Health Protection Agency

The Human Animal Infections and Risk Surveillance (HAIRS) Group

First Report 2004-2007










animalhealth

defra
Department for Environment Food and Rural Affairs

DH Department of Health

FOOD STANDARDS AGENCY

The Scottish Government

Veterinary Laboratories Agency

Health Protection Scotland

NHS National Services Scotland

National Public Health Service for Wales
Gwasanaeth Iechyd Cyhoeddus Cenedlaethol Cymru

Contents

Glossary of abbreviations

ACDP	Advisory Committee on Dangerous Pathogens
AH	Animal Health
BHLV	Bovine lymphotropic herpesvirus
BSE	Bovine spongiform encephalopathy
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CMO	Chief Medical Officer
CVO	Chief Veterinary Officer
DEFRA	Department for the Environment, Food and Rural Affairs
DH	Department of Health
EBLV	European Bat Lyssa Virus
EU	European Union
FSA	Food Standards Agency
HAIRS	Human Animal Infections and Risk Surveillance Group
HPS	Health Protection Scotland
NSS	National Services Scotland
NEPNEI	National Expert Panel on New and Emerging Infections
NPHS Wales	National Public Health Service for Wales
PCR	Polymerase Chain Reaction
SGDIA	Surveillance Group on Diseases and Infections in Animals
SPPV	Squirrel parapoxvirus
TB	Tuberculosis
UKZG	United Kingdom Zoonoses Group
VHS	Viral haemorrhagic septicaemia
VLA	Veterinary Laboratories Agency

Introduction

The Human Animal Infections and Risk Surveillance (HAIRS) Group was established in 2004, and is a Health Protection Agency (HPA), Department for the Environment, Food and Rural Affairs (Defra), Veterinary Laboratories Agency (VLA) and Department of Health horizon scanning group chaired by the HPA's Department of Gastrointestinal, Emerging and Zoonotic Infections (GEZI) at the Centre for Infections. The Chair of the National Expert Panel on New and Emerging Infections (NEPNEI) and representatives from the National Public Health Service for Wales, Food Standards Agency, Animal Health, Health Protection Scotland, the Scottish Government and CDSC Northern Ireland are also members.

The group meets monthly and acts as a forum to identify and assess infections with potential for interspecies transfer (particularly zoonotic infections). This report summarises the work of the HAIRS group to date. Future reports will be produced on an annual basis.

HAIRS group members

Health Protection Agency (HPA)

Gastrointestinal, Emerging and Zoonotic Infections Department, Centre for Infections (CfI):

Dilys Morgan ***(Chair)***
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Senior Scientist

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David Brown
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Communicable Disease Surveillance Centre (Northern Ireland):

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Department for the Environment, Food and Rural Affairs (Defra)

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Head

Stephen Wyllie
Deputy Head

Andrew Frost
Veterinary Advisor

Lesley Larkin
Veterinary Advisor

Veterinary Laboratories Agency (VLA)

Geoff Pritchard
Project Leader for Non-Statutory Zoonoses

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Emerging Diseases and Welfare Programme Manager, Surveillance Division

Food Standards Agency (FSA)

Microbiological Safety Division:
Judith Hilton
Head

Linden Jack
Head of Food Microbiology Branch

Chun Han Chan
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Health Protection Scotland (HPS)

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Scottish Government

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Veterinary Division, Rural Directorate

National Public Health Service for Wales (NPHS)

Robert Smith
Clinical Scientist (Zoonoses Surveillance)
Communicable Disease Surveillance Centre

Department of Health (DH)

Maggie Tomlinson
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Chair of the National Expert Panel on New and Emerging Infections (NEPNEI)

Chris Whitty
Professor of International Health
London School of Hygiene and Tropical Medicine

Horizon scanning and hazard identification

The HAIRS group carries out horizon scanning to identify emerging and potentially zoonotic infections which may pose a threat to UK public health. This is carried out by systematic examination of formal and informal reports on infectious incidents in animal and human populations globally. A wide range of sources of information are scanned, including informal news reports and bulletins, early warning communications, surveillance data and peer-reviewed scientific literature. The Secretariat and members of the group identify potential hazards, such as new or unusual syndromes or infections in animals, or increases in endemic disease, and these are then brought to the group for discussion and assessment. The multidisciplinary nature of the HAIRS group enables objective and scientific assessment of potential threats, and the group to assess these reports in an objective and scientific manner.

If infections are thought to be of potential significance, they are included in the “Infectious Disease Surveillance and Monitoring System for Animal and Human Health: Summary of notable events/incidents of public health significance” which is produced monthly. This output is circulated to a range of colleagues working in human and animal health, as well as the members of the National Expert Panel on New and Emerging Infections (which include the Chairs of the various Advisory Committees, representatives from the Devolved Administrations, Cabinet Office etc), Department of Health, Directors and others working in related areas in the HPA, Defra and the VLA and is placed on the HPA and Defra intranets.

Box 1: Terms of Reference of the HAIRS group

The HAIRS group activities cover England, Wales, Scotland and Northern Ireland. The terms of reference of this group are currently:

1. Hazard Identification
To identify and review zoonotic or potentially zoonotic/interspecies infectious incidents which may pose a change in risk to animal or human health, whether these are acute clusters or outbreaks or increasing trends in reports of known or new infections or syndromes. If the incident discussed falls within the remit of another group, the HAIRS group will ensure that the relevant group is aware and considering the event. These incidents are identified using a variety of sources and can be within the UK or international.

2. Risk Assessment
If an infectious incident or trend has been identified, then the group discusses whether there might be a risk of interspecies transfer, which could pose a threat to animal or human public health. There are various levels of assessment and actions as outlined in Box 2 and Figure 1.

If a member of the group considers an incident to be of urgent public health significance, the HAIRS group will be convened as rapidly as possible to discuss the implications of the event and ensure all the relevant agencies are informed. Members of the HAIRS group will also act as a focus through which the concerns of these agencies/groups can be considered by the group.

Risk assessment is done using the expertise within the group or their network contacts. This allows incidents brought to the attention of the group which are then considered to be of no or insignificant public health importance to be "signed off" by the group.

3. Risk Management
Depending on the outcome of the risk assessment process, the HAIRS group may act as risk managers or refer issues to other groups for risk management action.

For issues assessed as low risk or where direct action is not warranted, the group may "sign off" or "risk manage" the incident, or continue to monitor the situation and reassess the risk at appropriate intervals.

For incidents assessed as being of potential threat to public health the group will alert appropriate groups to the situation and the need for risk management action. Members of the group will act as points of contact for the agencies and departments responsible for risk management. The HAIRS group then will not directly act as risk managers but may contribute advice and expertise to the risk management process.

4. Risk Communication
The group will contribute to the monthly "Infectious Disease Surveillance and Monitoring System for Animal and Human Health: Summary of notable events/incidents of public health significance" and be responsible for informing other agencies after assessing the change in risk as outlined in the annex. The group will be responsible for preparing and communicating the conclusions and recommendations of any expert qualitative risk assessment process. This information will be communicated to members of the National Expert Panel on New and Emerging Infections (NEPNEI), UK Zoonoses Group (UKZG) and the Surveillance Group on Diseases and Infections in Animals (SGDIA) through circulation of the HAIRS group minutes.

Walsh AL, Morgan D. Identifying hazards, assessing the risks. *Veterinary Record* 2005;**157(22)**:684-687.

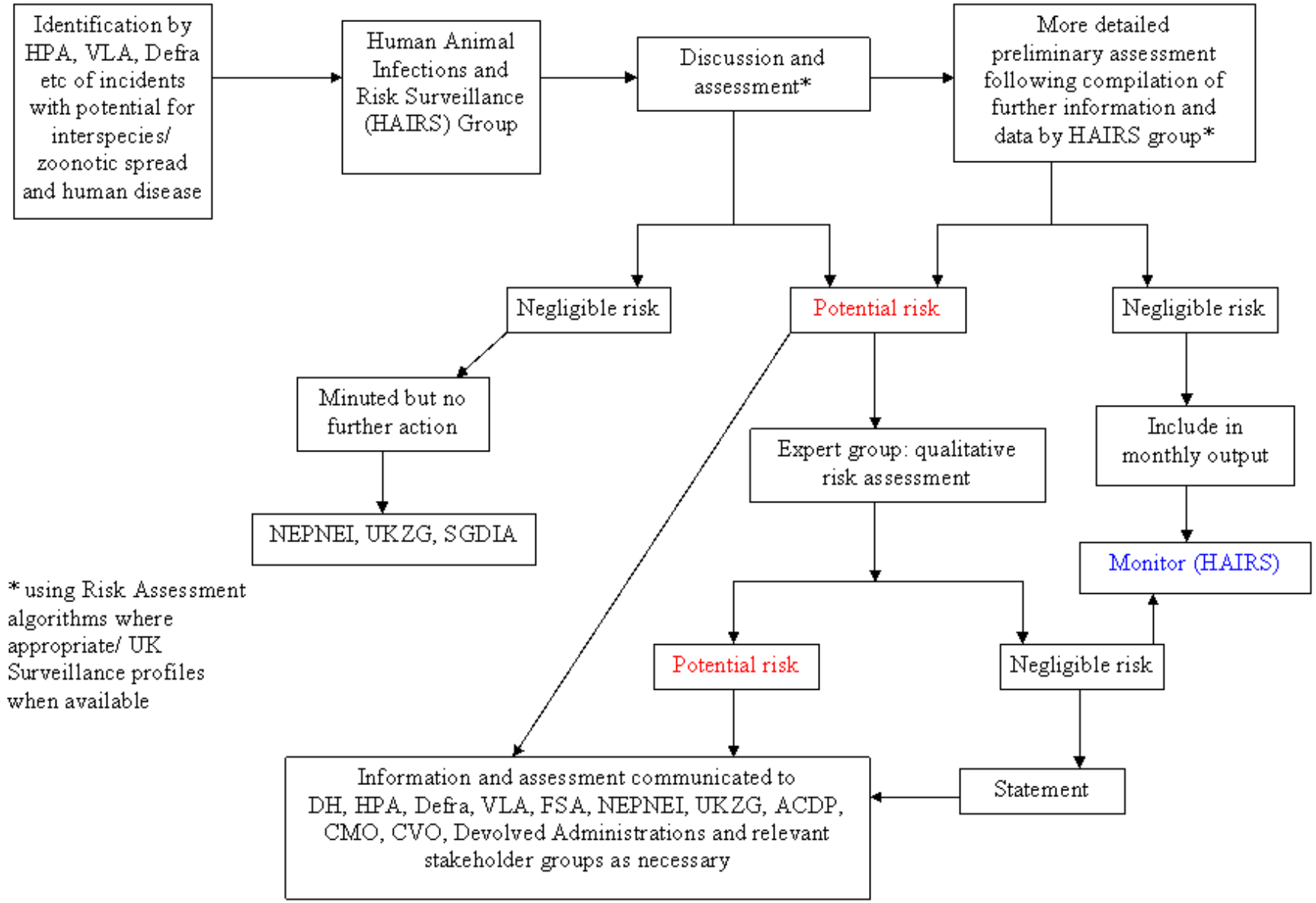
Box 2: Risk Assessment Process by the Human Animal Infections and Risk Surveillance Group

Incidents* are raised by a member of the group, discussed and:

- considered to be of negligible potential risk to public health, resulting in no action apart from being minuted.
- considered to be of negligible or little potential risk for interspecies transfer, but included in the monthly output for interest or information. However, the group will continue to monitor the situation.
- more information is needed in order to assess the incident. The group produces background information and briefing papers in order that a preliminary assessment can be undertaken. Other members of the zoonoses network or other contacts may be consulted at this stage. Where UK animal surveillance profiles are available these will be used. After reviewing this information, an incident can be assessed as negligible or low change in risk to public health on the basis of the current information. This decision would be recorded in the monthly output and the situation would continue to be monitored.
- If considered that there is the potential for zoonotic or interspecies transfer either immediately or after reviewing further information, the group will then establish whether there needs to be a formal qualitative risk assessment by an expert group. If a formal risk assessment is thought to be necessary, the group will convene this and be responsible for informing other bodies, agencies and individuals e.g. Department of Health, NEPNEI, UK Zoonoses Group, Food Standards Agency, Chief Executive HPA, Chief Medical Officer(s), Chief Veterinary Officer(s) etc. The expert group will include relevant national and international experts in animal and human health and will use an agreed risk assessment algorithm which has been approved by the UK Zoonoses Group. The urgency depends on the magnitude of the potential risk, and an expert group will be rapidly convened if necessary.
- The group will be responsible for preparing and communicating the conclusions and recommendations of the expert group.

* “incidents” include acute clusters or outbreaks or increasing trends in reports of known or new infections or syndromes

Figure 1: Process of risk assessment by the HAIRS group



Risk Assessment procedures

The HAIRS group uses three different risk assessment procedures, depending on the nature of the incident under discussion and the extent of the information available. In all of these processes a log is generated detailing the decisions made at specific time points, the available data, and gaps in evidence that need to be addressed.

i. Triage profiles

Defra's prioritisation tool involves the creation of a database of disease profiles, which provide information on a specific condition to allow decisions to be made on prioritisation. These full profiles are comprehensive documents which are written and reviewed by disease experts and include thoroughly researched and referenced information on well understood conditions, including risk assessments relating to Defra policy areas.

Defra disease profiles: http://www.defra.gov.uk/animalh/diseases/vetsurveillance/profiles/index.htm

For new or unusual animal conditions a Triage profile is produced. These are much shorter documents which summarise current knowledge of the condition, including information on human health aspects, and are updated as new information arises. Where a potentially zoonotic aetiology is suspected the triage profile is referred to the HAIRS group for discussion. If the group considers that the infection is potentially zoonotic, this is assessed using the algorithm described below.

ii. Zoonotic potential risk assessment

In situations where the zoonotic potential of a new or emerging infection in animals is unknown the group assesses this using a systematic decision tree approach as shown in Figure 2. This considers the key stages in the transmission of zoonotic infections and is used to categorise the zoonotic potential into one of four levels (Box 3). The risk assessment can be carried out using the expertise available within the HAIRS group, or using expert opinion if a specialist area of knowledge is required.

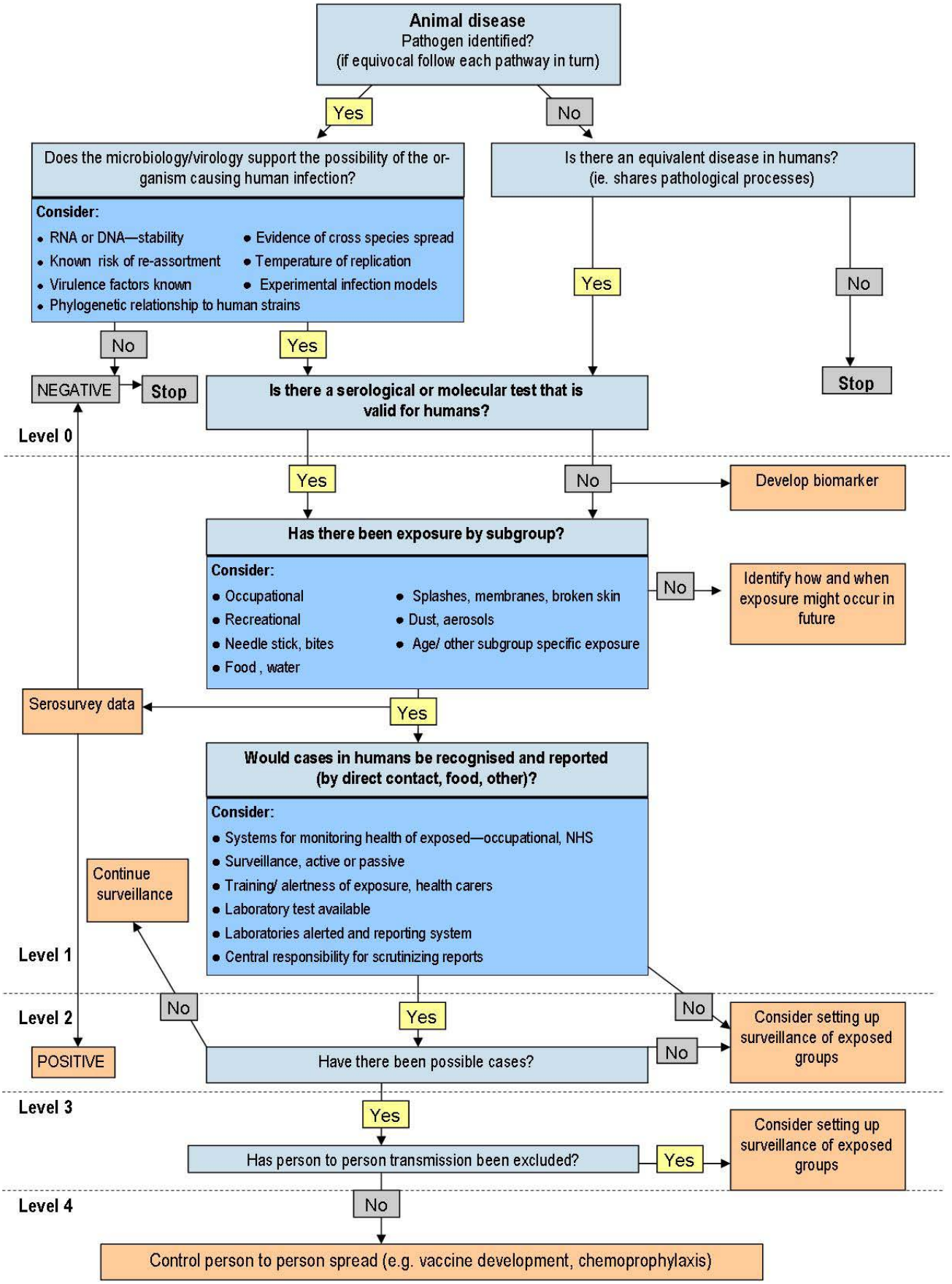
iii. Emerging infections risk assessment

The third risk assessment process assesses the risk to the UK population from a new or emerging infection arising anywhere in the world (Figure 3). In this context risk is taken as the product of probability and impact. The process deals with the *probability* that a new or emerging infection (either human or zoonotic) will infect the UK population, and the *impact* this will have on human health. The context of the threat is also considered, and if a threat is likely to create significant public or media concern then this is taken into account in the recommended actions.

The nature of the incidents being assessed means that the information available may be incomplete, and this is considered at each stage of the risk assessment. If the information available is insufficient to draw a conclusion on a specific question, the default position of higher level of risk is adopted.

If the necessary expertise is not available within the group to carry out a particular risk assessment, the HAIRS group will convene a meeting with experts in the area, or request expert input for specific questions. The output of these risk assessments is disseminated to those responsible for risk management.

Figure 2: Template for the Qualitative Risk Assessment of the Zoonotic potential of Emerging Infections (Adapted from Palmer S, Brown D, Morgan D. Early qualitative risk assessment of the emerging zoonotic potential of animal diseases. *Br Med J* 2005;**331**:1256-60.)



Box 3: Levels of confidence of risk of zoonotic transmission of animal diseases

Level 0: Not zoonotic—Evidence of lack of zoonotic potential. Good grounds for not taking further action

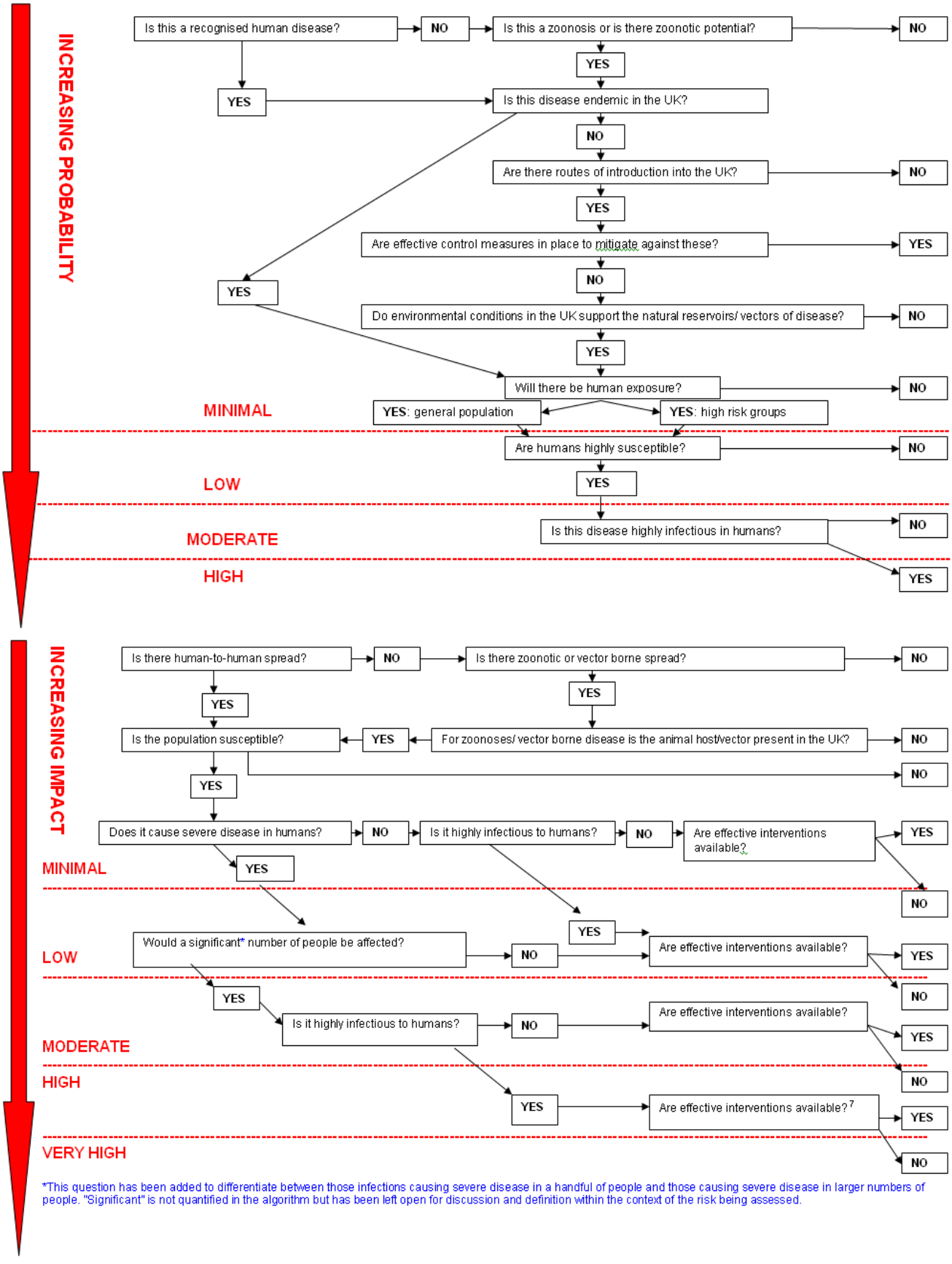
Level 1: Potential zoonosis—Possibility of human pathogenicity not excluded. Work needed on biomarkers of infection and pathways of exposure

Level 2: Potential zoonosis—Serological evidence of infection, or human exposure has occurred but surveillance not sufficiently reliable. Enhanced surveillance needed

Level 3: Confirmed zoonosis—Human cases have been reported, but evidence against person to person spread. Enhanced surveillance needed. Control exposure of humans to animals and environmental sources

Level 4: Confirmed zoonosis—Human cases have occurred, with subsequent person to person spread not excluded. Control of direct or indirect person to person spread needed

Figure 3: Risk assessment algorithms used for assessing:
PROBABILITY of infection (the likelihood of an infectious threat causing infection in the UK human population); and IMPACT (on human health- the scale of harm caused by the infectious threat in terms of morbidity and mortality)



*This question has been added to differentiate between those infections causing severe disease in a handful of people and those causing severe disease in larger numbers of people. "Significant" is not quantified in the algorithm but has been left open for discussion and definition within the context of the risk being assessed.

Selected issues discussed by the HAIRS group

2004

Neurological illness in cattle and sheep

Incident: In April 2004 the HAIRS group received information regarding a case of an aetiologically unexplained neurological illness in a heifer, and reports of similar conditions in a small number of cattle and sheep, which occurred over a 10 year period.

Process: HAIRS rapidly convened a group of experts in animal and human health to further investigate the reports, evaluate the available information and assess the risk to public health. This incident stimulated considerable media interest and the group was able to rapidly respond to requests for information.

Outcome: The expert group reviewed the available evidence and concluded that there was unlikely to be a significant risk to human health from the enterovirus that had by then been identified in the heifer. In addition the group considered that the previous cases were unlikely to pose a significant threat to human health for a number of reasons, including:

- there was no apparent link between the low number of cases identified over the 10 year period
- there was no increasing trend in samples submitted from cows or sheep with neurological disease or the proportion diagnosed as having encephalitis
- none of the 29 animals in question would have entered the food chain
- The illness in the animals represented a range of clinical and pathological findings.

A statement detailing the group's conclusions was issued to all the relevant authorities and groups including the UKZG, and a press release issued.

Further information:
Health Protection Agency. Unexplained neurological illness in cattle and sheep - assessing the potential risks to human health. 24th June 2004. Health Protection Agency Press Release, available at URL: http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1195733723285?p=1158945066107

Streptococcus halichoeri in UK grey seals

Figure 4: Grey seal (*Halichoerus grypus*) and pup

Incident: During 2004 a novel Lancefield group B streptococcus, *Streptococcus halichoeri*, was reported in seals by veterinary laboratories in Inverness and Cornwall. The organism was isolated in mixed culture from wounds on grey seals caused by bites from other seals, and it was hypothesised that the organism may be present on the teeth or skin of seals. Following further enquiries there was no evidence to suggest that humans had been infected with *S. halichoeri*.

Process: The HAIRS group assessed the available information and concluded that although this newly described organism was unlikely to pose a significant zoonotic risk for the general population, exposure could occur in seal handlers working in marine rehabilitation and rescue centres, and veterinarians. The potential for human infection following seal bites was unknown, although other group B streptococci are known human pathogens.

Outcome: The HPA Streptococcus Reference Unit was informed and awareness was raised more widely through publication of an alert in the *Communicable Disease Report* informing colleagues of the need to consider this organism in cases of seal bite.

Further information:
Lawson PA, Foster G, Falsen E, Davison N, Collins MD. *Streptococcus halichoeri* sp. nov., isolated from grey seals (*Halichoerus grypus*). *Int J Syst Evol Microbiol.* 2004;**54(Pt 5):**1753-6.

2005

***Pseudamphistomum truncatum* in otters and mink**

Figure 5: Eurasian otter (*Lutra lutra*).

Image by Catherine Trigg*

Incident: A study reported the detection of the bile fluke *Pseudamphistomum truncatum* in a small number of otters and mink examined in southern England between February 2002 and August 2004. *P. truncatum* is a parasite of a wide range of wild carnivores, particularly in Russia and Eastern Europe, however this was the first detection of this organism in Britain.

P. truncatum has a complicated life cycle with two intermediate hosts, a snail and freshwater fish. The fluke is transmitted to mammals through the consumption of infected fish, and the cases in wild otters and mink suggested that the infection had become established in the local fish population. It was hypothesised that the infection was introduced to the UK via importation of fish from endemic areas, and the study authors noted that two new freshwater fish species have colonised the area in recent years following their introduction by an ornamental fish supplier in the 1980s.

Process: A risk assessment was carried out to assess the zoonotic potential of this organism, and a subgroup of HAIRS was convened with the expert input from the Centre for Environment, Fisheries and Aquaculture Science (CEFAS).

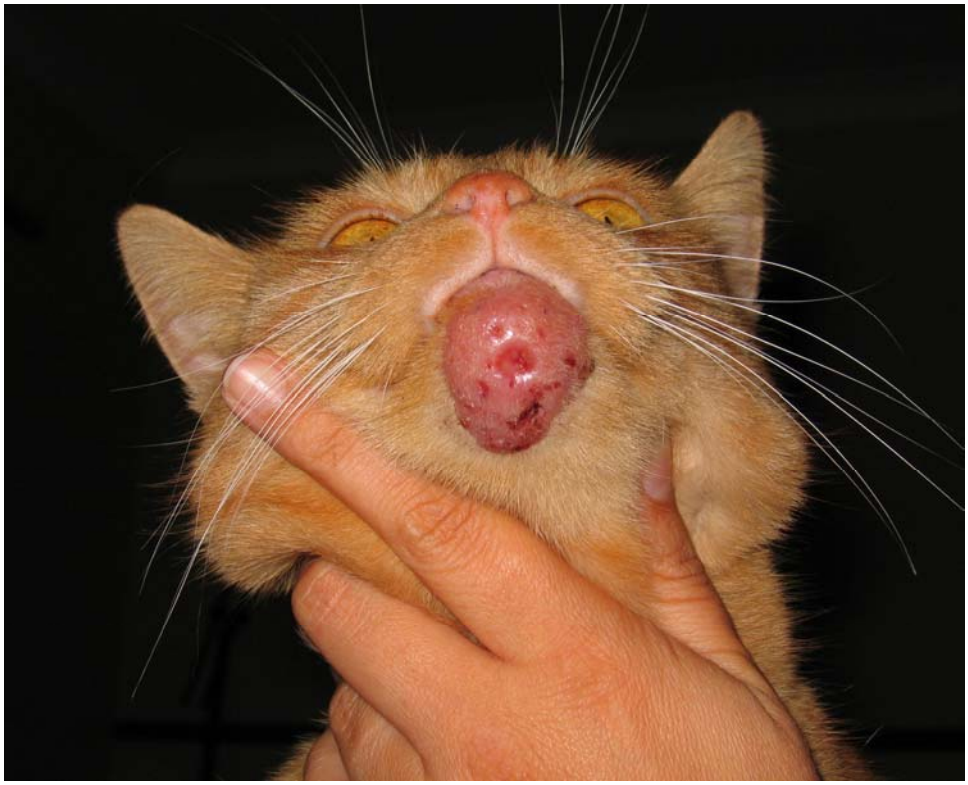
Risk Assessment outcome: Level 1: Potential zoonosis. The expert group concluded that human infection with this organism would be highly unlikely to occur in the UK. Humans can only be infected through consumption of raw fish muscle tissue containing the metacercariae of the parasite. Exposure to *P. truncatum* metacercariae in the UK is likely to be extremely rare, and confined to groups handling or consuming the parasite in raw fish. The host fish species in the UK has not yet been identified, but fish likely to be caught in the wild and consumed by humans in the UK, such as salmonids, have not been reported as host species for this parasite. There is no record of *P. truncatum* in any fish species in the UK, despite regular parasite surveys of wild fish populations including the newly introduced ornamental cyprinid species, the sunbleak and topmouth gudgeon.

Further information:
A further survey reported in early 2006 detected the parasite in small numbers of otters and mink examined from Somerset and east Dorset, indicating that the parasite has become established in the area. Information has been distributed to the veterinary profession through the *Veterinary Record*, and the HAIRS group will reassess the risk assessment if further information arises.

Simpson VR, Gibbons LM, Khalil LF, Wiliams JLR. Cholecystitis in otters (*Lutra lutra*) and mink (*Mustela vison*) caused by the fluke *Pseudamphistomum truncatum*. *Vet Rec* 2005;**157**:49-52.
Tomlinson A, Simpson VR. Bile fluke in otters and mink. *Vet Rec* 2006;**158**:69.

Tuberculosis in cats and ferrets (2005 and 2006)

Figure 6: Cat with *M. bovis* infection (Image courtesy of Christoph Stork)



Incident: In early 2005 the HAIRS group were informed by the VLA of an increase in the number of suspect cases of mycobacterial infections in domestic cats reported to them during 2004. Seventeen of the 39 submissions processed that year had yielded a positive culture as follows: *M. microti* (10 isolates), *M. bovis* (six isolates) and *M. avium* (one isolate).

Process: The group monitored reports over several months in 2005, and found that cases of suspected TB in ferrets were also being reported, including an outbreak at a ferret rescue centre. Both *Mycobacterium bovis* and *M. microti* were reported in cats and ferrets. The vast majority of cases were in rural and suburban settings and involved the predominant genotypes endemic to the areas in which the animals lived. Experts from Defra and VLA were consulted and it was noted that the increase may partly have been due to alterations to the charging arrangements for laboratory testing, which led to an increase in submissions late in 2004.

The HAIRS group investigated the situation regarding *M. bovis* and other potentially zoonotic mycobacteria in humans. The HAIRS group were concerned over the potential for zoonotic transmission of mycobacteria from these spillover hosts to their owners, however there was no evidence to suggest that zoonotic transmission from cats or ferrets had occurred.

Outcome: In response to the concerns of the HAIRS group a procedure was initiated whereby HPA reference laboratories send *M. bovis* isolates from humans for genotyping at the VLA TB Diagnostic laboratory in Weybridge. This allows further research to be carried out and possible links between human and animal cases identified.

It was noted at this time that notification of TB in cats was non-statutory and samples were received at VLA and other laboratories on an ad-hoc basis, therefore identifying a trend was complicated. However, the identification of *M. bovis* in all species of mammals became notifiable to VLA Weybridge during 2006 and this was likely to improve surveillance. The HAIRS group are continuing to monitor this issue.

2006

Bovine lymphotropic herpesvirus in cattle

Incident: The HAIRS group was informed in early 2006 of the detection of bovine lymphotropic herpesvirus (BHLV) for the first time in the UK. It was reported that approximately 33% of a 180 head dairy herd were affected with a chronic unresponsive endometritis, and the virus was identified in vaginal exudates from affected animals. Prior to this BHLV had not been reported in the UK, and no disease had been reported to be associated with the virus in other countries.

BHLV is a group 2 rhodinovirus and was detected using a 'pan-herpesvirus' test. *Arcanobacterium pyogenes* (a recognised pathogen) was recovered from all samples, and there was no evidence to indicate that BHLV was responsible for the cases of endometritis in the herd. It has been suggested that some of the group 1 rhodinoviruses may be zoonotic, however no zoonotic potential has been reported for group 2 rhodinoviruses.

Herpesviruses are relatively species-specific, and have often evolved over many years in conjunction with their specific host. Inter-species transfer events have been documented but are rare, and only between closely related species, however when this has occurred the effects have been devastating (e.g. herpes B virus transfer from nonhuman primates to humans). Pan-herpesvirus tests have been used in pathogen discovery in humans, and so far no new herpesviruses have been detected.

Process: A risk assessment was carried out to ascertain the zoonotic potential of the virus.

Risk Assessment outcome: Level 0, i.e. not zoonotic. HAIRS will reconsider the zoonotic potential of this virus if new information arises regarding pathogenicity in bovines, or if human pathogens are identified in the gamma herpesvirus group.

Further information:
Cobb SP, Banks M, Russell C, Thorne M. Bovine lymphotrophic herpesvirus in a UK dairy herd. *Vet Rec* 2006;**158**:807-8.

Hepatozoon spp. in red squirrels

Incident: A novel species of *Hepatozoon* was detected in red squirrels on the Isle of Wight. Sequence analysis indicated that the organism was closely related to, but distinct from, *Hepatozoon erhardovae* of bank voles.

Hepatozoon species are protozoan parasites, and more than 300 species have been described in amphibians, reptiles, birds, marsupials and mammals. A variety of arthropods act as definitive hosts, including ticks, mites, mosquitoes, sand flies, tsetse flies, fleas, lice and reduviid bugs. Vertebrates become infected with *Hepatozoon* spp. not by being bitten by the invertebrate host, but by ingesting the host together with the infective oocysts it contains. The life cycle is completed when naïve arthropods feed on an infected host.

Process: A risk assessment was carried out to determine the zoonotic potential of the organism.

Risk Assessment outcome: Level 1, i.e. a potential zoonosis. The infection appears to be largely subclinical in animals, and human infection would require ingestion of an infected arthropod, which although theoretically possible was considered highly unlikely to occur in the UK. It was agreed that further research on this organism would be monitored and the issue would be revisited if further information arose.

Further information:
Simpson VR, Birtles RJ, Bown KJ, Panciera RJ, Butler H, Davison N. *Hepatozoon* species infection in wild red squirrels (*Sciurus vulgaris*) on the Isle of Wight. *Vet Rec* 2006;**159**:202-5.

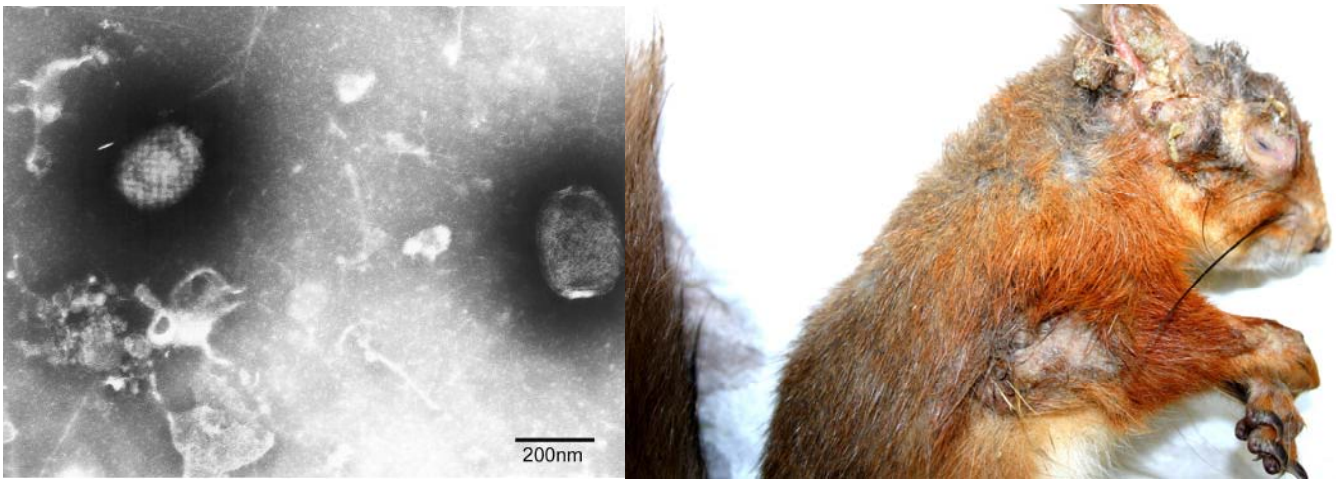
Squirrel Parapoxvirus (SPPV)

Squirrel parapoxvirus was discussed on several occasions during 2005 and 2006, following reports of the virus in red squirrels in Scotland and the north of England. SPPV infection is highly pathogenic in red squirrels, characterised by ulcerated and haemorrhagic scabs affecting the eyes, nose and lips, spreading to the ventral thorax, inguinal area and feet, with a high mortality rate. The virus causes little or no disease in grey squirrels, which are thought to be a reservoir host for the virus.

Although other parapoxviruses are zoonotic, e.g. Orf virus, there is no evidence to suggest that SPPV is zoonotic. Sequence analysis indicates that SPPV does not group within known genera of the subfamily Chordopoxvirinae, and partitions within a separate group of the poxviruses, which is genetically distinct from parapoxviruses and other orthopoxviruses (Thomas *et al* 2003; McInnes *et al* 2006).

Figure 7: a) Electron micrograph of Squirrelpox virions in a red squirrel sample; b) Red squirrel with facial squirrelpox lesions (images courtesy of VLA)

a) b)



Process: A risk assessment was carried out to assess the zoonotic potential of SPPV.

Risk Assessment outcome: Level 2: potential zoonosis. The recommended action at this level of risk assessment is to consider surveillance of exposed groups. The HAIRS group considered that surveillance was not a priority at this stage, given the small number of humans in close contact with squirrels, the genetic separation of squirrelpox from known zoonotic parapoxviruses, the genetic stability of the poxviruses and the lack of reports of possible human infection despite decades of human exposure, including among staff who have been working with the virus or infected animals for many years. Surveillance would be very costly, and would require the development of new investigative tools as there is no specific squirrel parapoxvirus serological test, and there are extensive cross-reactions between the poxviruses. However new developments relating to this virus will be monitored, and the risk assessment revised at a later date if necessary.

Further information:

Sainsbury A.W, Nettleton P, Gilray J, Gurnell J. Grey squirrels have a high seroprevalence to a parapoxvirus associated with deaths in red squirrels. *Anim Conserv* 2000;**3**:229-33.

Thomas K, Tompkins D, Sainsbury A, Wood A, Dalziel R, Nettleton P *et al*. A novel poxvirus lethal to red squirrels (*Sciurus vulgaris*). *J Gen Virol* 2003;84:3337-41.

McInnes CJ, Wood AR, Thomas K, Sainsbury AW, Gurnell J, Dein FJ *et al*. Genomic characterization of a novel poxvirus contributing to the decline of the red squirrel (*Sciurus vulgaris*) in the UK. *J Gen Virol* 2006;**87(Pt8)**:2115-25.

Tompkins DM, Sainsbury AW, Nettleton P, Buxton D, Gurnell J. Parapoxvirus causes a deleterious disease in red squirrels associated with UK population declines. *Proc R Soc Lond B Biol Sci* 2002;**269**:529-33.

Viral haemorrhagic septicaemia (VHS)

Figure 8: Trout with viral haemorrhagic septicaemia infection (images courtesy of CEFAS)

Incident: An outbreak of VHS was reported at a trout farm in North Yorkshire, and the virus was also detected in grayling samples from the River Nidd, below the outlet of the infected farm.

Process: HAIRS contacted expert colleagues at the Centre for Environment Fisheries and Aquaculture Science (CEFAS) in Weymouth for further information on VHS. A risk assessment was carried out to assess the zoonotic potential of the virus, in consultation with experts at CEFAS. On the basis of the information provided, in particular evidence that the virus does not replicate at mammalian body temperatures, and no evidence of infection of any member of a class of animal except fish, it was agreed that no further action was required.

Risk Assessment outcome: Level 0: i.e. not zoonotic.

Further information:
Defra News Release 1st June 2006. Available from:
http://nds.coi.gov.uk/content/detail.asp?NavigatedFromSearch=True&NewsAreaID=2&ReleaseID=205337

2007

Anisakis species in wild Atlantic salmon

Incident: The Food Standards Agency (FSA) representatives requested advice from the HAIRS group following reports of an increase in the detection of the *Anisakis simplex* nematode in the intestines of adult Atlantic salmon caught in UK waterways.

Figure 9: a) *Anisakis simplex* in the liver of a roundfish; b) *Pseudoterranova decipiens* in a monkfish fillet (Images courtesy of Institute of Aquaculture, University of Stirling)

a) b)

Anisakid nematodes are known foodborne zoonoses, acquired through consumption of raw or undercooked infected fish. The species associated with human disease are *Anisakis simplex* (known as herring worm) and *Pseudoterranova dicipiens* (the cod worm). While heating or freezing to certain temperatures will kill *Anisakis* spp, other methods of treatment under different conditions, such as cold smoking, may not. HAIRS obtained further information on the legislation surrounding fish production in the UK and determined that current EU Regulations for food business operators require fish that is to be consumed raw or almost raw to be frozen at a temperature of not more than -20°C for not less than 24 hours. If herring, mackerel, sprat or wild Atlantic/Pacific salmon are to be cold-smoked at a temperature not more than 60°C they must also be frozen before consumption. These requirements are sufficient to kill Anisakid species. The group therefore concluded that those at potential risk of infection would be anglers consuming their own catch, or selling their catch on a small scale to individuals or local businesses, as this would not be covered by the EU Regulation. The FSA issued guidance to these groups regarding preparation and cooking of fish to minimise the potential for *Anisakis* infection.

Process: The HAIRS group carried out an assessment of the risk of this infection emerging in the UK population, using the emerging infections algorithm in consultation with experts at the Centre for Environment, Fisheries and Aquaculture Science, and the FSA.

Risk Assessment outcome: Probability of *Anisakis* spp. causing infection in the UK population: Moderate. Impact: Low. No known human cases have been associated with this incident to date, however given the potential severity of Anisakid infections and the increasing popularity of raw or lightly cooked fish, the group referred this issue to the UK Zoonoses Group.

Further information:
Food Standards Agency. Guidance concerning Wild Salmon and the Anisakis parasite FSH/0015. 24th September 2007. Available at URL: http://www.food.gov.uk/multimedia/pdfs/guidsalmonanisakis.pdf

***Fasciola hepatica* in livestock**

Incident: Horizon scanning identified a report in the *Veterinary Record* describing acute *Fasciola hepatica* infection leading to the sudden death of two young calves on farms in northern Scotland. Monitoring of VLA reports indicated an increase in diagnoses of acute and chronic fascioliasis in livestock. Acute fasciolosis is more common in sheep than cattle, and is particularly unusual in young cattle. One risk factor identified was grazing cattle on fields recently cleared for silage, encouraging cattle to graze on areas at field margins with thick, wet grass, suited to snail activity. Risk factors for human infection include consumption of unwashed salad vegetables such as lamb's lettuce and watercress, and chewing contaminated khat.

Figure 10: Adult *Fasciola hepatica* fluke (image courtesy of VLA)

Figure 11: a) Cow with signs of liver fluke infection: note the "bottle jaw" or submandibular oedema, which is characteristic of the condition b) Acute *Fasciola hepatica* infection in a sheep's liver (images courtesy of VLA)

a) b)

Process: The HAIRS group examined national surveillance data for reports of fasciolosis in humans. Human cases of fasciolosis are rare in Great Britain, with a total of six cases reported since 2000 in England and Wales, and none in Scotland. However there was an increase in 2007 with three cases reported in July. This may be due to changes in reporting protocols instituted in February 2007 and the group are monitoring further reports.

Outcome: the HAIRS group is closely monitoring the situation in animals and humans.

Further information:

SAC Veterinary Services. Acute fasciolosis diagnosed in young Scottish calves. *Vet Rec* 2007;**161**:249-52.

Mycobacterial infections in camelids

Figure 12: An alpaca

Incident: The HAIRS group has considered infections in South American camelids on a number of occasions, and while the majority of these were isolated events the group has become increasingly aware of the growing camelid population in the UK and the potentially zoonotic infections these animals may carry.

The Bovine Tuberculosis team at Defra provided the HAIRS group with a briefing on mycobacterial infections in camelids. The first case of TB caused by *M. bovis* in a camelid in Great Britain was reported in 1999, and since then *M. bovis* and *M. microti* infections have been sporadically reported at a number of premises with llamas and alpacas.

Camelids appear to be particularly susceptible to mycobacterial infections and can develop severe disease with large granulomas, with the potential for wide dissemination of organisms. The recent removal of the requirement for keepers of guanacos and vicuna to have a Dangerous Wild Animal Licence may increase the appeal of keeping these species. Camelids are often kept on open farms or other public premises, and may sold as pets, and the HAIRS group were concerned at the potential for camelids to be taken into areas where *M. bovis* is endemic, by owners who may be unaware of the infection risks. In addition there is the potential for camelids with undisclosed infection to be moved into areas free of *M. bovis*. Given the sometimes close contact between people and these animals, and the increase in reported cases in recent years, the potential for zoonotic transmission of mycobacteria from infected camelids was discussed.

Process: The bovine TB policy group at Defra are actively reviewing the legislation and procedures underpinning the surveillance and control of TB in camelids. A letter was sent to the team outlining the concerns of the HAIRS group.

Outcome: The response from Defra's bovine TB policy group outlined the current approach to dealing with *M. bovis* in camelids, and cautioned that the public health risk of *M. bovis* in camelids must be put in perspective in relation to the higher risks arising from a far higher prevalence of TB in cattle and badgers. A working group has been established to review the extent and impact of *M. bovis* infections in domestic mammals other than cattle, and their next meeting will be attended by an HPA representative. This issue continues to be closely monitored by the HAIRS group.

***Toxocara vitulorum* in cattle**

Incident: During 2007 HAIRS were informed of the first detection of *T. vitulorum* as an established herd infection of cattle in Great Britain. The organism was detected among calves in a beef herd in South-West Wales, which was established in 1992 and had no known contacts with water buffalo or bison.

T. vitulorum is mainly found in tropical and subtropical regions, where it is a common parasite of cattle, water buffalo and zebu. It is rare in Europe and North America but has been reported occasionally, including in beef cattle in the southern USA, American bison in Belgium and rarely in bison in Great Britain. Mature *T. vitulorum* worms are found almost exclusively in calves under 10 weeks old, and are rarely found in older animals. The life cycle involves eggs being shed in the faeces and developing in the environment at warm temperatures to become infective, after which they are ingested by pregnant cows. Calves become infected through transmission of the larvae in the cow's milk, and go on to shed eggs in their faeces. The eggs do not develop at temperatures below 12°C however they may survive and develop when temperatures increase.

Figure 13 a) Adult *Toxocara vitulorum* taken from the small intestine of a bison calf *(left)*;
b) *Toxocara vitulorum* eggs, with a *Strongyloides* egg for comparison. Magnification x200 *(right)* (Images courtesy of VLA)

Process: A triage profile was produced for Defra, providing information on the incident and its potential impacts, and circulated to the HAIRS group. The VLA estimated that the prevalence of this infection in British herds was extremely low.

HAIRS had a number of concerns regarding the zoonotic potential of this organism, and potential routes of transmission to humans. On further investigation it was concluded that zoonotic transmission via milk was extremely unlikely to arise, and this would be minimised even further in Britain by the filtering and pasteurisation processes carried out on the majority of milk consumed. In addition the organism was detected in a beef herd, and has not been detected in any animals from which milk would enter the human food chain in Britain. Transmission via ingestion of eggs in the environment poses a theoretical risk however given the very low prevalence of this infection at present this is highly unlikely to occur in the UK. In addition, evidence from the tropics suggests that human infection is rare despite much greater exposure.

Outcome: The HAIRS group concluded that the most important action at this time was to prevent the organism from spreading within British herds and ensure that the prevalence remains low. Information for farmers regarding prevention and control was posted on the Defra website, and information on the organism was added to the Toxocara pages on the HPA website to inform the public. HAIRS will continue to monitor this infection for evidence of increasing prevalence in the UK.

Further information:
GB Cattle Disease Surveillance Quarterly Report July-September 2007. Defra. Available from:
http://www.defra.gov.uk/VLA/reports/rep_surv_cattle.htm

Health Protection Agency Toxocara pages:
http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutoListName/Page/1191942148976

***Tritrichomonas foetus* in domestic cats**

Incident: Horizon scanning identified reports of the identification of *T. foetus* as a cause of large bowel diarrhoea in domestic cats, and its increasing detection in pedigree cats in the UK. *T. foetus* is a flagellate protozoan parasite which is traditionally recognised as a cause of reproductive disease in cattle.

There have been two reports of human infection with *T. foetus* in Japan and France, both in immunocompromised individuals. In both cases the organism was detected in unusual sites.

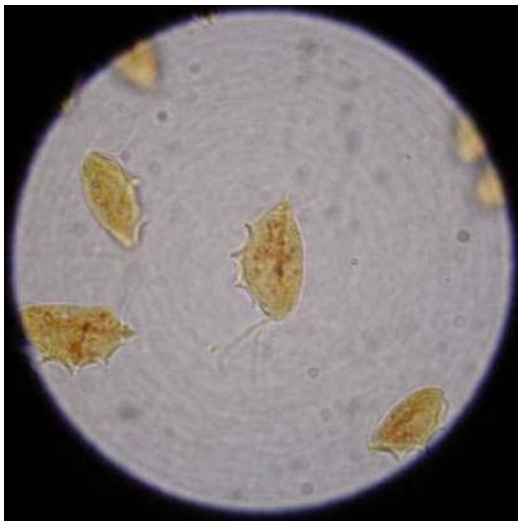


Figure 14: *Tritrichomonas foetus* stained with Lugol's iodine. Three anterior flagella can be seen, and an undulating membrane runs the length of the body. (Image courtesy of Andy Sparkes, Animal Health Trust)

Process: A risk assessment for the zoonotic potential of *T. foetus* was carried out in conjunction with experts in human trichomonad infections, and the author of the original reports, to assess the zoonotic potential of this organism.

Risk Assessment outcome: Level 2, i.e. potential zoonosis.
Although there is no direct evidence that *T. foetus* is zoonotic, hygiene advice was provided to pedigree cat breeders and owners via specialist websites, to minimise the risk of transmission of *T. foetus* or other diarrhoeal pathogens to humans and other cats.

Further information:
Gunn-Moore D, Tennant B. *Tritrichomonas foetus* diarrhoea in cats. *Vet Rec* 2007;**160(24)**:850-1.
Feline Advisory Bureau Information Sheet. Available at URL:
http://www.fabcats.org/breeders/infosheets/tritrichomonas.html

Conclusion

Among the lessons learned from the response to and consequences of emerging infectious incidents in recent years is the recognition of the need for a multidisciplinary approach to control. The BSE Inquiry in 1998 highlighted the importance of clear communication of risk to both the public and the officials responsible for implementing and enforcing control measures. The formation of the HAIRS group is an important initiative to address these needs, and the examples given in this report illustrate the wide range of subjects discussed by the group so far.

The majority of emerging infections are zoonotic in origin, and their successful control depends heavily on the collaboration between well trained staff working in human and animal health. HAIRS has developed into an established group made up of representatives from the organisations responsible for human and animal health across the UK. Members have developed a close working relationship and have the wide range of expertise and contacts necessary to facilitate a truly multidisciplinary, informed assessment of potential threats.

The HAIRS group has developed a clear system for identifying and assessing potentially zoonotic threats to UK public health. The group is able to rapidly provide an initial risk assessment on an emerging infection in its early stages, with supporting information and a statement of risk to those responsible for risk management action. The group is also able to provide information to the public about specific issues of concern.

HAIRS is increasingly recognised as providing a focal point for referring potentially zoonotic incidents, particularly those that do not fall within the existing established framework for dealing with zoonoses. The group has expanded substantially since its formation in 2004 and its dynamic and flexible nature is crucial in ensuring a robust approach to emerging zoonoses. HAIRS is part of a wider network of expert groups which together make up a robust structure to protect UK human and animal health from infectious threats. The group will continue to develop and evolve over the coming years, to provide an important contribution to infectious disease preparedness in the UK, and an example of successful collaborative working.

Useful websites

Health Protection Agency

Emerging Infections
http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1191942149476

Zoonoses
http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1191942145653?p=1191942145653

National Expert Panel on New and Emerging Infections
http://www.advisorybodies.doh.gov.uk/nationalexpertpanel/index.htm

Defra Disease Surveillance and Control http://www.defra.gov.uk/Animalh/diseases/default.htm

Veterinary Laboratories Agency http://www.defra.gov.uk/vla/Default.htm

Food Standards Agency http://www.food.gov.uk/

UK Zoonoses Group
http://www.defra.gov.uk/animalh/diseases/zoonoses/ukzg/index.htm

Surveillance Group on Diseases and Infections in Animals
http://www.defra.gov.uk/animalh/diseases/vetsurveillance/sgdia/index.htm

UK Zoonoses Reports
http://www.defra.gov.uk/animalh/diseases/zoonoses/reports.htm

BSE Inquiry
http://www.bseinquiry.gov.uk/

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Appendix 1

List of issues discussed by HAIRS 2004-2007

2004
30 incidents/conditions were discussed during 2004, including the following:

Aedes albopictus detection in Spain
Atypical BSE in Europe
Avian botulism
Bluetongue in ruminants, Spain
Bush meat importation
European Bat Lyssavirus (EBLV) type 2 in a bat, UK
Glanders
Herpesvirus in dolphins in Florida
Idiopathic necrotising enteritis in calves
Influenza in greyhounds, USA
Johne's disease increase, England and Wales
Liver fluke in sheep
Microsporum canis ringworm in sheep, England and Wales
Neurological illness in cattle and sheep
Polioencephalomyelitis in weaner pigs, UK
Rabies surveillance in Spain
Streptococcus halichoeri in seals
Streptococcus zooepidemicus, human, Wales
Tick borne disease
Tuberculosis in a llama
Tularemia in hamsters, Canada
Undiagnosed deaths in chickens and pigs, Indonesia

2005
50 incidents/conditions were discussed during 2005, including the following:

Aedes albopictus mosquitoes in Europe
Atypical scrapie
Bovine tuberculosis in pigs
Caseous lymphadenitis in goats and sheep
Chlamydophila abortus in sheep
Chronic wasting disease in the USA
Chytrid fungus in bullfrogs in the UK
Dermacentor reticulatus ticks in Wales
Dogger bank itch in dogs, England
EBLV in bats study, UK
Hantavirus- increase in Germany, France and Belgium
Hendra virus in Queensland
Hepatitis E in humans, England
Mosquito-borne infections
Mycobacterium bovis in humans
Mycoplasma bovis in calves
Newcastle disease in pheasants, Surrey
Parvoviruses – bocavirus and PARV-4
Post-weaning multisystemic wasting syndrome, late onset, pigs
Pseudamphistomum truncatum in otters and mink, UK
Psittacosis at a pet superstore
Q fever in humans and animals
Rabies in foxes, Germany
Respiratory illness in greyhounds, USA
Rosette-like agent in freshwater fish, England
Salmonella typhimurium in wild birds, England
SARS-like coronavirus in bats, China
Squirrelpox, Scotland
Streptococcus suis outbreak, China

Tick borne diseases
Toscana virus emergence in Europe
Tuberculosis in cats and ferrets

2006
35 incidents were discussed during 2006 including the following:

Anthrax, bovine, Wales
Avian influenza H7N3 in Norfolk
Bluetongue in Europe
Bonamia ostrae in oysters, Scotland
Botulism in cattle
Bovine lymphotrophic herpesvirus in a dairy herd, UK
Corynebacterium ulcerans, toxigenic, human
Cryptosporidiosis in New World Camelids
Cytotoxic necrotising factor positive *Escherichia coli* in pigs
Dirofilariasis in Europe
Equine infectious anaemia, Ireland
Hepatozoon species in red squirrels, Isle of Wight
Hydatid disease, Wales
"Kangaroo gait" in sheep, England
Koi herpesvirus, fisheries, England
Leptospirosis in pet shop rats, England
Newcastle disease in game birds, Scotland
Q Fever at a meat processing plant, Scotland
Renibacteriosis salmoninarum in trout, England
Rhinosporidium seeberii in dogs
Swimmers itch (cercarial dermatitis), Scotland
Ticks imported on reptiles
Trichinella risk and freezing pork, Europe
Vesiviruses in US blood donors and hepatitis patients
Viral haemorrhagic septicaemia in trout and grayling, Yorkshire
Yersinia pseudotuberculosis in Guinea pigs
Zoonoses Monitoring (England) Regulations

2007
40 incidents/conditions were discussed during 2007 including the following:

Abomasal bloat in calves
Anisakid infections in Atlantic salmon
Avian influenza H7N2 at a poultry farm, Wales
Campylobacter fetus fetus epidemiology
Clostridium difficile in calves, Canada
Corynebacterium ulcerans in humans and animals
Cryptosporidiosis survey in outdoor pig units
"Dancing pigs"
EBLV-1 in a cat, France
Fasciolosis in calves, Scotland
Hepatitis E in poultry
Influenza A in cattle
"Lambing ears" in farmers
Louping ill in horses
Mycobacterial infections in camelids
Mycobacterium bovis in humans
Mycobacterium microti in humans, Scotland
Mycoplasma wenyonii in cattle, England
Non-statutory zoonoses reporting
Q fever in animals and humans
Tickborne diseases in Europe
Toxocara vitulorum in cattle and bison
Tritrichomonas foetus in domestic cats
Tuberculosis on an open farm, Wales

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