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Zoonoses Report

UK 2012

September 2013

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Preface

This annual report on zoonoses in the United Kingdom (UK) includes a summary of reported cases of zoonotic infection in humans and animals during 2012. The data have been compiled from statutory notifiable or reportable disease reports, national scanning surveillance systems, control programmes, research programmes and from data submitted to the European Community via the Trends and Sources Report under the Zoonoses Directive 2003/99, by agencies contributing to the Report.

This report is a collaborative publication produced by:

- Public Health England (PHE): lead organisation for this year's report
- Department for Environment, Food and Rural Affairs (Defra)
- Food Standards Agency (FSA)
- Department of Health (DH)
- Animal Health and Veterinary Laboratories Agency (AHVLA)
- Health Protection Scotland (HPS)
- Scottish Government (SG)
- Scotland's Rural Colleges (SRUC)
- Public Health Agency (PHA), Northern Ireland
- Department of Agriculture and Rural Development (DARD), Northern Ireland
- Public Health Wales (PHW)
- Welsh Government (WG)

Occasional corrections and amendments to the data, many of which are derived from dynamic databases, may occur following publication; these will result in minor changes to subsequent annual reports.

We have made some changes in presenting the data in this year's UK Zoonoses Report. We would very much appreciate comments and suggestions for items in future reports. Please send these to ZoonosesReport@Defra.gsi.gov.uk.


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Executive Summary

As well as a summary of reported cases of zoonotic infection in humans and animals during 2012, this report includes feature articles which highlight human and animal incidents and issues of public health significance. There were significant trends in a number of infections, which will continue to be monitored, and some of which are reported below. These emphasise the need for continued surveillance and collaboration between veterinary and human health practitioners. However, interpreting trends in veterinary data in particular needs to be done with care, as the number of submissions to the various Government laboratories involved in supplying data for this report may vary from year to year for a number of reasons. These may include weather conditions, concerns about disease or financial factors, and these are likely to affect the livestock sectors and type of submissions differently. For example in 2012, there was a 30% increase in the number of ovine abortion submissions tested compared to 2011. This may have been an effect of the emergence of Schmallenberg virus infection and a greater awareness of the importance of submitting material for diagnostic investigation. This year for the first time, hepatitis E and hantavirus are included in the report, and human and veterinary data for England and Wales, Scotland and Northern Ireland are reported separately in appendices 3 and 4. It is hoped this will be a useful development.

Campylobacter

Campylobacter continues to be the most commonly reported human gastrointestinal pathogen, but the number of reported human cases increased only slightly during 2012 compared to 2011 (72,592 from 72,266). In 2012, there were eight campylobacter outbreaks reported, compared with 20 in 2011. Seven were foodborne outbreaks and although six of these were associated with the consumption of chicken liver and chicken liver parfait, this was a reduction on the 13 such outbreaks reported in 2011.

Cryptosporidiosis

The number of cases of cryptosporidiosis reported in the UK in 2012 was 6,612. This is almost double the number reported in 2011, and the increase was observed across England, Wales and Scotland. The increase is likely due to the year-on-year variation which is observed in *Cryptosporidium* cases, exacerbated by a large outbreak of over 300 cases associated with the consumption of mixed salad leaves.

Hantavirus

The first human case of Seoul hantavirus infection in the United Kingdom (UK) was confirmed in 2012, with virus subsequently being isolated from wild rats at the location of exposure in north east England. A study of wild rodents (collected between 2009-2011) resulted in the detection of a new, distinct hantavirus named Tatenale virus, in a field vole in Cheshire.

Hepatitis E

Human hepatitis E cases have increased significantly in recent years and it is increasingly being recognised as a major zoonosis. There were 657 cases reported in the UK in 2012, a 39% increase since 2011. Indigenous cases now account for the majority of the cases in England and Wales and appear to be the main reason for the recent significant rise. More than 50% of cases are male aged over 50 years of age, with no geographic clustering. Studies have shown that non-travel related cases are infected by Hepatitis E virus genotype 3 similar to that carried by British pigs.

There is increasing evidence that hepatitis E is a food borne zoonoses. In addition, a study has shown that 10% of pork sausages sampled at point of sale from UK retailers were positive for hepatitis E virus, and similar findings have been reported from other European laboratories.

Hepatitis E infection does not cause disease in pigs, but an Animal Health and Veterinary Laboratories Agency (AHVLA) investigation in Scottish pigs found serological evidence hepatitis E in 49% of pig samples. A multi-agency pig abattoir survey will be undertaken in early 2013 to aid understand of the possible role of infection in pigs on human disease incidence.

Bovine tuberculosis (bTB)

In 2012, 5,173 new *Mycobacterium bovis* incidents were recorded in cattle in Great Britain (GB), a 5% increase from 2011. Post-mortem evidence of lesions characteristic of bTB and/or culture of *M. bovis* was detected in 3,443 (67%) and 99% of these new bTB incidents occurred in England and Wales. A total of 37,068 cattle were slaughtered as tuberculin skin or interferon-gamma (blood) test reactors in England and Wales, an increase of nearly 11% from 2011. This increase was also seen in Northern Ireland where there were 1,695 new tuberculosis reactor herds and 10,896 reactor animals in 2012, an increase of 22% and 34% respectively compared to 2011. The number of human cases of *M. bovis* infection remained the same as last year, with 35 confirmed cases.

Rabies and the Pet travel scheme

On 1st January 2012, the UK harmonised with the European Union's (EU) rabies import controls for the non-commercial movement of pet dogs, cats and ferrets, whilst retaining the additional requirement for all dogs entering the UK to be treated for the *Echinococcus multilocularis* tapeworm. For the first time, there is a single regime of rabies controls for pet movements in operation across all 27 EU member states. This has resulted in a significant increase in the number of people choosing to travel with their pets. During 2012, 139,216 dogs, 14,444 cats, and 93 ferrets entered the UK under this scheme - a 63% increase in the number of pets entering GB compared to 2011. These numbers mostly comprise UK-origin animals re-entering GB after a holiday with their owners.

There was one recorded human death from rabies in 2012. This was in a woman who had travelled to Northern India where she had been bitten by a dog.

Vero cytotoxin-producing *Escherichia coli* (VTEC)

In 2012, there were 1,217 laboratory confirmed cases of VTEC O157 reported in humans in the UK, an 18% decrease compared to 2011. The number of cases fell in England, Wales and Scotland, but there was a marked increase in Northern Ireland due to a large foodborne outbreak. Of the 188 cases of VTEC O157 reported in Northern Ireland, 140 cases were associated with one outbreak.

In 2012 there were also 60 laboratory confirmed cases of VTEC other than serogroup O157 (non-O157) in humans. The burden of disease due to non-O157 VTEC is likely to be underestimated because the necessary diagnostic tests are not routinely used by most first line laboratories.

Seventeen outbreaks of VTEC in England and Wales affecting a total of 103 cases were reported in 2012. Twelve were non-foodborne, including five with a potential association with animals. Four of these were investigated by AHVLA, and VTEC O157 was isolated from a variety of animal species, including cattle, sheep, pigs, goats, camelids and wild rabbits. A localised outbreak of VTEC serogroup O26 was reported, but the source of infection was not determined.

Introduction

Zoonoses are defined by the World Health Organisation as “diseases and infections which are transmitted naturally between vertebrate animals and man”. Transmission may occur by a number of routes, from indirect contact through food or drink to direct contact through occupational exposure on farms, from pets or through leisure pursuits. Data on zoonotic diseases in human and animal populations are sourced from national surveillance schemes for outbreaks of infectious disease and laboratory-confirmed infections, enhanced surveillance schemes for specific zoonoses and notification of infectious diseases.

Notification and Reporting of Zoonotic Diseases

Some (but not all) zoonotic infections are statutorily notifiable or reportable under veterinary and/or human health legislation. A list of these can be seen in Appendices 1 and 2. Relevant animal legislation includes: the Animal Health Act 1981 and its subsequent amendments; the Zoonoses Order 1989; the Specified Animal Pathogens (Amendment) (England) Order 2008; the European Communities Act 1972 and the Transmissible Spongiform Encephalopathies (England) Regulations 2010. The Devolved Governments have equivalent legislation. Relevant human legislation includes the Public Health (Control of Disease) Act 1984 and the Public Health (Infectious Diseases) Regulations 1988. The Public Health (Control of Disease) Act 1984 was amended in 2010 to include a revised list of notifiable diseases, and for the first time a list of notifiable organisms (this revised list of notifiable diseases and organisms does not apply to Northern Ireland). In addition to the public health legislation, employers and the self-employed are required to report work-related incidents and diseases (including specified infections) to the Health and Safety Executive (HSE) under the Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations (RIDDOR), 1995 (www.hse.gov.uk/riddor/).

The significance of notification differs in human and veterinary contexts. In animals, there is an obligation on any person having in their possession, or under their charge, an animal affected or suspected of having a notifiable disease (as listed in Appendix 1) to immediately notify the local Animal Health and Veterinary Laboratories Agency (AHVLA) Field Office in England, Wales and Scotland (http://www.defra.gov.uk/ahvla-en/) or the local Divisional Veterinary Office in Northern Ireland. Procedures for notification and control of specified diseases are outlined in the legislation detailed above.

For human cases, registered medical practitioners in England and Wales have a statutory duty to notify the proper officer of the local authority (usually the Consultant in Communicable Disease Control (CCDC) of Public Health England (PHE)[1] in England or Public Health Wales (PHW) immediately on suspected clinical diagnosis of a notifiable

[1] Formerly the Health Protection Agency (HPA) until 31st March 2013

disease. Similar processes exist in Scotland and Northern Ireland though the list of notifiable diseases varies slightly by country. A summary is provided in Appendix 2. For more detail of the specified notifiable diseases and causative organisms see:

Scotland: www.legislation.gov.uk/asp/2008/5/contents

Wales: www.legislation.gov.uk/wsi/2010/1546/contents/made

England: www.legislation.gov.uk/uksi/2010/659/contents/made

Northern Ireland: www.legislation.gov.uk/apni/1967/36/contents

Surveillance and Recording of Zoonotic Diseases

Humans

In addition to notification of specified infectious diseases, voluntary laboratory reporting (Appendix 3) and outbreak surveillance are conducted in each of the constituent countries of the United Kingdom (UK). Due to under-diagnosis and under-reporting, the cases recorded in national surveillance databases tend to be biased towards more clinically severe cases in high-risk groups, or outbreak related cases. New legislation outlined above places a statutory obligation on clinical microbiological laboratories to report specified causative agents or evidence of an infection caused by such agents.

The national surveillance centres receive and collate reports of outbreaks of foodborne gastrointestinal disease from laboratories, local health protection teams and local authority environmental health (Public Protection) departments as required under article 8 of the European Union Zoonoses Directive 2003/99/EC[2]. The minimum dataset on each outbreak is then collected through a standardised questionnaire. Surveillance provides information on specific risk factors associated with different pathogens and on trends in the importance of these factors. Enhanced surveillance schemes, either nationally or locally, provide information on specific aspects of a zoonosis.

Data from the surveillance schemes are reported on national surveillance centre websites and for England and Wales quarterly in the Health Protection Report available at http://www.hpa.org.uk/hpr/archives/Infections/2013/zoonoses_13.htm.

Health Protection Scotland and Northern Ireland's Public Health Agency provide surveillance data on their websites:

www.hps.scot.nhs.uk/giz/index.aspx

[2] OJ L 325, 12.12.2003, p. 31. Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and Zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/11/EEC

www.publichealth.hscni.net/directorate-public-health/health-protection/surveillance-data.

Animals

In GB, livestock are monitored for the appearance of notifiable or novel diseases or changing trends in endemic diseases, including actual and potential zoonoses. This is done by the AHVLA, Scotland's Rural Colleges (SRUC) (Veterinary Sciences Division) and Food Standards Agency (FSA) Operations. A similar function is performed by the Agri-Food and Biosciences Institute (AFBI) and the Department of Agriculture and Rural Development (DARD) in Northern Ireland. In addition, information may be available from universities, veterinary research organisations and other private veterinary laboratories.

The AHVLA undertakes scanning surveillance for new and re-emerging animal diseases on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Government (WG). The SRUC perform a similar role for the Scottish Government (SG). Surveillance is achieved primarily through the collection, collation and analysis of disease data arising from material submitted for diagnostic purposes. Clinical diagnostic samples are submitted to AHVLA Regional Laboratories and post mortem examination sites and to SRUC Disease Surveillance Centres. The results are entered onto the Veterinary Investigation Diagnostic Analysis (VIDA) database and collated into reports covering GB which are published monthly, quarterly and annually. The results are available at: http://vla.defra.gov.uk/reports/rep_surv.htm. SRUC reports can be found at: www.sruc.ac.uk/info/120344/2011_monthly_reports. Appendix 4 also records results for notifiable zoonotic diseases.

In Northern Ireland the AFBI publish quarterly Disease Surveillance Reports on the internet http://www.afbini.gov.uk/index/services/services-diagnostic-and-analytical/adds/services-diagnostic-adds-diagnostic-report.htm. The disease summary is compiled by the veterinary services division of AFBI and is based on diagnostic submissions to AFBI's veterinary laboratories at Stormont, Belfast and Omagh, County Tyrone.

Risk assessment and control of zoonoses

The UK Zoonoses, Animal Diseases and Infections (UKZADI) group provides a high-level strategic overview and a means of ensuring overall coordination of public health action on zoonoses across the UK. The multi-agency, cross-disciplinary Human Animal Infections and Risk Surveillance (HAIRS) group acts as a forum to identify and discuss infections with potential for interspecies transfer (particularly zoonoses).

Control policies have been introduced to reduce the prevalence of pathogens in the food chain and other areas. These include the implementation of legislation relating to the production of drinking water and food. The UK FSA, PHE and devolved equivalents and Local Government Regulation operate national microbiological food sampling programmes and carry out studies focusing on particular foods, food processes and the production environment. This work enables potential food safety issues to be identified, as well as

establishing current levels of microbial contamination. Local authorities also carry out food sampling activities.

Under the auspices of the FSA, the Epidemiology of Foodborne Infections Group and the Advisory Committee on the Microbiological Safety of Food bring together UK surveillance data on humans, animals and food to consider foodborne risks.

Further information on the human aspects of infection is available from the PHE webpages:
http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Zoonoses/TableZoonoticDiseases/

Information on the animal aspects of infection is available from the Defra webpages:

www.defra.gov.uk/animal-diseases/a-z/

Feature Article 1: Antimicrobial Resistance: a new approach

Authors: Suzanne Eckford, Nicole Batey, Antimicrobial resistance (AMR) policy team of the Veterinary Medicines Directorate and Sally Wellsteed, Department of Health, England

Antimicrobial Resistance- what is the issue?

Antimicrobial resistance, the ability of a micro-organism to withstand and survive an antimicrobial agent, is an inherent risk associated with the use of antimicrobials in any species and its public health importance is recognised globally.

Modern medical and veterinary practice relies on the widespread availability of effective antimicrobials to prevent and treat infections. In future, AMR could be so widespread that we return to the pre-antibiotic era with currently curable diseases becoming untreatable. Antimicrobials have a variety of uses including treating and preventing infections and reducing the risk of potentially life threatening complications in surgery and other treatments.

Currently, veterinary treatment failures arising from resistance are relatively uncommon in the UK, although they have been seen in swine dysentery, a serious and debilitating cause of enteritis in pigs. Concern about treatment failure is more pressing in human medicine, where resistance to antibiotics of last resort is an increasing global problem for example with increases in multi-drug resistant tuberculosis (TB) and gonorrhoea. The effects of the spread of resistance in bacteria are compounded by the lack of new antibiotics being developed.

Role of animals

Increasing scientific evidence suggests that the clinical issues associated with AMR that are faced in human medicine are primarily the result of antibiotic use in people, rather than the use of antibiotics in animals. Nevertheless, use of antibiotics in animals is an important factor contributing to the wider pool of resistance which may have long term consequences.

Antibiotic use in the veterinary sector can also influence the occurrence of resistance in food borne pathogens which can be carried by animals, such as *Campylobacter* and *Salmonella.* Therefore we should aim to eliminate inappropriate use of antibiotics in both human and veterinary medicine.

Activities to encourage responsible prescribing and tackle AMR to date

The first UK AMR Strategy and Action Plan published in 2000[3] has resulted in a wide ranging but fragmented AMR work programme throughout the UK. While faster progress is required, good work has been carried out and examples of initiatives to improve practice are shown below.

General Practitioner (GP) consultations can often be challenging, particularly when patients expect to receive antibiotics and may be unwilling to accept that they do not need them. In order to provide support for GPs in 2012, a GP toolkit *"*TARGET*" (*Treat Antibiotics Responsibly, Guidance, Education, Tools,) was developed by the then Health Protection Agency (HPA) in collaboration with several other professional bodies (the Antimicrobial Stewardship in Primary Care Collaboration). It is hosted on the Royal College of General Practitioners website[4].

In recent years, hospital use of antibiotics has improved through the introduction of "antimicrobial stewardship", programmes involving a multi-professional specialist team in monitoring prescribing, resistance and infections, and supporting prescribers in choice and use of antibiotics. Resources such as "Start Smart then Focus" launched in 2011[5] have helped provide guidance on antibiotic stewardship in hospitals and ensure use of the right drug, right dose and right duration to limit unnecessary antibiotic exposure.

On the animal health side, concerted efforts across the veterinary and animal health sectors have led to a number of initiatives to promote the responsible use of antibiotics in animals. These include:

- A requirement in the Professional Code of Conduct for Veterinary Surgeons 2012 for veterinarians to use antimicrobials responsibly to minimise development of resistance[6]

- Formation of the Responsible Use of Medicines in Agriculture Alliance, a cross industry alliance encompassing farming organisations, veterinarians, veterinary pharmaceutical industry, and retail organisations, which publishes responsible use guidance for each of the main food producing species

[3] UK Antimicrobial Resistance Strategy and Action Plan 2000 http://antibiotic-action.com/wp-content/uploads/2011/07/DH-UK-antimicrobial-resistance-strategy-and-action-plan.pdf
[4] Target toolkit www.RCGP.org.uk/TARGETantibiotics/
[5] Antimicrobial stewardship: Start smart - then focus https://www.gov.uk/government/publications/antimicrobial-stewardship-start-smart-then-focus
[6] Code of Professional Conduct for Veterinary Surgeons http://www.rcvs.org.uk/advice-and-guidance/code-of-professional-conduct-for-veterinary-surgeons/

- Publication by the British Veterinary Association, the British Equine Veterinary Association and the British Small Animal Veterinary Association of general and species specific prescribing guidelines

- Production of leaflets on responsible use by the European Federation of Vets for vets and for the general public

- A voluntary ban by the British Poultry Council on the use of certain antibiotics considered critically important for human health in day old chicks

- Prohibiting the advertising of antibiotics to professional animal keepers and to owners or keepers of horses. This change is expected to ease client pressure on vets to prescribe antibiotics.

While not an exhaustive list the above shows the range of activities and players required to tackle AMR, there is no one silver bullet for this problem.

The Future: UK AMR Strategy 2013-2018

The second volume of the Chief Medical Officer (CMO) for England's annual report for 2011[7], published in March 2013, highlighted the need to act promptly and comprehensively to minimise the threat from AMR to human and animal health. It recognised that AMR cannot be eradicated, but it can be managed to limit the threat and minimise the impact for human and animal health.

The forthcoming AMR Strategy sets out how the UK Government intends to address the challenges of AMR, as part of the 'One-Health' agenda spanning people, animals and the environment. The Strategy has been informed by input from a wide range of experts in different disciplines and defines an approach that will involve many partners and cross organisational co-operation at local, national and international levels. It also takes account of World Health Organisation (WHO)[8] and EU documents[9,10].

The overarching goal of this Strategy is to slow the development and spread of AMR by focusing on the following three strategic aims to:

- Improve the knowledge and understanding of AMR

- Conserve and steward the effectiveness of existing treatments

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[7] CMO's Annual Report volume II https://www.gov.uk/government/publications/chief-medical-officer-annual-report-volume-2

[8] WHO's European strategic action plan on antibiotic resistance, 2011. http://www.euro.who.int/__data/assets/pdf_file/0008/147734/wd14E_AntibioticResistance_111380.pdf

[9] EU Action plan against the rising threats from Antimicrobial Resistance, COM (2011) 748. http://ec.europa.eu/dgs/health_consumer/docs/communication_amr_2011_748_en.pdf

[10] Council conclusions on the impact of antimicrobial resistance in the human health sector and in the veterinary sector – a "One Health" perspective. http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/131126.pdf

- Stimulate the development of new antibiotics, diagnostics and novel therapies.

Achieving these objectives will require working across the following seven key areas simultaneously**.**

- Improving infection prevention and control practices in human and animal health.
- Optimising prescribing practice
- Improving education, training and public engagement
- Developing new drugs, treatments and diagnostics
- Better access to and use of surveillance
- Better identification and prioritisation of AMR research needs
- Strengthened international collaboration

A cross Government High Level Steering Group will oversee implementation of the Strategy, with delivery coordinated by DH, Defra and PHE. Annual progress reports will be produced from November 2014 and implementation plans will be amended if the Strategy is not having sufficient impact.

Feature Article 2: Imported Exotic Zoonoses in 2012

Case of Crimean Congo Haemorrhagic Fever in Glasgow

Author: Susan Brownlie (Health Protection Scotland)

On 2 October 2012, a 38 year old male returned to Glasgow following a three week visit to Afghanistan. He had been ill for the preceding five days with symptoms including abdominal pain, fever, diarrhoea and vomiting, which had been blood stained. He was rapidly admitted the same day to his local hospital before being transferred to the Brownlee Centre for Infectious Diseases in Glasgow where he was barrier nursed in a negative pressure room and treated with intravenous antibiotics.

Crimean Congo Haemorrhagic Fever (CCHF) was suspected given his symptoms and recent travel to an endemic area. On 4 October the HPA Rare and Imported Pathogens Laboratory confirmed this diagnosis by Polymerase Chain Reaction (PCR) detection of CCHF virus. The next day the patient was transported by the Royal Air Force to the High Security Infectious Diseases Unit at the Royal Free Hospital in London, but he died on 6 October despite intensive treatment.

The endemic area for CCHF is defined by the geographical range of the *Hyalomma* tick which is the main vector. This range includes areas of Africa, the Balkans, the Middle East and Asia south of the 50° northern latitude. The main risk factors for contracting CCHF are either tick bites or through contact with infected animal blood or tissues during or immediately after slaughter. Thus, cases usually occur in people involved in the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians[11,12].

Person-to-person transmission is possible through close contact with contaminated human secretions, blood and body fluids. Public health teams therefore focused on identifying individuals in the community in Glasgow, the healthcare and airport setting, including airline passengers and crew, who had had significant contact with the blood and body fluids of the case. No secondary transmission occurred.

It is believed that the patient had participated in the slaughter of an animal whilst in Afghanistan, and that transmission of CCHF resulted from direct contact with infected

[11] http://www.who.int/mediacentre/factsheets/fs208/en/
[12] http://www.who.int/entity/csr/disease/crimean_congoHF/Global_CCHFRisk_20080918.png

animal blood or tissue. This was supported by sequencing which demonstrated strong similarity with CCHF viruses from the Middle East in the Asia 1 group[13].

This was the first laboratory confirmed case of CCHF in the UK.

A case of human rabies following travel to India

Author: Hilary Kirkbride (Public Health England)

(Image courtesy of Wikimedia Commons)

A London resident travelled to northern India to visit family and during this visit, she sustained a bite on the forearm from a stray puppy in early April. The wound was disinfected and cleaned, but she did not seek medical attention or receive post exposure prophylaxis. She had not received rabies vaccination prior to travel.

Following her return to the UK on 14th May, the patient presented to her GP and subsequently to Accident and Emergency complaining of fatigue and a pain in her arm. Over the following days she became agitated, developed hydrophobia, and reported the history of a bite to her right forearm by a puppy in India. She was admitted to a local hospital and subsequently transferred to University College Hospital for specialist care. Rabies was confirmed by Real Time-PCR from saliva, nuchal and bite site biopsies. Subsequent sequencing results showed a strain of rabies virus associated with Pakistan, northern Indian and Nepal. Treatment was commenced using a modified Milwaukee Protocol[14,15]. This involves a combination of drug induced coma, neurotransmitter

[13] Atkinson et al. Sequencing and phylogenetic characterisation of a fatal Crimean – Congo haemorrhagic fever case imported into the United Kingdom, October 2012. *Euro Surveill*. 2012;17(48):pii=20327. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20327

[14] http://www.mcw.edu/FileLibrary/Groups/Pediatrics/InfectiousDiseases/Milwaukee_rabies_protocol_V3_1.pdf

[15] Willoughby et al. Survival after treatment of rabies with induction of coma. *N Engl J Med.* 2005; 352: 2508-2514. Available online: http://www.nejm.org/doi/full/10.1056/NEJMoa050382

replenishment and antivirals, with intensive care support. However, her condition deteriorated over the following 2 weeks and she died.

An incident control team was convened by South East London Health Protection Unit to coordinate the management of the patient and public health actions. The incident team comprised of colleagues from the HPA (three Health Protection Units and HPA Colindale epidemiology and virology), National Health Service (NHS) Acute Trusts, and occupational health, AHVLA and HPA and NHS Communications. Public health action involved identifying and risk assessing close contacts exposed to the patient's body fluids. Excluding organ transplantation, there have been no documented cases of human to human transmission of rabies. However, as a precautionary measure close contacts of human rabies cases should be risk assessed and those with direct contact with saliva and other body fluids offered post exposure prophylaxis.

This is the 6th human death from rabies in the UK since 2000, five cases of terrestrial rabies were imported following exposure to rabid animals overseas and one case of European Bat Lyssavirus (EBLV)-2 was acquired from a bat in Scotland.

Feature Article 3: The EU Pet Travel Scheme: keeping the UK free of rabies and *Echinococcus multilocularis*

Authors: The PETS and Rabies Team (Defra)

Harmonisation with the EU rules

On 1st January 2012, the UK harmonised with the EU's rabies import controls for the non-commercial movement of pet dogs, cats and ferrets, while retaining the additional requirement for all dogs entering the UK to be treated for the *Echinococcus multilocularis* (EM) tapeworm. For the first time, there is a single regime of rabies controls for pet movements in operation across all 27 EU member states. The new rules allow a pet owner (or a person authorised by the pet owner) to bring their pet into the UK from anywhere in the world without a quarantine period provided that all the relevant rules of the scheme are met. There are different rules depending on where in the world the pet is travelling from, with the most stringent controls for the highest risk countries. Harmonisation has made it easier and cheaper for owners to travel with their pets, whilst maintaining a high level of protection against rabies.

Context of harmonisation: risk of rabies and other exotic diseases

The UK led the way in the EU by establishing a national Pet Travel Scheme (PETS), from 2000. In 2003, the EU introduced its own pet travel scheme, albeit with different rules. The UK (along with Ireland, Malta, Finland and Sweden) was granted a temporary derogation

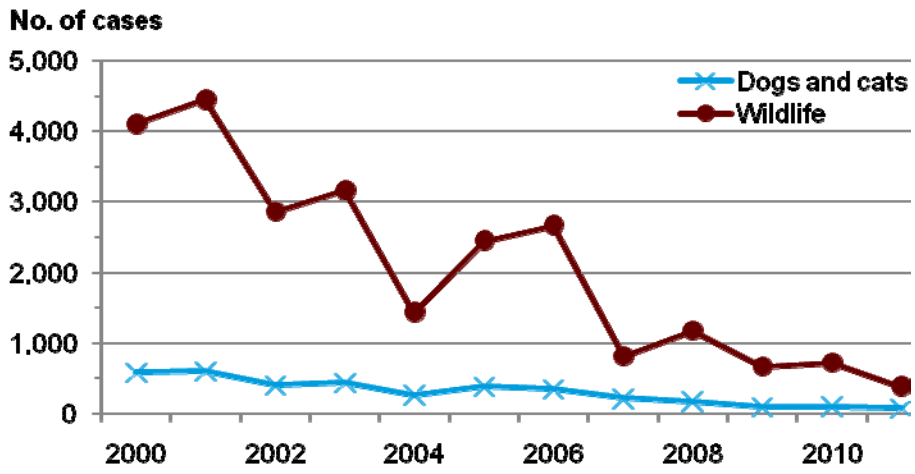
from the EU scheme. This was based on the prevalence of rabies present in the EU at this time and the UK's ability, as an island nation, to enforce more stringent national rules.

The dramatic reduction in the incidence of rabies across the EU over the last decade was the backdrop for harmonisation in 2012. There were around 550 rabies cases in pets and wildlife across the EU in 2011, compared with almost 5,000 in 2001 (Figure 1) and around 13,000 in 1991. This has been achieved though systematic eradication programmes co-funded by the EU. These programmes have focused on the vaccination of pets and wildlife against rabies. In light of this, the UK concluded, on the basis of risk assessments, that after harmonisation with the EU regime the risk of rabies entering the UK would remain very low. It is worth noting that there hasn't been a single case of rabies in the EU associated with pets moved legally under the EU pet travel scheme since it first started operating in 2004.

However, the risk assessments showed a clear increase in risk if the EM tapeworm controls were removed. An EU legislative act then followed that has allowed the UK to maintain this import control (along with Ireland, Malta and Finland). There is no current requirement for a tick treatment under the rules of the EU pet travel scheme. The risk assessment showed that the change in risk is uncertain, but that permanent establishment of the tick *Rhipicephalus sanguineus* is unlikely under current climatic conditions.

Nevertheless, Defra strongly encourages pet owners to apply preventive measures against ticks and other parasites while abroad. Pets travelling abroad with their owners may also be exposed to other pathogens, some of which can impact on human health. We recommend pet owners consult their vet to make sure their pet is appropriately prepared for the part of the world they are travelling to, and to inform themselves of any possible welfare risks.

Figure 1: Reported instances of rabies within the EU (2000 to 2011)



Source: World Health Organisation (WHO) Rabies Bulletin

The current EU pet travel scheme

Since January 2012 under the harmonised regime, the requirements for pet dogs, cats and ferrets travelling into the UK from another EU county or from a lower-risk country outside the EU (the so-called “listed” third countries) are an electronic microchip for identification and a rabies vaccine, followed by a 21 day wait before travel (to allow the vaccine to take effect). In addition, dogs - excluding those travelling directly from Ireland, Finland, Norway or Malta - must be treated for the EM tapeworm not less than 24 hours and not more than 120 hours prior to their scheduled arrival in the UK. The details of these preparations must be set out in an EU pet passport or third country certificate by an authorised veterinarian. Additional rules are in place for pets travelling from non-EU countries which are considered to pose a greater rabies risk (the so-called “unlisted” third countries). For travel into the UK from these countries, the effectiveness of the vaccination against rabies must be verified by a blood test carried out not less than 30 days after the date of vaccination. This must then be followed by a further three month wait before travel. More information is available at https://www.gov.uk/take-pet-abroad.

This contrasts with the regime in force prior to January 2012, under which pets travelling from EU countries and listed third countries needed a blood test and a six month wait before entering the UK, while pets from the unlisted countries faced a compulsory six-month quarantine period. In addition, both cats and dogs were required to be treated for both *E. multilocularis* and ticks.

The effects of the changes so far

The new requirements have resulted in a significant increase in the number of people choosing to travel with their pets. A 61% increase in the number of pets entering GB under the scheme was recorded between 2011 and 2012. Sixty per cent of those entering GB in 2012 did so under a UK-issued pet passport, suggesting that the majority of those taking advantage of the newly harmonised regime were UK residents taking their pet on holiday. Meanwhile pets with passports issued in the UK, Germany, France, Spain and the Netherlands accounted for the large majority (around 85%) of all pets entering GB.

Future developments

Once harmonisation across the EU had been achieved, the European Commission immediately embarked on a project to consolidate and revise the legislation surrounding the non-commercial movement of pet animals. As well as bringing the existing pet travel legislation together into a single Regulation, this provided an opportunity to re-examine one or two elements of the scheme. The new Regulation has been agreed and is expected to become legally binding in EU Member States early in 2015. The fundamental elements of the regime will not change, including the requirements for identification, vaccination and treatment against EM tapeworm. There are a few improvements, including the potential for two rabies-free Member States to apply for a derogation from the requirement for vaccination against rabies for movements between their territories; a new requirement for

all Member States to carry out compliance checks on a proportion of the pets entering their territory from other Member States; a uniform minimum age of 12 weeks at the time of vaccination against rabies; and a series of anti-fraud measures such as improved traceability for pet passports.

Clamping down on those who break the rules

Following harmonisation, all pets entering the UK on authorised carriers continue to be checked for compliance with the pet travel rules. Within Great Britain, the responsibility for carrying out these checks is delegated to the ferry, cruise, rail and air companies, as they are better placed to carry out the checks at the various points of entry. The carriers are authorised to carry pets by the AHVLA on the basis that they have the equipment, staff and facilities available to carry out the checks and deal with pets that do not comply with EU pet movement rules. The approval process ensures that the same checks are carried out to the same standard irrespective of whether they are carried out by staff at an airport animal reception centre or by the staff of a ferry or rail operator.

The popularity of some so-called ‘designer’ breeds of dog is rising and imported puppies are often sold more cheaply than UK-bred animals. For the first time, the new rules allow a legal route to bring puppies less than six months of age into the UK. However, some unscrupulous traders are still attempting to evade the rules either through false documentation or smuggling in order to import puppies for sale in the UK. These individuals are putting the health of UK animals and people at risk, and the welfare of the puppies can also be compromised. Anyone who doesn’t follow the rules is committing a criminal offence and local authorities have the power to deal with offenders.

Defra is working closely with its operational partners to crack down on this illegal trade and prosecute those taking part in it. Anyone with information regarding this illegal trade should contact their local Trading Standards office immediately. The public can help stop this illegal trade at its source. Advice on the simple checks an owner can make to reduce the risk of buying an illegally imported puppy is available at: https://www.gov.uk/buying-a-cat-or-dog.

Feature Article 4: Olympic and Paralympic preparedness: safeguarding human and animal health

Authors: Kate Halsby (PHE) and Adam Hardgrave (FSA)

In the summer of 2012, London hosted the Olympic and Paralympic Games. More than 10,000 competitors from over 200 nations competed in the Olympics, and 4,200 competitors from 147 nations competed in the Paralympic Games. Over nine million tickets were sold for the two Games, and on the busiest day, about 800,000 people used public transport to travel to Games events.

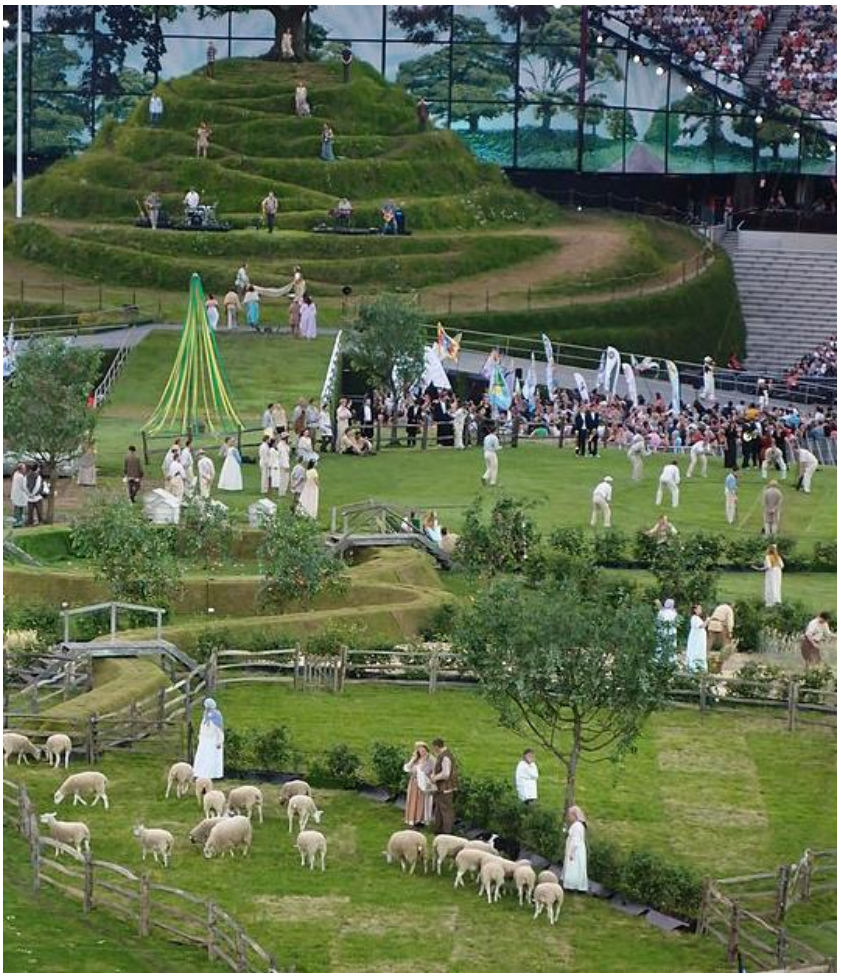
Considerable work was generated in preparing for and assessing the potential impact of health incidents on the Games, the host population, and the countries to which athletes and visitors would return. These public health considerations included diseases spread among humans, diseases spread from animals to humans, and diseases spread among animals, especially horses.

The opening ceremony[16]

The opening ceremony for the London 2012 Olympics included a pastoral scene to represent the British countryside. This scene included the use of cattle, sheep, goats, horses, dogs and poultry.

In July 2012, a number of members of the HAIRS group were approached to advise on the potential risk to public health posed by the use of these animals in the ceremony. A risk statement was produced by the group using the limited publically available information in conjunction with information made available to Defra and AHVLA. This included formal risk assessments from the organisers which provided reassurances that a wide range of risks to animal handlers, animal welfare and staff practices had been considered and that measures had been put in place to control these. Further information and points of clarification were obtained during a site visit by Defra and AHVLA colleagues. The risk statement prepared by the HAIRS group also included recommendations to reduce potential disease risks for any persons coming into contact with the animals, their environment and their waste products. No disease incidents associated with the animals used during the opening ceremony were reported.

[16] Adapted from: HAIRS report 2011-2012. Available online: http://www.hpa.org.uk/Publications/InfectiousDiseases/EmergingInfections/1302HumanAnimalInfectionsandRiskSurveillance2011to12/



(Image courtesy of Wikimedia Commons)

Equine events[17]

The London 2012 Olympic and Paralympic Equestrian Games were the highest profile event in the 2012 equestrian calendar and were the culmination of four years of meticulous biosecurity planning to ensure that all horses arrived, competed and returned home safely and in good health. The goals for the equine biosecurity programme were: to prevent disease entry into the Greenwich Park venue; to prevent further spread within and outside of the venue (should any disease get into the venue); to safeguard the event through measures to minimise disease impact and, if at all possible, allow the Games to continue.

In previous Games, virtually all horses flew long haul to the Olympic venue. The host country's health regulations usually required horses to be quarantined and closely monitored before they flew, and then a further period of monitoring after arrival. Additional vaccination and testing were sometimes required. Health certificates and declarations had

[17] Adapted from: Slater J, Greenleaves A and Paterson A. Ensuring equine biosecurity at London 2012. *Vet Rec* Feb 2013, pp 117-119. Available online: http://veterinaryrecord.bmj.com/content/172/5/117.full?eaf

to be completed, importation regulations complied with and re-export requirements fulfilled before horses could return home.

In contrast, almost all horses travelled to London 2012 by road from permanent bases or training camps in Europe. This meant that some of the key biosecurity controls were not possible. One of the early decisions made by the biosecurity team was not to impose additional health monitoring requirements over and above those of the standard animal health certificates and the Trade Control and Expert System, because to do so would undermine the current provisions facilitating horse movements within Europe. All horses were imported as normal legal trade and were considered to be of very low or negligible risk with no requirement for special exemptions to be made.

Detailed contingency and countermeasures planning was required for each of the diseases on the Equestrian Games Risk Register, which identified 14 notifiable (exotic) and endemic diseases that posed a threat to the Games. A risk-based approach was put together by a single biosecurity team made up of representatives from the Olympic Games organisers: LOCOG (the London Organising Committee of the Olympic and Paralympic Games), equestrian logistics (Peden Bloodstock) and government (Defra and AHVLA). No diseases were given a 'red' status, which would have indicated that action was needed, whilst two notifiable diseases (equine infectious anaemia and African horse sickness) and three endemic diseases (salmonellosis, equine herpes virus and myeloencephalopathy) were given an 'amber' status, indicating that monitoring was needed with possible action. The overall official risk assessment of exotic disease occurring was very low.

A key precautionary measure in preventing disease entry into the venue was the equestrian staging facility (ESF). This was situated 10km from the Greenwich Park venue, and was purpose-built for screening horse transporters, equipment, personnel and the competing horses. No significant clinical signs of disease were detected at the ESF at any point during the Games, and no significant health or welfare problems were detected during the Games.

Food safety during the Games

The FSA is the lead Government Department on food safety in the United Kingdom, and the Games were widely recognised as being the 'largest peace-time catering operation in the world'. An operation on this scale brought distinct challenges, and required a fresh approach.

Food safety was a high priority throughout the planning process, which was confirmed with the publication of a food safety strategy known as the Food Vision[18]. This document was a joint collaboration with inputs from Government departments, LOCOG, and commercial partners. The FSA was involved in the early stages of planning, providing input into the Food Vision.

[18] http://www.london2012.com/documents/locog-publications/food-vision.pdf

The project had a UK focus across three main areas:

- providing information to and protecting consumers
- supporting local authorities
- providing information to and supporting businesses

The FSA identified risks arising from specific areas that would provide food, and further risks were identified arising from:

- cultural and live sites, and torch relay
- training camps and training venues
- food supply chain
- accommodation at hotels
- food business operators stockpiling foods due to transport restrictions preventing regular deliveries
- illegal food vendors trading in the streets
- diminishing resources within local authorities and lack of training opportunities available to local authority staff due to financial constraints
- shipping in the Thames, including hotel ships, cruise ships, private yachts and National Olympic Committee accommodation on board ships

During the Games the FSA worked across many agencies though the Incident Team providing support and response to queries raised from the public, local authorities and other government agencies. Preparation and innovative proactive engagement with key partners proved very successful.

Health protection during the Games[19]

The key objective of the HPA during the London 2012 Olympic and Paralympic Games was to contribute to a safe and healthy Olympics by ensuring potential health protection threats were identified and prevented or effectively managed. Mass gatherings are recognised as presenting a range of complex challenges to host countries and can create ideal circumstances for the spread of infectious diseases, due to large numbers of visitors from different geographic regions and cultures who are often in close proximity to one another. Evidence suggests that the main areas of risk are respiratory and food-related or

[19] Adapted from: London 2012 Olympic and Paralympic Games. Summary report of the HPA's games time activities. Available online: http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317137693820

water-borne diseases, although infectious diseases have not been recognised as a major cause of morbidity during previous Olympic Games.

The HPA had lead responsibility for delivering public health information, risk assessment, diagnostic testing and disease control measures throughout the Games. One of the key commitments was to deliver a daily public health Situation Report (SitRep) to the Games CMO. Over the 73 days of daily reporting, the HPA included 59 new events in the SitRep and there were an additional 12 exceptional reports. This SitRep information provided assurance to partners and internally within the HPA that there were no significant public health issues requiring escalation.

The majority of incidents identified by HPA were those routinely seen during summer and related mainly to gastroenteritis and vaccine preventable diseases. These posed no risk to the Games and were all managed through standard public health measures. There were, however, some events reported that were mainly associated with athletes, and the HPA managed these through the provision of expert advice and close working with LOCOG.

Reported incidents included:

- Gastroenteritis reports:
    - Involving visitors, security and team members. None were more than isolated cases of presumptive food poisoning with different causative agents. No incidents were associated with food sources at a Games venue.
    - From the FSA. A number of reports of issues related to food products.
- Heightened ozone levels across London and the South East.
- An outbreak of Legionnaires' disease in Edinburgh in June and an outbreak in Stoke-on-Trent in July. Neither represented any significant threat to the Games and no cases occurred in anyone connected to the Games.
- Ongoing measles and pertussis outbreaks.

International infectious disease incidents were also monitored and assessed whether they might pose not a threat to the Games, or might have attracted media, political, or public attention.

The systems, collaborations and working arrangements put in place for the Games provided a significant legacy across the full range of activities for the many Agencies, Departments and sectors involved.

Zoonoses A-Z

Anthrax (*Bacillus anthracis*)

Anthrax is caused by the bacterium *Bacillus anthracis*. Under certain environmental conditions *B. anthracis* can convert into a spore, which may survive in the environment for many decades in an inert state. In this form the organism shows great resistance to the effects of heat, drying, UV light and many disinfectants.

Anthrax can occur in all mammalian species, and has also been reported in some birds. The clinical presentation in animals varies between species with three forms of anthrax recognised; peracute/apoplectic, acute and chronic. Sporadic anthrax cases still rarely occur in cattle in the UK, presumably from exposure to anthrax spores present in soil and originating from cases that occurred decades earlier.

Anthrax infection in humans classically causes one of three types of disease that affect either the lungs (inhalation/ pulmonary), the digestive tract (intestinal) or the skin (cutaneous). In 95% of naturally-acquired human cases, the infection is cutaneous. Recent human cases of anthrax in the UK have been associated with drums made from imported animal hides, or with contaminated heroin.

Infection in humans

There were six cases of anthrax reported in humans in the UK in 2012 (five in England and Wales, and one in Scotland) all in persons who inject drugs. As in the 2009/10 outbreak, these cases are thought to have been acquired from contaminated heroin. There have also been cases of anthrax among heroin users reported in Germany, Denmark and France during 2012.

Genetic and genomic analyses demonstrated that anthrax strains from the 2009-10 outbreak were most closely related to isolates from Turkey[20]. Turkey is along a common route for transport of heroin from its primary source in Afghanistan into European countries, and the contamination most likely occurred from contact with animal hides.

Further molecular analyses provide evidence that a single strain of *B. anthracis* may have been responsible for both the current European cases of anthrax and the 2009/10 outbreak[21]. This may indicate a continuing source of imported contaminated heroin which

[20] Price EP *et al*. Molecular epidemiologic investigation of an anthrax outbreak among heroin users, Europe. *Emerg Infect Dis* 2012;18(8):1307-13 http://dx.doi.org/10.3201/eid1808.111343

[21] Grunow R *et al*. Anthrax among heroin users in Europe possibly caused by same bacillus anthracis strain since 2000. *Euro Surveill* 2013; 18(13) :pii=20437. http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20437

is being detected intermittently due to increased awareness, or a source of contaminated heroin that was removed from circulation in 2010 and recently re-introduced.

Infection in animals

The last cases of anthrax in animals in GB occurred in 2006 when six cattle died on one farm in Wales (two confirmed and four suspected cases). The cause was thought to be river flooding/damage to a floodplain grazing field. In Northern Ireland the last case of anthrax was in 1990, affecting one cow on a farm in County Antrim.

There were no cases of anthrax detected in animals in the UK in 2012.

Avian and animal influenza

Influenza is a respiratory infection caused by viruses of the Orthomyxoviridae family. Animal-adapted influenza viruses do not readily infect people. However, spontaneous mutation or re-assortment of influenza virus genes between human and animal strains can occur. Some of these strains have the potential to be readily transmitted between people and can lead to pandemic spread in humans.

Avian influenza (AI), also referred to as ‘Fowl Plague’ or ‘Bird Flu’, is a disease of birds caused by type A influenza viruses. It is one of the most important poultry diseases as it is highly infectious, can produce significant mortality and can affect many species of birds. Avian influenza viruses are classified according to the severity of disease (pathogenicity) they cause in kept birds. They are either highly pathogenic or of low pathogenicity. Highly pathogenic avian influenza (HPAI) can cause severe disease in poultry, with a high death rate of up to 100% in affected flocks. HPAI disease can develop so rapidly that birds may die without showing any previous signs of disease. Low pathogenicity avian influenza (LPAI) viruses result in milder, less significant disease, but can mutate into highly pathogenic strains. Only HPAI is notifiable in birds. There are other influenza A viruses that affect other species of animals. None of these infections are notifiable and different virus strains can cause varying degrees of disease in their specific animal host. Most generally cause mild disease in comparison to the severity associated with HPAI infection in poultry.

The highly publicised H5N1 HPAI strain has been responsible for considerable poultry losses across Asia, and between 2005-2007 in Europe and other parts of the world. As a result the UK has maintained a high vigilance for avian influenza in response to the potential for westward spread of H5N1 from Asia and occasional incursion of other influenza viruses to European poultry.

Infection in humans

Human cases of avian influenza in the UK are very rare. In 2006, there was one confirmed case of H7N3 in a farm worker. In 2007, there were four cases in owners who kept birds,

associated with a H7N2 poultry outbreak. All viruses were of low pathogenicity for poultry. There have been no deaths reported as a result of avian influenza in the UK.

There were no human cases reported in 2012 in the UK.

Infection in animals

There were no cases of HPAI in birds in the UK in 2012.

The last case of HPAI in the UK was in Oxfordshire in June 2008 when H7N7 infected a single laying hen flock. Active surveillance of UK poultry stocks for viruses of H5 and H7 subtypes has been undertaken annually since 2003. Infrequently, antibodies to H5 or H7 infection subtypes have been detected in a small number of sampled birds, which is most likely indicative of prior exposure to LPAI virus strains and in ducks these are most likely to indicate non-specific reactions. During 2012, nine of 377 holdings sampled in the UK had birds with antibodies to avian influenza viruses of subtypes H5 or H7. This compared with five detections from 433 holdings sampled in 2011.

The UK undertakes EU-mandated AI wild bird surveillance activities on dead wild birds. Wild bird surveillance activities include patrols of designated reserves and wetlands around the UK and the investigation of wild bird 'mass mortalities' (defined as five or more wild birds of any species in any location in the UK). In Northern Ireland individual dead gulls, waders, ducks, geese and swans are investigated, in addition to mass mortality events. In 2012, a total of 516 wild birds were sampled in the UK. All of the birds sampled were found dead by the public or warden patrols of wetlands and reserves. H5N1 HPAI (notifiable in wild birds since 2003) was not detected, neither were other influenza A viruses.

The most significant non-avian influenza in recent years has been swine influenza. The number of diagnoses of swine influenza remained high in 2012. This was partly attributed to the introduction of a more sensitive screening assay, leading to an increase in the number of case submissions and an apparent increase in disease activity. The predominant strains of swine influenza circulating in the pig population in 2012 were A(H1N1)pdm09, and the endemic H1N2 subtype. Co-circulation of multiple strains raises questions as to the long term dynamics of virus strain dominance or coexistence, particularly the potential for further genetic re-assortment. A first generation re-assortment between H1N2 and A(H1N1)pdm09 was detected in several cases and the situation will be monitored through ongoing surveillance.

Further information:

Great Britain AI Wild Bird Surveillance data for 2012:

http://www.defra.gov.uk/ahvla-en/publication/wildlife-survreports/

Northern Ireland Wild Bird Surveillance data for 2012:

http://www.dardni.gov.uk/index/animal-health-and-welfare/animal-diseases/avian-influenza/avian-influenza-questions-and-answers/wild-bird-surveillance.htm

Bovine tuberculosis (*Mycobacterium bovis*)

The *Mycobacterium tuberculosis* complex includes *M. tuberculosis, M. bovis* and *M. microti.* Bovine tuberculosis (bTB) is caused by *M. bovis*, a zoonotic organism that can give rise to a form of tuberculosis in humans that is virtually indistinguishable from the disease caused by *M. tuberculosis,* which is the major cause of human TB.

Infection with *M. bovis* most often occurs when airborne droplets of moisture (aerosols) containing the organism are inhaled, but can also occur by eating or drinking contaminated foodstuffs. The consumption of unpasteurised milk or dairy products from infected cows was an important cause of childhood tuberculosis in the UK until pasteurisation became widespread in the mid-20th century.

Bovine TB is one of the most serious animal health problems for the cattle industry in the UK. Over the last ten years the disease has cost the Government more than £500 million and could cost another £1 billion in the next ten years unless the current trends are reversed. *M. bovis* infection has also been found in many other mammal species, including other livestock, wildlife, domestic cats and dogs. However, only badgers and cattle are considered maintenance hosts for *M. bovis* in the UK, although wild deer may also act as maintenance hosts in isolated areas in some circumstances[22]. Other mammals behave as spill-over or dead-end hosts.

A compulsory eradication campaign for bTB began in GB in 1950 and in Northern Ireland in 1959. This was underpinned by routine screening of herds using the comparative tuberculin skin test, slaughter of all test reactors and cattle movement restrictions in infected herds. This programme gradually reduced the incidence infection in cattle herds to a very low level by the early 1980s. However, since then, the number and geographical distribution of new incidents of TB in cattle herds ('breakdowns[23]') have steadily increased in England and Wales. This trend accelerated immediately after the foot and mouth disease outbreak in 2001, during which the routine TB testing and slaughter programme was suspended for almost ten months.

M. bovis is currently endemic in cattle and badgers in most of Northern Ireland and large tracts of south west England and south and mid-Wales. Scotland was declared an officially bTB free region of the UK by the European Commission in 2009 (Decision 2009/761/EC)

[22] Delahay, RJ *et al*. 2007. Bovine tuberculosis infection in wild mammals in the South-West region of England: a survey of prevalence and a semi-quantitative assessment of the relative risks to cattle. Veterinary Journal 173, 287-301

[23] Incidents of bovine TB are also known as 'breakdowns', i.e. herds in which at least one animal was identified as a reactor to the tuberculin skin test or where one or more *M. bovis* culture-positive tuberculous lesions were detected by meat inspection during commercial slaughter of a non-reactor animal.

and, as such, it implements strict controls regarding the movement of cattle from the rest of the UK.

Infection in humans

In recent years, *M. bovis* has accounted for approximately 0.5% of all culture-confirmed *M. tuberculosis* complex diagnoses in humans in the UK annually.

In 2012, there were 35 culture-confirmed cases of human TB caused by *M. bovis* in the UK: 29 in England and Wales; six in Scotland, and none in Northern Ireland. This is the same as the number of cases in 2011 (26 in England and Wales, seven in Scotland, and two in Northern Ireland).

A country of birth was reported for 26 out of the 29 cases in England and Wales. Seventeen were UK-born of which 16 were of white ethnicity. The majority of non-UK-born cases were from sub-Saharan Africa (6/9 cases).

Infection in animals

In GB there were 79,324 cattle herds and 8.41 million cattle registered during 2012. A total of 5,173 new bTB incidents were recorded in GB in 2012, a 5.4% increase on the 4,907 new bTB incidents recorded in 2011, with 99.0% of these new bTB incidents occurring in England and Wales. Post-mortem evidence of lesions characteristic of bTB and/or culture of *M. bovis* was detected in 3,443 (66.6%) of the new bTB incidents for GB. A total of 37,068 cattle (England and Wales only) were slaughtered as tuberculin skin or interferon-gamma (blood) test reactors in 2012, an increase of 10.8% from 2011 (n=33,458).

In Northern Ireland there were 25,776 cattle herds with 1.63 million cattle registered during 2012. There were 1,695 new TB reactor herds and 10,896 reactor animals, and at the end of the year 1,425 herds (5.5%) were still under bTB restriction.

In Scotland, there were 54 new bTB incidents in 2012, an increase from 43 in 2011. Of the new incidents in 2012, 11 were post-mortem and/or culture-confirmed, an increase from eight in 2011. The majority of these bTB incidents in Scotland were due to inward movements of cattle from high risk areas elsewhere in the UK and Ireland.

Ninety-eight incidents of *M. bovis* infection in non-bovine domestic animals (mainly sheep, goats, pigs, camelids, dogs, cats and farmed deer) and wild deer in GB were confirmed by culture during 2012. This compares to 133 incidents during 2011. There was also one case of M. bovis in a non-bovine domestic animal identified in Northern Ireland.

Further information

Bovine TB leaflet for farmers:

http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1259151943662

For historical annual bTB incidence and charts (1998-2012):

https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/series/bovine-tb

The GB data provided above on animal incidents was accessed on 6 August 2013 from the above link (all TB data in this Defra TB database are provisional and subject to change as more data become available).

Brucellosis (*Brucella* spp.)

The cattle population of GB has been officially brucellosis free (OBF) since 1985, while Northern Ireland has not yet achieved this status. Bovine brucellosis was largely eradicated from Northern Ireland during the 1980s and only sporadic outbreaks occurred during 1990 to 1996. In 1997, three primary outbreaks resulted in secondary and tertiary spread to more than 60 farms. An eradication programme is in place in Northern Ireland, as a result of which the prevalence of bovine brucellosis has fallen since the peak of infection in 2002. Nevertheless, the presence of *B. abortus* in cattle in Northern Ireland continues to constitute a potential risk to public health.

Infections with *B. ovis*, *B. melitensis*, *B. suis* and *B. microti* have never been detected in the animal population in the UK. The marine species *B. ceti* and *B. pinipedalis* are occasionally isolated from marine mammals washed up on the coast around the UK.

Cases of *B. abortus* in humans are occasionally acquired in Northern Ireland, peaking in 2002 along with the peak of infection in cattle otherwise brucellosis is generally acquired abroad (usually *B. melitensis*). Most human cases of brucellosis are acquired through the consumption of unpasteurised milk and dairy products. However, where disease exists in cattle, infection is often as a result of occupational exposure through the handling of infected afterbirths and products of conception (e.g. farmers, veterinarians and abattoir workers).

Infection in humans

Between 2003 and 2011 an average of 19 cases of acute brucellosis were identified in humans each year. This level of infection has remained relatively stable, with slight variation between years.

In 2012, 14 cases of brucellosis in humans were identified in the UK (Table 1): nine in England and Wales, three in Scotland and two in Northern Ireland. Nine of the cases were known to be infected with *B. melitensis*, and two with *B. abortus*. Sources and countries of infection are not reported consistently, but two were associated with travel to Iraq.

Neither of the two cases from Northern Ireland were travel-associated.

Table 1: Reports of *Brucella* infection in humans in the UK, 2012

	England & Wales	Scotland	Northern Ireland	UK Total
B. abortus	0	0	2	2
B. melitensis	8	1	0	9
Other *Brucella* spp.	1	2	0	3
Total	9	3	2	14

Infection in animals

The OBF status and trading rules underpin international trade and it is important to detect an incursion as quickly as possible should one occur. Therefore, a programme of surveillance is carried out in GB to ensure that the OBF status is not compromised. Cattle surveillance includes targeted post-import testing of breeding cattle, risk-based investigations of cattle abortions and premature calvings and testing of bulk milk samples from all dairy herds. An annual survey to specifically demonstrate the absence of *B. melitensis* in sheep and goats, as required by EU Council Directive 91/68/EEC, is conducted in the UK. Evidence of absence of *B. melitensis* is also supported through the testing of submissions of abortion samples from sheep and goats.

No cases of brucellosis were detected in terrestrial animals in GB during 2012. Tests were carried out on 42,124 bulk milk samples, 6,449 cattle abortions and premature calvings, 1,501 post importation tests of breeding cattle and 5,916 tests of imported cows at their first calving following importation. The annual sheep and goat survey which tested 21,071 small ruminants from 1,311 sheep flocks and 716 goats from 185 herds, found no evidence of *B. melitensis*.

In Northern Ireland in 2012, 879,831 eligible animals in 19,812 cattle herds were tested for *B. abortus.* Twenty-three herds (0.1%) were positive (the same percentage as 2011) and these were all new herds. A total of 64 cattle were positive (0.007%, compared to 0.026% in 2011), with one herd confirmed by bacteriological culture.

Campylobacteriosis (*Campylobacter* spp.)

The species of greatest public health importance are *Campylobacter jejuni* and *C. coli* (thermophilic campylobacters) which can be found in a wide range of livestock (especially poultry) and wildlife species. They do not generally cause disease in animals, apart from occasional abortion in sheep and enteritis in young mammalian animals. *C. fetus fetus* is a common cause of abortion in sheep and may occasionally cause serious systemic disease in humans. Other *Campylobacter* species, such as *C. sputorum*, *C. hyointestinalis* and *C. lari* are present in mammals and birds in the UK, but are not generally considered of public health importance.

Campylobacter was first confirmed to cause human illness in 1972, and by 1986 it became recognised as the most commonly reported gastrointestinal pathogen in the UK, ahead of salmonella. *C. jejuni* accounts for approximately 90% of human infection. However, most laboratories do not routinely speciate strains isolated from human clinical specimens, so changes in relative incidence may not be detected.

Transmission to humans is through the faecal-oral route, usually by the consumption of contaminated foods or water.

Infection in humans

National laboratory report surveillance for campylobacter began in 1982. Relatively small dips in reporting were recorded in the period 2000-2004 and in 2008, but otherwise there has been an upward trend.

In 2012, there were 72,592 laboratory reports of campylobacter in the UK. This is an increase of 0.5% from 2011. However, whilst reports increased by 3.1% in Northern Ireland and 0.5% in England and Wales, they fell by 0.3% in Scotland (Table 2).

Table 2: Number of *Campylobacter* reports in humans 2010-2012

Year	England & Wales	Scotland	Northern Ireland	UK
2010	62,686	6,601	1,040	70,327
2011	64,726	6,365	1,175	72,266
2012*	65,032	6,349	1,211	72,592

*These figures are provisional and may be subject to change due to delayed reporting

The Second Study of Infectious Intestinal Disease in the Community established that the ratio of unreported human campylobacter infection to reports to national surveillance is 9.3 to 1[24]. This suggests that in 2012, there were approximately 750,000 campylobacter cases[25] in the UK.

In 2012 there were eight campylobacter outbreaks reported, compared with 20 in 2011. Seven were foodborne, six of which were associated with the consumption of chicken liver and chicken liver parfait, and one which was associated with the consumption of lamb. There was one non-foodborne outbreak of campylobacter at an outdoor recreational event that was caused by poor personal hygiene with 18 people affected. A summary of foodborne outbreaks by zoonotic pathogens, broken down by food vehicle category, is given in appendix 5.

[24] Tam CC, *et al.* Longitudinal study of infectious intestinal disease in the UK (IID2 study): incidence in the community and presenting to general practice (2012) *Gut* Jan; 61(1):69-77.
[25] confirmed and estimated unconfirmed cases

Infection in animals

The majority of livestock derived samples were from ruminant abortion investigations. Ninety-seven (66.9%) of the ovine isolates were confirmed as *C. fetus fetus,* compared to 70.2% in 2011. Of the fifty-five bovine isolates, 21 (38.2%) were identified as *C. fetus venerealis* compared to 41.6% in 2011 and six (10.9%) were *C. fetus fetus* (12.4% in 2011) with the remaining 18 (32.7%) a mixture of unspecified and enteric (thermophilic) strains. A novel campylobacter related to *C. jejuni* was detected in a chicken. All isolates from pet animals in table 3 were from testing undertaken by SRUC. Campylobacter isolates may not always be considered clinically significant in a disease investigation. Therefore, discrepancies may exist between the figures reported below (which relate solely to testing of individual bacterial isolates) and those provided in Appendix 4 (which relate to clinical diagnoses of campylobacteriosis in animals).

Table 3: Number of *Campylobacter* spp. isolates identified by Government laboratories in animal derived samples in the UK in 2012

	Total units tested positive for Campylobacter	C. coli	C. jejuni	C. sputorum	C. upsaliensis	Campylobacter spp, unspecified	C. fetus subsp fetus	C. fetus subsp venerealis*	C. hyointestinalis	C. mucosalis
Cattle	55	2	2	9		10	6	21	4	1
Pigs	3	3								
Sheep	145	6	11	3		26	97		1	1
Chickens	4	1	3							
Cats**	22	1	3		8	10				
Dogs**	215	5	38	2		170				
Rhinoceros	1						1			
Horses	2		2							
Total**	447	18	59	14	8	216	104	21	5	2

* Also includes C. fetus subsp venerealis intermedius (Cfvi) isolates, although not all laboratories test isolates to this level.

** SRUC (formerly the Scottish Agricultural College) routinely receives and tests diagnostic samples from companion animals and this data has been included above this year.

Chlamydiosis and Psittacosis

Ovine chlamydiosis (*Chlamydophila abortus*)

Infection of pregnant ewes with *Chlamydophila abortus* may result in enzootic abortion of ewes (EAE). *C. abortus* may also cause abortion in goats and cattle. The main route of transmission of this zoonosis to humans is through the inhalation of aerosols and contaminated dusts.

This infection can cause serious zoonotic disease in pregnant women, resulting in stillbirth or abortion. However, human infections appear to be rare.

Infection in humans

It has been generally accepted that there are only one or two cases of *C. abortus* each year in pregnant women in the UK. However, the number of human cases of *C. abortus* occurring annually is uncertain as routine serological testing does not distinguish between *C. abortus* and other *Chlamydophila* species. Diagnosis of *C. abortus* is dependent primarily on clinical suspicion in a person with positive serology for Chlamydophila infection and relevant exposure to sheep/lambing.

There were no human cases reported in 2012 in the UK.

Infection in animals

In 2012, there were 539 incidents of sheep or goat abortion due to *C. abortus* infection in the UK (Table 4). This represents 34.2% of small ruminant abortion submissions where a diagnosis was reached by UK government laboratories (compared to 40.2% in GB in 2011). There were no incidents of abortion due to *C. abortus* in cattle in 2012.

Table 4: Laboratory confirmed reports of *C. abortus* in animals in the UK, 2012

		GB	NI	UK Total
Sheep and goat abortions submissions*		1,340	234	1,574
C. abortus confirmed as cause of abortion	in goat abortion material	3	0	3
	in sheep abortion material	468	68	536

***** To AHVLA and SRUC in GB, and AFBI in NI, where a diagnosis is reached

Psittacosis (*Chlamydophila psittaci*)

Psittacosis (also known as ornithosis or chlamydiosis) is an infection caused by *Chlamydophila psittaci*. It has been described in over 130 species of birds but is most

common in psittacines (parrots and parakeets). Other birds commonly affected include pigeons and doves, whilst turkeys, ducks and geese can also be infected.

Transmission of *C. psittaci* from birds to humans most often occurs via infectious aerosols, so the presence of strong air currents may be a factor in its spread[26]. It is likely that most, if not all, cases of psittacosis are attributable to exposure to birds or bird products.

Infection in humans

In 2012, there were 37 laboratory reports of human infection with *C. psittaci* in the UK (compared with 41 cases reported in 2011), with 27 cases in England and Wales and 10 in Scotland. Some of the Scottish cases were attributable to an outbreak in Tayside Health Board which began in 2011 and was the subject of a feature article in the 2011 UK Zoonoses Report. No cases were diagnosed in Northern Ireland.

A lack of specific serological testing means that reported cases could have been caused by *Chlamydophila* species other than *C. psittaci*.

Infection in animals

Two cases of avian chlamydiosis (presumed *C. psittaci*) were diagnosed by government laboratories following testing of samples from birds during 2012 in GB (compared to none in 2011).

Further information

Chlamydiosis (Enzootic Abortion in Ewes) and risks in lambing season:

http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/ChlamydophilaAbortus/GeneralInformation/

Cryptosporidiosis (*Cryptosporidium* spp.)

Cryptosporidiosis is a disease caused by protozoan parasites of the genus *Cryptosporidium*. *C. hominis* is normally only recovered from humans and *C. parvum* is found in both animals and humans. Together, these *Cryptosporidium* species are responsible for up to 96% of cases in the UK and have different risk exposures, seasonal and geographical distributions[27].

Young calves (particularly those aged between 10-20 days) are considered to be the major animal reservoir for *C. parvum*, but infection can also be acquired from other species, particularly lambs and goat kids. *C. parvum* is considered to be endemic on the majority of

[26] www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Psittacosis/GeneralInformation/psiControlofPsittacosis/

[27] Chalmers RM, *et al.* Epidemiology of anthroponotic and zoonotic human cryptosporidiosis in England and Wales, 2004 to 2006. *Epidemiology and Infection* 2011; 139(5): 700-712.

cattle holdings in the UK, and is also common in sheep flocks and deer. Clinical disease (diarrhoea) is seen in young animals, but may not always be apparent.

Human infection is acquired through the consumption of contaminated food or water, contact with infected animals, exposure to faeces in the environment or person-to-person spread. Confirmed reports of cryptosporidiosis in humans in the UK follow a bimodal seasonal pattern, with higher incidence occurring in spring and early autumn. The spring peak consists predominantly of *C. parvum* cases, which are most likely acquired from animal sources. In contrast, the larger, early autumn peak has a greater rise in *C. hominis* cases, many of which are associated with travel outside the UK.

Infection in humans

The number of cases diagnosed and reported in the UK in 2012 was 6,612. This is almost double the number reported in 2011, and the increase was observed across England, Wales and Scotland (Table 5). A year-on-year variation is observed in cryptosporidium case numbers (Appendix 3), and this recent increase may therefore be attributable to natural variation, exacerbated by the large outbreak of over 300 cases detailed below.

Table 5: Number of *Cryptosporidium* reports in humans 2010-2012

Year	England & Wales	Scotland	Northern Ireland	UK
2010	3,853	584	119	4,556
2011	2,934	443	140	3,517
2012*	5,722	713	177	6,612

*Provisional data

The Second Study of Infectious Intestinal Disease in the Community indicated that the ratio of unreported human cryptosporidiosis in the community to reports to national surveillance is approximately 8.2 to 1[24]. This suggests that, in 2012, there were approximately 60,000 cases[25] of cryptosporidiosis in the UK.

In 2012, there were 13 outbreaks of cryptosporidium reported in England and Wales, compared to 12 reported in 2011. The most common outbreak settings in 2012 were swimming pools and petting/open farms. In Scotland three outbreaks were reported. Two were associated with farms and one with a leisure centre.

In addition, there was a foodborne outbreak associated with the consumption of mixed salad leaves sold in supermarkets, which accounted for over 300 UK-wide laboratory confirmed cases[28]. Industry representatives worked with the FSA and HPA to try to identify possible sources of contamination. Investigation of the food chain including practice and

[28] [Anon]. Outbreak of cryptosporidiosis in England and Scotland, May 2012. (2013) *HPR* 7(12). http://www.hpa.org.uk/hpr/archives/2013/hpr1213.pdf

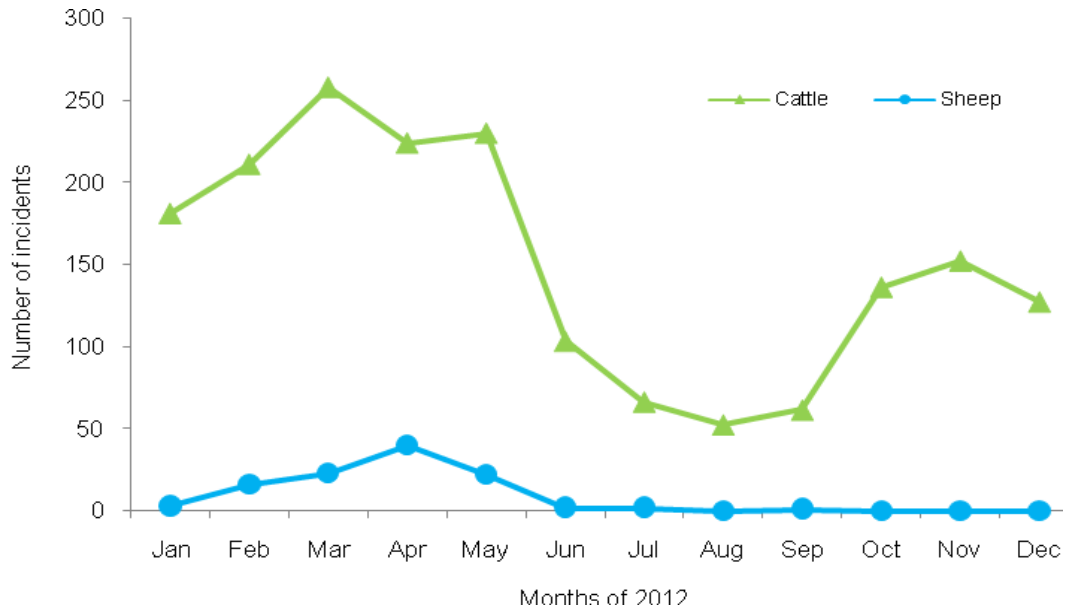
procedures throughout each stage of growing, processing, packing and distribution of salad vegetables was carried out but no definitive source was apparent.

Infection in animals

Clinical cryptosporidiosis is relatively common in animals in GB. Examination of the VIDA data indicates that, of clinical material examined by government diagnostic laboratories in GB, clinical infection with *Cryptosporidium* spp. was diagnosed in 2.8% of cattle submissions and 0.7% of sheep submissions tested.

There were 1,163 diagnoses of clinical animal infection with cryptosporidia recorded in GB (1,084 in cattle, 71 in sheep, four goats, two in birds, one red deer and one alpaca), and 736 positives in Northern Ireland in 2012 (698 in cattle and 38 in sheep). Recorded incidents in cattle and sheep show a distinct seasonal distribution, with a peak in the spring (Figure 2).

Figure 2: Recorded diagnosis of cryptosporidiosis in cattle and sheep in UK, 2012



Echinococcosis

Cystic hydatidosis (*Echinococcus granulosus*)

Echinococcus granulosus is a tapeworm which inhabits the small intestine of canines. The *E. granulosus* complex consists of 10 *E. granulosus* genotypes,[29] two of which are present in the UK in indigenous animals: a sheep adapted strain involving a dog to sheep life-cycle (the G1 strain), and a horse adapted strain involving a dog to horse life-cycle (the G4 strain). The latter is the only strain present in Northern Ireland.

The main cycle of infection in GB is between farm dogs (the definitive host in the UK) and sheep (the main intermediate host in the UK). Sheep acquire hydatidosis by grazing on pastures contaminated with dog faeces containing the cestode eggs or by ingesting other contaminated feed. Cattle can also be infected with the sheep strain, but resultant cysts are usually sterile. Dogs are infected by ingesting animal viscera containing viable cysts.

Humans can act as an accidental intermediate host through direct contact with infected dogs or their faeces. The current incidence of human hydatid disease in the UK is considered to be very low. Over 95% of new cases identified in the UK are diagnosed in non-UK nationals and have a history of prior residence in countries around the Mediterranean Basin or Asia, or travel to countries where cystic echinococcosis is endemic.

Developing cysts may grow for 20 or more years before becoming large enough to cause a range of symptoms depending on the affected organ and the location of the cyst. This long incubation period means that new autochthonous cases will continue to occur occasionally in people who have been exposed in the UK many years previously but who have remained asymptomatic for a substantial part of their lives.

Infection in humans

During 2012, six confirmed cases of hydatid disease in humans were reported in the UK (compared with fifteen in 2011). All six were from England and Wales, but had an exposure history that suggested they contracted their disease outside of the UK.

Infection in animals

The following figures are reported findings of hydatid disease at post mortem inspection of sheep and cattle for human consumption at licensed abattoirs in GB during 2012. There was a throughput of 13,507,471 sheep, of which 35,758 (0.3%) were recorded as being

[29] Boubaker G *et al*. (2013) A Multiplex PCR for the Simultaneous Detection and Genotyping of the *Echinococcus granulosus* Complex. PLoS Negl Trop Dis 7(1): e2017. doi:10.1371/journal.pntd.0002017 http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0002017

affected with hydatid cysts (0.4% in 2011). Of a throughput of 2,182,280 cattle, 2,005 (0.1%) were recorded as affected with hydatid cysts (0.1% in 2011).

In Northern Ireland there was a throughput of 423,897 sheep and 446,367 cows during 2012. There was one ovine case of hydatid disease reported at an abattoir in 2012. In 2011, there was also one abattoir case, but prior to this, the last recorded abattoir detection in Northern Ireland was in June 2006.

In 2008, the Welsh Government launched a Wales-wide hydatid disease awareness campaign and a South Powys pilot eradication scheme, which continued throughout 2009 and finished in 2010. This was focussed in the same area as a previous dog worming campaign in South Powys, Wales, undertaken in the eighties, and was initiated following evidence[30] to suggest a rising trend of dog infestation.

Data from the South Wales pilot eradication scheme indicated an initial prevalence of 9% of farm dogs sampled. One or more dogs on 20% of farms tested positive, representing a potential human health risk. The study helped confirm that worming dogs regularly with an appropriate treatment remains highly effective and a key personal health protection measure.

Further investigation by the Welsh Government has shown that *E. granulosus* is present in a wide geographical distribution across Wales and the west and south west of England.

Alveolar echinococcosis (*Echinococcus multilocularis*)

Echinococcus multilocularis causes alveolar hydatid disease, which has a wide geographical distribution across the Northern hemisphere throughout Europe, North America and Asia. Alveolar hydatid disease is a much more invasive disease in humans than cystic hydatidosis. The life-cycle normally involves foxes and raccoon dogs as definitive hosts and small rodents, particularly voles, as intermediate hosts. Dogs, cats and wolves may also act as definitive hosts to a lesser extent.

E. multilocularis is not known to be present in indigenous animals in the UK, although rarely cases have been identified in imported animals in previous years. Dogs entering the UK are required to receive treatment for *E. multilocularis*.

There is evidence that the distribution of *E. multilocularis* is spreading in northern Europe[31,32,33]. Particular concern has been expressed in relation to the increase in the

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[30] Buishi I, *et al*. (2005) Re-emergence of canine *Echinococcus granulosus* infection, Wales. *Emerg Infect Dis. 11*(4):568-71

[31] Takumi K, *et al.* Evidence for an increasing presence of *Echinococcus multilocularis* in foxes in The Netherlands. *Intl J for Parasitology* 2008; 38(5):571-578.

[32] Berke O, *et al.* Emergence of *Echinococcus multilocularis* among red foxes in northern Germany 1991-2005. *Veterinary Parasitology* 2008; 155(3-4):319-322.

[33] Vervaeke M, *et al.* Spatial spreading of *Echinococcus multilocularis* in red foxes across nation borders in Western Europe. *Preventive Veterinary Med.* 2006; 76(3-4):137-150.

number of urban foxes in the UK. In Sweden (previously thought to be *E. multilocularis* free) a small number of foxes have tested positive since December 2010[34]. In April 2012 Denmark reported a fox tested positive for *E. multilocularis* (using samples collected in November 2011)[35,36].

The European Commission adopted Regulation (EU) No 1152/2011 on 14 July 2011, as regards preventive health measures for the control of *E. multilocularis* infection in dogs[37]. It states the requirements for implementing a pathogen-specific surveillance programme regarding sampling, detection techniques and reporting which allows the UK, Ireland, Finland and Malta to maintain disease free status. Under this regulation, a programme is in place to carry out surveillance in foxes sufficient to detect not more than 1% prevalence with a confidence of 95% (at least 300 foxes sampled). As with previous surveys, the 2011-2012 surveillance of the UK fox population did not identify any *E. multilocularis.*

Hantavirus

There are many different hantaviruses; some are present worldwide, some occur in Europe and Asia, and others occur in North and South America. They are rodent-borne and each is specific to a different host. They are not usually associated with overt disease in rodents (although domesticated animals can develop clinical signs with some hantaviruses), and once infected, the rodent may shed infectious virus for prolonged periods.

Transmission of hantaviruses to humans occurs through the inhalation of infected animal excreta and fluids, i.e. urine, faeces and saliva. Although some hantaviruses are associated with asymptomatic infections or mild disease, most can cause serious infections in humans ('haemorrhagic fever with renal syndrome' and 'hantavirus pulmonary syndrome'). Case fatality rates vary greatly with disease syndrome and specific viruses, ranging from 0.1% to in excess of 50%. In 2012, 10 cases of hantavirus (Sin Nombre virus), of which three were fatal, occurred in American visitors to Yosemite National Park in the United States of America. Historically, few cases of infection have been confirmed to have been acquired in the UK, and virological evidence has been lacking.

[34] www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20215
[35] OIE (2012) www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapEventSummary&reportid=11865
[36] OIE (2012) www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=12539
[37] OJ L 296, 15.11.2011, p.6. http://eur-lex.europa.eu/JOIndex.do?year=2011&serie=L&textfield2=296&Submit=Search&_submit=Search&ihmlang=en

Infection in humans

The first case of Seoul hantavirus infection in the UK was confirmed in 2012, with virus subsequently being isolated from wild rats at the location of exposure in north east England.

Infection in animals

A study of wild rodents (collected between 2009-2011) resulted in the detection of a new, distinct hantavirus in a field vole in Cheshire in 2012. This new hantavirus, named Tatenale virus, appears to be closely related to the Asian *Microtus* vole–associated hantaviruses[38].

Hepatitis E

Hepatitis E virus (HEV) is an enteric virus that can cause acute liver disease in humans. HEV infection is usually a mild, self-limiting illness however, in rare cases fulminant disease (acute liver failure) develops and can prove fatal, particularly in pregnant women. Infection can progress to chronic hepatitis in immuno-compromised individuals, mainly among solid organ transplant recipients.

Hepatitis E is found worldwide. There are four main genotypes of HEV: genotype 1 is usually found in Asia and Africa, genotype 2 in Mexico, genotype 3 in North America and Europe, and genotype 4 in China. Genotypes 1 and 2 are only found in humans while genotypes 3 and 4 can infect humans and other animal species, particularly pigs and deer, although they do not appear to cause illness in these animals. HEV is endemic throughout Europe, including the UK. The majority of hepatitis E cases in UK are non-travel related and a study has shown that they were infected by HEV genotype 3 similar to that carried by British pigs[39].

HEV is transmitted mainly through ingestion of faecally-contaminated water or undercooked products from infected animals. In developed countries, sporadic outbreaks have followed consumption of undercooked pork or deer meat, or uncooked shellfish. Other routes of transmission include transfusion of infected blood products and vertical transmission (during pregnancy to the foetus).

The disease usually clears within one to four weeks, but immune deficiency and chronic liver disease, along with increasing age, appear to be associated with moderate to severe disease. Mortality in the general population is usually 1-3%.

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[38] Pounder KC *et al.* Novel hantavirus in field vole, United Kingdom [letter]. http://wwwnc.cdc.gov/eid/article/19/4/12-1057_article.htm

[39] Banks M, Bendall R, Grierson S, *et al*. Human and porcine hepatitis E virus strains, United Kingdom. *Emerg Infect Dis* 2004; 10:953-5.

Infection in humans

Confirmed hepatitis E cases have significantly increased in recent years, with 657 cases reported in the UK in 2012, a 39.5% increase since 2011.

Indigenous cases now account for the majority of the cases in England and Wales and appear to be the main reason for the recent dramatic rise. In 2012, 409 (70.6%) cases were assessed as non-travel associated, compared with an average of 45.3% since 2003 (table 6). In 2012, 273 (66.7%) cases were male and 310 (75.8%) were in people over 50 years of age: more than 51% (211 cases) were both male and over 50 years of age. There was no geographical clustering.

Table 6: Laboratory confirmed reports of Hepatitis E in UK residents, 2003-2012

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
England & Wales	124	149	329	289	162	176	175	274	456	579
E&W: non travel associated cases	14	35	133	176	63	76	77	141	252	409
Scotland	5	3	10	3	4	4	3	13	15	78
Northern Ireland*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	129	152	339	292	166	180	178	287	471	657

*Northern Ireland do not routinely test for Hepatitis E

A 2011/12 study found that indigenous cases of hepatitis E in England and Wales were associated with the consumption of processed pork products[40]. In addition, a recent study has shown that 10% of pork sausages sampled at point of sale from UK retailers were positive for hepatitis E virus[41], and similar findings have been reported from other European laboratories[42].

Infection in Animals

Hepatitis E does not cause disease in pigs and there are no routine surveillance systems in place. The AHVLA investigated seroprevalence in Scottish pig samples as part of the Chief Scientist Office (CSO) funded project investigating epidemiology and potential

[40] Said B, Ijaz S, Chand MA, Kafatos J, Tedder R, Morgan D. Hepatitis E virus in England and Wales: indigenous infection is associated with the consumption of processed pork products. Epidemiology & Infection (In press)

[41] Berto A *et al.* Hepatitis E virus in pork food chain, United Kingdom, 2009–10. *Emerg Infect Dis* 2012; 18(8): 1358–60. DOI: 10.3201/eid1808.111647

[42] Di Bartolo I *et al.* Hepatitis E virus in pork production chain in Czech Republic, Italy, and Spain , 2010. *Emerg Infect Dis* 2012; 18(8). DOI: 10.3201/eid1808.111783. http://wwwnc.cdc.gov/eid/article/18/8/11-1783_article.htm

transmission routes of autochthonous HEV infection in Scotland. In this project, evidence of infection (IgG) was found in 49% of pigs (Grierson, personal communication).

A pig abattoir survey will be undertaken in early 2013 (as part of a multi-agency project with PHE, Defra, FSA and AHVLA) to better understand the possible role of infection in pigs on human disease incidence. Further detail will be available in next year's report.

Leptospirosis (*Leptospira interrogans* serovars)

Leptospirosis is a zoonotic disease caused by the bacterium *Leptospira interrogans*, of which only some strains are pathogenic. *L.* Icterohaemorrhagiae is the main serovar causing human disease.

Leptospires are widespread amongst wild and domesticated mammals. The serovars encountered most frequently in farm livestock in the UK are *L.* Hardjo (cattle), *L*. Bratislava (pigs) and *L*. Icterohaemorrhagiae (which affects a wide range of wild and domestic species). Leptospirosis is a major cause of economic loss to intensive cattle and pig industries in developed countries. Clinical disease in animals in GB is less common than in the past, although it remains a significant problem in Northern Ireland.

Humans mainly acquire infection by direct contact with the urine of chronically infected carrier animals. Infection occurs when spirochaetes in contaminated water or soil enter micro-abrasions in healthy intact skin or intact mucous membranes or conjunctiva. They may also cross the nasal mucosa and pass through the lungs (from inhalation of aerosolised body fluids)[43]. Most reported cases occur in men, probably due to greater occupational and recreational exposures.

Infection in humans

During 2012, 78 cases of leptospirosis were reported in the UK (Table 7). Seventy-two of these cases occurred in England and Wales, and the following serovars were determined by the *Leptospira* Reference Unit: *L.* Icterohaemorrhagiae (n=20); *L.* Saxkoebing (n=17); *L.* Australis (n=6); *L.* Hardjo (n=6); *L.* Autumnalis (n=3); other serovars (n=7). The infecting serovar was not determined for the remaining 13 cases.

Table 7: Laboratory confirmed reports of leptospirosis in UK residents, 2010-2012

Year	England & Wales	Scotland	Northern Ireland	UK
2010	39	3	0	42
2011	44	5	3	52
2012	72	4	2	78

[43] Smith, RM *et al.* (2011) Leptospirosis. In: Zoonoses (2nd Ed). Palmer SR *et al.* Oxford, Oxford University Press, p.224-231.

Fifty cases in England and Wales were acquired indigenously, and 22 were acquired through travel (with the largest number of cases returning from Thailand (n=8)).Eighteen of the indigenous infections were likely to have been acquired through occupational activities (including eight farmers, two water sports instructors, one wildlife park worker, one abattoir worker, a builder clearing out a pool and a pub manager clearing out flood water). A further 25 cases were likely to have been acquired through recreational or non-occupational exposures to rodent-infected or contaminated environments. There was no risk factor information available for the remaining seven cases. One fatality was reported in a member of a travelling family with a variety of rural exposures.

Infection in animals

Countries within the UK use different diagnostic methods, and the diagnostic criteria required for disease confirmation have also changed in recent years. It is therefore difficult to make comparisons between countries and time periods.

There was a noticeable rise in the number of incidents of leptospirosis in GB livestock diagnosed in 2012. Leptospirosis may present in a number of clinical syndromes in animals, commonly abortion or milk drop, but also as systemic infection. There were fifteen incidents involving infection with leptospires in animals diagnosed in GB during 2012. All fifteen of these incidents occurred in England, and were diagnosed using a range of methods. Four incidents of milk drop in cattle herds in England were identified in 2012. There were eight incidents of abortion in cattle diagnosed, four by PCR testing of aborted foetuses, and four on serology. Clinical disease in cattle can be controlled by vaccination. In pigs three incidents were diagnosed. Abortion due to infection with *L.* Bratislava was diagnosed on one farm. *L.* Icterohaemorrhagiae was diagnosed as the cause of abortion using PCR and serological testing on a second pig farm. *L*. Icterohaemorrhagiae was also diagnosed as the cause of jaundice in young weaned pigs on a third farm.

In England and Wales, real-time PCR is used to test for the presence of pathogenic leptospires in animal tissues. In 2012, 345 specimens from a range of mammalian species (mainly cattle and pig foetal kidneys) in England and Wales were submitted for examination by real-time PCR. Of the 335 samples suitable for PCR testing, five (5.2%) of 97 porcine samples (1.9% in 2011), four (1.7%) of 237 bovine samples (0.6% in 2011) were positive.

During 2012 the AHVLA tested 8,203 serum samples from a range of species for diagnostic, monitoring and export (mainly dogs) purposes. A summary of the positive samples is given in Table 8, although it should be noted that only a few samples were examined for the full range of serovars. These data only indicate serological evidence of exposure and/or vaccination (which is widely practiced in cattle and dogs) and not clinical disease.

Bulk milk testing of dairy herds in England and Wales in 2012 to monitor *L.* Hardjo status continued to show evidence of potentially active infection and/or extensive vaccination in

about 56% of herds[44]. In Northern Ireland, of 1,083 suitable samples (including cattle) examined by the fluorescent antibody test, there were 70 confirmed cases (6.5%).

Table 8: Detection of antibody (possibly vaccination associated) to pathogenic leptospires in serum samples submitted to AHVLA for testing using the MAT, 2012

	Dogs	Cattle	Pigs	Horses
Total samples	2,235	4,251	520	299
Positive *L.* Canicola	346*	0	0	0
Positive *L.* Icterohaemorrhagiae	152*	0	0	4
Positive *L.* Hardjo	0	1,131*	0	0
Positive *L.* Bratislava	33	0	217	0
Positive *L.* Copenhageni	1	0	0	0
Positive *L.* Pomona	26	0	0	0
Positive *L.* Grippotyphosa	0	0	0	0

* Serovars for which a vaccine is available in this species.

It should be noted that results only reflect the serological tests requested for each submission, and therefore significant titres to other *Leptospira* serovars could be missed.

Listeriosis (*Listeria monocytogenes*)

Listeria monocytogenes is widely distributed in the environment, including in soil, decaying vegetation and fodder such as silage in which the bacteria can multiply. In animals, listeriosis is mainly a disease of farmed ruminants, with cattle and sheep considered the most important species. Infection occurs due to direct ingestion of soil or through soil-contaminated feed, notably spoilt silage.

In humans, the disease most commonly occurs in pregnant women, neonates and people over the age of 60 years with underlying medical conditions. Consumption of foods contaminated with *L. monocytogenes* is the main route of transmission to humans. Zoonotic infection acquired directly from animals is also possible, although cases reporting animal contact are rare.

Infection in humans

There were 183 cases in the UK in 2012, an increase of 11.6% when compared with 2011. Nineteen of the cases were pregnancy-associated (Table 9).

[44] Non statutory zoonoses report: http://www.defra.gov.uk/ahvla-en/publication/zoo-reports/

Table 9: Laboratory reports of listeriosis in humans in the UK, 2010-2012

		2010	2011	2012
England and Wales	Pregnancy-associated cases	19	27	17
	Others	140	120	148
	Total England and Wales cases	159	147	165
Scotland	Pregnancy-associated cases	1	2	1
	Others	16	12	10
	Total Scottish cases	17	14	11
Northern Ireland	Pregnancy-associated cases	0	0	1
	Others	2	3	6
	Total Northern Irish cases	2	3	7
	Total	178	164	183

In 2012, two outbreaks of listeriosis were reported in England. One outbreak involved cross-contamination of pressed beef products (also known as 'potted beef' and 'beef stew' products) and involved four cases, including two who died. The second outbreak was traced to cross-contamination of pork pies, and involved 14 cases, one of whom died. A summary of foodborne outbreaks by zoonotic pathogens, broken down by food vehicle category, is given in appendix 5.

Infection in animals

The majority of cases in the UK occur between January and April when many animals, especially cattle, are housed. This peak in cases is considered to be linked to the feeding of soil-contaminated silage. During 2012, 220 diagnoses of listeriosis in animals were made in the UK (Table 10). Of these, 175 occurred in GB compared to 146 in 2011, an increase of 19.9%. This may be related to the increase in submissions of material to government diagnostic laboratories. However, it is worthwhile noting that the risk of contamination with *Listeria* spp. in silage increases when the silage is made during wet weather, which may explain the variation in the incidence of disease. The number of diagnoses in Northern Ireland during 2012 (45 cases, 42 of which were *L. monocytogenes*) has increased since 2011 (total of 19 positives, 17 of these were *L. monocytogenes*). This also reflects an increase in submissions of material to government diagnostic laboratories.

Table 10: Confirmed *Listeria* cases in animals in the UK, 2010-2012

Animal	*Listeria* cases in 2010 (all species)	*Listeria* cases in 2011 (all species)	*Listeria* cases in 2012 (all species)
Birds (at farm)	2	3	4
Cattle	58	47	66
Sheep and goats	174	111	139
Other	3	4	11
Total	237	165	220

Lyme Borreliosis (*Borrelia burgdorferi*)

Lyme borreliosis, known as Lyme disease, is caused by the bacterium *Borrelia burgdorferi* and is transmitted to humans and animals through the bite of an infected tick (*Ixodes* species). It is the most common tick-borne infection in humans in the temperate northern hemisphere and numbers have increased within the UK since 2001. The majority of UK cases are indigenously acquired, usually through recreational activities including country or hill walking, running, orienteering or gardening.

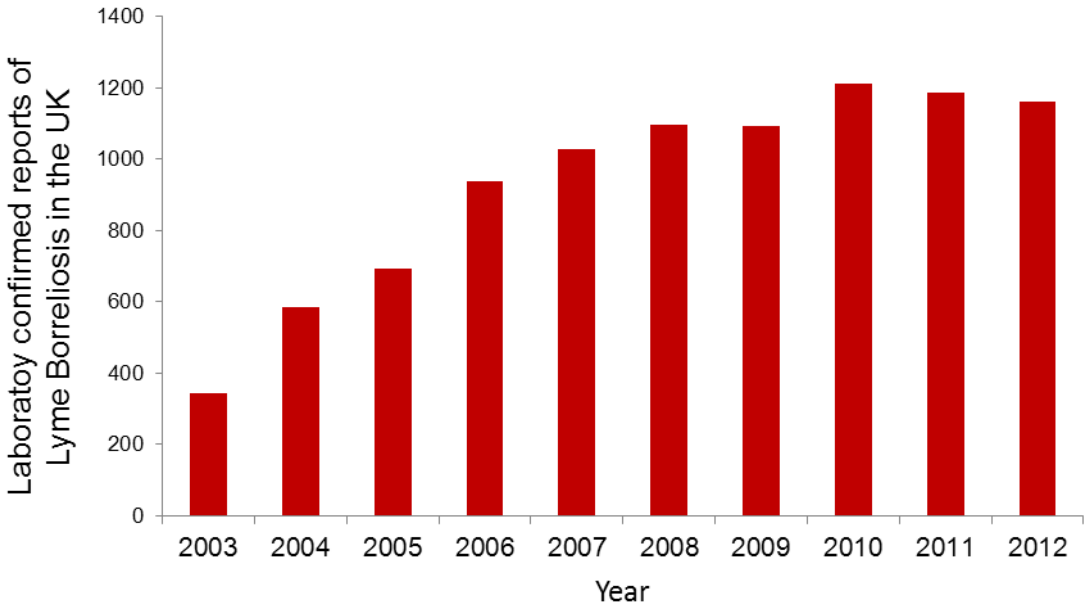
Well known regional foci of Lyme borreliosis include the New Forest, Salisbury Plain, Exmoor, the South Downs, Thetford Forest and parts of Wiltshire and Berkshire. Similar foci are known on the west coast and Highlands and Islands of Scotland.

Infection in humans

There were 1,163 serologically confirmed cases of *B. burgdorferi* infection in humans in the UK in 2012 (1,040 in England and Wales, 121 in Scotland, and two in Northern Ireland), an overall decrease on 2011 (n=1,189) (Figure 3).

In recent years in Scotland, efforts have been made to differentiate as clearly as possible between recently acquired infections and identifications of infections that may have been acquired longer ago, reporting only those which are believed to have been acquired during the reporting period (in England and Wales this differentiation has been carried out for a number of years). This slight change in case definition needs to be borne in mind when examining and interpreting historic trends in case numbers.

Figure 3: Number of laboratory confirmed human cases of Lyme borreliosis in the UK, 2003-2012



Of the 1,040 cases in England and Wales, 61 (5.9%) are known to have acquired their infections overseas (compared with 20.5% in 2011). This decrease in the proportion of cases with a travel history reflects a change in the surveillance system in 2012 from a system with active follow-up of exposure histories to a passive system. The seasonal pattern in 2012 was similar to previous years, with infections reported throughout the year and with a peak in the third quarter. This is consistent with the major tick feeding period which occurs in the late spring and early summer months.

In England and Wales, reports were received from all regions, with the South East and South West contributing 35.4% and 28.2% respectively of the total reports.

Pasteurellosis (*Pasteurella* spp.)

Pasteurellosis is a zoonotic bacterial disease with a worldwide distribution. *Pasteurella multocida* is found in the upper respiratory tract of many animal species including cats, dogs, chickens, turkeys, cattle, pigs, rabbits and rodents. It can cause disease in wild and domesticated animals, including 'avian cholera' in birds and poultry, respiratory disease and septicaemia in cattle, mice and rabbits, and atrophic rhinitis in pigs.

In humans, *P. multocida* is the species most commonly associated with infection. The most common mode of zoonotic transmission to humans is via dog or cat bites and scratches. These frequently lead to a cutaneous infection, which may be severe.

Infection in humans

There were 666 laboratory confirmed reports of human pasteurellosis in the UK in 2012, almost no change from the 668 cases reported in 2011 (Table 11).

In 2012, 535 cases were reported in England and Wales (359 *P. multocida)*, compared to 538 (387 *P. multocida*) in 2011. There were 129 cases reported in Scotland in 2012 (66 *P. multocida)*, the same as in 2011 (63 *P. multocida).* Two cases were reported in Northern Ireland in 2012 compared to one in 2011.

Table 11: Laboratory confirmed reports of pasteurellosis in humans in the UK, 2012

Serovar	England and Wales	Scotland	Northern Ireland	UK total
P. aerogenes	1	1	0	2
P. haemolytica	0	0	0	0
P. multocida	359	66	1	426
P. pneumotropica	21	5	0	26
P. other named	31	33	0	64
Pasteurella spp	123	24	1	148
Total	535	129	2	666

Infection in animals

There were 378 cases of *P. multocida* diagnosed in animals in the UK in 2012 (Table 12).

Table 12: Laboratory confirmed reports of *P. multocida* in animals in the UK, 2011-2012

Year	2011			2012		
	GB	NI	UK	GB	NI	UK
Cattle	142	112	254	112	106	218
Sheep	104	29	133	68	10	78
Pigs	55	7	62	49	18	67
Birds	6	0	6	5	4	9
Miscellaneous / wildlife	5	0	5	4	2	6
Goats	4	0	4	0	0	0
Total	316	148	464	238	140	378

Q Fever (*Coxiella burnetii*)

Q fever is caused by the bacterium *Coxiella burnetii*. It can survive for long periods in the environment and is generally transmitted in aerosols or by fomites, including dust particles. *C. burnetii* infection occurs mainly in domesticated ruminants (cattle, sheep and goats), where it can cause abortion. Most cases of abortion due to Q fever in livestock are sporadic, although larger outbreaks can occur.

Transmission to humans mostly occurs through exposure to aerosols containing *C. burnetii*. This may arise via bacterial shedding in products of abortion or normal parturition, or result from contaminated dust particles or bedding. Most human infections are asymptomatic, but cases may present as acute or chronic disease, and relapses may occur. Since 1999, HPA data show that an average of 16% of cases diagnosed annually are chronic.

Infection in humans

In 2012, a total of 127 cases of Q fever were reported in the UK. There were 115 cases reported in England and Wales, compared to 106 in 2011 (up 8.5%) (Table 13).

Table 13: Laboratory confirmed reports of Q fever in humans in the UK, 2010-2012

Year	England & Wales*	Scotland	Northern Ireland	UK total
2010	52	3	0	55
2011	106	7	1	114
2012	115	11	1	127

*Enhanced surveillance scheme recording acute and chronic cases

In 2012, an acute case of Q fever was diagnosed in another worker at the same slaughterhouse reported in 2011. Investigations identified other workers whose duties may have exposed them to increased risk of Q fever, and who had serological evidence of infection in the absence of clinical illness. HSE and the HPA advised on changes to work practices at the premises.

Infection in animals

There were six incidents (three cattle, three goats) of Q fever abortion in England and Wales confirmed in 2012. Of the confirmed cattle incidents, all involved dairy herds where single or multiple abortions had been reported. The three goat incidents shared a common epidemiological link to a single farm of breeding goats. There were no confirmed diagnoses of Q fever in Scotland from abortion specimens submitted to SRUC and no reported cases of Q fever in Northern Ireland.

Further information

Information on Q fever infection risks during the lambing season are available at:

www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/QFever/GeneralInformation/qfevQFeverRisksLambingSeason/

Q fever information for farmers is available at:

www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1210834106356

Rabies (Rhabdoviridae)

Rabies is an acute viral infection of the central nervous system, caused by a lyssavirus in the family *Rhabdoviridae*. It affects all mammals, including humans, cats, dogs, wildlife and farm animals. In animals, three forms are classically described; prodromal, excitement (furious) and paralytic (dumb). The disease is absent from land mammals in the UK. The last case of rabies in an animal outside of quarantine in GB was a dog in Newmarket in 1970[45]. In Northern Ireland the last case was reported in 1923. The last case of rabies in quarantine was reported in 2008 in England.

The virus is present in the saliva of affected animals, and the most frequent method of transmission to humans is by bites, scratches or licks to broken skin or mucous membranes. In humans, post exposure treatment with vaccine, and if indicated rabies immunoglobulin, is very effective in preventing disease. Once symptoms develop in untreated individuals, death is almost inevitable with very few documented survivors[46].

Infection in humans

The last case of human terrestrial rabies acquired in the UK was in 1902; however occasional travel-related cases do occur. Between 2000 and 2011, there were four cases of imported human rabies in the UK.

There was one human case of rabies infection in England in 2012. The patient was bitten by a dog in South Asia (see Feature article 2).

Infection in animals

In 2012, three cats and one dog died in quarantine and samples were submitted to the AHVLA for laboratory testing. None of the samples were positive for rabies.

[45] Pethece CK, Hopes R. A case of rabies at Newmarket. Veterinary Record, 1970 Mar 7;86(10):299.b www.ncbi.nlm.nih.gov/pubmed/5461596

[46] Jackson AC. Why does the prognosis remain so poor in human rabies? *Expert Rev. Anti Infect. Ther.* 2010; 8(6): 623-625

The UK Pet Travel Scheme was launched in 2000 to allow people to bring in or travel with their pets (dogs, cats and ferrets), while ensuring the UK remains free from rabies and certain other exotic diseases. On 1st January 2012 the UK harmonised its pet movement controls with the rest of the EU. Feature article 3 describes the changes. Under the EU scheme, the risk of rabies entering the UK remains very low, although these controls make it easier to travel with pets. During 2012, 139,216 dogs, 14,444 cats, and 93 ferrets entered the UK under this scheme; in 2011 there were 85,774, 8,279 and 68 respectively. In total, 1,018,460 pet animals have entered the UK since 2000 under the UK Pet Travel Scheme arrangements and there have been no cases of rabies in any of these animals.

Further information

Further information on pet movement rules are at: https://www.gov.uk/take-pet-abroad

Bat rabies (European Bat Lyssavirus)

European Bat Lyssaviruses (EBLVs) 1 and 2 are commonly referred to as 'bat rabies'. EBLVs have been known to infect other animals and humans, presumably through a bite or scratch from an infected bat. Since 1977, there have been five human deaths in Europe (three confirmed, two possible) from EBLVs. In all cases the person had not received rabies vaccination either before or after the incident.

Infection in humans

In 2002, it was recognised that UK bats carry EBLV-2 when the only human case of EBLV-2 occurred in the UK. This was when a bat handler was infected following a bite from a Daubenton's bat (*Myotis daubentonii*) in Scotland[47].

There were no human cases of bat rabies infection in 2012 in the UK.

Infection in animals

A seroprevalence study conducted in England between 2003 and 2006 found EBLV-2 antibodies in 2.2% of Daubenton's bats, and EBLV-1 antibodies in <1% of Serotine bats[48].

Nine bats have tested positive through AHVLA's passive lyssavirus surveillance scheme since 1996. In 2012, over 850 dead bats from the UK were submitted to the scheme. None tested positive for EBLV-2.

[47] Crowcroft N. Rabies-like infection in Scotland. *Euro Surveill*. 2002;6(50):pii=1984. Available online: www.eurosurveillance.org/ViewArticle.aspx?ArticleId=1984

[48] Harris SL, *et al.* Targeted surveillance for European bat lyssaviruses in English bats (2003-06). *J Wildlife Disease* 2009; 45(4):1030-41.

Further information

Information, including guidance on post exposure prophylaxis, is available from PHE:

www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Rabies/

Advice for bat workers and their GPs can be found at:

www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1194947347180

Information on bats is available from the Bat Conservation Trust at: www.bats.org.uk

Results of the Scottish Natural Heritage bat lyssavirus monitoring programme:

www.snh.org.uk/press/detail.asp?id=2104

Salmonellosis *(Salmonella* species*)*

Overall, there are more than 2,600 *Salmonella* serovars, but salmonellosis in humans and animals is largely caused by the subspecies *S. enterica* subspecies *enterica.* Over 1,500 serovars belonging to this subspecies have been identified. In domestic animals, clinical cases of salmonellosis are most common in cattle. Subclinical carriage is most common in poultry, reptiles and pigs. However, reports of clinical disease in weaned pigs have increased in recent years as a result of the emergence of monophasic *S.* Typhimurium in the pig sector.

Most human salmonellosis is acquired via the foodborne route. *Salmonella* Typhi and *S.* Paratyphi A are adapted to humans and are thus not considered to be zoonoses. Illness in humans associated with other *Salmonella* serovars is known as non-typhoidal salmonellosis. Two of these serovars, *S.* Enteritidis and *S.* Typhimurium, account for over half of all human salmonellosis cases.

Infection in humans

In 2012, 8,798 cases of laboratory confirmed salmonellosis were reported in the UK. For every laboratory confirmed report of disease made to national surveillance schemes, there are estimated to be 4.7 unreported cases[24]. This means the total number of cases in the UK in 2012 was approximately 50,000[25].

Salmonella Enteritidis remained the most commonly reported serovar in 2012, accounting for 27.9% of cases. Although there was a significant fall in the number of cases in England and Wales (18.8%), numbers in Scotland and Northern Ireland remained relatively stable. In the UK as a whole, reports of *S.* Enteritidis PT4 fell by 18.1% between 2011 and 2012, to 249 cases (Figure 4, Table 14). *Salmonella* Typhimurium (including monophasic strains) was the second most commonly reported serovar and also fell by 15.6% from 2011. Reporting shows a consistent seasonal pattern with a distinct peak of infection observed in the third quarter of the year.

Monophasic variants accounted for 50.0% of the *S.* Typhimurium reports in England and Wales in 2012 (Lane, personal communication).

Figure 4: Laboratory reports of non-typhoidal human *Salmonella* cases in the UK, 1993-2012

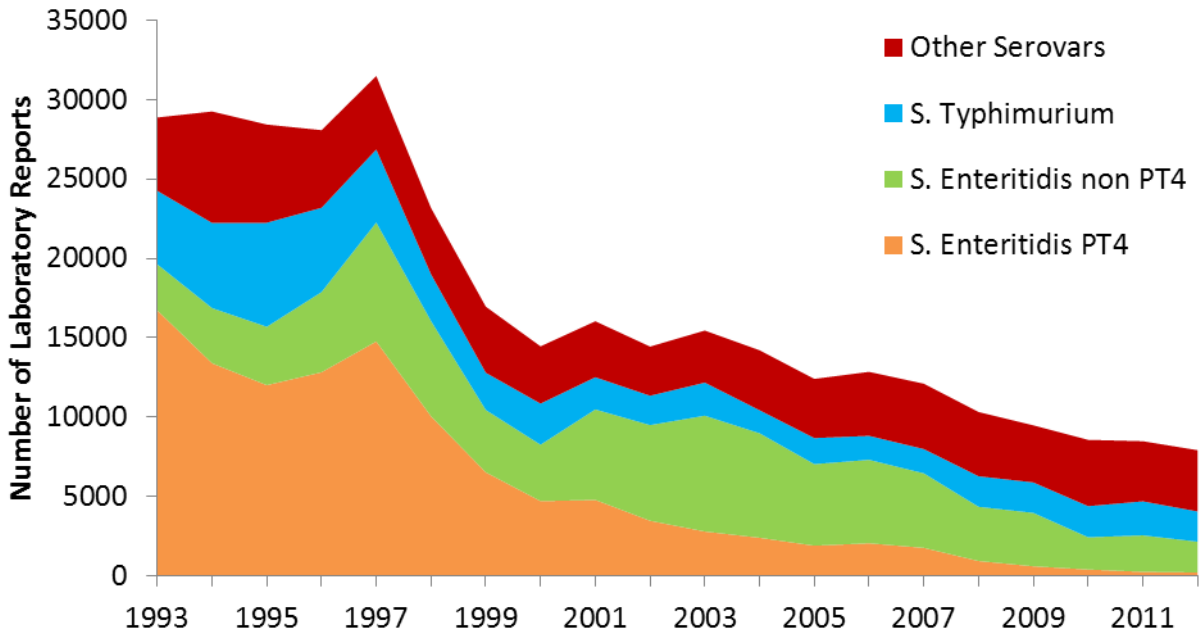


Table 14: Surveillance of non-typhoidal salmonellosis in the UK in 2012

Serotype	England & Wales	Scotland	Northern Ireland	UK	
	Cases	Cases	Cases	Total cases	Change from 2011
S. Enteritidis (TOTAL)	2,169	252	38	2,459	-13.0%
S. Enteritidis PT4	229	18	2	249	-12.9%
S. Typhimurium	1,902	139	53	2,094	-12.1%
Other serovars	3,854	337	54	4,245	1.4%
All	7,925	728	145	8,798	-6.4%

Fourteen foodborne outbreaks of salmonella were reported in the UK in 2012 compared with eighteen in 2011, and of these six each were caused by *S.* Enteritidis and *S.* Typhimurium, one Newport and one Agona. The most common food types associated with salmonella outbreaks in 2012 were egg dishes. A summary of foodborne outbreaks by zoonotic pathogen, broken down by food vehicle category, is given in Appendix 5.

Infection in animals

The majority of *Salmonella* isolations in farm livestock in the UK are detected as a result of testing diagnostic samples from clinically diseased cattle (the farmed species most commonly clinically affected by a salmonella infection) or as a result of statutory surveillance under legislative programmes to control salmonella in flocks of domestic fowl and turkeys. The poultry Salmonella National Control Programmes (NCPs) are required under EU regulation. The primary goal of the legislation is to reduce salmonella prevalence at farm level and thereby minimise the risk of disease transmission to humans. All NCPs focus on reducing the prevalence of the most important serovars of salmonella that can affect human health: *S.* Enteritidis and *S.* Typhimurium (including monophasic strains). Specific reduction targets are set for these important serovars. In the NCP for breeding chicken flocks, *S.* Hadar, *S.* Infantis and *S.* Virchow are also included in the reduction target. Salmonella NCPs have been implemented in the breeding chicken, laying chicken, broiler chicken and turkey breeding and fattening industry sectors.

For the poultry population (chickens and turkeys) subject to Salmonella NCPs, results are reported as the number of positive flocks detected under the programmes. Trends in the number of salmonella reports in animal species not subject to an NCP also need to be treated with caution in view of the inherent biases associated with the data, e.g. the level of diagnostic and surveillance testing carried out.

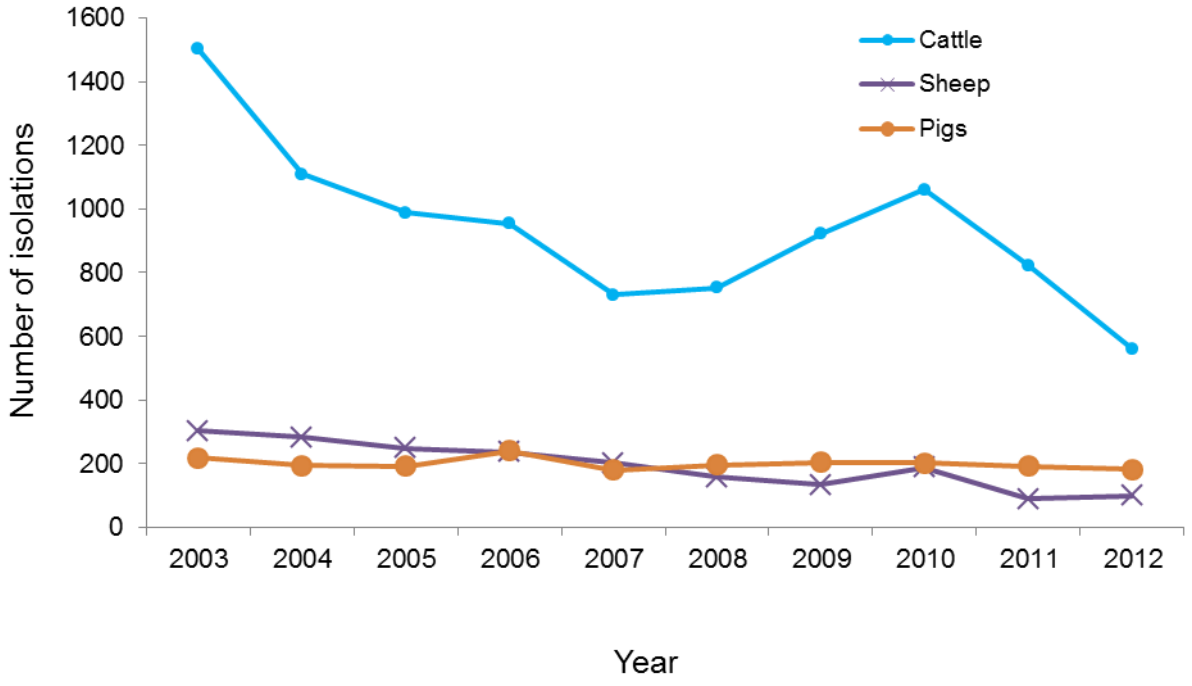
Farmed livestock (excluding species in the NCPs) and horses

Changes have been made this year to the way the salmonella data in livestock are presented in this publication. For all species not covered by an NCP the number of isolations are reported rather than the number of incidents (these data were formerly reported as incidents and so comparisons with data from a previous year are difficult). This has been done as the number of isolations gives a more representative picture of the number of *Salmonella* isolates reported in livestock than the number of incidents. As each salmonella incident can have one or more isolations associated with it, the number of isolations reported may therefore be greater than the number of incidents.

There were 561 *Salmonella* isolations reported from cattle in GB during 2012, a 31.8% decrease compared with 2011 (n=823) (Figure 5). There was a 12.4% increase in the number of reported isolations from sheep (100 compared to 89 in 2011), and a 5.2% decrease in the number of isolations from pigs (183 compared to 193 in 2011).

In Northern Ireland, there were 148 *Salmonella* isolates from cattle, 10 from pigs and eight from sheep in 2012. This compares to the 2011 figures of 103 isolates from cattle, 34 from pigs and 11 from sheep.

Figure 5: Number of laboratory-confirmed isolations of Salmonella in animals in GB, 2003-2012



Cattle

S. Dublin, which seldom causes disease in humans, accounts for most of the incidents in cattle. There were 497 reported isolations of *S.* Dublin in the UK in 2012 compared with 632 reports in 2011. There were also three isolations of *S*. Enteritidis, 33 of *S.* Typhimurium plus 29 of *Salmonella* 4,5,12:i:- and six isolations of *Salmonella* 4,12:i:- (the latter two both monophasic *S.* Typhimurium strains) from cattle during 2012 plus a number of other serovars and a few untypable strains.

Sheep and goats

Isolations from sheep increased, from 100 reports during 2011 to 108 isolations during 2012. This is likely to be related to increased monitoring to identify SBV and other pathogens in abortion cases. *S. enterica* subspecies *diarizonae* 61:k:1,5,(7) (also not common in humans) was, as usual, the most frequently reported serovar in sheep. There were four isolations of *S.* Typhimurium and no monophasic *Salmonella* 4,5,12:i:-.

There were no isolations of *Salmonella* from goats in 2012.

Pigs

Salmonella Typhimurium was the most commonly recorded serovar in pigs clinically affected by salmonella, accounting for 94 (48.7%) isolations (compared to 50.8% in 2011). Monophasic *S.* Typhimurium (*S*. 4,5,12:i) (38 isolations) represented 19.7% of isolations (compared to 40 isolates in 2011). The *S.* 4,12:i:- variant accounted for 28 isolations

(14.5% of total pig incidents in 2012, compared with 22 isolations in 2011).These results indicate the continued maintenance of monophasic *S.* Typhimurium strains in pigs. Monophasic strains of *S.* Typhimurium have emerged rapidly over the past few years, most significantly in pigs. The remaining 33 isolations were from other serovars.

Further background to the pig Zoonoses NCP initiative is available at the British Pig Executive's website: www.bpex-zap.org.uk

Horses

Forty-two isolations of *Salmonella* were received from horses during 2012, which is slightly fewer than in 2011 when there were 50 isolations.

Ducks and geese

There were a total of 169 isolations in ducks during 2012 in GB, which represents a 134.7% increase relative to 2011 (72 isolations) but a 14.2% decrease relative to 2010 (197 isolations). The 2012 GB isolations included ten of *S.* Typhimurium and four of *S.* Enteritidis. This apparent increase results from more frequent voluntary testing in commercial duck flocks. In Northern Ireland, there were no reports of *Salmonella* isolation from ducks during 2012 (and no reports in 2011 either).

There have been very few isolations of *Salmonella* from geese in recent years, with no isolations in 2012 or in 2011.

Results from the UK Salmonella NCPs in chickens and turkeys

The different NCPs have been operating for varying time periods. The breeding chicken NCP is the longest-established and was in its sixth year in 2012 whereas the turkey NCP is the most recent addition and was only in its third year. Each year, the UK NCP results have been significantly below the EU reduction targets. The UK chicken breeding sector is now effectively free of *S.* Enteritidis and *S.* Typhimurium, with a reported prevalence for the target serovars of 0% for 2012. In laying flocks during 2012, only one adult flock was detected positive for *S*. Enteritidis and two flocks for *S.* Typhimurium out of the total 4,042 flocks included in the programme during the year, giving an overall prevalence of 0.07%. The prevalence of the target serovars in broiler flocks was 0.01% in 2012, with three broiler flocks detected positive for *S*. Typhimurium and one flock for monophasic *S.* 4,5,12:i:- out of a total of approximately 37,946 flocks tested. No broiler flocks were detected positive for *S*. Enteritidis during the year.

The turkey NCP includes targets for both fattening and breeding turkey flocks. The 2012 prevalence of the target serovars was 0.06% (2/3,558) in fattening flocks. *Salmonella* Typhimurium was detected in one fattening flock and a further one fattening flock tested positive for monophasic *S.* Typhimurium (*S*. 4,5,12:i:-). These data are out of a total of 3,558 fattening flocks tested under the programme. No fattening or breeding turkey flocks

were detected positive for *S*. Enteritidis during the year, and no breeding flocks tested positive for *S*. Typhimurium in 2012.

Animal feed surveillance for Salmonella

Feedstuff contaminated with salmonella may be a source of infection for animals. Due to the large quantity of feed that is consumed such contamination is considered to be a significant risk. In order to reduce this risk, salmonellae are monitored and controlled, according to guidelines described in Codes of Practice, at a number of points in the feed production process. The isolation rate of salmonella from animal feedstuffs and feedstuff ingredients in GB has continued to remain stable. In GB in 2012, 0.9% of samples were positive (437 *Salmonella* isolates from 48,096 samples). In Northern Ireland 716 isolations of salmonella were made under the animal feed surveillance programme during 2012.

Further information

A description of salmonella data collection and reporting in animals in Great Britain is included in the Salmonella in Livestock Report:

http://www.defra.gov.uk/ahvla-en/category/publications/disease-surv/salmonella-live-prod/

Toxoplasmosis (*Toxoplasma gondii*)

Toxoplasmosis is caused by the protozoan parasite *Toxoplasma gondii*. Cats are the definitive host for the organism although many warm-blooded animal species can be infected as intermediate hosts. The resistant oocysts excreted by cats can remain viable in the environment for many months.

Humans are infected with *T. gondii* by four routes:

- Ingesting sporulated oocysts from water, food or soil or other materials contaminated with the faeces of infected cats
- Ingesting undercooked or raw meat (mainly pork or lamb) that contains tissue cysts
- Transmission from a newly infected mother to the foetus
- Receiving organ transplants or blood products from donors with toxoplasmosis, although this is rare

Infection in humans

A total of 327 laboratory confirmed cases of toxoplasmosis were reported in the UK during 2012 (Table 15). In England and Wales, 311 cases of toxoplasmosis were reported, of which 228 cases had acute infection (73.3%). Twelve cases had reactivated infection (3.9%), and the remaining 71 were undetermined (22.8%).

Since 2011 in Scotland, efforts have been made to differentiate as clearly as possible between recently acquired infections and identifications of infections that may have been acquired longer ago, reporting only those which are believed to have been acquired during the reporting period. This slight change in case definition needs to be borne in mind when examining and interpreting historic trends in case numbers.

Table 15: UK confirmed human cases of toxoplasmosis, 2010-2012

Year	England & Wales	Scotland	Northern Ireland	UK total
2010	345	67	2	414
2011	341	23	0	364
2012	311	16	0	327

Infection in animals

In 2012, which heralded the arrival of Schmallenberg virus, toxoplasmosis was the third most common diagnosis of abortion in sheep and goats in GB, accounting for 248 (18.5%) of all incidents of fetopathy investigated by government veterinary laboratories where a diagnosis was subsequently reached. Of this total, 247 incidents involved sheep and there was one goat diagnosis. This compares to 17.8% in 2011 (n=145). There was also a 30% increase in the number of ovine abortion submissions tested in GB government laboratories in 2012 compared to 2011. This is thought to be due to the incursion of Schmallenberg virus and the willingness of farmers to present material for diagnosis to monitor this disease progression.

There was also an increase in the number of *T. gondii* incidents diagnosed in NI during 2012 (100) compared to 2011 (45). This was also due to the sharp rise in the number of samples being submitted in NI for diagnostic purposes following abortions, attributed to a publicity campaign about the perceived risk of introduction of Schmallenberg virus.

In 2012 antibodies suggesting exposure to toxoplasma were identified in 65.2% of 1,379 sheep sera submitted (Table 16). This compares with 44.3% seropositivity in 2011. This testing does not distinguish between antibody as a result of vaccination and that produced by natural infection, therefore the vaccination status of the animal must be considered. However, as most of these samples will have been taken from sheep with a recent history of abortion it is likely that the majority of positives were associated with natural infection.

Table 16: Serological testing for toxoplasmosis in animals in the UK, 2012

Sera testing	GB	NI	UK
No. separate sheep submissions*	213	276	428
No. sheep samples sera tested	864	533	1,379
No. positives *T. gondii*	444	455	899
No. separate goat submissions*	14	0	14
No. goat samples sera tested	44	0	44
No positives *T. gondii*	7	0	7
No. separate pig submissions*	5	0	5
No. pig samples sera tested	154	0	154
No. positives *T. gondii*	1	0	1

*Each submission may contain a number of samples.

In addition to the data in the table, Northern Ireland diagnosed *T. gondii* in 25 of 34 submissions from cattle during 2012.

Trichinellosis (*Trichinella* spp.)

Trichinellosis is caused by a small parasitic nematode worm (*Trichinella* spp.) known as 'the muscle worm', which can infect many species of mammals and some birds. It is a foodborne disease that is spread primarily by the consumption of raw or undercooked meat products from horses and pigs containing trichinae, the infective, immature (larval) stage of the worm.

There are nine species of *Trichinella*, of which *T. spiralis* is the most common in Europe[49]. The ninth species was recently identified in South America[50]. *T. spiralis* was found in two foxes in Northern Ireland in 2007 and 2009. In humans, European outbreaks of trichinellosis are regularly reported mainly linked to the consumption of raw or undercooked meat from wild boar, back yard pigs or horses. In contrast, there have been no human cases acquired from meat produced in the UK for over 30 years.

Infection in humans

Ten cases of trichinellosis were diagnosed in the UK between 2000 and 2012, including an outbreak of eight cases in England and Wales in 2000 associated with the consumption of

[49] Pozio E. World distribution of Trichinella spp. Infections in animals and humans. *Vet Parasitol.* 2007; 149(1-2) p3-21

[50] S. J. Kivrokapich *et al. Trichinella patagoniensis* n. sp. (Nematoda), a new encapsulated species infecting carnivorous mammals in South America (2012) *Int J Parasitol* 42(10):903-10.

imported meat products. The remaining two cases were travel related: one in England and Wales in 2001, and the other in Scotland in 2010 in a person who had eaten partially cooked meat in France.

There were no human cases in 2012 in the UK.

Infection in animals

Pigs and horses are routinely monitored for the presence of *Trichinella*. In 2012, 177,751 breeding sows and boars (no tests were available from non-controlled housing) were tested together with 853,232 fattening pigs (including 336,570 from non-controlled housing). In addition, 8,764 horses, 1,478 farmed wild boar and 308 feral wild boar in GB were tested. All samples examined were negative.

An ongoing UK monitoring programme for *Trichinella* in foxes is routinely carried out, and from 2006 other susceptible wildlife have also been tested. In 2012, 420 foxes, 90 badgers and six seals were tested and none were positive for *Trichinella*.

Variant Creutzfeldt-Jakob disease (vCJD) in humans and Bovine Spongiform Encephalopathy (BSE) in animals

Infection in humans

Creutzfeldt-Jakob disease (CJD) is a rare and fatal transmissible spongiform encephalopathy (TSE) of humans. Sporadic CJD is the most common form and was initially described in 1921. In 1996, a new variant, vCJD, was recognised and was strongly linked to BSE, which was first recognised in cattle in 1986.

There have been no cases of vCJD in people born after the 1980s. The government introduced leucodepletion of blood in 1999, and in 2004 implemented a policy that people who had received a blood transfusion in the UK since 1980 would no longer be able to give blood. There have been four probable secondary infections associated with blood transfusions in the UK.

There were no deaths from definite or probable vCJD in the UK in 2012, leaving the total number recorded since 1995 at 176. The number of deaths per year peaked at 28 in 2000.

Further information

The National Creutzfeldt-Jakob Disease Research & Surveillance Unit: www.cjd.ed.ac.uk/

Report on the incidence of variant Creutzfeldt-Jakob disease diagnoses and deaths in the UK, January 1994 – December 2011: www.cjd.ed.ac.uk/documents/cjdq72.pdf

Infection in animals

BSE is a TSE disease of domestic cattle. BSE caused a major epizootic in cattle and smaller epizootics in exotic ruminants and domestic and exotic felines. Worldwide there have been two naturally occurring cases of BSE in goats: one in France and one in the UK. The transmissible agent in TSEs is widely suspected to be an abnormal form of a host-encoded protein called the 'prion protein', although some research[51,52] suggests that in some TSEs, infectivity may be associated with low levels of detectable abnormal prions, or that abnormal prion protein may not always be infectious.

The UK BSE epidemic peaked in 1992 with over 37,000 cases in cattle and has since declined steadily. The annual incidence of BSE cases in the EU has declined since targeted surveillance started in 2001. There have been a small number of cases in North America, the Middle East, and Asia.

In 2012, three cases of BSE were diagnosed in cattle in the UK, two from England and one in Northern Ireland.

Vero cytotoxin-producing *Escherichia coli* (VTEC)

Escherichia coli (E. coli) is a bacterium which normally inhabits the intestines of animals and humans. Although many strains are considered to be harmless, there are a number of subgroups that are associated with human disease. Vero cytotoxin-producing *E. coli* are only known to cause disease in humans. VTEC O157 is the most commonly diagnosed zoonotic serogroup affecting people in the UK. However other serogroups can produce vero cytotoxin and are important causes of disease in other parts of Europe.

Many animals can carry VTEC without clinical symptoms or disease. Cattle are the main reservoir of VTEC O157 in the UK, but the organism may also be found in other ruminant species, particularly sheep, and it has been occasionally isolated from a wide range of other livestock and wildlife species.

VTEC O157 can be transmitted to people in several ways. These include:

- Consumption of contaminated food or water
- Direct or indirect contact with animals, their faeces or contaminated environments
- Person-to-person spread

[51] Barron RM, *et al.* High titres of TSE infectivity associated with extremely low levels of PrPSc in vivo. (2007) *J. Biol. Chem*. 282:35878-35886

[52] Piccardo P, *et al.* Accumulation of abnormal prion protein that is not infectious. (2007) *PNAS* 104: 4712-4717

Approximately 80% of human cases appear to be sporadic and unattributed to an identifiable source, although case-control studies suggest that contact with farm animals and the rural environment may be a major contributing factor.

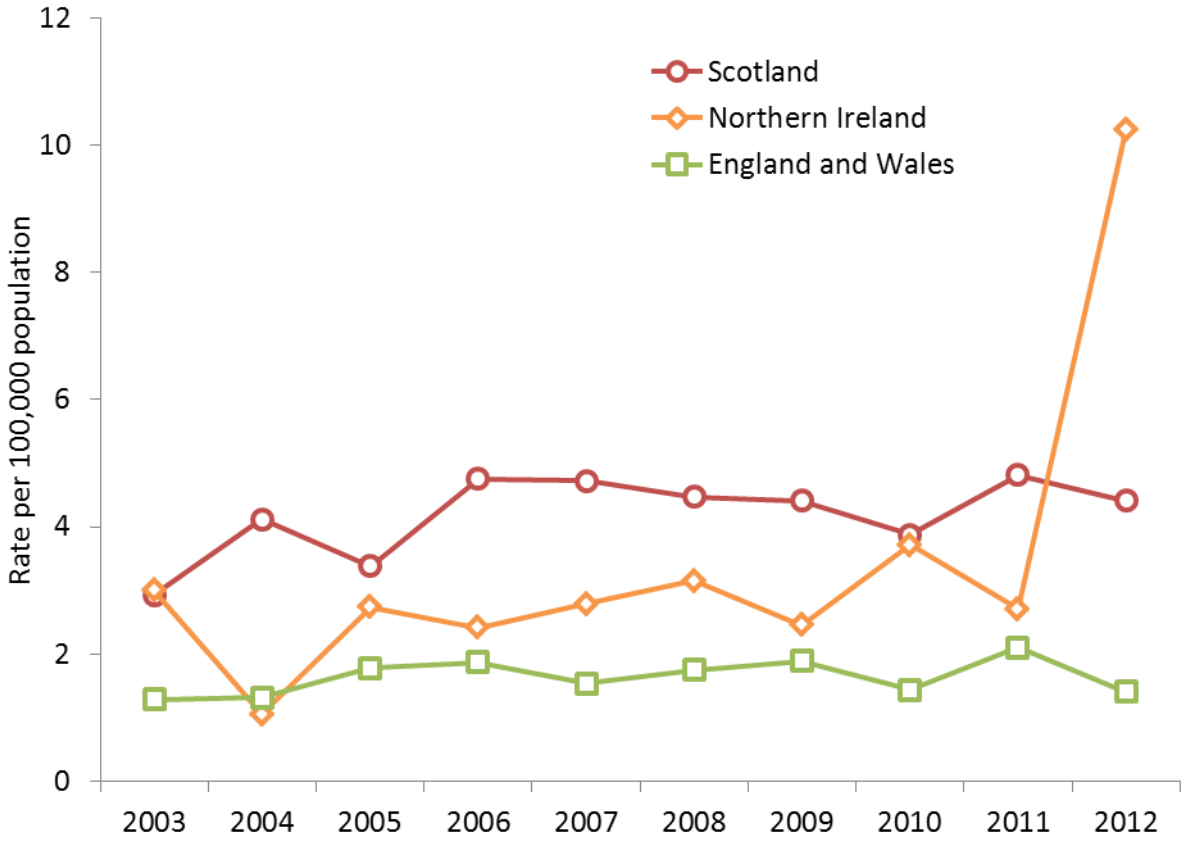
Infection in humans

In 2012, there were 1,217 laboratory confirmed cases of VTEC O157 reported in humans in the UK (795 in England and Wales, 234 in Scotland and 188 in Northern Ireland), an 18.0% decrease on the 1,484 cases reported in 2011. Of the 188 NI cases of VTEC O157, 140 cases were known to be associated with one outbreak.

The Second Study of Infectious Intestinal Disease in the Community established that the ratio of unreported human VTEC O157 infection to reports to national surveillance is 7.4 to 1[24]. This suggests that in 2012, there were likely to have been approximately 10,200[25] cases in the UK.

There are clear differences in the geographical distribution of laboratory confirmed cases within the UK, and Scotland has consistently recorded the highest rates of infection per 100,000 head of population since the late 1980s (Figure 6). The NI data are unusually high due to one large outbreak in 2012.

Figure 6: Annual rates of laboratory confirmed reports of human VTEC O157 infections in the UK, 2003–2012



In 2012 there were 60 laboratory confirmed cases of VTEC other than serogroup O157 (non-O157 VTEC) confirmed in the UK. The burden of disease due to non-O157 VTEC is likely to be underestimated when compared to VTEC O157. This is because the diagnosis of non-O157 VTEC is mainly dependent on the use of PCR based methods to detect the genes coding for the production of verocytotoxin. Such diagnostic tests are not routinely used by most first line laboratories. Therefore non-O157 VTEC is only diagnosed in cases whose clinical specimens are referred to specialist laboratories for detailed follow up.

Seventeen outbreaks of VTEC in England and Wales affecting a total of 103 cases were reported to the HPA in 2012. Sixteen of these involved VTEC O157:

- Four foodborne outbreaks: three were associated with a single venue including one linked to the consumption of undercooked burgers. The fourth was linked to consumption of minced beef products outside the home from a variety of vendors.
- Five outbreaks associated with animal contact: four involving open farms and one at a large country park where animals graze. Four of these were investigated by AHVLA (see below).
- Six outbreaks attributed to person-to-person spread: five associated with schools and nurseries, and one at a holiday park in England.
- One localised outbreak where the source of infection was not determined.

In addition, one VTEC O26 outbreak occurred, the source was not determined.

A large outbreak also occurred in Northern Ireland in the second half of 2012, linked to a restaurant in Belfast; there were 140 confirmed cases and 148 probable cases.

Infection in animals

VTEC O157 infection is widespread in cattle in the UK. However, because it does not cause disease in cattle and shedding of the organism is intermittent, prevalence figures are of limited help in assessing the degree of risk to humans. It is therefore assumed that ruminants are infected with VTEC O157.

During 2012, four out of the five outbreaks of human infection with VTEC O157 in England or Wales where animal-associated sources were suspected were investigated by AHVLA. Investigations, including animal sampling, were carried out on all four of these premises and VTEC O157 was isolated from a variety of animal species, including cattle, sheep, pigs, goats, camelids and wild rabbits. In all four outbreaks, VTEC strains isolated from human, animal and environmental samples were identical by molecular typing, consistent with the animals being the likely source of the human infection.

Further information regarding these outbreak investigations is given in the AHVLA non-statutory zoonoses reports at: http://www.defra.gov.uk/ahvla-en/publication/zoo-reports/.

Further Information

Advice leaflets on minimising the risk of infection with VTEC can be found at:

- http://adlib.everysite.co.uk/resources/000/264/533/sci_vtec_leaflet.pdf
- http://www.face-online.org.uk/resources/preventing-or-controlling-ill-health-from-animal-contact-at-visitor-attractions-industry-code-of-practice
- www.scotland.gov.uk/Publications/2005/03/20839/54388
- http://www.wales.nhs.uk/sitesplus/888/page/43884
- http://www.food.gov.uk/science/research/foodborneillness/ecoliresearch/fs421009/

Yersiniosis (*Yersinia* spp.)

Y. enterocolitica, *Y. pseudotuberculosis* and *Y. pestis* (which causes plague) are zoonoses. Plague does not occur in the UK.

Y. enterocolitica has been isolated from many domestic and wild mammals, birds and some cold-blooded animals. More than 50 serotypes have been identified, not all of which cause disease in animals and man. *Y. pseudotuberculosis* has been isolated from various species of wild and domestic mammals, birds and reptiles. Yersiniosis in humans is mostly caused by *Y. enterocolitica,* and humans usually acquire infection through food contaminated with the faeces of infected animals.

Infection in humans

In 2012 there were 55 cases of human yersiniosis reported in the UK (Table 17), the same number as in 2011.

Table 17: Confirmed human cases of yersiniosis (non-pestis) in the UK, 2012

	England & Wales	Scotland	Northern Ireland	UK total
Y. enterocolitica	37	10	0	47
Y. pseudotuberculosis	5	0	0	5
Y. spp	2	1	0	3
Total	44	11	0	55

Infection in animals

During 2012, 50 cases (34 in NI and 16 in GB) of yersiniosis were diagnosed in animals in the UK (Table 18). GB cases have decreased (22 in 2011) and NI cases have increased

(22 in 2011). This increase was due to a change in laboratory test procedures. Many of the recorded cases correspond to low level isolates from faecal samples.

Table 18: Laboratory confirmed cases of yersiniosis in animals in the UK, 2012

Sheep	Goats	Birds	Wildlife & Miscellaneous	Cattle	Total
30	0	0	4	16	50

Further information

Reports on *Yersinia* in animals in GB are produced by the AHVLA in the Non-Statutory Zoonoses Reports, which can be found at: http://www.defra.gov.uk/ahvla-en/publication/zoo-reports/

Appendix 1: Notifiable and reportable diseases in animals which are potential zoonoses in the UK

Notifiable diseases are those where there is a statutory requirement to report a suspicion of a clinical case of disease.

Reportable diseases (in animals) include those where there is a statutory requirement to report laboratory confirmed isolation of organisms of the genera *Salmonella* and *Brucella* under the Zoonoses Order 1989. In addition further diseases are included in the schedule of the Specified Animal Pathogens Order 1998. The report is to be made by the laboratory which isolated the organism from an animal derived sample.

Disease	Main species	Last Occurred in UK[53]	Notifiable to AHVLA in GB, Veterinary Service in NI	Reportable
Anthrax (*Bacillus anthracis*)	Cattle/other mammals	2006	✓	
Avian Influenza (HPAI)	Poultry/ waterfowl	2008	✓	
Bovine Spongiform Encephalopathy	Cattle	Present	✓	
Brucellosis (*Brucella abortus*)	Cattle[54]	2004 GB/ 2012 NI[55]	✓	✓
Brucellosis (*Brucella melitensis*)	Sheep and goats	Never	✓	✓
Contagious Epididymitis (*B. ovis*)	Sheep and goats	Never	✓	✓
Equine Viral Encephalomyelitis	Horses	Never	✓	
Glanders & Farcy (*Burkholderia mallei*)	Horses	1928	✓	
Newcastle disease and paramyxovirus infection	Poultry and pigeons	2006	✓	
Psittacosis (Ornithosis)	Poultry	Present	Ornithosis (including psittacosis) notifiable in	

[53] Figures taken are correct as at 20th June 2013.

[54] In the Zoonoses Order 1989 Brucella reporting relates to (a)“animal” meaning cattle (bull, cow, steer, heifer, calf), horse, deer, sheep, goat, pig or rabbit; and (b)“bird” meaning a domestic fowl, turkey, goose, duck, guinea-fowl, pheasant, partridge, quail or pigeon.

[55] Present in NI; outbreak in Scotland in 2003 and Cornwall, England in 2004.

			Northern Ireland in poultry [56]	
Rabies (Terrestrial)	Dogs and other mammals	1970[57]	✓	
Rabies (EBLV)	Bats	2009[58]	✓	
Rift Valley Fever	Cattle, sheep and goats	Never	✓	
Salmonella	All species	Present	Salmonella, when carried in animals or poultry, which the Department considers to be a risk to human health, is notifiable in Northern Ireland	✓
Trichinella	Pigs, horses and other mammals	Present[59]		✓
Tuberculosis (*Mycobacterium bovis*)	Domestic cattle, buffalo, bison and deer	Present[60]	✓[61]	✓
Vesicular stomatitis virus (VSV)	Cattle/ other mammals	Never	✓	
West Nile Virus	Horses	Never	✓	

[56] Legislative veterinary powers under The Psittacosis or Ornithosis Order 1953 (S.I. 1953 No. 38) give discretionary powers to serve notices to impose movement restrictions and require cleansing and disinfection of affected premises so AHVLA may be involved in the control of Psittacosis, even though it is not a notifiable disease in animals or birds.

[57] A quarantine case was confirmed in 2008, however this does not affect the national disease status.

[58] European bat Lyssavirus type 2 was isolated from a Daubenton's bat in 2009.

[59] Trichinella is known to be present in wildlife in Northern Ireland following the identification of a single positive fox in 2007 and again in 2009 during wildlife surveillance. Trichinella does not appear to be present in animals in GB.

[60] Scotland has been officially free since October 2009, although sporadic incidents continue to be identified in cattle herds.

[61] In addition to any bovines and deer with suspect clinical signs of tuberculosis, under the Tuberculosis (England) Order 2007, the Tuberculosis (Wales) Order 2011, and the Tuberculosis (Scotland) Order 2007 (as amended), there is a statutory requirement in Great Britain to notify to the local AHVLA office of the presence of suspect TB legions in the carcases of any bovine animals or other farmed or companion (pet) mammals. Furthermore, identification of *Mycobacterium bovis* in samples taken from any mammal (other than man) must also be reported to AHVLA Weybridge unless the organism was present in the sample as a result of an agreed research procedure. Notifying the suspicion of TB in a living domestic animal in the course of clinical examination, surgery, by radiography or in biopsy material is not mandatory (except for cattle or deer), but submission of clinical samples from such cases to AHVLA is encouraged.

Appendix 2: Notifiable zoonotic diseases in humans

Disease	Notifiable in humans under public health legislation in			Reportable under RIDDOR* to HSE
	England & Wales	Scotland	Northern Ireland	
Anthrax	✓	✓	✓	✓
Acute infectious hepatitis/Hepatitis unspecified: viral (e.g. Hepatitis E)	✓		✓	✓
Botulism	✓	✓		
Brucellosis	✓	✓		✓
Chlamydiosis (avian)				✓
Chlamydiosis (ovine)				✓
Diphtheria	✓	✓	✓	
Clinical syndrome due to *E. coli* O157 infection		✓		
Gastro-enteritis (under 2 years of age only)			✓	
Haemolytic uraemic syndrome	✓	✓		
Food poisoning	✓		✓	
Infectious bloody diarrhoea	✓			
Leptospirosis			✓	✓
Lyme disease				✓
Plague	✓	✓	✓	
Q fever				✓
Rabies	✓	✓	✓	✓
Clinical syndrome due to *Streptococcus suis*				✓
Tetanus	✓	✓	✓	✓
Tuberculosis (including bovine TB)	✓	✓	✓	✓
Tularaemia		✓		
Viral haemorrhagic fevers	✓	✓	✓	
West Nile Virus		✓		
Yellow fever	✓	✓	✓	

* RIDDOR: Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (not including Part II: Diseases additionally reportable in respect of offshore work places)

The table above lists notifiable zoonotic diseases only; further organisms are notifiable when isolated in laboratories. The lists of notifiable organisms can be found here:

England: www.legislation.gov.uk/uksi/2010/659/contents/made

Northern Ireland: www.legislation.gov.uk/apni/1967/36/contents

Scotland: www.legislation.gov.uk/asp/2008/5/contents

Wales: www.legislation.gov.uk/wsi/2010/1546/contents/made

Appendix 3: Laboratory-confirmed cases of zoonotic disease in humans, 2003-2012 [62]

United Kingdom

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Anthrax	0	0	0	1	0	1	13	39	0	6
Avian Influenza	0	0	0	1	4	0	0	0	0	0
Mycobacterium bovis	17	13	23	29	22	22	24	28	35	35
Brucellosis	23	33	12	16	15	15	18	12	25	14
Campylobacteriosis	51,479	49,783	52,184	52,655	58,059	55,732	65,176	70,327	72,266	72,592
Cryptosporidiosis	6,759	4,186	5,302	4,371	3,626	4,875	5,569	4,556	3,517	6,612
Hantavirus	0	0	0	0	0	0	0	0	1	1
Hepatitis E	129	152	339	292	166	180	178	287	471	657
Hydatid disease	7	12	11	14	10	18	9	7	15	6
Leptospirosis	28	42	60	50	81	76	56	42	52	78
Listeriosis	250	230	223	208	255	208	235	178	164	183
Lyme disease	345	586	693	940	1,027	1,098	1,093	1,213	1,189	1,163
Pasteurellosis	392	410	425	490	457	443	559	586	668	666
Psittacosis	104	67	61	30	39	63	60	58	41	37
Q fever	96	60	61	200	71	68	31	55	114	127
Rabies 'classical'	0	0	1	0	0	1	0	0	0	1
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonellosis (non-typhoidal)	16,920	15,809	13,716	14,090	13,292	11,523	10,493	9,697	9,395	8,798
Streptococcus suis	2	0	3	4	2	7	2	4	1	3
Taeniasis	100	103	76	89	101	100	72	114	94	70
Toxocariasis	3	6	5	2	1	2	4	12	4	7
Toxoplasmosis	100	100	114	123	146	457	494	414	364	327
Trichinellosis	0	0	0	0	0	0	0	1	0	0
vCJD[63]	18	9	5	5	5	2	3	3	5	0
VTEC O157	874	926	1,169	1,286	1,120	1,247	1,316	1,072	1,484	1,217
Non-O157 VTEC	N/A	11	12	20	26	32	35	45	38	60
Yersiniosis	120	90	77	62	78	62	64	54	55	55

* Provisional data

[62] This is not a definitive list of zoonotic pathogens that are reported each year, but covers zoonotic diseases reported annually in the UK Zoonoses Report.
[63] Deaths

England and Wales

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Anthrax	0	0	0	0	0	1	0	5	0	5
Avian Influenza	0	0	0	1[64]	4[65]	0	0	0	0	0
Mycobacterium bovis	14	10	15	20	20	16	16	23	26	29
Brucellosis	5	19	8	11	8	5	13	11	17	9
Campylobacteriosis	46,291	44,577	46,735	46,853	51,982	50,006	37,784	62,686	64,726	65,032
Cryptosporidiosis	5,813	3,585	4,429	3,625	3,031	4,100	4,753	3,853	2,934	5,722
Hantavirus	0	0	0	0	0	0	0	0	1[66]	1
Hepatitis E	124	149	329	289	162	176	175	274	456	579
Hydatid disease	2	8	11	14	10	18	9	6	12	6
Leptospirosis	28	39	55	44	74	62	52	39	44	72
Listeriosis	233	211	189	185	227	182	214	159	147	165
Lyme disease	264	500	595	768	797	813	863	905	959	1,040
Pasteurellosis	369	385	407	430	392	438	455	466	538	535
Psittacosis	103	62	61	30	38	62	58	53	40	27
Q fever**[67]	79	52	53	43	63	56	27	52	106	115
Rabies 'classical'	0	0	1[68]	0	0	0	0	0	0	1[69]
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonellosis (non-typhoidal)	15,455	14,215	12,412	12,855	12,107	10,327	9,489	8,578	8,492	7,925
Streptococcus suis	2	0	3	3	1	7	1	3	0	3
Taeniasis	95	101	76	88	99	95	70	108	90	65
Toxocariasis	3	6	5	1	1	2	1	8	0	5
Toxoplasmosis	76	79	101	90	104	405**	422**	345**	341**	311**
Trichinellosis	0	0	0	0	0	0	0	0	0	0
VTEC O157	675	699	950	1001	828	950	1,034	793	1,182	795
Non-O157 VTEC	N/A	4	1	2	7	7	5	10	13	22
Yersiniosis (non-pestis)	57	32	39	33	55	39	49	47	51	44

* Provisional data

**Enhanced surveillance system

[64] H7N3
[65] H7N2
[66] Indigenously acquired.
[67] Acute and chronic infections
[68] UK national who visited India
[69] UK national who visited India

Northern Ireland

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Anthrax	0	0	0	0	0	0	0	0	0	0
Avian Influenza	0	0	0	0	0	0	0	0	0	0
Mycobacterium bovis	2	3	5	3	1	2	1	1	2	0
Brucellosis	16	14	2	4	5	10	4	0	2	2
Campylobacteriosis	743	841	891	937	885	848	977	1,040	1,175	1,211
Cryptosporidiosis	141	136	164	134	85	119	118	119	140	177
Hantavirus	0	0	0	0	0	0	0	0	0	0
Hepatitis E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hydatid disease	0	0	0	0	0	0	0	0	0	0
Leptospirosis	0	1	1	3	1	1	0	0	3	2
Listeriosis	3	4	3	6	5	11	4	2	3	7
Lyme disease	0	0	2	1	0	0	2	0	1	2
Pasteurellosis	2	2	2	9	3	2	7	0	1	2
Psittacosis	0	1	0	0	0	0	0	0	0	0
Q fever	11	7	6	13	5	11	2	0	1	1
Rabies 'classical'	0	0	0	0	0	1[70]	0	0	0	0
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonellosis (non-typhoidal)	211	451	177	206	155	185	158	178	166	145
Streptococcus suis	0	0	0	0	0	0	0	0	0	0
Taeniasis	0	0	0	0	0	0	0	0	0	1
Toxocariasis	0	0	0	0	0	0	0	0	0	0
Toxoplasmosis	7	1	2	0	2	4	3	2	0	0
Trichinellosis	0	0	0	0	0	0	0	0	0	0
VTEC O157	51	18	47	42	49	56	44	67	49	188[71]
Non-O157 VTEC	0	0	0	0	0	0	0	0	0	3
Yersiniosis[72]	4	1	4	3	1	0	0	0	0	0

* Provisional data

[70] UK national who visited South Africa

[71] 137 of these cases were associated with one outbreak

[72] Yersinia species is not typed in Northern Ireland. No clinical presentations compatible with plague have been noted.

Scotland

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Anthrax	0	0	0	1	0	0	13	34	0	1
Avian Influenza	0	0	0	0	0	0	0	0	0	0
Mycobacterium bovis	1	0	3	6	1	4	7	4	7	6
Brucellosis	2	0	2	1	2	0	1	1	6	3
Campylobacteriosis	4,445	4,365	4,558	4,865	5,192	4,878	6,415	6,601	6,365	6,349
Cryptosporidiosis	805	465	709	612	510	656	698	584	443	713
Hantavirus	0	0	0	0	0	0	0	0	0	0
Hepatitis E	5	3	10	3	4	4	3	13	15	78
Hydatid disease	0	0	0	0	0	0	0	1	3	0
Leptospirosis	0	2	4	3	6	13	4	3	5	4
Listeriosis	14	15	31	17	23	15	17	17	14	11
Lyme disease	81	86	96	171	230	285	228	308	229	121
Pasteurellosis	21	23	16	51	62	57	97	120	129	129
Psittacosis	1	4	0	0	1	1	2	5	1	10
Q fever	6	1	2	144[73]	3	1	2	3	7	11
Rabies 'classical'	0	0	0	0	0	0	0	0	0	0
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonellosis (non-typhoidal)	1,254	1,143	1,127	1,029	1,030	1,011	846	941	737	728
Streptococcus suis	0	0	0	1	1	0	1	1	1	0
Taeniasis	5	2	0	1	2	5	2	6	4	4
Toxocariasis	0	0	0	1	0	0	3	4	4	2
Toxoplasmosis	17	20	11	33	40	48	69	67	23	16
Trichinellosis	0	0	0	0	0	0	0	1	0	0
VTEC O157	148	209	172	243	243	241	237	212	253	234
Non-O157 VTEC	9	7	11	18	19	25	30	35	25	35
Yersiniosis (non-pestis)	59	57	34	26	22	23	15	7	4	11

* Provisional data

[73] 142 of these relate to a single outbreak

Appendix 4: Government laboratory-confirmed cases or incidents of zoonotic infection in animals, 2003-12 [A]

United Kingdom

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Anthrax	0	0	0	2	0	0	0	0	0	0
Avian Influenza [B]	0	0	0	0	1	2	0	0	0	0
New TB breakdowns in cattle herds [C]	5,570	5,665	5,457	5,043	5,452	6,285	5,892	5,883	6,293	6,868
M. bovis isolates in non-bovine animals (excludes badgers)	43	64	72	89	77	123	156	142	142	99
Mycobacterium species in non-bovine animals (excluding *M. bovis*)	25	39	68	186	146	107	149	144	140	16
*Brucella abortus****	161	125	88	118	151	177	71	74	21	23
*Brucella melitensis****	0	0	0	0	0	0	0	0	0	0
Brucella sp *** (in marine mammals)	14	7	13	8	11	10	7	7	9	13
BSE	610	343	226	114	67	37	12	11	7	3
Campylobacter **‡	255	309	163	211	251	186	164	280	178	144
Chlamydiosis (*Chlamydophila abortus*) fetopathy**	637	432	548	508	553	372	406	397	447	539
Cryptosporidiosis **	1,198 Φ	1,171 Φ	1,326 Φ	1,348 Φ	1,043 Φ	1,311†	1,436	1,768	1,381	1,899
Hydatid ** [D]	0	1	0	0	0	0	0	0	0	0
Leptospirosis **	307	255	209	157	197	238	89	113	50	85
Listeriosis **	134	134	103	148	152	216	196	237	165	220
Orf **	40	37	26	39	48	44	38	41	36	49
Pasteurella multocida **	N/A	N/A	N/A	N/A	336†	394	540	510	464	378
Psittacosis (*C. psittaci*) **	14	9	3	1	2	1	3	8	0	2
Q fever **	3	3	6	5	4	5	3	5	8	6
Rabies 'classical'	0	0	0	0	0	1	0	0	0	0
Rabies EBLV	0	2	0	1	1	2	1	0	0	0
Salmonella (all types) ***#	4,116	3,324	3,218	3,119	2,352	2,311	2,672	3,513	2,961	3,344
Streptococcus suis **	82	91	96	90	100	132	115	139	124	96
Swine Influenza **	20	10	20	13	10	16	18	40	37	38
Toxoplasmosis **	405	365	417	380	424	257	232	267	189	348
Trichinellosis	0	0	0	0	1	0	1	0	0	0
Yersiniosis **	N/A	N/A	N/A	28†	24†	32†	37	23	44	50

[A] The tables in appendix 4 are not intended to provide a definitive list of all zoonotic pathogens, but include those for which data are available (notifiable/reportable and those recorded by VIDA system and or AFBI systems). The VIDA data provides figures only for new incidents with relevant VIDA codes (as per FZ2100 reporting). The FSA supplied the Trichinellosis data.
[B] Only highly pathogenic strains of avian influenza were notified. Table shows number of HPAI incidents p.a.

[C] Data for GB countries for new TB breakdowns in cattle herds included in this table is not directly comparable across this table. Since 2008 the figures are based on data derived from AHVLA's Sam system. Sam is an AHVLA IT system that holds information on all customers, and helps manage specific work areas such as TB. Prior to 2008 a different data system was in use and the data produced is not exactly comparable with the statistics produced from Sam. In addition the UK total is not the sum of the number of new incidents in each national table as a balancing amount is included in the overall GB total for cases where the exact region is unknown, and is therefore reflected in this UK figure. This balancing amount in 2012 was 66, 56 in 2011, 5 in 2010, 2 in 2009 and 1 in 2008.
[D] Laboratory, not abattoir, diagnoses.
** Confirmed cases obtained through scanning surveillance/ VIDA database.
*** Confirmed cases statutorily reportable under Zoonoses Order 1989.
† GB data.
‡ Data for GB countries included in this table has been derived from the incidents recorded on AHVLA's Veterinary Diagnostic Analysis (VIDA) system. This uses strict criteria and so not all isolated Campylobacter are included in this table.
Φ Data only includes isolations from cattle and sheep in GB.
Data for GB countries included in this table relates only to salmonella isolations from the statutory species (cattle, sheep, goats, pigs, horses, deer, rabbits, chickens, turkeys, ducks, geese, partridges, pheasants, guinea fowl, quail and pigeons).

England

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Anthrax	0	0	0	0	0	0	0	0	0	0
Avian Influenza [A]	0	0	0	0	1	2	0	0	0	0
New TB breakdowns in cattle herds [B]	3214†	3341†	3665†	3530†	4188†	3,765	3,362	3,634	3,765	3,932
M. bovis isolates in non-bovine animals (excludes badgers) †	35	56	64	78	68	119	144	134	133	98
Mycobacterium species in non-bovine animals (excluding *M. bovis*)	18†	25†	55†	138†	104†	77†	122†	130†	140†	14
*Brucella abortus****	0	0	0	0	0	0	0	0	0	0
*Brucella melitensis****	0	0	0	0	0	0	0	0	0	0
Brucella sp *** (in marine mammals)	2	1	1	0	0	6	4	0	1	7
BSE	421	229	153	78	39	25	9	11	5	2
Campylobacter **‡	113	182	96	117	125	94	93	148	93	73
Chlamydiosis (*Chlamydophila abortus*) fetopathy**	242	194	230	258	263	201	219	215	226	260
Cryptosporidiosis **	N/A	N/A	N/A	N/A	N/A	1311†	1346†	1674†	1095†	1163†
Hydatid **[C]	0	0	0	0	0	0	0	0	0	0
Leptospirosis **	67	23	34	26	45	16	5	8	3	15
Listeriosis **†	114	101	86	118	132	191	177	215	146	175
Orf **	28	24	18	25	29	26	26	29	20	30
Pasteurella multocida **	N/A	N/A	N/A	N/A	336†	281†	319†	368†	316†	238†
Psittacosis (*C. psittaci*) **	8	5	0	0	1	0	1	4	0	1
Q fever **	2	2	4	4	4	3	3	5	3	5
Rabies 'classical'	0	0	0	0	0	1	0	0	0	0
Rabies EBLV	0	2	0	1	1	2	0	0	0	0
Salmonella (all types) ***#	3,359	2,703	2,689	2,658	1,948	1,729	2,198	3,044	2,392	2,739
Streptococcus suis **	70	80	69	67	67	96	83	94	94	66
Swine Influenza **	18	10	18	12	9	16	13	31	34	36
Toxoplasmosis **	171	166	174	170	166	93	115	101	84	146
Trichinellosis	0	0	0	0	0	0	0	0	0	0
Yersiniosis **	N/A	N/A	N/A	28†	24†	32†	33†	15†	22†	16†

[A] Only highly pathogenic strains of avian influenza were notified. Table shows number of HPAI incidents p.a..

[B] Data for new TB breakdowns in cattle herds is not directly comparable across this table. Since 2008 the figures are based on data derived from AHVLA's Sam system. Prior to 2008 a different data system was in use and the data produced is not exactly comparable with the statistics produced from Sam.

[C] Laboratory, not abattoir, diagnoses.

** Confirmed cases obtained through scanning surveillance/ VIDA database.

*** Confirmed cases statutorily reportable under Zoonoses Order 1989.

† GB data.

‡ Data has been derived from the incidents recorded on AHVLA's Veterinary Diagnostic Analysis (VIDA) system. This uses strict criteria and so not all isolated Campylobacter are included in this table.

Data provided in the table combines results for England and Wales and relates only to salmonella isolations from the statutory species (cattle, sheep, goats, pigs, horses, deer, rabbits, chickens, turkeys, ducks, geese, partridges, pheasants, guinea fowl, quail and pigeons).

Northern Ireland

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Anthrax	0	0	0	0	0	0	0	0	0	0
Avian Influenza [A]	0	0	0	0	0	0	0	0	0	0
New TB breakdowns in cattle herds per year and the % Herd incidence	2,356 9.56	2,324 9.17	1,792 7.22	1,513 6.23	1,264 5.35	1,274 5.58	1,293 5.61	1,160 5.12	1,386 6.00	1,695 7.32
M. bovis isolates in non-bovine animals (excludes badgers)	8	8	8	11	9	4	12	8	9	1
Mycobacterium species in non-bovine animals (excluding *M. bovis*)	7	14	13	48	42	30	27	14	0	0
Brucella abortus- number of reactor herds per year and confirmed infected herds	161	125	88	118	151 53	177 34	71 13	74 25	21 4	23 1
*Brucella melitensis***	0	0	0	0	0	0	0	0	0	0
Brucella sp *** (in marine mammals)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BSE	62	34	23	10	14	4	3	0	2	1
Campylobacter **	43	39	18	47	36	35	15	46	25	35
Chlamydiosis (*Chlamydophila abortus*) fetopathy**	85	52	82	61	40	36	39	55	61	68
Cryptosporidiosis **	N/A	N/A	N/A	N/A	N/A	N/A	90	94 Φ	286 Φ	736 Φ
Hydatid **[B]	N/A	N/A	N/A	N/A	0	0	0	0	0	0
Leptospirosis **	218	217	161	113	106	199	84	105	46	70
Listeriosis **	20	33	17	30	20	25	19	22	19	45
Orf **	1	1	0	2	3	1	1	1	1	0
Pasteurella multocida **	N/A	N/A	N/A	N/A	N/A	113	221	142	148	140
Psittacosis (*C. psittaci*) **	0	0	0	0	0	0	0	0	0	0
Q fever **	0	0	0	0	0	0	0	0	0	0
Rabies 'classical'	0	0	0	0	0	0	0	0	0	0
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonella (all types) ***	299	216	130	184	223	382	252	345	354	426
Streptococcus suis **	4	3	16	5	17	10	14	21	12	19
Swine Influenza **	0	0	0	0	0	0	5	4	0	0
Toxoplasmosis **	59	40	47	53	54	64	44	51	45	100
Trichinellosis	0	0	0	0	1	0	1	0	0	0
Yersiniosis **	N/A	N/A	N/A	N/A	N/A	N/A	4	8	22	34

[A] Only highly pathogenic strains of avian influenza were notified. Table shows number of HPAI incidents p.a.
[B] Laboratory, not abattoir, diagnoses.
** Confirmed cases obtained through scanning surveillance/ AFBI database.
*** Confirmed cases statutorily reportable under Zoonoses Order (NI) 1991.
Φ Data only includes isolations from cattle and sheep.

Scotland

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Anthrax	0	0	0	0	0	0	0	0	0	0
Avian Influenza [A]	0	0	0	0	0	0	0	0	0	0
New TB breakdowns in cattle herds[B]	3214†	3341†	3665†	3530†	4188†	47	49	45	43	54
M. bovis isolates in non-bovine animals (excludes badgers) †	35	56	64	78	68	119	144	134	133	98
Mycobacterium species in non-bovine animals (excluding *M. bovis*)	18†	25†	55†	138†	104†	77†	122†	130†	140†	2
*Brucella abortus****	0	0	0	0	0	0	0	0	0	0
*Brucella melitensis****	0	0	0	0	0	0	0	0	0	0
Brucella sp *** (in marine mammals)	12	6	12	8	11	4	3	7	8	6
BSE	41	37	22	12	7	1	0	0	0	0
Campylobacter **‡	64	50	40	28	44	35	39	47	34	25
Chlamydiosis (*Chlamydophila abortus*) fetopathy**	125	79	112	97	140	65	66	52	79	103
Cryptosporidiosis **	N/A	N/A	N/A	N/A	N/A	1311†	1346†	1674†	1095†	1163†
Hydatid **[C]	0	1	0	0	0	0	0	0	0	0
Leptospirosis **	8	10	10	16	41	22	0	0	0	0
Listeriosis **†	114	101	86	118	132	191	177	215	146	175
Orf **	10	6	2	10	8	10	6	8	7	8
Pasteurella multocida **	N/A	N/A	N/A	N/A	336†	281†	319†	368†	316†	238†
Psittacosis (*C. psittaci*) **	6	4	3	1	1	1	1	4	0	1
Q fever **	0	0	0	0	0	0	0	0	0	0
Rabies 'classical'	0	0	0	0	0	0	0	0	0	0
Rabies EBLV	0	0	0	0	0	0	1	0	0	0
Salmonella (all types) ***#	458	405	399	277	181	200	222	124	215	179
Streptococcus suis **	8	7	11	14	14	26	17	22	18	8
Swine Influenza **	1	0	2	1	1	0	0	5	3	2
Toxoplasmosis **	125	96	124	94	142	68	52	91	31	66
Trichinellosis	0	0	0	0	0	0	0	0	0	0
Yersiniosis **	N/A	N/A	N/A	28†	24†	32†	33†	15†	22†	16†

[A] Only highly pathogenic strains of avian influenza were notified. Table shows number of HPAI incidents p.a.

[B] Data for new TB breakdowns in cattle herds is not directly comparable across this table. Since 2008 the figures are based on data derived from AHVLA's Sam system. Sam is an AHVLA IT system that holds information on all customers, and helps manage specific work areas such as TB. Prior to 2008 a different data system was in use and the data produced is not exactly comparable with the statistics produced from Sam.

[C] Laboratory, not abattoir, diagnoses.

** Confirmed cases obtained through scanning surveillance/ VIDA database.

*** Confirmed cases statutorily reportable under Zoonoses Order 1989.

† GB data.

‡ Data has been derived from the incidents recorded on AHVLA's Veterinary Diagnostic Analysis (VIDA) system. This uses strict criteria and so not all isolated Campylobacter are included in this table.

Data provided in the table relates only to salmonella isolations from the statutory species (cattle, sheep, goats, pigs, horses, deer, rabbits, chickens, turkeys, ducks, geese, partridges, pheasants, guinea fowl, quail and pigeons).

Wales

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Anthrax	0	0	0	2	0	0	0	0	0	0
Avian Influenza [A]	0	0	0	0	0	0	0	0	0	0
New TB breakdowns in cattle herds[B]	3214†	3341†	3665†	3530†	4188†	1,198	1,186	1,039	1,043	1,121
M. bovis isolates in non-bovine animals (excludes badgers) †	35	56	64	78	68	119	144	134	133	98
Mycobacterium species in non-bovine animals (excluding *M. bovis*)	18†	25†	55†	138†	104†	77†	122†	130†	140†	0
*Brucella abortus****	0	0	0	0	0	0	0	0	0	0
*Brucella melitensis****	0	0	0	0	0	0	0	0	0	0
Brucella sp *** (in marine mammals)	0	0	0	0	0	0	0	0	0	0
BSE	86	43	28	14	7	7	0	0	0	0
Campylobacter **‡	35	38	9	19	46	22	17	39	26	11
Chlamydiosis (*Chlamydophila abortus*) fetopathy**	185	107	124	92	110	70	82	75	81	108
Cryptosporidiosis **	N/A	N/A	N/A	N/A	N/A	1311†	1346†	1674†	1095†	1163†
Hydatid **[C]	0	0	0	0	0	0	0	0	0	0
Leptospirosis **	14	5	4	2	5	1	0	0	1	0
Listeriosis **†	114	101	86	118	132	191	177	215	146	175
Orf **	1	6	6	2	8	7	5	3	8	11
Pasteurella multocida **	N/A	N/A	N/A	N/A	336†	281†	319†	368†	316†	238†
Psittacosis (*C. psittaci*) **	0	0	0	0	0	0	1	0	0	0
Q fever **	1	1	2	1	0	2	0	0	5	1
Rabies 'classical'	0	0	0	0	0	0	0	0	0	0
Rabies EBLV	0	0	0	0	0	0	0	0	0	0
Salmonella (all types) ***#	3,359	2,703	2,689	2,658	1,948	1,729	2,198	3,044	2,392	2,739
Streptococcus suis **	0	1	0	4	2	0	1	2	0	3
Swine Influenza **	1	0	0	0	0	0	0	0	0	0
Toxoplasmosis **	50	63	72	63	62	32	21	24	29	36
Trichinellosis	0	0	0	0	0	0	0	0	0	0
Yersiniosis **	N/A	N/A	N/A	28†	24†	32†	33†	15†	22†	16†

[A] Only highly pathogenic strains of avian influenza were notified. Table shows number of HPAI incidents p.a.

[B] Data for new TB breakdowns in cattle herds is not directly comparable across this table. Since 2008 the figures are based on data derived from AHVLA's Sam system. Sam is an AHVLA IT system that holds information on all customers, and helps manage specific work areas such as TB. Prior to 2008 a different data system was in use and the data produced is not exactly comparable with the statistics produced from Sam.

[C] Laboratory, not abattoir, diagnoses.

** Confirmed cases obtained through scanning surveillance/ VIDA database.

*** Confirmed cases statutorily reportable under Zoonoses Order 1989.

† GB data.

‡ Data has been derived from the incidents recorded on AHVLA's Veterinary Diagnostic Analysis (VIDA) system. This uses strict criteria and so not all isolated Campylobacter are included in this table.

Data provided in the table combines results for England and Wales and relates only to salmonella isolations from the statutory species (cattle, sheep, goats, pigs, horses, deer, rabbits, chickens, turkeys, ducks, geese, partridges, pheasants, guinea fowl, quail and pigeons).

Appendix 5: Food vehicles associated with foodborne gastrointestinal outbreaks in the UK in relation to Campylobacter, L. monocytogenes, Salmonella, and VTEC O157

Food vehicle category	*Campylobacter*	*L. monocytogenes*	*Salmonella*	VTEC O157
Poultry meat	6	0	0	0
Red meat	1	2	2	4
Vegetables & fruits	0	0	2	0
Eggs & egg dishes	0	0	3	0
Composite/Mixed foods	0	0	1	0
Potable water	0	0	0	0
Unknown	0	0	6	0
Total*	7	2	14	4

Appendix 6: Animal population

Number of livestock in the UK in 2012

	England	Wales	Scotland	N. Ireland	UK
Cattle	5,450,787	1,142,603	1,815,658	1,625,446	10,034,494
Sheep	14,325,847	8,619,414	6,801,134	1,968,872	31,715,267
Pigs	3,599,559	25,809	389,995	426,900	4,442,287
Poultry	237,811,617	12,728,669	17,982,732	19,128,094	288,790,879
Goats	79,382	8,040	3,756	3,133	94,311
Farmed Deer	20,925	884	5,977	3,064	30,850
Horses	871,409	113,163	73,062	12,007	1,069,641

*Source: Radar Veterinary Surveillance database (Defra)

Cattle data are for 1st June 2011 and obtained from the GB Cattle Tracing System on 10th June 2012.

Pig, sheep and goat numbers come from the June Agricultural Surveys for 2011.

Poultry data are for 31/12/2011 obtained from the GB Poultry Register on 10th June 2012.

Farmed deer numbers come from the June Agricultural Survey for 2011.

Horse population data obtained from the National Equine Database on 6th April 2012.

Northern Ireland data provided by Department of Agriculture and Rural Development Northern Ireland, 2012.

Note that figures in the above table are a snapshot of the population at a specific time during the year, as shown in the table footnotes. For further information on data quality including accuracy and comparability contact: vetsurveillance@defra.gov.uk

Number of pets owned in the UK in 2012[74]

PFMA research shows that in 2012 48% of UK households owned at least one pet. This would be approximately 13 million households with pets, out of approximately 27 million UK households in total. The table below shows the estimated population of UK pets, as well as a breakdown of the most popular pets, in 2012.

Species	Approximate number of pets (millions)
Dogs	8
Cats	8
Rabbits	1
Birds (indoor)	1
Guinea Pigs	1
Hamsters	Over 0.5
Outdoor fish	20 - 25
Indoor fish	20 - 25
Domestic fowl	Over 0.5

[74] Source: Pet Food Manufacturers' Association: www.pfma.org.uk

Appendix 7: Further reading

General further reading

Advisory Committee on the Microbiological Safety of Food: Report on microbial antibiotic resistance in relation to food safety. The Stationery Office, ISBN 0 11 322283 1.

http://acmsf.food.gov.uk/acmsfreps/acmsfreports

Defra - Zoonoses web pages

www.defra.gov.uk/animal-diseases/zoonotic/

Defra Publications - Zoonoses Reports UK

www.defra.gov.uk/animal-diseases/zoonotic/

Food Standards Agency: A report on the study of Infectious Intestinal Disease in England, The Stationery Office, ISBN 0 11 322308 0

www.food.gov.uk/science/research/foodborneillness/microfunders/intestinal

Food Standard Agency – Foodborne Illnesses web pages

www.food.gov.uk/safereating/microbiology/58736

Public Health England - Zoonoses web pages

www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Zoonoses/

Public Health England - Zoonoses newsletters

www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Zoonoses/ZoonosesNewsletters

Health Protection Scotland – Outbreaks in Scotland in 2012

http://www.documents.hps.scot.nhs.uk/ewr/pdf2013/1320.pdf

HSE Agriculture Information Sheet 2 'Common zoonoses in agriculture' available free from HSE Books, tel. 01787 881165

www.hse.gov.uk/pubns/ais2.pdf

Joint Agency Guidelines for the Investigation of Zoonotic Disease (England and Wales)
www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1240530336599

Guidelines for the investigation of zoonotic disease in Scotland

http://www.documents.hps.scot.nhs.uk/giz/general/guidelines-investigation-of-zoonotic-diseases.pdf

AHVLA - Non-Statutory Zoonoses Reports www.defra.gov.uk/ahvla-en/publication/zoo-reports/

Oxford Textbook of Zoonoses: Biology, Clinical Practice and Public Health Control, 2nd Ed. (Palmer, Soulsby, Torgerson and Brown) OUP ISBN 9780198570028

Disease specific further information:

Useful links can also be found at the end of each A-Z section.

Appendix 8: List of Abbreviations/ Acronyms

AFBI	Agri-Food and Biosciences Institute
AHVLA	Animal Health and Veterinary Laboratories Agency
AI	Avian Influenza
AMR	Antimicrobial Resistance
BSE	Bovine Spongiform Encephalopathy
bTB	Bovine Tuberculosis
CCDC	Consultant in Communicable Disease Control
CCHF	Crimean Congo Haemorrhagic Fever
CJD	Creutzfeldt-Jakob Disease
CMO	Chief Medical Officer
DARD	Department of Agriculture and Rural Development (Northern Ireland)
Defra	Department for Environment, Food and Rural Affairs
DH	Department of Health
EAE	Enzootic Abortion of Ewes
EBLV	European Bat Lyssavirus
EM	*Echinococcus multilocularis*
ESF	Equestrian Staging Facility
EU	European Union
FSA	Food Standards Agency
GB	Great Britain (England, Wales, Scotland)
GP	General Practitioner
HAIRS	Human, Animal Infections and Risk Surveillance Group
HEV	Hepatitis E Virus
HPA	Health Protection Agency
HPAI	Highly Pathogenic Avian Influenza
HPS	Health Protection Scotland
HSE	Health and Safety Executive
IgG	Immunoglobulin type G
LOCOG	London Organising Committee of the Olympic and Paralympic Games
LPAI	Low Pathogenic Avian Influenza
NCP	National Control Programme for *Salmonella* in Poultry

NHS	National Health Service
OBF	Officially Brucellosis Free
PCR	Polymerase Chain Reaction
PHA	Public Health Agency (Northern Ireland)
PHE	Public Health England
PHW	Public Health Wales
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (HSE)
SG	Scottish Government
SitRep	Situation Report
SRUC	Scotland's Rural Colleges (created on 1st October 2012, formally SAC)
TB	Tuberculosis
TSE	Transmissible Spongiform Encephalopathy
UK	United Kingdom (England, Wales, Scotland, Northern Ireland)
UKZADI	United Kingdom Zoonoses, Animal Diseases and Infections Group
vCJD	Variant Creutzfeldt-Jakob disease
VIDA	Veterinary Investigation Diagnosis Analysis Database
VTEC	Verocytotoxigenic *Escherichia coli*
WG	Welsh Government
WHO	World Health Organisation

Appendix 9: Acknowledgements

This report was produced by a small group formed under the Chairmanship of Dilys Morgan, PHE. The group contained representatives of, or received assistance from, the following organisations:

Animal Health and Veterinary Laboratories Agency (AHVLA)

New Haw, Addlestone, Surrey KT15 3NB

www.defra.gov.uk/ahvla/

***Cryptosporidium* Reference Unit** (PHE Collaborating Laboratory)

Public Health Wales, Microbiology Swansea, Singleton Hospital, Sketty, Swansea SA2 8QA

www.wales.nhs.uk/sites3/page.cfm?orgId=457&pid=25284

Department for Environment, Food and Rural Affairs (Defra)

Area 5B, Nobel House, 17 Smith Square, London SW1P 3JR

https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

Department of Agriculture and Rural Development (Northern Ireland) (DARD)

Dundonald House, Upper Newtownards Road, Belfast BT4 3SB

www.dardni.gov.uk

Department of Health

Skipton House, 80 London Road, Elephant and Castle, London SE1 6LW

www.dh.gov.uk

Department of Health, Social Services & Public Safety (Northern Ireland)

Castle Buildings, Stormont, Belfast BT4 3SJ

www.dhsspsni.gov.uk

Food Standards Agency (FSA)

Aviation House, 125 Kingsway, London WC2B 6NH

www.food.gov.uk

Health Protection Scotland (HPS)

Meridian Court, 5 Cadogan Street, Glasgow G2 6QE

www.hps.scot.nhs.uk

***Leptospira* Reference Unit** (PHE Collaborating Laboratory)

Department of Microbiology and Immunology, County Hospital, Hereford HR1 2ER

www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1200660022261

Lyme Borreliosis Unit[75]

Southampton PHE Laboratory, Level B South Laboratory Block, Southampton General Hospital, Southampton SO16 6YD

www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1200660022877

National Lyme Disease Testing Service (Scotland)

Microbiology department, Raigmore Hospital, Inverness IV2 3UJ

Public Health Agency (Northern Ireland)

18 Ormeau Avenue, Belfast, BT2 8HS

www.publichealth.hscni.net/

Public Health England (PHE) (formerly HPA)

PHE Colindale, 61 Colindale Avenue, London NW9 5EQ

www.phe.gov.uk

Public Health Wales

Communicable Disease Surveillance Centre, Health Protection Division, The Temple of Peace and Health, Cathays Park, Cardiff CF10 3NW

www.wales.nhs.uk/sitesplus/888

Rare and Imported Pathogens Laboratory, Porton

Public Health England Porton, Porton Down, Salisbury, Wiltshire, SP4 0JG

http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/QFever/LaboratoryInformation/

[75] Function moved to RIPL in June 2012

Scotland's Rural Colleges

West Mains Road, Edinburgh EH9 3JG

http://www.sruc.ac.uk/

Scottish *E. coli* O157/VTEC Reference Laboratory (SERL)

Department of Clinical Microbiology, Western General Hospital, Crewe Road, Edinburgh EH4 2XU

www.hps.scot.nhs.uk/reflab/RefLabDetail.aspx?id=13

Scottish Government, Rural Directorate

Saughton House, Broom House Drive, Edinburgh EH11 3XD

www.scotland.gov.uk

Scottish Parasite Diagnostic and Reference Laboratory

House-on-the-Hill, Stobhill Hospital, 133 Balornock Road, Glasgow, G21 3UW

http://www.spdl.scot.nhs.uk

Scottish *Salmonella* Reference Laboratory

North Glasgow University Hospitals NHS Trust, 133 Balornock Road, Glasgow G21 3UW

www.ssrl.scot.nhs.uk/

Scottish Toxoplasma Reference Laboratory

Microbiology department, Raigmore Hospital, Inverness IV2 3UJ

***Toxoplasma* Reference Unit** (PHE Collaborating Laboratory)

Public Health Wales, Microbiology Swansea, Singleton Hospital, Sketty, Swansea SA2 8QA

www.wales.nhs.uk/sites3/page.cfm?orgId=457&pid=25359

Welsh Government (WG)

Cathays Park, Cardiff, CF10 3NQ

www.wales.gov.uk