days): Of the 92,022 EIA tests conducted between June 2006 and March 2007, 12.3% were conducted at DAFF's Central Veterinary Research Laboratory (CVRL; Table 1);
- Investigative support*: SIU (legal investigation; 101 person-days) and CVERA (epidemiological investigation; 240 person-days).

The salary costs paid by DAFF for each of these above-mentioned activities was approximately €793,000. Travel and subsistence costs were also paid to DAFF staff in associated with the eradication effort, however, these data are not available. DAFF paid approximately €272,000 from June 2006 to March 2007 to support non-DAFF activities, including costs associated with serological testing (including consumables) in a non-DAFF laboratory, and a part-contribution towards the cost of sample collection to PVPs as part of the enhanced surveillance programme. A detailed breakdown of resources is presented in the supplementary material available from www.ucd.ie/cvera (Appendix 5).

Horse owners covered all costs associated with the care of restricted horses throughout the outbreak.

Discussion

Equine infectious anaemia has been successfully eradicated from Ireland. Scientific aspects of this outbreak are presented elsewhere (More *et al.* 2008a,b). This paper specifically addresses issues relating to the management of the national eradication programme (including control and eradication strategies, programme management, linkages with industry and the international community, resource issues) and lessons learned. Despite their importance to the equine industries, these issues are rarely discussed in the international literature.

Throughout the EIA outbreak in Ireland, DAFF coordinated national efforts to control and eradicate the disease, and to maintain trade requirements for the export of horses. It was evident from the beginning of the outbreak that DAFF would encounter new challenges in dealing with this disease of horses, which was previously exotic to Ireland. DAFF was aware of the diversity and significance of the Irish horse industry both domestically and globally, and of how EIA could affect trade within this industry. Factors that may, to a degree, have impacted on the management, control and eradication strategy were identified as follows:

- Prior to the 2006 outbreak, neither the Irish equine industry nor DAFF had experience in dealing with this disease. Further, current information about EIA behaviour is mainly drawn from experiences in the US, where the horse population is not naïve.
- DAFF was working with an industry with which it had had limited dealings in the area of animal health. The disease context, particularly at the level of the DVO, was different to those of other animal health sectors.
- There was substantial variation in the quality of records maintained by equine holdings (horse movements and treatments provided) and related veterinary practices (treatments provided). Epidemiological investigations were hampered by the lack of standardised records, as was the development of a national system to manage data relating to restriction and testing requirements. This issue is particularly important, given the substantial movement of horses for breeding, competition/racing and sales and the associated requirement in the event of a disease emergency for rapid tracing of horses both nationally and internationally. Current EU legislation does not require records to be maintained for the administration of animal remedies to non-food producing horses.
- In this outbreak, most EIA cases related to the TB industry where registration of equids is a prerequisite for pedigree recording. Since 1999, all TB horses must be microchipped when registered with Weatherby's Ireland. Horses registered in the Irish Sport Horse and Irish Draught studbooks since 2001 must also be microchipped. The microchipping of nonpedigree horses is voluntary and many of these horses have no permanent identity record. The EU commission is currently examining legislation with respect to implementing EU requirements for registering equine holdings and non-TB equids.
- EIA was not identified in Ireland until 14th June 2006, approximately 3.5 months after initial incursion (which is believed to have occurred on 1st March; More *et al.* 2008a). Prior to initial detection, there was little information about the EIA situation throughout the EU, and particular in Italy. Further, there was no known history of importation of animals

from EIA endemic areas. Among the initial cases, there was no information from the history to suggest that EIA should have been included among the list of differential diagnoses.

During the course of the outbreak, a number of factors were identified that may help in the future when dealing with outbreaks of this nature in equids:

- 1) A number of cases could be attributed to iatrogenic transmission (see More *et al.* 2008a), reminding veterinary professionals of the need for high practice standards, both in the implementing of aseptic techniques to prevent the iatrogenic transfer of infections, and in increased awareness of medicines legislation, including the importation of unauthorised medicines. The Department intends to work with veterinary practitioners and the Veterinary Council of Ireland to introduce a voluntary Code of Practice for equine veterinary practitioners.
- 2) There were several cases of probable vector transmission between horses on the same holding (More *et al.* 2008a). However, there was no evidence of contiguous spread of the disease from an infected holding to adjoining premises. This provides reassurance with respect to the limited capacity of transmission among vectors that are currently present in Ireland.
- 3) This outbreak highlights the value of detailed interdisciplinary collaborative investigations. In a naïve population, infection may not necessarily behave as previously described. National control policies need to adapt to accommodate new information, such as the possibility of extended incubation periods and periods to detection using the AGID test, and of false-negative results from so-called gold standard tests.
- 4) As with any diagnostic test, the gold standard test for EIA has imperfect sensitivity and specificity. Consequently, detection of cases will rely on information from a variety of sources, including the use of multiple tests (More *et al.* 2008a). In common with the approach taken during the early stages of the BSE outbreak (Wilesmith *et al.* 1988), we developed case definitions to encompass both confirmed and unconfirmed cases, thereby maximising both our understanding of disease epidemiology and the effectiveness of the national eradication effort.
- 5) This outbreak highlights the potential for unusual, or hitherto undocumented, epidemiological features of exposure to and transmission of EIA infection (More *et al.* 2008a,b).
- 6) Efforts to combat future disease outbreaks in equine populations will be greatly enhanced by the introduction of a standardised approach to horse identification and mandatory registration of all equine premises. These issues are currently under discussion within the EU. Significant effort will be required, by both DAFF and the industry, to achieve effective compliance with any resulting EU legislation regulations.
- 7) There is a need for increased dissemination and sharing of information among all relevant players. Further, there needs to be increased awareness among this and all livestock industries of disease risks and measures to prevent such diseases from occurring, particularly among industries that wish to trade freely. During 2007, the TB and sport horse industries, in collaboration with DAFF, each introduced specific EIA guidelines for horses moving for breeding purposes.

International animal movement for racing, breeding and sport fixtures is a key feature of the Irish equine industry and, indeed, of

the TB industry worldwide. Further, recent data have highlighted a significant increase in the extent of global horse movements associated with competitions, particularly over the last few years (Herholz *et al.* 2008). There is also a very substantial trade in horsemeat; almost 100,000 horses for slaughter entered into and moved between EU member states during 2005, principally to Italy (84%), France (7%) and Belgium (5%).

The movement of horses, as well as the import/export of equine semen, ova, biological products and vaccines, are major contributors to the spread of serious equine viral diseases (Daszak *et al.* 2000; Timoney 2000a,b). Horse movement has played a key role in many recent disease incursions in equine populations, including CEM (UK, most recently in 2005; USA, 2006; UK, 2007), equine viral arthritis (EVA) (UK, 2004; USA, 2006; France, 2007) and glanders (Russia, 2007; United Arab Emirates, 2004). The role of animal movement in EI outbreaks is well-recognised (Powell *et al.* 1995; Guthrie *et al.* 1999), as demonstrated recently with the 2007 epidemics in Japan and Australia (Anon 2007b). A review of equine vector-borne diseases, in the context of international horse movements, has recently been completed (Herholz *et al.* 2008).

National rules and regulations seek to achieve a balance between preventing the introduction and spread of serious transmissible viral diseases on the one hand, and undue impediments to the commercial movement of horses and related materials on the other. This balance is reflected in current approaches to this issue internationally, within the EU and by industry, including OIE recommendations, European Council Directive 90/426/EEC (Anon 1990) and voluntary Codes of Practice (Anon 2007a). Of necessity, the prescribed controls vary from country to country depending on the geographical distribution and ability to control particular viruses, and the requirements of the individual equine industries.

In Europe, a number of OIE listed equine diseases (including EIA, EVA, EI and CEM) have a widespread or variable distribution, and are regulated largely by industry, with a lesser input from the national authorities. EI, the most economically significant disease affecting racing horses, and EVA are controlled by vaccination, while EIA is more problematic as vaccines are not available. Other listed viral diseases such as AHS and vesicular stomatitis (VS), which are regarded as 'exotic', are subject to stricter controls as reflected in EU Directives.

A number of factors may influence disease risk within the EU. Community expansion may affect disease risks, particularly with respect to slaughter horses. The EIA situation in Romania formed the basis of a recent community decision on within-community horse movements (Anon 2007c). Further, climate change may challenge national and international systems of animal disease control (Anon 2007d; Vallat 2007), as a result of changes to the distribution of vector borne diseases. It may have contributed to the establishment of bluetongue virus serotype 8 in northern Europe during 2006/07 (Purse *et al.* 2005; Anon 2007e). Nonetheless, in many European countries, we note that vectors already exist which are capable of transmitting equine and other viral infections. There are currently 6 OIE-listed vector borne equine viral diseases exotic to Europe including AHS, VS, the equine encephalitides (Eastern, Western and Venezuelan) and Japanese encephalitis (Anon 2006b). Present EU controls, based on early detection and eradication, should insure against the establishment of these infections. It is reassuring that the virus responsible for the epizootic of AHS in the Iberian Peninsula in

the 1980s was eventually eradicated, albeit with serious economic consequences, and that VS (which was first recorded in Europe) has 'died out' (Hanson 1952). Likewise, among the other listed vector borne equine diseases that are present in Europe, namely West Nile disease and EIA, there have only been sporadic outbreaks (Durand 2005; Sabirovic *et al.* 2006).

The movement of horses within the European Community is subject to certification in accordance with Directive 90/426/EC (Anon 1990). An exception is that registered horses may move between the Tripartite Agreement countries (Ireland, UK and France) with a horse passport only. Consequently, EU-level disease control is heavily reliant upon rapid identification, notification and containment of disease by each member state. EIA is a compulsory notifiable disease under both EU and Irish legislation, and movement restrictions on infected premises are mandatory (Anon 1990). The EIA situation within the EU has become more complex, following the accession of Romania on 1st January 2007. EIA is endemic in Romania, unlike in other EU member states, which has prompted the European Commission to introduce protective measures with regard to EIA in this country (Anon 2007c). The outbreak highlights the key roles of industry and the veterinary profession in minimising the risk of disease transmission and spread. For this reason, industry and professional voluntary codes of practice are very important. Ireland was fortunate that EIA proved a relatively easy disease to contain. Unfortunately, the same may not apply for a range of other equine diseases, such as EI. Contingency planning is critical to effective disease control, providing an opportunity to conduct detailed planning in preparation for a disease incursion (Geering *et al.* 1999). Ireland has developed detailed contingency plans for a range of animal diseases, including avian influenza (Anon 2008b), classical swine fever (Anon 2004b) and foot and mouth disease (Anon 2003). To this point, there has been limited international work on contingency plans for equine diseases, although progress has been made in some countries including Australia (Anon 2007f), the Netherlands (Anon 2002) and the UK (Anon 2005b).

During this outbreak, it was possible to estimate the costs borne by government during the eradication effort. These were very substantial, noting that €1.065 million is a conservative estimate. Although the costs borne by industry were not estimated, these were primarily limited to those associated with individual infected horses. Due to the effectiveness of the eradication programme, impediments to trade (and any associated costs) will have been minimal. There is substantial private, as well as public, good associated with the Irish equine industry (More 2008). However, the balance between private and public good in this industry appears at odds with the relative costs borne by industry and government during the 2006 EIA outbreak in Ireland. For this reason, detailed national negotiations are needed to determine the relative roles and responsibilities (both financial and otherwise) of industry and government in future disease preparedness and response.

Acknowledgements

We gratefully acknowledge assistance from Des Leadon (Irish Equine Centre, Johnstown, Naas, Co. Kildare), Pat Lenihan (DAFF, Central Veterinary Research Laboratory, Backweston Campus, Celbridge, Co. Kildare) and Fraser Menzies (Department of Agriculture and Rural Development, Belfast, Northern Ireland) for contributions to aspects of the discussion.

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Author contributions All authors contributed to the coordination, planning and writing of this study. The field work was by D.C.B., J.F.L., T.M. and S.J.M. and additional data collection by P.B., D.C.B., T.M. and S.J.M.