Zoonoses Report

United Kingdom 2002

Scottish Executive Environment and Rural Affairs
Department
Welsh Assembly Government
Department of Agriculture and Rural Development,
Northern Ireland
Department of Health
Food Standards Agency

Department for Environment
Food and Rural Affairs

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United Kingdom 2002

DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

SCOTTISH EXECUTIVE

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PREFACE

This report gives an overview of zoonoses in the United Kingdom (UK) in 2002. It has been produced as a result of collaboration between the organisations listed in Appendix 1.

Zoonoses are defined by the World Health Organisation as ‘diseases and infections which are transmitted naturally between vertebrate animals and man’. Zoonoses cover a broad range of diseases with different clinical and epidemiological features and control measures, because the causative organism may be viral, bacterial, fungal, protozoal, parasitic or any other communicable agent. In the UK not all zoonoses may be reported to national surveillance centres (Appendix 2).

This is the fifth United Kingdom (UK) report[1] which pulls together information on zoonoses. It is hoped that this will be especially useful to the professionals who deal with zoonotic diseases. The report also seeks to give the non-specialist an insight into zoonoses, their prevalence and importance. It is not possible to cover all the zoonoses in a report of this nature. The more important ones are covered in some detail, whilst others which occur infrequently, or are associated with certain occupations or activities, are given only a brief mention.

Zoonotic infections in man can occur by a variety of routes, which include foodborne, waterborne, direct contact and through insect vectors. In the United Kingdom, the foodborne source is thought to be the most common.

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[1] The first four reports - Zoonoses Report UK 1998, 1999, 2000, and 2001 are available on http://www.defra.gov.uk/animalh/diseases/zoonoses/reports.htm

INTRODUCTION

In man, a series of steps have to be undertaken before a confirmed case of infection is recorded. Laboratory confirmed cases represent patients who have consulted a doctor, the doctor has ordered a laboratory investigation, obtained a positive result from the laboratory and the laboratory or doctor have reported the result to their national communicable disease surveillance centre (Appendix 2). Not all zoonotic diseases are notifiable under Public Health legislation (Appendix 3). Thus recorded cases represent only the "tip of the iceberg" as many patients do not seek medical attention, or their doctor does not request a laboratory investigation, or a positive result is either not notified or the occurrence of the disease is not notifiable. Reports also tend to be biased towards more clinically severe cases in high risk groups. A certain amount is known about this from a special study on Infectious Intestinal Disease carried out in the early 1990s.[2]

Similarly in animals for many diseases available data represent only a small proportion of the total cases. In these cases the information will, in general, have arisen through a farmer bringing a problem to the attention of his/her veterinary surgeon and the private veterinary surgeon submitting samples to a veterinary laboratory for examination. There is a statutory requirement for laboratories to report to the government the isolation of *Salmonella* or *Brucella* organisms from livestock samples specified in the legislation. Some zoonoses do not cause disease in animals so samples will not be submitted to the laboratory for examination unless a programme of monitoring has been specifically implemented to detect them, or samples are taken as a result of an investigation into an outbreak of disease in humans. A number of animal diseases, some of which are zoonoses, are notifiable on suspicion of the disease and comprehensive information on these is available (Appendix 4).

During 2001 the normal surveillance of animal disease was interrupted as the result of a large outbreak of foot and mouth disease. The control measures implemented to eradicate the disease disrupted the normal routine animal surveillance activities. There was also disruption to the management activities on many farms, and a reduction in the contact which the general public had with livestock. The full implication of the outbreak in relation to surveillance information on animal diseases and zoonoses is not fully understood. Caution is therefore required when comparing information on zoonotic infections in animals in 2001 with information collected in previous years and in subsequent years.

The number of livestock in the UK in 2002[3] and the number of pet animals[4] are presented in Appendix 4a. Any shortfall in UK production is likely to be balanced by import of products and this may affect the risk of foodborne disease.

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[2] *BMJ* 1999;318:1046-1050 Study of infectious intestinal disease in England: rates in the community, presenting to general practice, and reported to national surveillance Wheeler, J G et al
[3] www.defra.gov.uk
[4] Source of data - The Pet Food Manufacturers' Association

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 potable water and food production. The UK government operates a national microbiological food surveillance programme and carries out regular surveillance studies on foods and food processes. Local Authorities also carry out surveillance, although data from this activity are not systematically collated nationally. The Epidemiology of Foodborne Infections Group brings together surveillance data in humans and animals. There is a co-ordinating group on surveillance of animal disease and infection chaired by the Chief Veterinary Officer. In 1999 the National Zoonoses Group for England was set up to provide a high-level forum for discussions on zoonoses in England. The Group was established jointly by the Department of Health and MAFF (now Defra). It brought together the professionals from both central and local government involved in animal and public health aspects of zoonoses and their control in England. Similar Groups already existed in Scotland, and Wales. In 2001 the National Zoonoses Group was replaced by the UK Zoonoses Group. The formation of the UK Zoonoses Group is in line with the recommendation in the Phillips Report on BSE for better liaison between central government, devolved administrations, and local enforcement and health organisations on animal and human health issues that have implications for the whole of the UK. The Group advises Agriculture and Health Ministers on zoonoses issues.

The Food Standards Agency (FSA) was set up on 1 April 2000. The Agency, which operates on a UK basis took over the responsibility for food safety previously shared by MAFF and the Department of Health.

The main sources of data which help to build a picture of the burden of zoonotic infection in the human and animal populations in the UK are considered and discussed in Appendix 7. Appendix 7 should be referred to when studying the information in the rest of the report as it affects interpretation and comparisons of the data presented. A small selection of further reading and reference material is given in Appendix 5.

This report attempts to look at information relating to the whole of the UK, consisting of England, Wales, Scotland and Northern Ireland. Due to differences in recording data, information relating to only part of the UK is presented on some aspects, and at times data from a single country may be highlighted.

MAJOR FOODBORNE AND WATERBORNE ZOONOSES

In 2002 the Public Health Laboratory Service (PHLS) published an estimate of the population burden of foodborne disease. This represented the first time that data from a variety of different surveillance systems were reconciled into a single figure. The report's authors estimated that, in 2000, there were 1,388,772 cases of foodborne infection acquired in England and Wales, 20,759 hospital admissions and 480 deaths. In terms of disease burden the most important pathogens were campylobacters, salmonellae, *Clostridium perfringens*, Verocytotoxin-producing *Escherichia coli* (VTEC) O157 and *Listeria monocytogenes*.

CAMPYLOBACTER

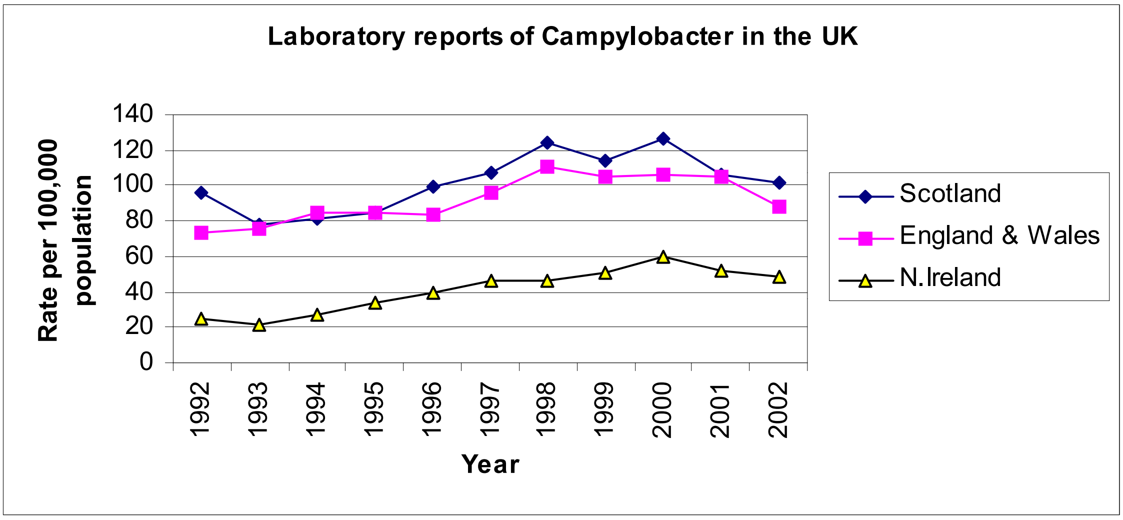
In 1972, an association between human enteric illness and *Campylobacter jejuni* was demonstrated. During the last 25 years, reported cases of human illness caused by *Campylobacter* spp. have generally risen year on year, but have remained stable lately and now appear to be declining. Campylobacter is the most commonly isolated bacterial gastrointestinal pathogen. In 2002, 52,519 reports were recorded in the UK, compared with a peak of 65,209 in 1998. The ratio of infection in the community to reports to national surveillance for *Campylobacter* spp. is approximately 8 to 1. This means that, in 2002, there were nearly half a million campylobacter cases in the community.

Campylobacter in humans

Campylobacter infection causes diarrhoea, which is often bloodstained, and which is frequently associated with colicky abdominal pain, which may mimic acute appendicitis. Symptoms may clear up within a couple of days, or may persist for weeks.

Most *Campylobacter* spp. are not serotyped, but where this is carried out *C. jejuni* is predominant with the remainder mostly being *C. coli*. Figure 1 shows the trend in laboratory reports of human cases in all parts of the UK over the period 1992 to 2002.

Figure 1



Sources of infection

Most cases of campylobacter infection are sporadic and the route of transmission remains unknown. Poultry meat may be an important vehicle of infection and surveys have shown that a significant proportion of raw poultry meat for human consumption is contaminated before cooking (see Zoonoses Report United Kingdom 2001). Evidence suggests that *Campylobacter* has a low infectious dose and thus cross-contamination of ready to eat foods by raw meat may be an important source of infection.

The role of other animal products, other foods, water and non-foodborne exposures is still under investigation. These studies have been hampered by a lack of routine methods for identifying species and standardised methods for subtyping strains. There is a need for enhanced typing methods to identify those strains in animals which are of public health significance, and to assist in the study of sporadic infections which are the majority. Recent advances in molecular fingerprinting and serotyping have indicated that there may be host-specificity among *Campylobacter*, enabling some isolates to be subdivided into groups affecting poultry only, humans only, and some which affect both.

Data generated through the Campylobacter Sentinel Surveillance Scheme (CSSS), established by the PHLS are starting to generate new insights into the epidemiology of this organism. For example, analysis of the CSSS dataset suggests that point source general outbreaks might be more common than is currently recognised.[5]

In a separate analysis people who described their ethnic origin as Pakistani were at a higher risk of infection, experienced longer periods of illness and higher rates of hospital admission. The Pakistani community reported lower levels of chicken and

[5] Gillespie IA, O'Brien SJ, Adak GK, Tam CC, Frost JA, Bolton FJ, Tompkins DS; Campylobacter Sentinel Surveillance Scheme Collaborators. Point source outbreaks of *Campylobacter jejuni* infection – are they more common than we think and what might cause them? Epidemiol Infect 2003; 130: 367-75

red meat/meat product consumption, lower levels of water consumption and lower levels of contact with animals.[6]

The use of case-case analysis combined with microbiological typing data has revealed the potential for different risk factors for human *Campylobacter jejuni* and *Campylobacter coli* infection,[7] and that the risk of acquiring fluoroquinolone-resistant *C. jejuni* infections are much higher abroad.[8]

Campylobacter in food

A two month Local Authority Co-ordinators of Regulatory Services (LACORS) and the Public Health Laboratory Service (PHLS) study (May - June 2002) was carried out to assess the microbiological quality of ready-to-eat cold sliced meats and paté from catering and retail premises, and to investigate possible links hypothesised by the PHLS Campylobacter Sentinel Surveillance Scheme between foodborne campylobacter infection and the consumption of cold sliced meats and paté.

In total 4078 samples were examined, comprising 2894 cold meats and 1184 patés. All samples were tested for presence or absence of *Campylobacter* and isolates were serotyped, phage typed and screened for antimicrobial resistance.

One of the 2894 (0.03%) cold meat samples (beef) was *Campylobacter* positive (*C. jejuni* HS18 PT44).

Campylobacter in animals

Disease caused by *C. jejuni* and *C. coli* in animals is not notifiable and the isolation of the organism is not reportable. Experimentally these organisms may cause diarrhoea in animals. Under natural conditions they rarely cause disease in farm animals although surveys indicate that the carriage rate is high in livestock. The organism can be isolated from the intestines of healthy farm animals, poultry, pets, and wild birds. Birds, in particular may become heavily colonised.

No survey of animals was carried out in 2002. The last survey conducted January 1999 to March 2000 in cattle sheep and pigs arriving for slaughter (GB) was summarised in Zoonoses Report UK 2000. The following is a summary of the results.

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[6] The Campylobacter Sentinel Surveillance Scheme Collaborators. Ethnicity and campylobacter infection: a population-based questionnaire survey. J Infect 2003; 47: 210-6.
[7] Gillespie IA, O'Brien SJ, Frost JA, Adak GK, Horby P, Swan AV, Painter MJ, Neal KR and the Campylobacter Sentinel Surveillance Scheme Collaborators. A case-case comparison of *Campylobacter coli* and *Campylobacter jejuni* infection: A tool for generating hypotheses. Emerging Infect Dis 2002; 8: 937-42.
[8] The Campylobacter Sentinel Surveillance Scheme Collaborators. Ciprofloxacin resistance in *Campylobacter jejuni*: case-case analysis as a tool for elucidating risks at home and abroad. J Antimicrob Chemother 2002; 50: 561-568.

Prevalence of faecal carriage of campylobacter in cattle, sheep and pigs at slaughter (GB) 1999-2000

	Cattle		Sheep		Pigs	
	N	% positive	N	% positive	N	% positive
Campylobacter spp.	891	24.5	973	17	860	94.5
C. jejuni	-		-		-	3.4
C. coli	-	}13.5	-	}15.8	-	83.7
C. lari	-		-		-	
Others*	-	10.9	-	1.1	-	7.6

N = number examined

A similar repeat survey of cattle, sheep and pigs was commissioned to begin in 2003.

Control measures for Campylobacter

The FSA's Advisory Committee on the Microbiological Safety of Food (ACMSF) has set up a Working Group to develop advice to assist the Agency in evolving its strategy for reducing the incidence of foodborne *Campylobacter* infection. The first tranche of advice, focussing upon on-farm control of *Campylobacter* in poultry, was published in September. The ACMSF concluded that control was a practical proposition in housed flocks, given a commitment by producers to rigorous biosecurity combined with high standards of stockmanship and attention to good flock health and stress control. The Agency is drawing upon this advice in drafting a strategy for the control of *Campylobacter* in poultry. Good practice in safe meat handling, hygiene and cooking are also important control measures.

SALMONELLA

Salmonella in humans

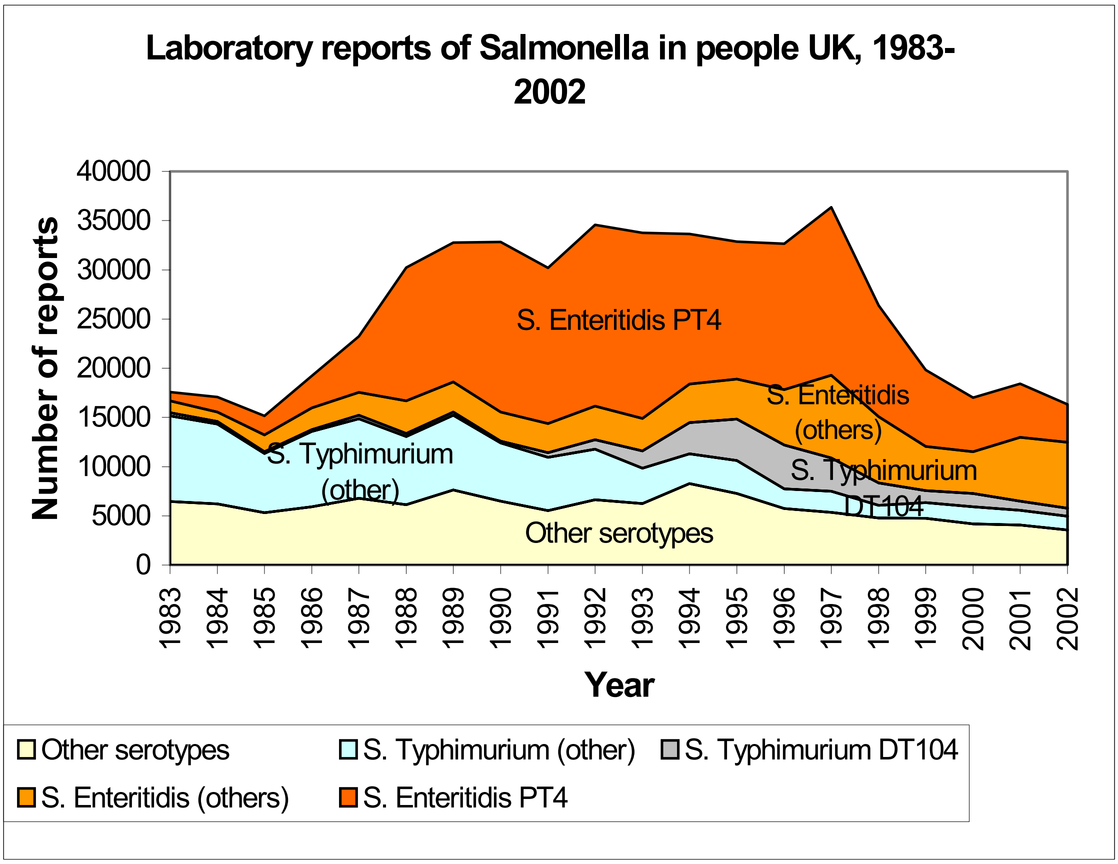
Background

Salmonellae have been recognised as important pathogens and *Salmonella* Enteritidis and *S.* Typhimurium, have accounted for the majority of cases of human salmonellosis for many years and have consistently been the most commonly-implicated pathogens in general outbreaks of foodborne disease. Under-ascertainment of infectious intestinal disease (IID) is well recognised, and the true population burden is greater than that given by national surveillance. For every report to national surveillance for *Salmonella* spp. there are approximately three cases in the community. In 2002, 16,319 laboratory confirmed cases of salmonellosis were reported in the UK, (Figure 2) a fall of around 11% compared with 2001. In 2001 there had been an 8% increase for the UK as a whole over 2000 figures, due to an increase in the number of cases in England and Wales. The *Salmonella* figures in Scotland and Northern Ireland continued to fall (by around 11% in Scotland and 30% in Northern Ireland). The total number of reports in 2002 are approximately half that recorded during the mid-1990s.

Further information on salmonella cases in Northern Ireland is available at http://www.cdscni.org.uk/

Non-typhoidal salmonella infection is usually associated with self-limiting illness characterised by diarrhoea, fever and abdominal pains. However infection can result in more severe disease and even death. Certain serotypes, including *S.* Virchow and *S.* Java, tend to be more invasive.

Figure 2



Laboratory reporting trends

A sharp rise in the incidence of salmonellosis in the UK was observed in the mid 1980s. This was largely due to an increase in *S.* Enteritidis phage type 4 (PT 4) infection. The incidence of this phage type reached a peak in the early 1990s and remained broadly stable until 1998 when a significant fall was recorded throughout most of the UK which continued for the next 2 years. Since then, the decline has continued, albeit less sharply. However, in 2001 and 2002 there has been an increase in non-PT4 *S.* Enteritidis in England & Wales, but not in Scotland or Northern Ireland. At least some of this increase in 2002 was due to outbreaks associated with raw shell eggs used in commercial food preparation. The incidence of *Salmonella* Typhimurium, including *S.* Typhimurium DT 104, has continued to decrease and is now at its lowest for over 30 years. *S.* Enteritidis remains the most commonly isolated salmonella serotype, followed by *S.* Typhimurium, *S.* Virchow and *S.* Hadar (Table 1) in the UK as a whole

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Table 1: The top ten laboratory confirmed *Salmonella* serotypes isolated from people UK 2002

England and Wales		Scotland		Northern Ireland	
Serotype	Rate per 100,000	Serotype	Rate per 100,000	Serotype	Rate per 100,000
S. Enteritidis	18.82	*S.* Enteritidis	12.49	*S.* Enteritidis	5.86
*S.*Typhimurium	3.67	*S.*Typhimurium	4.35	*S.*Typhimurium	4.14
of these DT104	1.39	of these DT104	1.66	of these DT104	0.95
S. Virchow	0.47	S. Virchow	0.71	*S.* Virchow	0.30
S. Hadar	0.40	S. Hadar	0.47	*S.* Montevideo	0.24
S. Agona	0.33	*S.* Agona	0.43	*S.* Hadar	0.18
S. Infantis	0.32	S. Stanley	0.36	*S.* Infantis	0.18
S. Braenderup	0.30	S. Java	0.30	*S.* Braenderup	0.18
S. Java	0.29	S. Montevideo	0.24	*S.* Newport	0.12
S. Newport	0.23	S. Infantis	0.22	*S.* Agona	0.12
S. Montevideo	0.14	S. Blockley	0.18	*S.* Panama	0.12

Salmonella reporting shows a consistent seasonal pattern with a distinct peak of infection observed in August.

Sources of infection

The salmonellae are a group of organisms with a diverse range of host species including mammals, birds, reptiles and fish. Investigations have shown that infection can be acquired through the consumption of a large variety of different foods if they become contaminated, as well as through direct contact with a wide range of animal species and contact with faecally contaminated environments. The serotyping and phage typing schemes that have been developed have enabled microbiologists to differentiate between thousands of salmonella strains with widely varying natural histories, which helps to identify the source of infections.

Epidemiological and microbiological investigations have demonstrated that chicken is the main source for the most important disease causing strains of *S.* Enteritidis. Outbreaks of infection are most commonly associated with the consumption of chicken and lightly cooked egg dishes. Strains of *S.* Typhimurium have been found to be associated with the consumption of a variety of foods including beef, dairy produce, pork, lamb, chicken and turkey. A range of vehicles of infection has been found to be associated with the other serotypes of salmonella. Most are of animal origin, however a wide variety of spices, herbs and other produce have also been implicated in general outbreaks of infection. Table 2 shows the food vehicles associated with outbreaks of *Salmonella* in 2002.

Table 2: Food vehicles associated with outbreaks of Salmonella, UK 2002

Food Vehicle Category	England and Wales	Scotland	N Ireland
Poultry	1	2	0
Red Meat	0	0	0
Fish/Shellfish	0	0	0
Salad, vegetables, fruit	0	0	0
Sauces	2	0	0
Desserts	4	0	0
Milk/milk products	1	0	0
Water	0	0	0
Rice	0	0	0
Eggs	7	0	0
Miscellaneous	5	0	0
Total	20	2	0

Please note that more than one food vehicle can be reported for any one outbreak.

***Salmonella* in food**

A two month Local Authority Co-ordinators of Regulatory Services (LACORS) and the Public Health Laboratory Service (PHLS) study (May - June 2002) was carried out to assess the microbiological quality of ready-to-eat cold sliced meats and pate from catering and retail premises.

In total 4078 samples were examined, comprising 2894 cold meats and 1184 pates. None of the samples examined had *Salmonella* spp. present.

The PHLS initiated an outbreak-related public health investigation (PHI) in response to the dramatic change in the epidemiology of *Salmonella* Enteritidis thought to be associated with raw shell eggs. Raw shell eggs from premises linked to outbreaks of *S.* Enteritidis, or their sources of supply, were examined for the presence or absence of *Salmonella* spp.

From October 2002, public health laboratories tested 32 batches of eggs, comprising 691 pooled samples of six whole eggs (4145 eggs in total) in the PHI. All samples were tested for the presence or absence of *Salmonella*. All isolates from the investigation were serotyped, phage typed and screened for antimicrobial resistance.

Salmonella was recovered from 36 (5.2%) of the 691 pools. Salmonella was isolated from 24 out of 468 (5.1%) pooled samples labelled as originating from Spain; from one out of 74 (1.3%) pooled samples labelled as United Kingdom (UK) origin but not Lion Quality; and from 11 out of 60 (18%) pooled samples of eggs reported as imported but with no country of origin. No salmonellae were recovered from UK eggs bearing the Lion Quality mark (29 pooled samples) or from eggs imported from the United States (US) (60 pooled samples). The 36 positive pools yielded ten different phage types of *S.* Enteritidis, as well as *S.* Altona, *S.* Infantis, and *S.* Ohio.

In response to these events the London local authorities' environmental health departments within the London Food Co-ordinating Group also sampled eggs from large catering outlets, hospitals, and suppliers/distributors, and 726 pooled samples of six whole eggs (4356 eggs in total) were tested.

Salmonella was recovered from seven (0.96%) of the 726 pools. Salmonella was isolated from one of 200 (0.5%) pooled samples labelled as United Kingdom (UK) origin but not Lion Quality; and from six of 140 (4.28%) pooled samples of eggs where the details of the country of origin were not known. No salmonellae were recovered from UK eggs bearing the Lion Quality mark (341 pooled samples) or from eggs from France (45 pooled samples). The seven positive pools yielded *S.* Enteritidis PT4, *S.* Livingstone and *S.* Cerro.

Salmonella in animals

When livestock, particularly poultry and pigs, become infected with *Salmonella*, they frequently become carriers of the infection without showing any clinical signs of ill health. Nevertheless, infection may result in enteritis, septicaemia, or death on occasions and some strains may cause particularly severe illness. Livestock are normally kept in groups, so one infected animal may readily pass on the organisms to the others within the group.

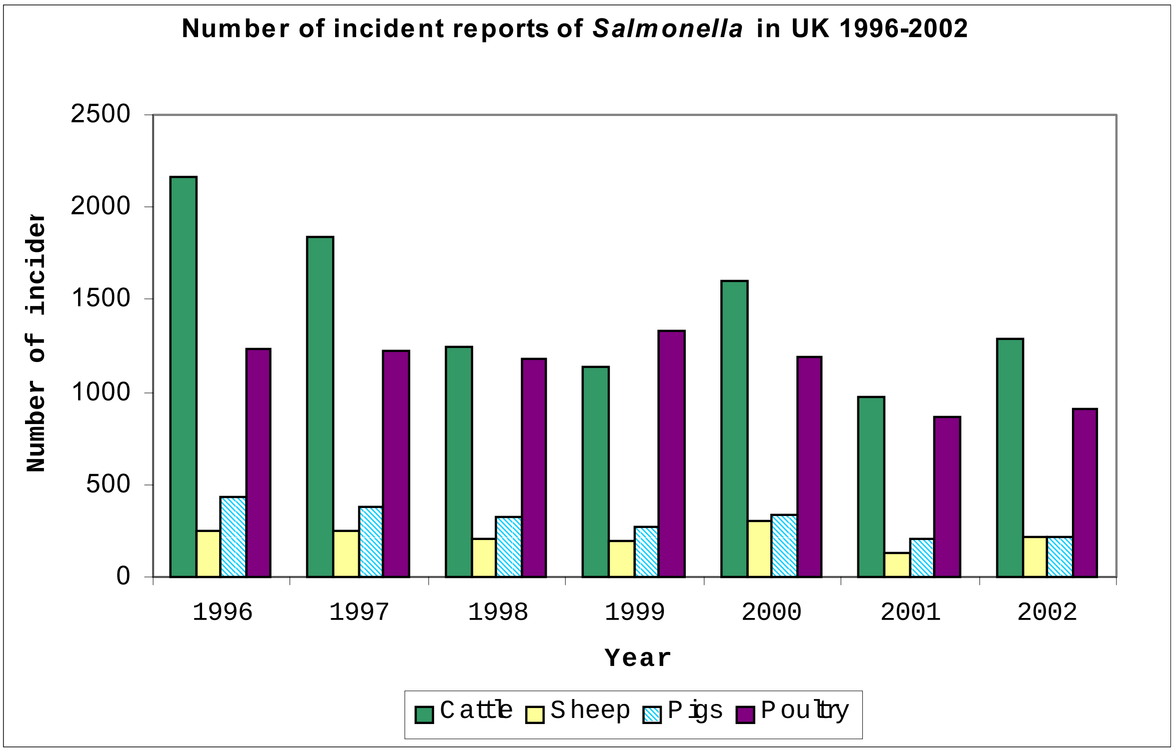
Isolations of *Salmonella* from livestock may result from investigations of disease, statutory surveillance under the government programme to control *Salmonella* in breeding flocks of domestic fowl, voluntary surveillance (mainly poultry) carried out by the industry, or as incidental findings. Varying numbers of animals within a herd or flock may be sampled during investigations and surveillance activity, and samples from a number of animals may be pooled for examination. The animal data for *Salmonella* refer to animal/group/herd/flock incidents rather than total isolates, where an incident comprises all isolations of the same strain of *Salmonella* from an animal or animals in contact in a group/herd/flock on a single premise within a time period based on the knowledge and experience of the farm situation.

In breeding flocks of domestic fowl, the UK implements the sampling requirements of Council Directive 92/117/EEC. All registered breeding flocks of domestic fowl are required to have specified samples taken and submitted to an authorised laboratory for examination for the presence of salmonella. If *S.* Enteritidis or *S.* Typhimurium is officially confirmed in a breeding flock of domestic fowl, no further eggs may be sent for hatching and the flock is slaughtered. This prevents the infection from passing on from the hen through her egg to the newly hatched chick. These measures help to ensure that chickens reared for meat (broilers) and chickens which produce eggs for human consumption (commercial layers) start life free from *S.* Enteritidis and *S.* Typhimurium.

Codes of practice for the control of *Salmonella* in commercial flocks laying eggs for human consumption, in chickens reared for meat on farm, in breeding flocks, and in hatcheries, as well as industry assurance schemes, complement the statutory *Salmonella* control programme. If either *S.* Enteritidis or *S.* Typhimurium is isolated from a commercial flock the premises are visited by government veterinary surgeons and advice is given on measures to be taken to control infection and prevent transmission of disease to subsequent flocks. Vaccines against *S*. Enteritidis have been used as one of the measures to reduce the risk of introducing salmonella into parent broiler breeder flocks and a significant number of table egg producers also operate to a code of practice which requires that layer flocks have been vaccinated against *Salmonella*. Vaccines against *S.* Enteritidis and *S.* Typhimurium are now available for use in poultry.

Figure 3 shows the trends of *Salmonella* incident reports in animals and birds in UK in the period 1996-2002. During 2002 surveillance was increased for the strain of multi drug resistant *S.* Newport reported in the USA mainly in cattle. No similar strains were found. It is important to remember that the trend in the number of reported incidents may not reflect the actual level of infection in a particular animal species and can be influenced by economic factors which affect the number of samples submitted for examination (particularly true in 2001).

Figure 3



The *Salmonella* serotypes commonly reported in incidents in livestock are presented below in Table 3.

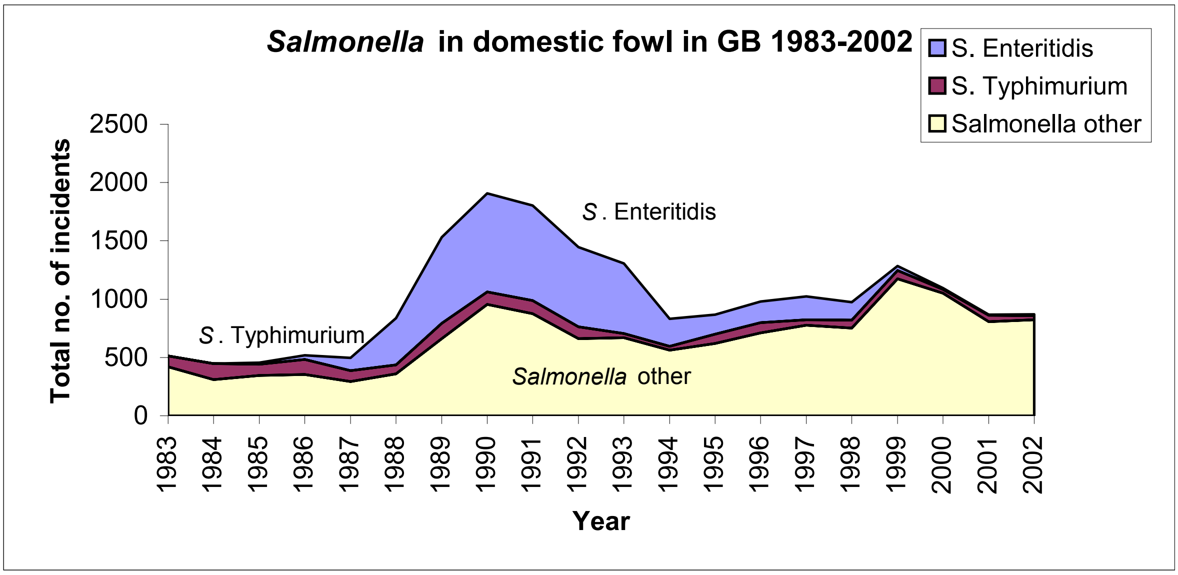
Table 3: The top 10 *Salmonella* Serotypes in livestock incidents in 2002 UK

Cattle*		**Sheep**	
Serotypes	**% of total (1283)**	**Serotypes**	**% of total (212)**
S. Dublin	80.7	*S. diarizonae*	59.4
S. Typhimurium	11.4	*S.* Dublin	21.2
S. Anatum	1.4	*S.* Montevideo	6.1
S. Agama	1.0	*S.* Agama	4.7
S. Newport	0.9	*S.* Typhimurium	4.7
S. Enteritidis	0.5	*S.* Agona	0.5
S. Agona	0.3	*S.* Brandenburg	0.5
S. Thompson	0.3	*S.* Derby	0.5
S. Vejle	0.3	*S.* Enteritidis	0.5
S. Goldcoast	0.2	Others (4 single incidents)	2.0
Chickens**		**Pigs**	
Serotypes*	**% of total (909)**	**Serotypes*****	**% of total (216)**
S. Livingstone	13.4	*S.* Typhimurium	72.2
*S. S*enftenberg	11.8	*S.* Derby	7.4
S. Mbandaka	8.4	*S.* Kedougou	4.6
S. Montevideo	6.9	*S.* London	2.3
S. Binza	6.7	*S.* Reading	2.3
S. Kedougou	6.6	*S.* Goldcoast	1.8
S. Virchow	5.2	*S.* Dublin	0.9
S. Ohio	4.2	*S.* Infantis	0.9
S. Typhimurium	4.0	*S.* Panama	0.9
S. Liverpool	3.4	Rough Strain	0.9

* Serotypes cattle: in 0.6% incidents the structure only could be determined
** Serotypes chicken: in 9.0% incidents the structure only could be determined
***Serotypes pigs: in 2.3% incidents the structure only could be determined

The reported incidents of *S.* Enteritidis in domestic fowl (chickens) have continued to remain at low levels. Figure 4 illustrates how *S.* Enteritidis was at very low levels in the mid 1980s, then increased towards the end of the 1980s. Control measures and codes of practice for the control of salmonella were introduced in 1989 and modified in 1993. *S.* Enteritidis reports have declined in poultry since the mid 1990s. Although there was a fall in the total number of incidents of salmonella serotypes reported in poultry, the figure remains high and is believed to reflect the volume of monitoring carried out by the industry.

Figure 4



Salmonella in poultry breeding flocks

In UK in 2002 there were 709 registered breeding flocks of domestic fowl, turkeys, ducks and geese which supplied hatching eggs to 53 registered hatcheries.

The statutory monitoring of breeding flocks of domestic fowl for *S.* Enteritidis and *S.* Typhimurium continued during 2002. No suspected incidents of either organism were recorded in the breeding sector either through statutory sampling or voluntary sampling carried out by the industry.

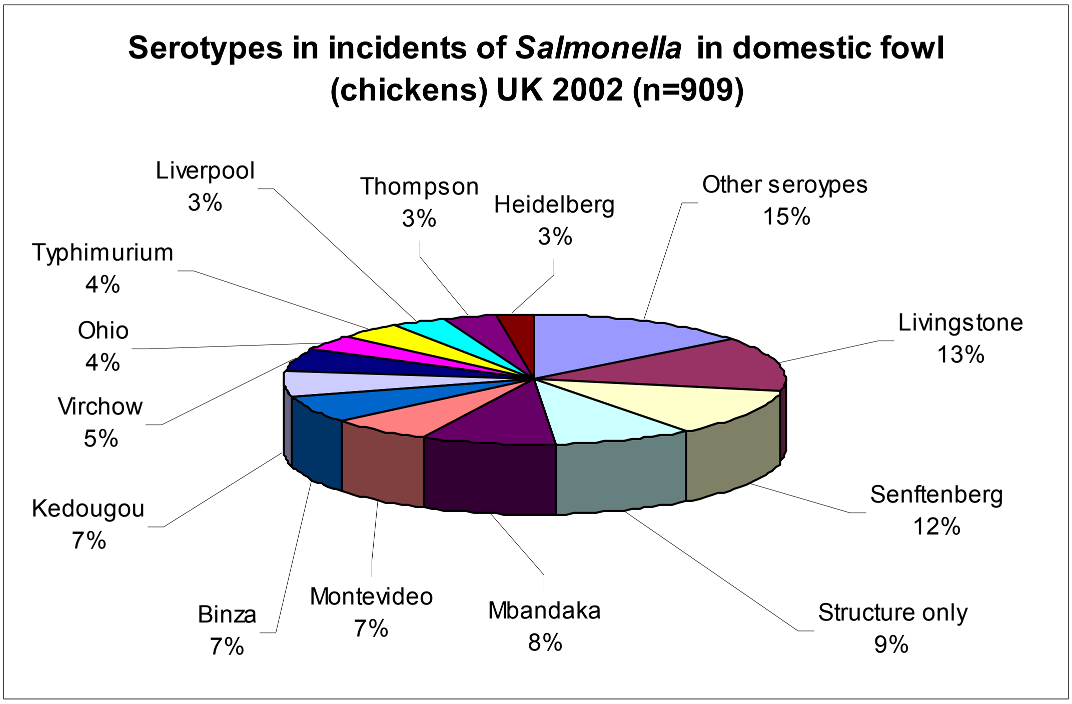
Commercial poultry

The overall number of *Salmonella* incidents reported in layers of eggs for human consumption and in chickens reared for meat (broilers), ducks and turkeys is shown in Table 4. The number of reported incidents of *Salmonella* in broilers remained similar to 2001. The number of reports of *S.* Enteritidis in broilers increased in 2002 but remained at low levels. These birds reared for meat are routinely sampled by the industry around two weeks before they are slaughtered and the most common serotypes found are *S.* Livingstone and *S.* Senftenberg. In hens laying eggs for human consumption the number of reports of any type of *Salmonella* remained low. Voluntary surveillance of commercial duck flocks increased in 2002 and this was reflected by an increase in reports. The most common serotypes reported in ducks were *S.* Indiana, *S.* Binza/Orion and *S.* Hadar.

Table 4: UK reported *Salmonella* incidents in layers, broilers, turkeys, ducks in 2002 compared with 2001

	No. of incidents		*S.* Enteritidis		*S.* Typhimurium		Other serotypes	
	2001	2002	2001	2002	2001	2002	2001	2002
Layers	9	9	6	6	1	1	2	2
Broilers	803	800	0	5	46	35	757	760
Turkeys	235	123	1	0	33	23	201	100
Ducks	34	235	13	11	9	10	12	114

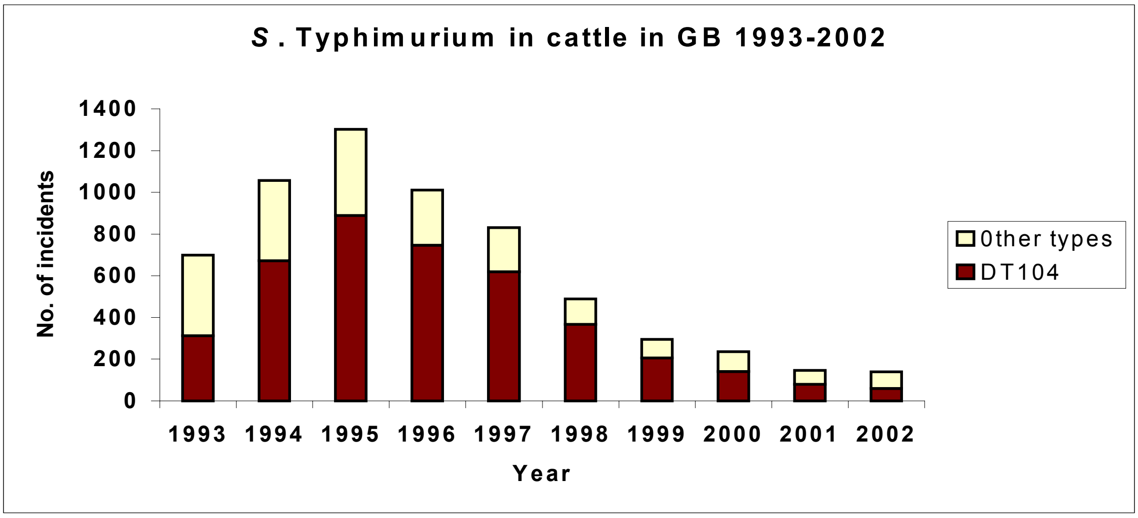
Figure 5



Salmonella in cattle, sheep and pigs

During 2002 the number of reported incidents of *Salmonella* in the UK increased in cattle, and remained similar to 2001 in sheep and pigs (Figure 3). The number of reported incidents in cattle increased in 2002 to the level seen in 2000 which itself had been an increase over previous years. The number of reports of *S.* Typhimurium continued to decline and DT104 continued to be the most common definitive type. Most isolates of *S.* Typhimurium DT104 tested *in vitro* for antimicrobial sensitivity are multi-resistant. The most common serotype in cattle was *S.* Dublin for the fourth year running. Some serotypes were reported for the first time in 2002 in cattle in Great Britain – *S.* Ank, and *S.* Vejle. The number of reports of *S.* Typhimurium definitive phage type (DT) 104 continue to fall in cattle, although still accounting for more than 50% of reports in Great Britain of *S.* Typhimurium in cattle (see Figure 6). Total levels of *Salmonella* isolated from cattle in Northern Ireland decreased from 347 isolations in 2001 to 247 isolations in 2002. Similarly, the number of isolations *S.* Typhimurium decreased from 26 in 2001 to 6 in 2002.

Figure 6



Some serotypes are more frequently reported from some livestock species than others as shown in Figure 7a, 7b and 7c. – for poultry see Figure 5 above. (The percentage figures given in the charts have been rounded to make 100% total incidents). In cattle *S.* Dublin, which is seldom associated with human infection, was again the most common serotype reported in cattle. *S.* Typhimurium was the most common serotype recorded in pigs, and in sheep *S. Enterica Diarizonae* subspecies reports continued to increase for the third year.

Figure 7a

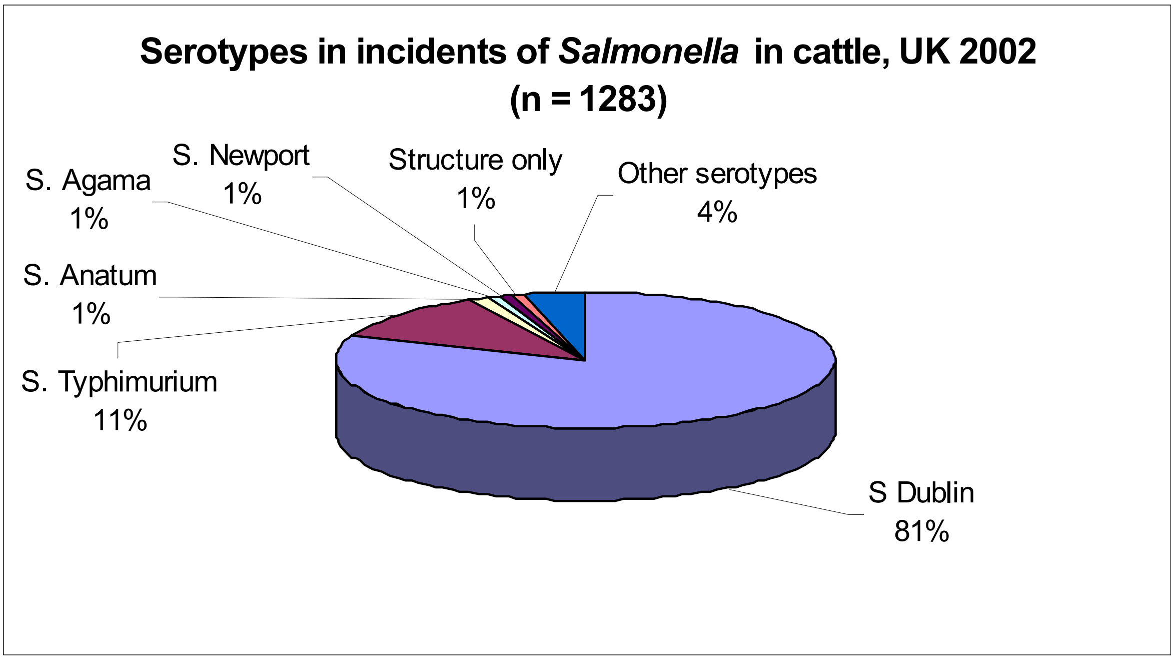


Figure 7b

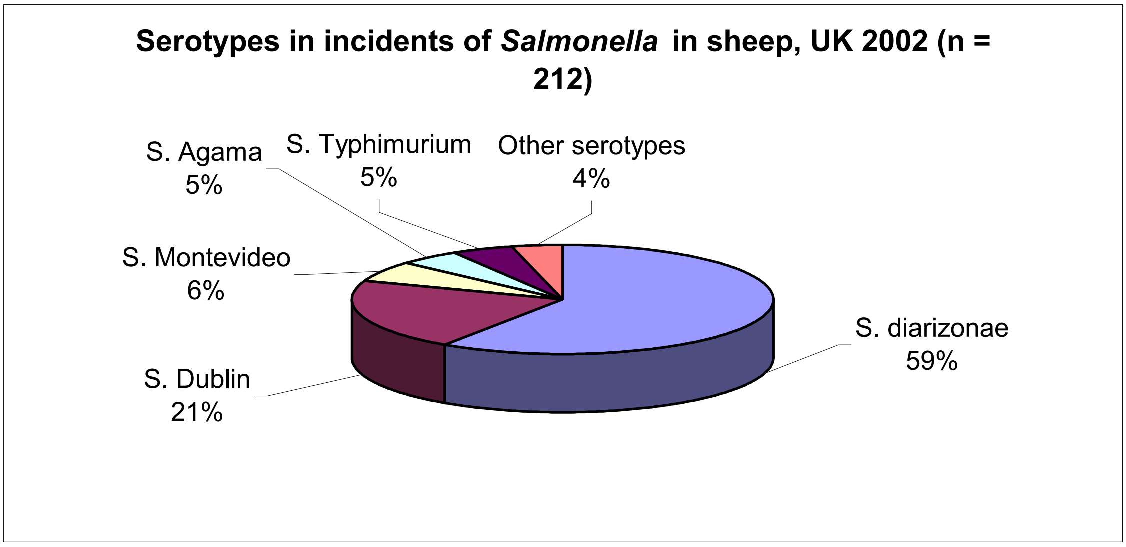
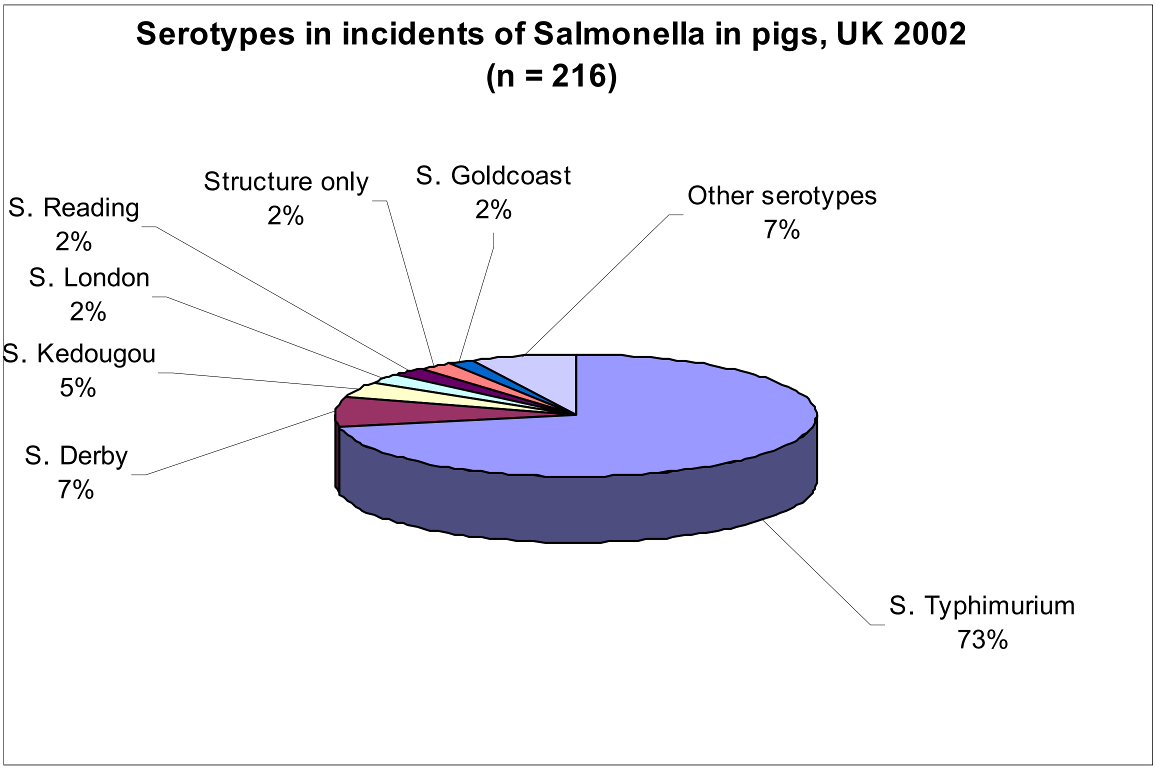


Figure 7c



No surveys were carried out in cattle, sheep or pigs in 2002. The results of a survey in 1999-2000 were reported in Zoonoses Report UK 2000. About 23% of pigs were found to carry infection before slaughter, whereas little *Salmonella* were found in the faeces of cattle and sheep as summarised below (Table 5):

Table 5: Prevalence of *Salmonella* in cattle, sheep and pigs at slaughter (GB)

	Cattle		Sheep		Pigs			
					Caecum		Carcase swab	
	N	% positive	N	% positive	N	% positive	N	% positive
Salmonella spp.	891	0.2	973	0.1	2509	23.0	2509	5.3
S. Enteritidis	-	0.0	-	0.0	-	0.1	-	0
S. Typhimurium	-	0.2	-	0.1	-	11.1	-	2.1
S. Derby	-	0.0	-	0.0	-	6.3	-	1.6
S. Kedougou	-	0.0	-	0.0	-	1.0	-	0.04
Other serotypes	-	0.0	-	0.0	-	4.8	-	1.7

N = number of animals examined

A new survey similar to the one above was commissioned and will start in 2003.

Animal feed surveillance for Salmonella

Feedingstuffs contaminated with *Salmonella* may be a source of infection for animals. To reduce this risk, *Salmonella* is monitored and controlled at a number of points in the production processes. Statutory monitoring for the presence of *Salmonella* in processed animal protein destined for livestock feedingstuffs also takes place. Defra, in consultation with industry, has issued codes of practice for the control of *Salmonella* in the production of final feed for livestock, and during its storage, handling and transport. Codes of practice are also available for the control of *Salmonella* in the rendering and fishmeal industries. These codes have been widely adopted. They recommend testing for *Salmonella* at various critical control points to facilitate risk assessment and enable corrective action to be taken. Additional codes of good practice have also been produced by the industry, e.g., the United Kingdom Agricultural Supply Trade Association (UKASTA) code

The manufacturing processes involved in the production of animal feedingstuffs would be expected to eliminate *Salmonella* in most cases. Since 1992, laboratories have provided enhanced information on the results of monitoring for *Salmonella* in animal feedingstuffs. Many samples are taken as a result of codes of practice and on the receipt of a positive result would be expected to lead to corrective action. A large number of samples (up to 50,000 per year) are tested by the industry as a result of these activities.

S. Enteritidis and *S.* Typhimurium are rarely reported in feedingstuffs and ingredients. In finished feeds *S.* Enteritidis was not isolated in 2002 (twice in 2001). *S.* Typhimurium was isolated on one occasion (4 in 2001). The reason for sampling finished feeds is not always given but in many cases it will have been as part of the Company's surveillance procedures leading to corrective action being taken. Feedingstuffs may also become contaminated on farm if not protected against contamination. As would be expected the raw ingredients in animal feedingstuffs may be contaminated with *Salmonella* prior to processing. *S.* Enteritidis and *S.* Typhimurium are isolated rarely from ingredients in comparison with other serotypes such as *S.* Mbandaka, *S.* Agona, *S.* Senftenberg, and *S.* Tennessee. These serotypes are isolated relatively rarely in samples from livestock (see above).

VERO CYTOTOXIN-PRODUCING *ESCHERICHIA COLI* O157

Human infection

Background

Vero cytotoxin-producing *Escherichia coli* (VTEC) have emerged in recent years as a group of pathogens of worldwide importance. Their public health significance started to come to light in the early 1980s following the publication of a series of papers by teams of American and Canadian scientists. Investigators established that two outbreaks of haemorrhagic colitis (HC) that occurred in the north of the USA in 1982 were caused by VTEC O157 infection associated with the consumption of hamburgers from a national restaurant chain. At about the same time a team of American and Canadian scientists found evidence of a link between VTEC infection and the development of haemolytic uraemic syndrome (HUS) in children. HUS is a disease characterised by renal failure, haemolytic anaemia and thrombocytopaenia.

The disease spectrum associated with VTEC O157 infection ranges from mild diarrhoea through HC to HUS, thrombotic thrombocytopaenic purpura (TTP) and death. TTP is a syndrome that incorporates the main clinical features of HUS but with additional neurological involvement. HUS tends to be more common in children and TTP in adults, particularly the elderly. Disease is most severe in infants and the elderly.

Laboratory reporting trends

The first report in England and Wales was in 1982 and in Scotland in 1984. In 2002, 852 laboratory-confirmed cases of VTEC O157 infection were reported in the UK, a reduction from the number of confirmed reports in 2001 (1049). Trends in the laboratory reporting of VTEC O157 in the UK are shown in Figure 8. It can be seen that, up to 1995 there was a rising trend in the reporting of VTEC O157 throughout the UK. However, since then, the number of reported cases has stabilised at approximately 1000 cases per year. It is apparent from the graph that there are clear differences in the geographical distribution of disease within the UK, and Scotland has consistently recorded the highest rates of infection since the late 1980s. Many cases of VTEC O157 infection are sporadic, i.e., individual cases not known to be associated with any other cases. It is often difficult to confirm a source of infection in these circumstances. A number of case control studies in GB have shown the importance of contact with animals and the animals' environment.

In Northern Ireland there were 27 reports of VTEC O157 in 2002, all of which were VT positive. There were no VTEC O157 outbreaks reported to CDSC NI during 2002.

In Scotland there were 10 general outbreaks (60 cases) recorded in which the foodborne route was suspected in three of them but no specific foods were identified (Table 6).

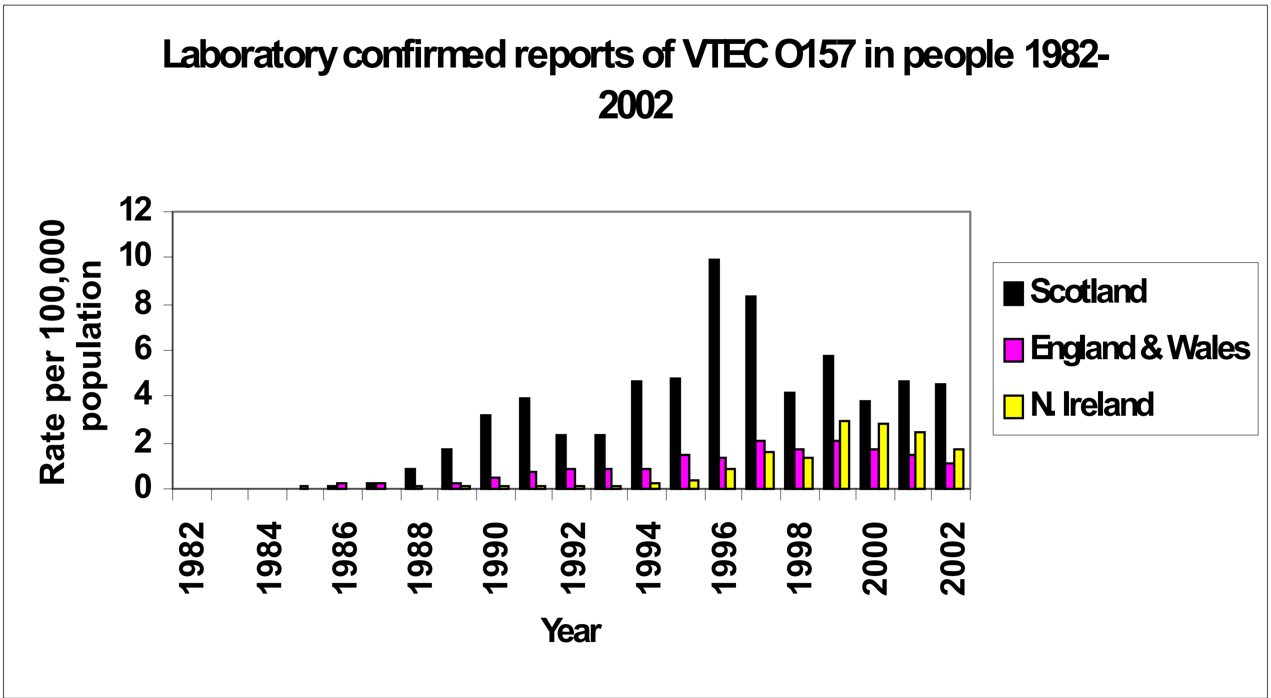
Table 6 Outbreaks of VTEC O157 in Scotland

Main mode of transmission	Location
Foodborne	Restaurant
Foodborne	Butchers
Multiple modes including foodborne	Caterers
Water	Farm
Water	Private house
Environmental	Farm
Person to Person	Community
Person to Person	Private house
Not known	Restaurant
Information not complete	Guide Camp

In England and Wales there were 16 general outbreaks (126 cases).

A Task Force set up by the Minister for Health and Community Care in Scotland reported in June 2001[9] making more than 100 recommendations on a wide variety of topics including risk assessment, diagnosis and management of human cases, animal carriage, waste disposal, water, recreational use of agricultural land, food education and training. The Scottish Executive formally responded to the Report in July 2002[10] accepting the majority of the recommendations. Regular reports will be made monitoring the progress against the recommendations.

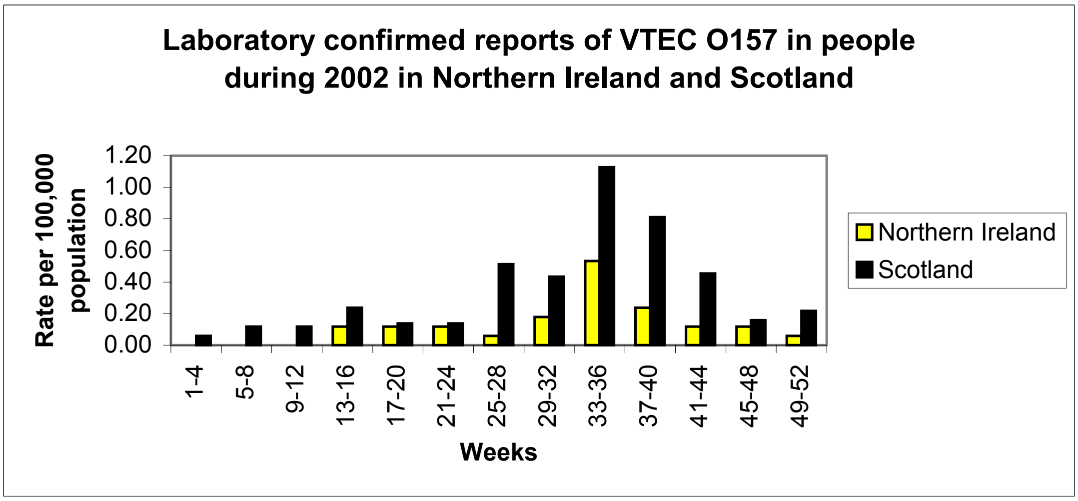
Figure 8

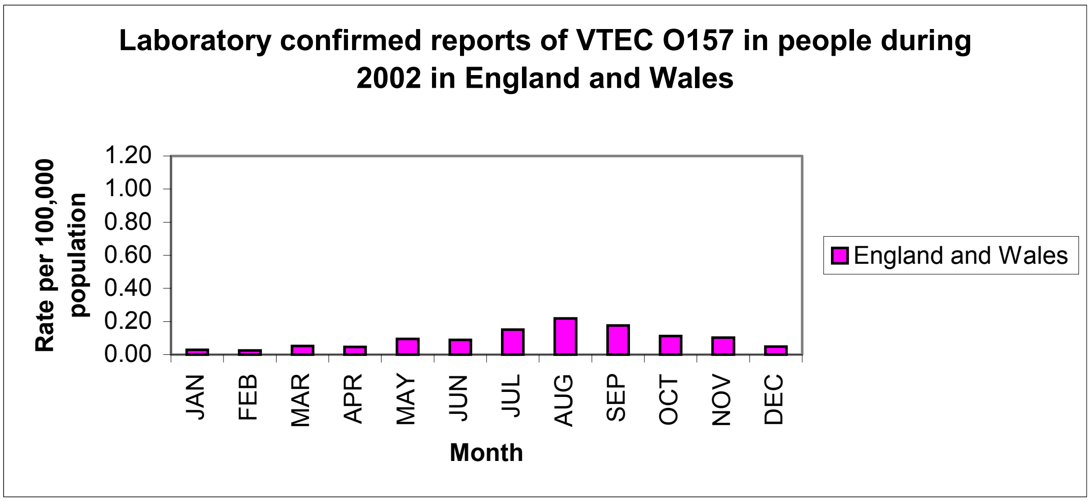


There is a seasonal pattern in reporting of VTEC O157 infection with generally an increase in the number of reports in the autumn (Figure 9).

[9] http://www.foodstandards.gov.uk/multimedia/pdfs/ecolitaskfinreport
[10] http://www.foodstandards.gov.uk/multimedia/pdfs/rrec.pdf

Figure 9





Investigating sources

The main reservoir of VTEC O157 in livestock is ruminants, particularly cattle, sheep and goats. Information from outbreak surveillance in the UK demonstrates that VTEC O157 infection can be transmitted *via* consumption of contaminated food or water; person to person spread; contact with livestock; and environmental exposure. A variety of foods have been implicated in outbreaks of infection. These include cold cooked meats, dairy products, minced beef products and salad vegetables. It has been estimated that VTEC O157 has an infectious dose of between 10 and 100 organisms. With an infectious dose as small as this, cross contamination of ready to eat foods from raw meats is a major potential problem in retail outlets, and in both domestic and commercial kitchens. In addition it also facilitates person-to-person spread of infection in institutions such as nurseries, hospitals and residential homes for the elderly.

When outbreaks of disease occur in man and the evidence suggests that animals on a particular farm are a possible source either via the food chain or through direct animal contact, government veterinary surgeons will, at the request of the Outbreak

Control Team, assist with on-farm investigations to establish the possible source. Advice is also given to farmers on farm hygiene. The Health and Safety Executive have issued guidance to farmers who open their farms to visitors and also to teachers who may visit farms with their pupils[11].

VTEC O157 IN FOOD

No surveys were reported in 2002

Animal infection

VTEC O157 has been found in the faeces of healthy livestock including cattle, sheep, pigs, goats, horses, and wild birds. The organism is not associated with disease in livestock. The organism is excreted in the faeces, however, and as such is a potential risk to those working closely with farm animals and their environment.

VTEC O157 animal surveillance data

A survey of cattle, sheep and pigs in Great Britain in 1999 to 2000 sent for slaughter for human consumption estimated the faecal carriage rate of VTEC O157 and was reported in Zoonoses Report UK 2000.

The main findings of the survey are given in Table 7.

Table 7: Prevalence of faecal carriage of VTEC O157 in cattle, sheep and pigs at slaughter (GB 1999-2000)

	Cattle		Sheep		Pigs	
	N	% positive	N	% positive	N	% positive
VTEC O157	3939	4.7	4171	1.7	2509	0.3

N = number of animals examined

Studies in finishing cattle in Scotland completed by SAC Veterinary Science Division were reported in Zoonoses Report UK 2000 and showed that 7.9% cattle and 22.8% herds were shedding the organism.

A further similar study in cattle, sheep and pigs arriving for slaughter in GB was commissioned in 2002 to start in 2003.

VTEC O157 and abattoir control measures

A number of measures have been emphasised in abattoirs to minimise the faecal contamination of carcasses. Amongst these, an assessment of the fleece/hide cleanliness of animals arriving at abattoirs is made by the official veterinary surgeon. Animals are graded from 1-5 with the higher scores denoting those which have high faecal contamination. The official veterinary surgeon decides if the animals are to be rejected, cleaned before re-submission to *ante mortem* inspection, or to be processed paying particular attention to hygienic dressing procedures.

[11] Advice to farmers (with teachers' supplement) http://www.hse.gov.uk/pubns/ais23.pdf

CRYPTOSPORIDIUM

Cryptosporidia are protozoan parasites with a widespread distribution in farm and wild animals. The parasite can cause clinical disease in animals, usually neonatal diarrhoea, although subclinical infection is common. Typing for *Cryptosporidium parvum* is now becoming available and has enabled improved classification of the different species. *C.hominis* (previously *C.parvum* genotype 1) is normally only recovered from humans although there have been exceptional reports from isolates reported from animals. *C.parvum* (previously *C.parvum* genotype 2) is found in both animals and humans.

Human infection

In the non-immunocompromised the illness lasts around two weeks, with symptoms which include watery diarrhoea, nausea, vomiting and abdominal pain. In those with suppression of the immune system, the disease can be much more severe, with persistent diarrhoea and malabsorption and a failure to clear the parasite.

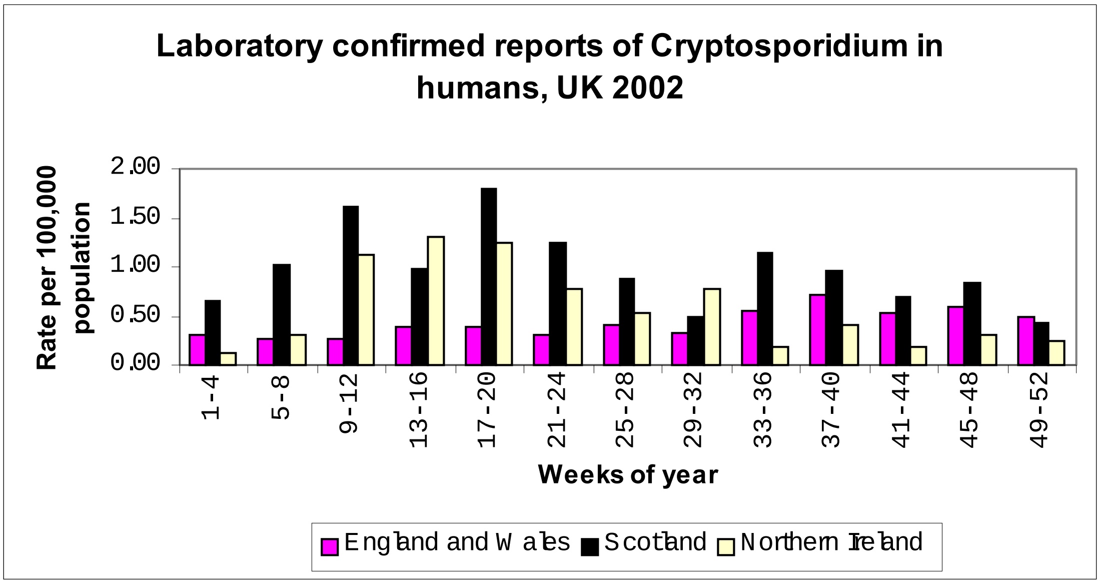
Many outbreaks are waterborne and are the result of contamination of water with animal faeces or human sewage. The increasing availability of typing will help to identify the source of infection in specific outbreaks. In 2002 there were 3663 cases reported in the UK, compared with 4482 in 2001 which was a significant reduction from the 7083 cases in 2000. The fall between 2000 and 2001 has been attributed, in England and Wales and in Scotland, to the impact on animal populations, animal movements and restrictions on human use of the rural environment as a consequence of the Foot and Mouth Disease outbreak during 2001.

Normally there is a seasonal pattern of confirmed reports of cryptosporidiosis in humans with higher numbers occurring in spring and autumn (Figure 10).

In Northern Ireland there were 126 reports of cryptosporidiosis in 2002. This is much reduced from the 360 reports in 2001, but 191 cases were associated with a waterborne outbreak during April/May of that year.

Measures to reduce the risk of waterborne transmission by protection of catchment areas and improved water treatment have been instituted over recent years. A requirement for water authorities to monitor sources of drinking water that are most vulnerable to contamination with the parasite was introduced in 1999.

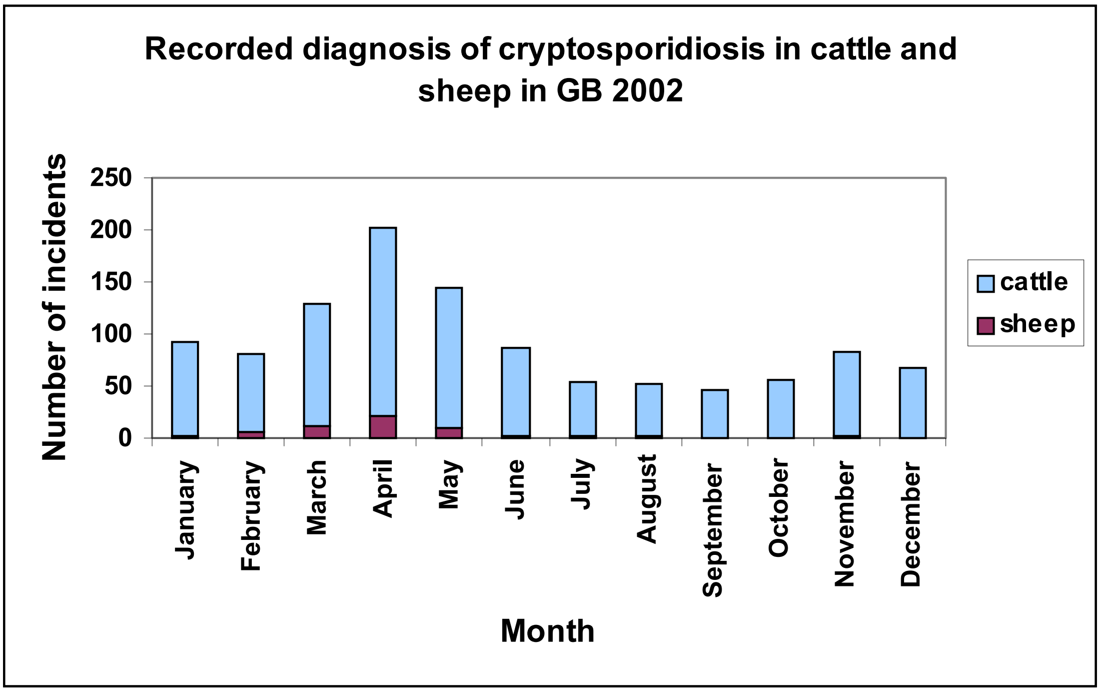
Figure 10



Animal infection

Infection may be found in healthy livestock. When disease occurs it is most often seen in the young animal, calf or lamb, and concurrent with management or environmental stress along with other pathogens such as coronavirus or rotavirus. Clinical signs include diarrhoea, weight loss and anorexia. Recorded outbreaks show a distinct seasonal distribution, with a peak in the spring (Figure 10a). Of the 1089 incidents diagnosed in cattle and sheep in UK in 2002, 1034 occurred in cattle and 55 in sheep.

Figure 10a



NOTIFIABLE ZOONOTIC DISEASES OF ANIMALS

BOVINE TUBERCULOSIS (*MYCOBACTERIUM BOVIS*) INFECTION

Human infection

Human tuberculosis is usually caused by *Mycobacterium tuberculosis* (usually acquired from another human) and not *Mycobacterium bovis* - which is the cause of bovine tuberculosis. *M. bovis* infection was formerly an important zoonotic disease most often transmitted to man by milk. The advent of pasteurisation and a compulsory eradication programme in cattle has significantly reduced human infection with this organism from the levels recorded prior to the 1950s.

In England and Wales in 2002 there were 20 laboratory reports of tuberculosis due to *M. bovis,* a decrease on the total of 27 for the previous year. None of the cases in 2002 had a known current link with disease in cattle.

In Scotland and Northern Ireland there were no human cases of *M. bovis* during 2002

Table 8: Patients with tuberculosis in the UK in 2002

	England & Wales	Scotland	N. Ireland	Total
M. bovis	20	0	0	20
M. tuberculosis *	6,981	234	68	7,193
M. africanum	4	0	0	4

*Enhanced surveillance –provisional

M. bovis in food

No surveys of food were carried out in 2002. A study on cows' milk was reported in Zoonoses Report UK 2000.

Animal infection

The disease caused by *M. bovis* is characterised by the progressive development of tubercles in any of the organs. In cattle the lesions are usually found in the upper respiratory tract and lungs but these may progress into any of the other organs of the body including the udder. The clinical signs seen with the disease will depend on which organ of the body is most affected by the organism. Often in the early stages of the disease no clinical signs are apparent and infected animals are only identified following routine testing. In later stages of the disease weight loss may be a feature, although nowadays it is rare to see clinically affected animals. If the disease enters a herd it can spread through that herd and if not controlled, be passed on to any other cattle in contact with them. It is a disease which can cause serious economic losses on the farm if not controlled.

Compulsory testing of cattle using the tuberculin skin test with compulsory slaughter of reactor cattle was introduced in 1950. The Tuberculosis Orders (1984), made under the Animal Health Act 1981, provides for notification of disease, compulsory testing, slaughter, valuation and compensation, and restriction of animal movement in affected herds. In Northern Ireland the equivalent legislation is the Tuberculosis Control Order (NI) 1999. These measures are supplemented by investigations following discovery of suspicious lesions reported by official veterinary surgeons during inspection of carcasses at slaughterhouses. In GB cattle herds are tested every one to four years depending upon the incidence of the disease within a region. In Northern Ireland all cattle herds are tested annually. Most cattle herds in UK are currently free from tuberculosis, and all herds in UK have achieved Officially Tuberculosis Free (OTF) status under EC Directive 64 / 432 / EEC. When reactor animals (i.e., ones which have failed the test for *M. bovis*) are found during routine testing, the OTF status of the herd is suspended and movements into and out of the herd are strictly controlled until the OTF status has been re-established. The incidence of *M. bovis* in cattle herds in GB has increased in recent years from the low levels seen in the 1980's. Likewise in Northern Ireland the incidence fell to a very low level in 1988 following the introduction of annual testing in 1982. In more recent years, and certainly since 1996, there has been evidence of an increase in Northern Ireland. In GB, the areas of high TB incidence are localised in the South West of England, the West Midlands and South Wales, infection occurring only sporadically outside these areas. Scientific evidence suggests there is a continuing significant source of infection in wildlife. A number of reasons are considered to have influenced the continued incidence of the disease in cattle. These include the effect of a reservoir of the disease in feral species (including the badger), cattle movements, and cattle contact between small and fragmented farm holdings where these exist. A large programme of research in this area continues.

The incidence of new confirmed cases of TB in cattle in Great Britain decreased in 2001, but due to the outbreak of Foot and Mouth Disease in Great Britain, the total number of herds and cattle tested for TB between March and December 2001 was significantly reduced in relation to 2000. In 2002 the amount of cattle testing was considerably increased and the provisional number of new confirmed TB incidents in 2002, was 3281 compared with 1734 in 2000. In 2002, 19,792 cattle were slaughtered as TB test reactors. In Northern Ireland there are approx. 30,244 cattle herds in Northern Ireland. The total cattle numbers in 2002 were approximately 1.7 million; 1,696,512 animals were tested during the year, and 15,115 reactors were found. A further 525 animals were removed as "negative in-contacts" because although they showed negative results to the tuberculin test, they were deemed to be at high risk of becoming infected with tuberculosis. The number of herds in which disease was found has increased since 2001. Further information is available at http://www.defra.gov.uk/ and http://www.dardni.gov.uk/

BRUCELLOSIS

Human brucellosis

Brucellosis is not notifiable in humans in the UK. Most new infections are likely to be acquired abroad although chronic cases of infection acquired in the UK before eradication of *Brucella abortus* in cattle continue to be reported. The presence of *B. abortus* in cattle in Northern Ireland continues to constitute a risk to public health. In 2002, 36 cases of brucellosis were reported in the UK (Table 9). In England and Wales, 7 cases of brucellosis were recorded; 6 were identified as *Brucella melitensis,* and one was unspeciated. There were 6 reports in the previous year. All the cases occurred in people believed to have acquired their infections overseas. No cases of *Brucella abortus* were recorded in England and Wales. There was a single case of *B. abortus* in Scotland in 2002 associated with travel to Nepal. No cases of the disease were associated with contact with marine mammals.

In Northern Ireland there were 28 cases reported in 2002. Twenty-seven were male, and 18 were thought to be acquired occupationally. All of the 18 were farmers and at least 17 had contact with infected herds. Occupationally-acquired brucellosis in Northern Ireland is a growing problem. Intervention methods involving general practitioners, veterinarians, farmers, meat plant workers and haulage contractors have increased diagnostic and public health awareness of the disease. The increase in cases being presented, reported and investigated in 2002 may, in part, reflect raised awareness and publicity.

Table 9: Reports of *Brucella* in people UK 2002

	England and Wales	Scotland	Northern Ireland
B. abortus	0	1	12
B. melitensis	6	0	0
Brucella spp.	1	0	16
Total	7	1	28

Animal brucellosis

B. abortus infection in cattle is characterised clinically by abortions in the last third of gestation, retention of placentas, and endometritis. It is a disease which will spread rapidly through a herd and cause serious economic losses through the loss of calves, loss of milk, and reduced fertility. All abortions and premature calvings are required to be reported.

The last outbreak of bovine brucellosis in GB occurred in 1993 and originated from imported cattle. Great Britain gained Officially Brucellosis Free status in December 1996 and freedom is maintained through a programme of ongoing surveillance (testing of bulk milk samples and blood samples) and testing of imported livestock. In Northern Ireland *B. abortus* infection was suspected in 425 herds out of approximately 30,000 herds being monitored and was confirmed in 235 of them. This was an increase compared with 2000, following a reduced number seen in 2001 probably as a result of the postponement of testing due to Foot and Mouth Disease controls.

B. melitensis, B. suis and *B. ovis,* have never been isolated from livestock in the UK.

ANTHRAX

Human Infection

Bacillus anthracis in humans is rare, especially in Europe and North America. Such infections usually result from occupational exposure to animals or animal products. The risk of infection to human contacts from a confirmed animal case is thought to be very low and limited to cutaneous anthrax, which is readily diagnosed and easily treated. Pneumonic anthrax, due to the inhalation of organisms, is very unlikely to be a risk from animal infections under natural conditions given the nature of the exposure, which is likely to be limited to contact with the animal or its fluids and not to aerosolised anthrax spores.

Since the early part of the century, the number of occurrences of this disease in man has steadily declined. A marked decline followed the introduction of vaccination for workers in key industries in 1965. The highest risk has been in occupations associated with people handling imported hides. No cases of cutaneous anthrax infection were identified in the UK during 2002; one formal notification referred to a case identified in 2001. The last case in Scotland was in 1991. The last case in Northern Ireland was in 1993 (overseas travel related).

Animal Infection

Anthrax is a peracute disease in cattle with an animal which appeared to be well a short time previously being found dead or dying. Frequently blood oozes from the nostrils and anus. Failure of the blood to clot, absence of *rigor mortis* and the presence of an enlarged spleen are the most common findings at post mortem examination. In horses and pigs the region of the throat is often found to be swollen. It is a statutory requirement for veterinary surgeons and people in charge of animals to report the suspicion of the disease in an animal or carcass to the appropriate government veterinary surgeon. Anthrax is always considered as a possible source of unexplained sudden death in cattle and examination of a blood smear is used to rule out the possibility. In pigs and horses a smear of the fluid causing the swelling around the throat is examined. Over 10,000 suspect carcasses were routinely tested for anthrax during the year. This resulted in one case of anthrax being confirmed in a dairy cow on a farm near Wrexham in October 2002. There had been deaths from anthrax in cattle on at least three previous cases on the farm, the last one 10 years ago. The few confirmed cases (1-2 positive carcasses) in previous years have usually been associated with earth works bringing spores to the surface. The last previous case in animals in the UK was in 1997 in a two year old Friesian heifer which died on a farm where there also had been a case many years previously. No cases of anthrax have been recorded in animals in Northern Ireland since 1983 and in Scotland since 1991.

RABIES

Rabies is an acute viral infection of the central nervous system, caused by the rabies virus, a member of the rhabdovirus family. Transmission is usually through saliva via the bite of an infected animal, with dogs being the main transmitter of rabies to humans. There are no documented cases of human-to-human spread, except by the artificial route of corneal transplant.

European bat lyssavirus type 2 was isolated on two occasions during 2002, once from a Daubenton's bat (*Myotis daubentonii*) in Lancashire in England, and once from a fatal human case of rabies in Scotland. The person in Scotland died in November and it is thought that he was bitten by a British bat about six months previously. European bat lyssaviruses (EBLV) are rabies-related viruses and are not the same strain as that carried by animals such as dogs, cats, foxes, etc. EBLV is found in bats across northern Europe, and between 1977 and 2000, a total of 630 EBLV cases in bats have been confirmed, mainly in Denmark, the Netherlands and Germany. Before the isolation of EBLV from the bat in 2002 in GB, there had been a previous isolation, when a Daubenton's bat was found to be infected with EBL type virus in Newhaven, Sussex during 1996. The virus had a genetic sequence which matched EBL viruses from the Swiss-German border, suggesting that this bat might have been a migrant bat. The finding in 2002 of EBLV in what appears to be a native British bat suggests that EBLV may be circulating in British bats at a low level. On-going passive surveillance is carried out on up to 200 bats each year for bat rabies. Over the past 15 years all surveillance cases (apart from the one found in Newhaven) have returned negative results. On rare occasions EBL is known to infect other animals and humans. Since 1977 there have been three human deaths in Europe attributed to EBLV infections, all in cases where the person had been in close contact with bats and received no immediate post-exposure treatment. On two occasions sheep have been infected and it has been detected in a stone marten in Germany.

The Department of Health recommends that those who are at risk through their work or regularly handle bats should seek advice on vaccination from their local General Practitioner. Advice is that all bat handlers should have pre-exposure immunisation against rabies.

Human rabies is extremely rare in the UK. In the UK the last human death from classical rabies occurred in 1902, and the last case of indigenous terrestrial animal rabies was in 1922. Since 1946 there have been 22 deaths in people infected with rabies abroad usually from infected dog bites; none of these cases had received post-exposure prophylactic treatment for rabies. Worldwide it is estimated that there are around 35-40,000 cases each year, almost always in less developed countries.

If rabies is suspected on the basis of clinical appearance and/or behaviour of humans or animals, it is compulsory to notify the relevant government departments and further investigations are carried out.

Further information on rabies can be found at: http://www.dh.gov.uk/, http://www.defra.gov.uk/animalh/diseases/notifiable/disease/rabies.htm, http://www.hpa.org.uk/ and http://www.who-rabies-bulletin.org. Information on bats, which are a protected species, is available at http://www.bats.org.uk/

Following a pilot scheme in 1999, February 2000 saw the launch of the Pet Travel Scheme, allowing pet cats and dogs from certain Western European countries to enter the UK without quarantine subject to certain conditions[12]. These arrangements were extended to certain "long haul" countries on 31 January 2001. During 2002, 4,237cats and 35,459 dogs entered the UK under the Scheme. A condition of entry to the UK is that the animals are fully vaccinated against rabies, and have also been treated against ticks and against the tapeworm *Echinococcus multilocularis* between 48 and 24 hours before arrival.

BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)

BSE

BSE, a disease of cattle, was first diagnosed in GB in November 1986. The two cows concerned came from herds in different parts of England, but showed the same abnormal neurological clinical signs. The epidemic reached its peak early in 1993. Since then the number of cases has decreased.

CJD

In March 1996, the Spongiform Encephalopathy Advisory Committee (SEAC) made the following statement:

> The Spongiform Encephalopathy Advisory Committee have considered 10 cases of Creutzfeldt-Jakob Disease (CJD) which have occurred in people aged under 42 and which have recently been identified by the CJD Surveillance Unit, Edinburgh. The Committee have concluded that the Unit has identified a previously unrecognised and consistent disease pattern. A review of patients' medical histories, genetic analysis to date and consideration of other possible causes, such as increased ascertainment, have failed to explain these cases adequately. Although there is no direct evidence of a link, on current data and in the absence of any credible alternative the most likely explanation at present is that these cases are linked to exposure to BSE before the introduction of the Specified Bovine Offal (SBO) ban in 1989.

CJD is a rare and fatal condition of humans that affects the nervous system, and is one of a group of transmissible diseases known as the prion diseases or transmissible spongiform encephalopathies which include BSE. All forms of CJD and other human prion diseases are associated with the accumulation of an abnormal form (known as a prion) of a host-encoded protein (called the prion protein) within the central nervous system. This abnormal protein is thought to be neurotoxic and responsible for the characteristic pathology occurring in the brain. Three major types of CJD are recognised:

- Sporadic CJD, the commonest form of CJD, which accounts for around 85% of all cases worldwide and for which the underlying cause is unknown.

[12] Requirements for the Pet Travel Scheme can be found at: http://www.defra.gov.uk/animalh/quarantine.

- Variant CJD (vCJD), an acquired human prion disease include variant CJD (vCJD), which is thought to be from the exposure to the bovine spongiform encephalopathy agent.
- Familial CJD accounts for between 10-15% of all cases (along with the Gerstmann-Straussler-Scheinker syndrome and Fatal Familial Insomnia) is associated with a point mutation or insertion mutation in the human prion protein gene, and is inherited as an autosomal dominant condition.

vCJD, a new disease, is believed to be caused by the same abnormal 'prion' protein that causes Bovine Spongiform Encephalopathy (BSE) and is thought to have resulted from eating contaminated beef products. vCJD was first recognised as a distinct clinical entity in 1996. Seventeen deaths from confirmed vCJD were recorded in 2002 (Table 10) bringing the total number of confirmed vCJD deaths in the UK to 121. Figures for 2002 showed a slight decrease on 2001 but total case numbers are too small to accurately establish any trend. It is impossible to say with certainty to what extent these changes reflect an improvement in case ascertainment and to what extent, if any, they reflect changes in incidence. A more extended version of the table can be accessed on the Department of Health website (www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/CJD/fs/en) or on the National CJD Surveillance Unit website (http://www.cjd.ed.ac.uk).

The Tenth Annual Report on Creutzfeldt-Jacob Disease Surveillance in the UK by the National CJD Surveillance Unit (NCJDSU) and the London School of Hygiene and Tropical Medicine (LSTHM) (http://www.cjd.ed.ac.uk/rep2001.html) is also available. The Annual Report of the CJD Incidents Panel, 2001-2002 can be found at: http://www.hpa.org.uk. Quarterly Reports of the CJD Surveillance Unit can be accessed at http://www.cjd.ed.ac.uk/vcjdq.htm.

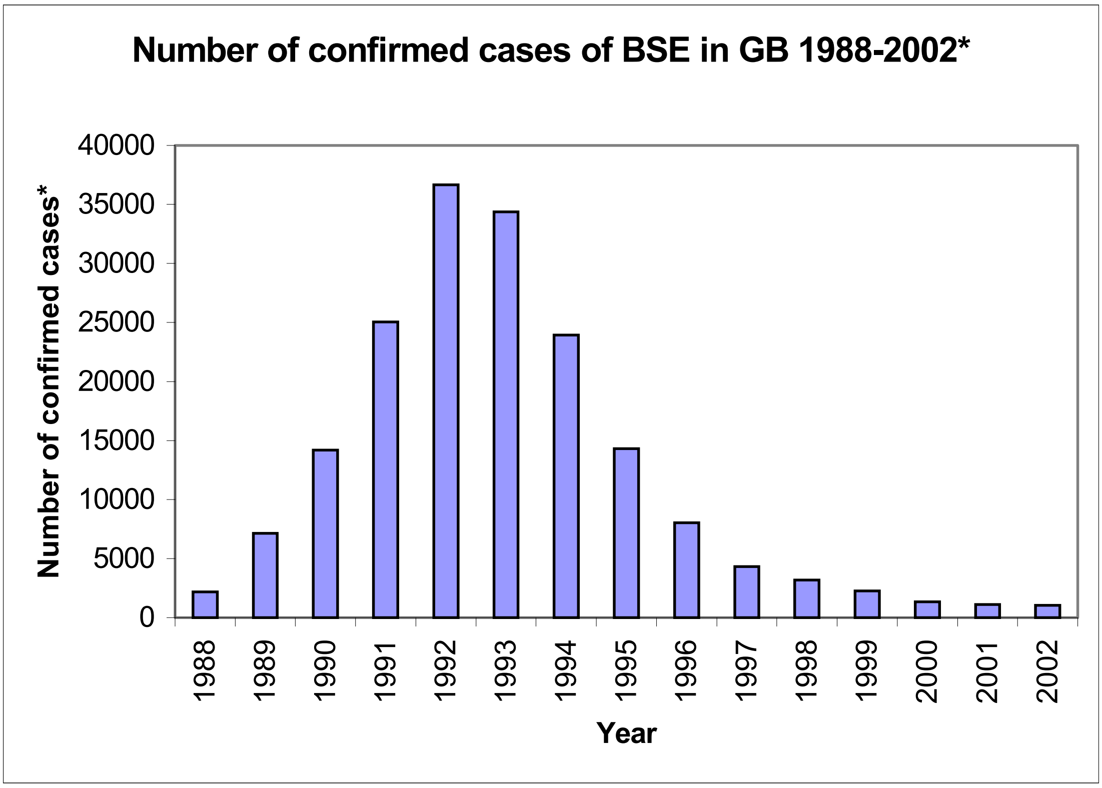
Table 10: Number of deaths from vCJD

Year	1995	1996	1997	1998	1999	2000	2001	2002
vCJD deaths	3	10	10	18	15	28	20	17

BSE in cattle[13]

The decline in the number of confirmed cases in cattle in GB began in 1993 and continued in 2002. Of the cases investigated in 2002, either on suspicion of disease or in ongoing surveys, 1,039 were confirmed, compared with 1,113 in 2001 (Figure 11).

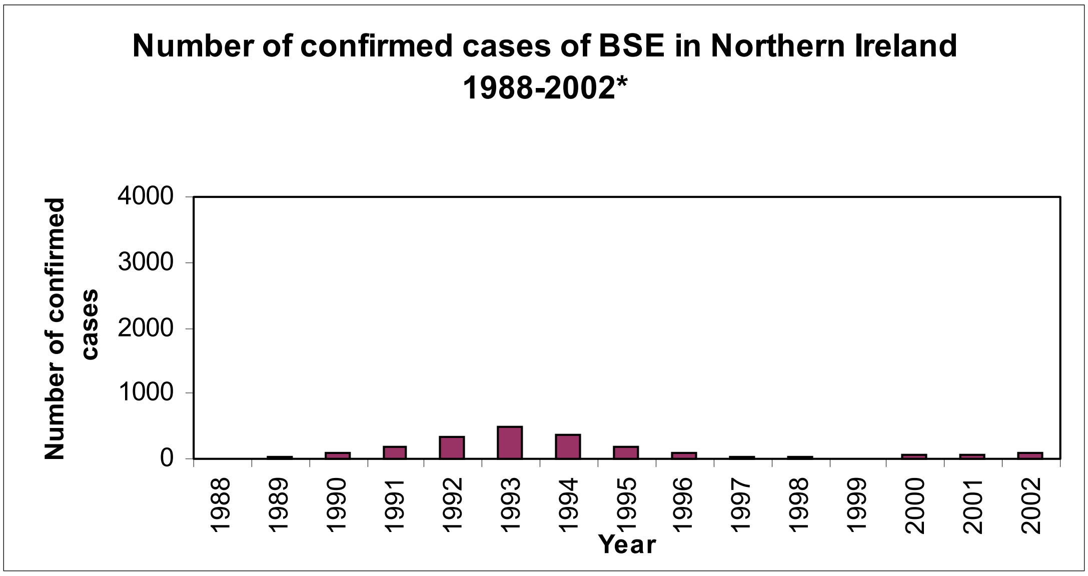
[13] For further information see http://www.defra.gov.uk/animalh/bse/index.html



* includes all confirmations including suspected, and survey cases.

For comparison the number of cases reported in Northern Ireland over the same period is given in Figure 11a (to a different scale).

Figure 11a



* includes all confirmations including suspected, and survey cases.
Under BSE-related controls, (currently TSE Regulations 2002) the feeding of mammalian meat and bone meal to all farmed livestock has been illegal since April 1996. The controls on the use of processed animal proteins in feedingstuffs changed during 2001, and the feeding of processed animal protein to animals kept, fattened or bred for the production of food is prohibited, with some exceptions including non-ruminant gelatin used for coating feed additives, animal-derived dicalcium phosphate and hydrolysed protein produced under certain conditions when fed to non-ruminants; fishmeal produced under certain conditions may be fed to farmed animals other than ruminants. A guidance note on the TSE Regulations 2002, is available at www.defra.gov.uk. Similar controls apply in Northern Ireland.

FOOT AND MOUTH DISEASE

The potential for Foot and Mouth Disease (FMD) virus to be a zoonosis was considered in last year's report. During the large outbreak of FMD in Great Britain in 2001 no case of transmission of the virus to humans was confirmed. Samples from 39 suspected human cases, most with oral lesions and who had been exposed to FMD virus were investigated. Specimens were tested both for FMD virus and/or antibodies. None of the suspected cases tested positive for virus or antibody, and there was no evidence to suggest that there had been transmission of FMD virus to humans during the outbreak. In a small number of individuals a human enterovirus was detected that was consistent with a diagnosis of hand, foot and mouth disease, a common benign infection affecting people, mainly children.

Foot and mouth disease (FMD) is one of the most contagious diseases of mammals and has a great potential for causing severe economic loss through the importance for many countries of the livestock and allied industries. It affects mainly cloven-hoofed animals, and particularly cattle, pigs, and sheep. For current information on the worldwide FMD status go to http://www.oie.int/eng/info/en_fmd.htm. The United Kingdom regained its previously recognised status of 'FMD free country where vaccination is not practised' on 22 January 2002.

OTHER ZOONOSES

HANTAVIRUS DISEASE

Wild rodents are believed to be the main reservoir of Hantavirus disease, excreting the virus in urine and saliva. The pronounced renal impairment described in Korean and Scandinavian human cases has not yet been reported in the UK. Infection in humans in the UK is rare and no cases were reported in 2002.

HYDATID DISEASE

Hydatid disease is caused by development of the cystic larval stage of the dog tapeworm *Echinococcus granulosus* in the tissues of an intermediate host. Man becomes an accidental intermediate host following ingestion of the eggs of the tapeworm which are excreted in the faeces of infected dogs harbouring the adult form of the tapeworm.

In the UK, sheep are important intermediate hosts, especially in mid-Wales, Herefordshire and the Western Isles. Sheep acquire hydatidosis by grazing on pastures contaminated with dog or fox faeces containing cestode eggs. Dogs are in turn infected by ingesting meat and viscera containing viable cysts and do not usually show clinical signs. Control measures include worming dogs, abattoir inspection of carcasses and rapid and appropriate disposal of carcasses of fallen stock.

Ten human cases were reported in England and Wales in 2002, one of whom was known to be a sheep farmer. There were no cases in Scotland or in Northern Ireland.

Echinococcus multilocularis, another causative agent of Hydatid disease, is not known to be present in the UK and a survey of foxes carried out in the winter of 1999 to 2000 supported this view. It has been recorded in ten European countries, including Belgium, France, Luxembourg, Germany, Switzerland, Liechtenstein, Austria, Poland, Czech Republic and Turkey. Prevention of the introduction of *E. multilocularis* into Britain depends on maintenance of adequate controls to ensure that dogs and cats which do not have to undergo six months quarantine receive effective treatment against the parasite at the correct time and correct dose before entering the country (see Rabies section above).

LEPTOSPIROSIS

Leptospirosis, a bacterial disease, is caused by pathogenic serovars of the genus *Leptospira*. It occurs throughout the world, although more commonly found in tropical and sub-tropical regions. There are over 200 known pathogenic serovars worldwide, for which different animal species act as maintenance hosts. Only a small number of serovars are endemic in any particular region or country, and those encountered most frequently in the United Kingdom are *Leptospira hardjo* and *L. icterohaemorrhagiae*. Leptospirosis is a notifiable disease in humans throughout the United Kingdom, and is reportable under the Reporting of Injuries, Diseases and

Dangerous Occurrences Regulations 1995 (RIDDOR 95) to the Health and Safety Executive (HSE) and is a Prescribed Industrial Disease (Appendix 3). The equivalent legislation in Northern Ireland is the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1997. For more information on RIDDOR see http://www.riddor.gov.uk, also http://www.hse.gov.uk/pubns/misc310.pdf

Leptospires persist in the kidneys and genital tracts of carrier animals and are shed in the urine and genital fluids. Common animal reservoirs (maintenance hosts or carriers) include rodents, cattle and pigs. Man is always an accidental host, and may be infected through direct contact with infected animal urine or by environmental contact in areas contaminated by infected animal urine. Risk factors to becoming infected include occupational exposure, such as in farmworkers, abattoir workers and sewer workers, recreational activities such as freshwater swimming, canoeing and household exposure from pets or from domesticated livestock. Leptospires can invade the mucous membranes, and abraded and water softened-skin leading to bacteraemic infection. Human disease and its severity vary according to the infecting serovar but all forms of the disease usually start with similar symptoms including sudden onset, severe headaches, muscle pains, fever, occasional rash of the skin or palate, and photophobia. The disease may be mild or progress to severe with renal and liver complications requiring careful management of the patient. Weil's disease is a clinical syndrome associated with *L. icterohaemorrhagiae* infection. This infection is maintained in the brown rat and presents a risk to those engaged in inland water associated leisure activities and occupations. *L. hardjo* infection usually causes a milder disease than seen in Weil's disease. It is maintained in infected cattle and shed in the urine and is an occupational hazard for those working with cattle, particularly dairy cattle. Environmental conditions are important for the survival of leptospires without the host, the optimum being warm, moist conditions with a pH close to neutral.

In England and Wales there were 53 laboratory-confirmed reports of human leptospirosis, of which 47 were indigenously acquired. There were 24 formal notifications of leptospirosis during 2002 (Table 11 and Table 11a). Twenty one infections were caused by *L. icterohaemorrhagiae*, six (6) were due to *L. hardjo*, three (3) were due to *L. saxkoebing*, two (2) were due to *L. autumnalis*, two to *L. australis* and in thirteen (13) cases the serovar was not determined. Details of the activity which may have resulted in leptospirosis were available for 36 people. Thirteen (13) were farmers or livestock workers, five (5) were canoeists (one of whom was also a farmer), three (3) acquired infection through fishing and three (3) through gardening. For nine individuals, no occupation was given, eight were indoor workers. Other occupational details of interest are rat catcher (1), RSPCA inspector (1) and police wildlife liaison officer (1). Two deaths were reported. Seven (7) cases of leptospirosis were confirmed in England and Wales residents who are considered to have acquired their infections overseas.

Table 11: Notifications of Leptospirosis within the United Kingdom since 1990

Year	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
England and Wales	20	18	28	28	25	13	15	23	32	23	32	25	24
Northern Ireland	2	3	1	3	3	0	1	1	2	1	0	0	1
Scotland	5	6	4	3	3	5	0	5	4	0	3	2	2
Total	27	27	33	24	31	18	16	29	38	24	35	27	27

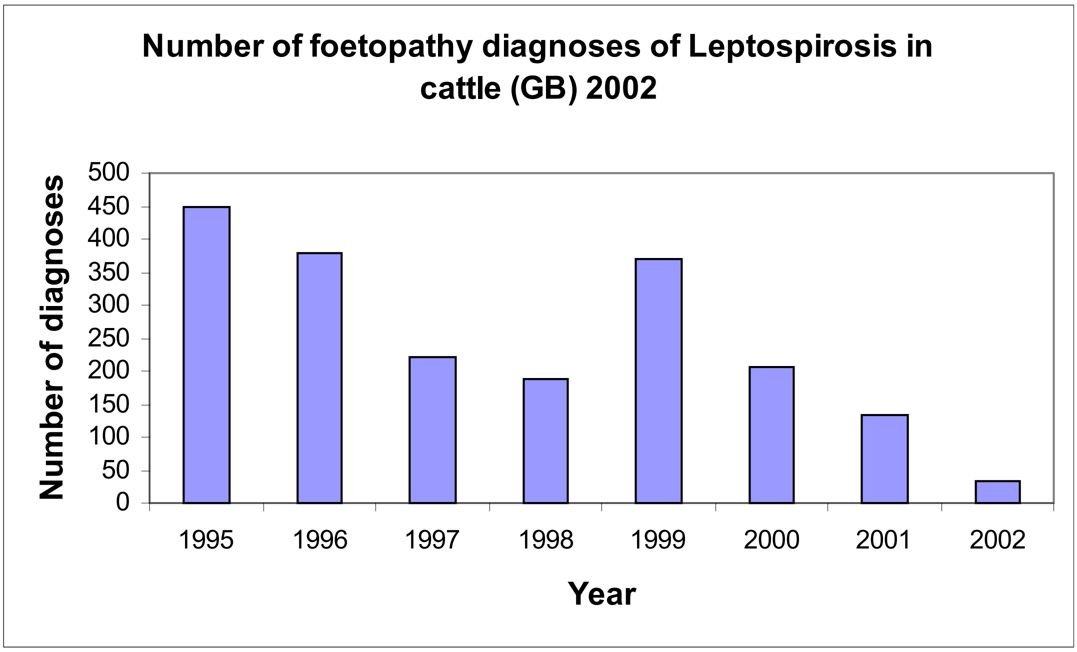
Table 11a: Laboratory-confirmed reports of Leptospira within the UK since 1990

Year	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
England and Wales	33	30	52	48	47	21	22	39	30	41	54	48	54
Northern Ireland	0	0	0	2	3	4	2	3	4	1	0	0	1
Scotland	6	4	2	3	0	2	0	1	1	0	0	0	3
Total	39	34	55	53	50	27	24	43	34	42	54	48	58

Imported cases are identified each year especially in travellers from South-east Asia and Australasia in whom the serovars encountered may differ from those found in the UK. These are most likely to occur in travellers who have participated in recreational watersports activities. Of the seven cases of leptospirosis acquired outside the United Kingdom, six were known to have had contact with surface waters. Countries visited were identified as Costa Rica, Laos, Vietnam, France, Thailand, Belize and Jamaica. There has been an overall increase during the period 1997–2002 in the number of patients with leptospirosis acquired during travel to both tropical and European countries compared with 1992-1996. This may be associated with the worldwide increase in travel, and adventure holidays in particular.

Leptospirosis may cause major economic losses to the cattle and pig industries through its adverse effects on the reproductive performance of these animals. *L. hardjo* infection in cattle may cause a rapid reduction in milk production in affected animals – 'milk drop syndrome' – as well as infertility problems. In bovine abortions in 2002 in which a causal agent was confirmed in a government laboratory in GB, *L. hardjo* infection counted for 3%, (down from 5% in 2001) but this is likely to have been influenced by the number of samples submitted. In addition to management and hygiene practices to control the disease, many cattle herds are vaccinated against the serovar *hardjo.* Most dog owners also have their animals vaccinated.

Figure 12



LISTERIOSIS

Listeria in humans

Listeria monocytogenes is a ubiquitous organism, widely distributed in the environment, and especially in sites with decaying vegetable material. It is generally believed that consumption of contaminated foods is the main transmission route for both people and animals. Human infection acquired directly from an infected animal is possible, but apart from these cases it is not clear what, if any, connection there is between human listeriosis and animal listeriosis. *L. monocytogenes* causes symptoms ranging from a mild flu-like illness to severe, life-threatening infections characterised by septicaemia and meningoencephalitis. Those at highest risk are pregnant women (in whom it may also cause abortion), neonates, the elderly and those who are immunocompromised.

In 2002, 150 cases of human listeriosis were diagnosed in the UK. In England and Wales there were 129 identified cases of listeriosis. The number of laboratory reports have fallen from a peak in the late 1980s following government advice to pregnant women to avoid eating ripened soft cheeses and patés. Information on pregnancy associated cases is only available for England and Wales (Table 12). There were 9 pregnancy associated cases reported in 2002.[14] Information is pending for 6 more cases in 2002 which may or may not be pregnancy associated so this figure will change.

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[14] The term ‘pregnancy associated’ cases has been used instead of ‘congenital’ or ‘perinatal’ cases since a proportion of neonates are not born with symptoms of listeriosis; there are both early and late stage neonatal infections up to the end of the neonatal period, ie. day 28 after birth

There were 33 deaths in non pregnancy associated cases and 2 pregnancy associated deaths (1 stillbirth, 1 neonatal death). No pregnant women died from listeriosis. This gives a crude mortality rate for non-pregnancy cases of (33/114) 29% in 2002, and for pregnancy-associated cases (2/9) 22%.

Table 12: Laboratory Reports of *Listeria monocytogenes*

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
England & Wales							
Total Cases	119	127	109	106	100	136	129
Pregnancy associated cases	18	24	21	18	13	17	9
Others	101	103	88	88	87	119	120
Scotland							
Total Cases	9	6	13	7	11	12	19
N Ireland							
Total Cases	2	4	6	1	4	5	2
Total	130		128	114	115	153	150

Listeria in food

In a LACORS/PHLS study of 4,078 samples of ready to eat cold sliced meats and pâté from catering and retail premises, *Listeria monocytogenes* was detected in 61/2874 (2%) samples of cold meats, although in all but one case this was at levels below 20 cfu/g. It was also detected in 22/1178 (2%) samples of pâté, but in all cases this was at levels below 20 cfu/g.

In a study carried out as part of the European Commission Co-ordinated Programme for the Official Control of Foodstuffs, *Listeria monocytogenes* was detected in 78/997 (8%) samples of pre-cut fruit. In all but two cases this was at levels below 20 cfu/g and in all but one sample, the level was below 100 cfu/g. It was also detected in 28/808 (3%) samples of sprouted seeds, in all but one case at levels below 20 cfu/g and in one case at levels above 100 cfu/g. In a small sample of unpasteurised fruit and vegetable juices, it was detected in 2/291 (<1%) samples, in both cases at levels below 20 cfu/g.

Listeria in animals

In farm animals, mainly cattle and sheep are affected. Clinical signs include encephalitis, abortion, septicaemia and keratoconjunctivitis. An association with poor quality silage as the possible source of infection is common. In GB in 2002 government veterinary laboratories recorded seven diagnoses of encephalitis in cattle due to *Listeria* species, and 78 in sheep. These are similar numbers to those recorded in previous years.

LYME BORRELIOSIS

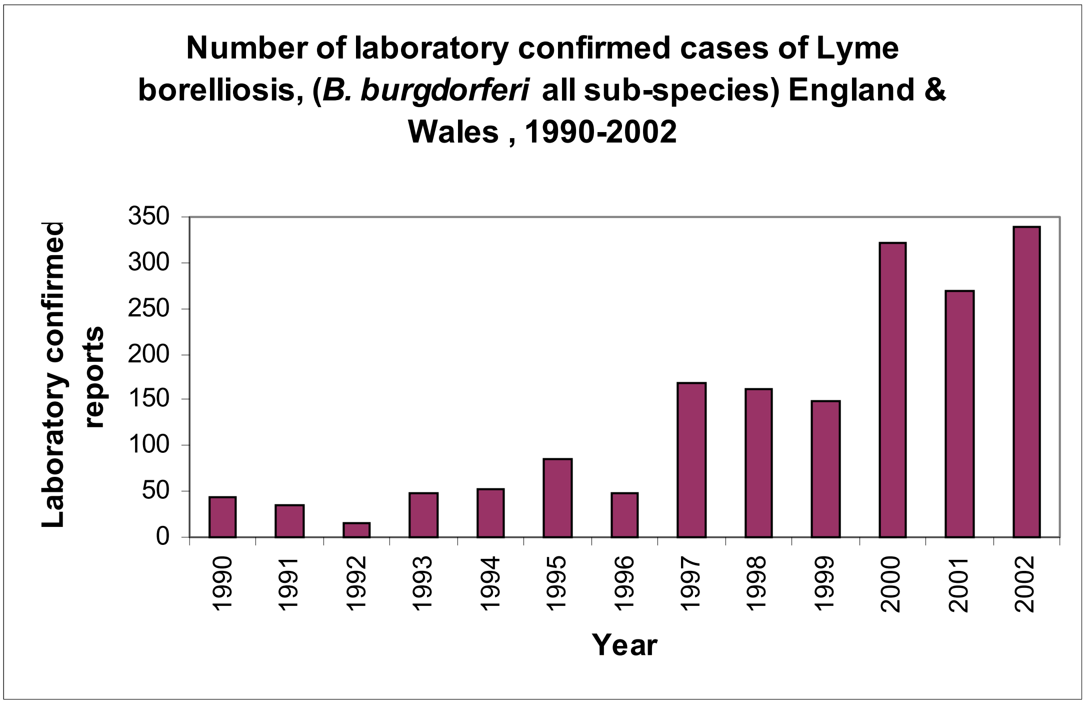
Lyme disease (so called because it was first reported in patients from Old Lyme, Connecticut) is a spirochaetal infection which causes skin, joint and nervous (*Ixodes ricinus*). Infection in North America is due almost exclusively to *B. burgdorferi sensu stricto (ss)*. In Europe, *B. afzelii* and *B. garinii* predominate with *B. burgdorferi (ss)* being less common. In England and Wales the less pathogenic *B. valasiana* is common. The different genospecies are associated with varying clinical manifestations. All can cause erythema migrans. The reservoir of infection is wildlife.

Serological diagnosis in England and Wales follows an internationally recommended two-step approach, using antibody screening tests, followed by immunoblotting of reactive or equivocal samples to assess the specificity of reactions.

The number of reports has continued to rise in recent years, with 339 reports of serologically diagnosed cases of *B. burgdorferi* infection in England and Wales residents received during 2002. This is equivalent to an annual rate of 0.64/100,000 total population. Lyme disease is notifiable in Scotland with 44 notifications in 2002. In England and Wales it is reportable under RIDDOR 95 for “Work involving exposure to ticks’. There were no laboratory confirmed reports in Northern Ireland in 2002.

A clear, consistent seasonal pattern of reports in England and Wales was seen, similar to that of previous years with 50% of cases having specimen dates in the third quarter of the year. The peak in laboratory reports in the summer months represents a peak onset of symptoms in late spring and early summer. The previously reported pattern of age and sex distribution was maintained, with a male-female ratio of 1:1 in all age groups. Thirty nine percent of all reports were in the 45-64 year age group, only 6% of reports were from children under 15 years of age. Fourteen (4%) cases were occupationally acquired, mainly in forestry and farm workers, one was a university lecturer on fieldwork in Poland and one was a seasonal canoeing instructor in Scotland. Seventy one (21%) were acquired abroad mainly in the United States, France, Germany, Scandinavia and other northern European countries. Most of these cases occurred in holidaymakers.
(Further reading go to http://www.cdc.gov/ncidod/eid/vol6no4/smith.htm).

Figure 13



The rise in reported cases since 1997 represents in part, a true increase in incidence, although continued enhanced surveillance will be required to confirm this. Climatic factors such as drought or prolonged cold weather can affect tick populations and activity significantly, which may also affect the incidence of Lyme borreliosis from year to year. Throughout Europe, heterogeneous deciduous woodlands appear to provide particularly favourable ecological conditions for the host species that maintain both ticks and spirochaetes. Changing ecological and environmental conditions, including altered patterns of land utilisation may also affect tick populations and those of animals which act as borrelial hosts. There is strong evidence to show that both the prevalence of *B. burgdorferi* infected ticks and the incidence of Lyme borreliosis in Europe is highest in eastern countries and decreases westward across the continent, including the British Isles.

ORF

Orf is caused by a parapox virus, and is a zoonotic infection largely restricted to those in direct contact with sheep. Orf produces local lesions on the skin which are generally inconvenient but resolve without leaving a scar. Infections are generally restricted to those who are occupationally at risk. Infection is usually uncomplicated and often recognised by those who become infected and benefits little from treatment. Secondary bacterial infection of orf lesions can however cause complications but these are usually controlled with antibiotic treatment In man, orf is most frequently diagnosed in those directly handling sheep, in particular those bottle-feeding lambs in the spring and those involved in shearing and slaughtering sheep at other times. The low number of cases reported by laboratories is likely to represent a small proportion of the total number of cases seen by General Practitioners in rural areas as diagnosis of human orf infection is often made on the basis of clinical presentation and history. Therefore, parapox viruses are generally under-reported. In 2002, one case was reported in England and Wales, three (all females) in Scotland, and none in Northern Ireland. An annual average of 10 (range 3 to 25) cases of orf virus infection were identified between 1991 and 2000.

In animals the disease usually causes pustular dermatitis particularly around the nose, lips, and face of young sheep and lambs and also on teats. The disease is under-reported since most farmers and veterinary surgeons recognise the condition and do not need to submit samples to confirm the diagnosis. In 2002, 30 incidents in sheep were recorded in GB at government associated laboratories. In the last five years the number of recorded diagnoses of the condition in sheep has varied between 28 and 60. Vaccination may be used for the control of the disease in sheep. This is a live vaccine and can cause disease in people if mishandled.

PASTEURELLOSIS

Human infection most commonly presents as a painful cellulitis following animal bites or scratches, usually from cats or dogs; over 50% of these pets are said to have the organism in their mouths and show no clinical signs. Chronic skin lesions and occasionally, penetrating wounds may become infected with *Pasteurella* species especially in individuals living with pet animals.

There were 302 laboratory confirmed reports of pasteurellosis in the UK in 2002, 270 from England and Wales, (200 *Pasteurella multocida*; 5 *P. pneumotropica*; 4 *P. haemolytica* and 61 *Pasteurella* spp.) 29 from Scotland and one (*P. multocida*) from Northern Ireland. Sixty seven percent of cases identified in England and Wales were in people over 45 years of age, of whom 55% were women. Fifty nine (22%) cases were reported with animal contact including one due to an adder bite. One occupationally acquired case was reported in a veterinary surgeon and one infection is believed to have been acquired in France.

Pasteurella multocida is the most commonly reported zoonotic infection in this group, resulting usually from infected dog and cat bites. *Pasteurella haemolytica* has also been associated with dog-bite wounds; it is also found in the nasal cavities of healthy cattle, sheep and goats. *Pasteurella pneumotropica* is a major cause of pasteurellosis in laboratory rodents, including rats, mice, hamsters and guinea pigs; these animals may carry the organism in the oropharyngeal mucous membranes.

In livestock, clinical signs of infection vary from mild subclinical involvement to severe respiratory disease and death.

PSITTACOSIS (CHLAMYDOPHILA PSITTACI)

It is likely that human laboratory reports of *Chlamydophila psittaci* are an underestimate of the true prevalence of infection even though an unknown reported proportion of infections may also be due to *Chlamydophila pneumonia,* (which is not zoonotic). The routinely used test does not differentiate between *C.pneumoniae* and *C.psittaci.*

In England and Wales in 2002 there were 68 laboratory confirmed infections of *Chlamydophila psittaci*, compared with 119 in 2001. In Northern Ireland there were 16 reports of respiratory chlamydial infection (not differentiated) compared with 21 reports in 2001. In Scotland there were 10 cases. The majority of cases in GB are aged 45 and over. *C. psittaci* infection was most frequently reported from the south west of England; which may be plausibly related to its importance as an agricultural area. No history of overseas travel was given for any patient. No occupational associations were identified.

Since the 1980s exposure to *Chlamydophila abortus* [15] (previously designated *Chalmydia psittaci*) has been reported as a risk to pregnant women assisting at lambing. *C. abortus* is the most common diagnosed infectious cause of abortion in sheep. In 2002, out of 1152 diagnoses of causes of sheep abortion in GB, *C. abortus* was the cause in 508 (44%) of them.

C. psittaci infection is thought to be common in a number of bird species, mainly psittacines, but also others including turkeys, ducks and geese and infection has been recorded in people working in pet shops and poultry processing plants.

In the UK there has in recent years been an increasing trend in the sale of birds and other pet animals by large store chains. Many of the birds obtained in this way originate from a small number of suppliers. For imported captive birds entering quarantine in the European Community, Decision 2000/666 now applies which requires specific action to be taken when the infection is detected in psittaciformes. If, during quarantine, it is suspected or confirmed that psittaciformes are infected with *Chlamydophila psittaci*, all birds in the consignment must be treated by a method approved by the Divisional Veterinary Manager, and the quarantine must be prolonged for at least 2 months after the last recorded case.

Q FEVER (*COXIELLA BURNETII*)

Transmission of *Coxiella burnetii*, the organism which causes Q Fever, is thought to occur primarily through inhalation of contaminated aerosols or from direct contact with infected animals. Infection with *Coxiella burnetii* is often mild or asymptomatic. In Europe, human infection increases in the spring (April and May). In the UK most Q fever cases are sporadic or associated with occupational exposure to animals. Exposure to cattle, especially dairy cattle, appears to increase the risk of Q fever. Being present at calving and handling cattle products of parturition may pose significant risks. Animal infection is most commonly reported in ruminants and a

[15] *C. psittaci* causing abortion in sheep now referred to as *Chlamydophilia abortus.* For further information on nomenclature see www.chlamydiae.com

recent study in England and Wales suggested that infection among dairy herds may be as high as 20%. Although heavy infections in sheep have been associated with abortions it is generally considered not to be pathogenic in animals.

In 2002, 35 serologically confirmed sporadic human cases were reported in England and Wales compared with 47 in 2001; a further 95 cases were associated with a single outbreak in South Wales. 27 cases were identified in Northern Ireland and 6 in Scotland, compared with 35 and 6 respectively in 2001. The greater number of cases reported in males (1.9 : 1 in England and Wales) may reflect opportunities for greater occupational exposure.

An outbreak of Q fever occurred in a factory manufacturing cardboard packaging materials on Newport Docks, South Wales. Ninety-five confirmed cases were identified, 5 people with pneumonia were admitted to hospital. The outbreak was confined to Newport Docks and there was no evidence of a wider community involvement. Analysis of the data from investigation of the outbreak suggested a point source of infection in early August 2002 associated with refurbishment of part of the factory. No wild or domestic animal sources were identified and windborne spread from adjacent farmland is considered unlikely.

During the period between 1991 and 2000 in England and Wales there were an average of 74 (range 57-94) cases per year compared to 47 reported in 2001. The number of reported sporadic cases continues to decline, although in 2002 may be associated with the level of re-stocking following the 2001 FMD outbreak.

In Northern Ireland from 1997 to 2002, the number of laboratory reports of *Coxiella burnetii* has ranged from 27-53, (1.6-3.1 cases per 100,000 population). In 2001 and 2002 there were 27 cases recorded in each year. The rate in Northern Ireland is considerably higher than in England and Wales. Northern Ireland is participating in a PHLS multi-centre case control study of risk factors associated with sporadic Q fever infection.

RINGWORM

Ringworm or dermatophytosis is an infection of the keratinised tissues (skin, hair or nails) with a fungus from the *Epidermophyton*, *Microsporum* or *Trichophyton* genera. The majority of zoonotic dermatophytoses are caused by three species: *M. canis* (usually from pet animals, especially cats and dogs), *T. verrucosum* (usually from cattle) and *T. mentagrophytes* var *mentagrophytes* (which has a wide host range, including farm animals, rodents and pets). Infection is usually acquired through direct contact with an infected animal, or indirect contact with a contaminated environment. Clinical disease is seldom serious and responds well to treatment. It can however be cosmetically unsightly although often self-limiting.

Whilst ringworm is likely to be one of the most common zoonotic infections, reliable data are not available for the number of cases in humans. Ringworm is thought to be fairly common in farm animal species, particularly cattle, but may also occur in horses, cats and dogs; however, there is no ongoing surveillance to determine the levels or monitor trends. The fungal spores may survive in the environment on gateposts, fences and on farm buildings for long periods. In cattle the disease is characterised by grey-white plaques on the skin of the head and neck which enlarge and may spread to other parts of the body. Cats may be infected and show no clinical signs. Routine laboratory surveillance does not provide any estimate of the prevalence of animal disease.

STREPTOCOCCUS SUIS

Streptococcus suis is one of two streptococci of zoonotic interest, the other being *Streptococcus zooepidemicus*. *S. suis* is a bacterium, the normal habitat of which is the pig tonsil and is a cause of meningitis in both piglets and humans. It is recognised worldwide as a swine pathogen and is endemic in the UK pig population. *S. suis* is a common cause of meningitis, polyarthritis, septicaemia and pneumonia in pigs and can be carried in the tonsils of clinically normal animals.

Streptococcus suis infection is rare in humans and cases of human infection are infrequently reported to the PHLS Communicable Disease Surveillance Centre (CDSC). *Streptococcus suis* infection of humans is usually due to *S. suis* type 2, which is also the type most associated with disease in pigs; it is a recognised occupational hazard to butchers, abattoir workers, meat processing plant workers, veterinary surgeons and pig farmers. Early recognition of the disease in these groups of workers is important. Human beings with *S. suis* infection often develop meningitis. *S. suis* infection is a particular risk for individuals who have undergone splenectomy (removal of the spleen) and for whom the disease may be fatal. In the UK, *S. suis* serotype 14 has been emergent since 1996 when it was first isolated from diseased pigs in Scotland. The disease continues to be rare with a total of 21 reports received between 1991 and 2001, an annual average of about 2 per annum. One case in an elderly female, who had no identifiable risk factors, was reported in 2002 in England and Wales. No cases were reported in Scotland or Northern Ireland.

TAPEWORM (TAENIASIS)

A total of 72 laboratory confirmed reports were received in England and Wales by CDSC during 2002 and of these, overseas travel was mentioned in 13 cases. Two cases were reported in Scotland. One case was reported from Northern Ireland. The first report of infection with *Taenia solium* (pork tapeworm) since 1994 has been received; the patient was a prison inmate.

It is difficult to assess trends because *Taenia* infections are rarely reported. The paucity of data on the likely country where infection occurred, the foods eaten and occupation makes comment difficult. It should not be assumed that for cases in which no country of infection was specified that infection was acquired in the UK.

In animals there are occasional reports of sporadic occurrence of cysts of *T. saginata* in cattle. There have been no reports of the cysts of *T. solium* in pigs for many years in the UK.

TOXOCARIASIS

Toxocariasis is a zoonosis with a worldwide distribution caused by roundworms (nematodes) of dogs and cats. It is common in dogs and cats in Europe. Humans may acquire infection from soil contaminated with eggs, by direct ingestion, from unwashed hands or by consumption of contaminated vegetables. The eggs require one to three weeks' incubation after they have been shed by their animal host before they are able to infect humans. Symptoms in humans are due to the migration of larval forms of the parasite into various tissues and include pneumonitis, chronic abdominal pain and skin rash. Larvae may also enter the eye and cause loss of vision.

Three laboratory reports of human toxocara infection in the UK were received during 2002 (in England and Wales) compared with 1 in 2001. Two infections were in children and one was in an adult.

Infection with *Toxocara canis* is common in dogs, but unless they are present in large numbers in the young puppy, the animals appear healthy. Effective anthelmintics may be administered to dogs and puppies to control the worms and eliminate or reduce the contamination of the environment with worm eggs, and pet owners are encouraged to do this. Prevention also focuses on basic personal hygiene including wearing gloves during, and washing hands after gardening, and ensuring that children wash their hands after playing in gardens and parks.

TOXOPLASMOSIS

Toxoplasmosis is a common illness in both animals and man throughout the world and is caused by an obligate intracellular protozoan parasite, *Toxoplasma gondii*. Virtually all warm blooded animals can act as intermediate hosts but the life cycle of *Toxoplasma gondii* is only completed in domestic cats and several species of wild felidae, the definitive hosts. The disease may be acquired through consumption of undercooked infected meat or food contaminated with cat faeces or from handling contaminated soil or cat litter trays. Although the majority of human infections are mildly flu-like or asymptomatic, infection during pregnancy can cause abortion or congenital malformation. In animals, *Toxoplasma* is an important cause of ovine abortion, which may be controlled by management practices and vaccination (there is no vaccine to control toxoplasmosis in humans). In 2001 for those occasions when the cause of abortion in sheep was determined at a government associated veterinary laboratory in GB, *Toxoplasma gondii* remained a common cause and accounted for just over 20% the diagnoses, a reduction from 2000 but FMD controls may have influenced the number of samples submitted. The incidence of toxoplasmosis in pregnant women is unknown. Human cases of toxoplasmosis in the UK are only notifiable in Scotland.

A total of 94 laboratory-confirmed cases of toxoplasmosis were reported in 2002 (Table 13) by laboratories in England and Wales. One patient was a Ghanaian national and one had travelled to France. Two occupationally acquired cases were identified, one was a farmer, the other a female veterinary surgeon who had contact with sheep. Since 1989 there has been a decline in the number of reports, the significance of which is uncertain. Systematic serological surveys indicate that voluntary laboratory reports underestimate the level of infection.

Table 13:

UK laboratory-confirmed human toxoplasmosis cases, 1999 - 2002.

Toxoplasmosis	1998	1999	2000	2001	2002
England & Wales	222	156	103	106	94
Scotland	12	24	20	16	32
N Ireland	0	1	5	7	12
Total	234	181	128	129	138

TRICHINELLOSIS

Trichinellosis is caused by the nematode of the *Trichinella* spp. Symptoms are associated first with the gastrointestinal tract and later with the muscles as the worm penetrates and develops there. The main source of human infection is raw or undercooked meat products from pigs or wild boar, but meat products from other animals may also be a source (e.g., horse and walrus).

No known cases of human trichinellosis acquired from infected meat from animals reared in the United Kingdom have been identified either in the United Kingdom or in other countries that have received meat and meat products from the UK since 1975.

Between 1975 and 2001, 39 laboratory confirmed reports of human trichinella infection in England and Wales were received by the CDSC. The suspected source or country of infection is not always stated but all cases are believed to have been acquired abroad or from consumption of infected meat imported into the UK. Reported countries of infection were:

Suspected country/source of infection	Number of cases 1975 – 2001 (E & W)
Egypt	1
Ethiopia	1
Zambia	2
Hong Kong	17
Yugoslavia	8
Not stated	10
Total	**39**

The last recorded outbreak in UK, albeit involving imported food, was of eight cases amongst Yugoslav immigrants in North London, reported in 2000. It was traced to consumption of infected pork salami imported as a gift from the town of Sombor in northern Serbia[16].

No cases were recorded in the United Kingdom during 2002.

There is no evidence to indicate that trichinellosis exists in pigs or horses in the UK, as shown by the negative results from the large proportion of carcasses that are

[16] CDR Weekly 2000; 10(2); 9, 12

tested annually for export. This view was supported by the survey reported in last year's report of foxes in GB in which no *Trichinella* were found in muscle digests. The last positive diagnosis was in pigs in 1978.

YERSINIOSIS

The disease in humans is caused mostly by *Yersinia enterocolitica*. Clinical presentations include fever, diarrhoea and abdominal pain that may mimic appendicitis and chronic arthritis. Transmission usually occurs by ingestion of contaminated food or water and less commonly by direct contact with infected animals, and rarely from person-to-person spread via the faecal-oral route. It occurs in all European countries. Human surveillance is based on voluntary laboratory reporting, but the extent to which the organism is looked for varies. In the UK**,** 44 cases of *Yersinia enterocolitica* were reported in 2002, the incidence ranging from 0.08–0.41/100,000 population, the higher prevalence occurring in Northern Ireland, and the lower in England and Wales.

Disease in animals is seldom caused by *Yersinia* spp. Although *Y. enterocolitica* may be present as a subclinical infection in livestock, a diagnosis of yersiniosis is seldom made.

No surveys were conducted in livestock in 2002. A survey in cattle, sheep, and pigs was reported in Zoonoses Report UK 2000. The main findings are repeated in Table 14. The carriage rate found in pigs was higher than in cattle and sheep.

Table 14: Prevalence of faecal carriage of *Yersinia enterocolitica* in cattle, sheep and pigs at slaughter (GB)

	Cattle		Sheep		Pigs	
	N	% positive	N	% positive	N	% positive
Y. enterocolitica	891	6.6	973	13.7	2506	26.1

N = number of animals examined

In pig isolates 40% were serovars recognised as the ones most likely to pose a threat to human health (Table 15).

Table 15: *Y. enterocolitica* serovars of the pig isolates

Serovar	O:3	O:9	O:8	O5,27	Others
Percentage	5	11	2	22	60

APPENDIX 1

Acknowledgements

This report was produced by a small group formed under the Chairmanship of Dr Sarah O'Brien. The group contained representatives or received assistance from the following organisations:

Department for Environment, Food and Rural Affairs
1A Page Street
Westminster
London SW1P 4PQ
http://www.defra.gov.uk

Department of Health
Skipton House
80 London Road
Elephant and Castle
London SE1 6LW
http://www.dh.gov.uk

Department of Agriculture and Rural Development, Northern Ireland
Dundonald House
Upper Newtownards Road
Belfast
BT4 3SB
http://www.dardni.gov.uk

Department of Health and Social Services & Public Safety (Northern Ireland)
Castle Buildings
Stormont
Belfast
BT4 3SJ
http://www.dhsspsni.gov.uk

Scottish Executive Environment and Rural Affairs Department
Pentland House
47 Robb's Loan
Edinburgh
EH14 1TY
http://www.scotland.gov.uk

Welsh Assembly Government
Cathays Park
Cardiff
CF10 3NQ
http://www.wales.gov.uk

Food Standards Agency
Aviation House
125 Kingsway
London
WC2B 6NH
http://www.foodstandards.gov.uk

Public Health Laboratory Service[17], Communicable Disease Surveillance Centre
61 Colindale Avenue
London
NW9 5EQ
http://www.hpa.org.uk

Scottish Centre for Infection and Environmental Health
Clifton House
Clifton Place
Glasgow
G3 7LN
http://www.show.scot.nhs.uk/scieh

Communicable Disease Surveillance Centre (Wales)
(Zoonoses Surveillance Unit)
Abton House
Wedal Road
Cardiff
CF14 3QX
http://www.wales.nhs.uk/sites/home.cfm?OrgID=368

Communicable Disease Surveillance Centre (Northern Ireland)
Belfast City Hospital
Lisburn Road
Belfast,
BT9 7AB
http://www.cdscni.org.uk

Veterinary Laboratories Agency
New Haw, Addlestone
Surrey
KT15 3NB
http://www.defra.gov.uk/corporate/vla/default.htm

Scottish Agricultural College
West Mains Road
Edinburgh
EH9 3JG
http://www.sac.ac.uk

[17] The Health Protection Agency (HPA), a new national organisation for England and Wales, was established on 1 April 2003 and the functions of the Public Health Laboratories Service now come within the Agency (http://www.hpa.org.uk/)

Public Health Laboratory Service, Laboratory of Enteric Pathogens
61 Colindale Avenue
London
NW9 5EQ
See http://www.hpa.org.uk

Scottish Salmonella Reference Laboratory
Stobhill NHS Trust
133 Balornock Road
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G21 3UW

Scottish *E.coli* Reference Laboratory
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Hereford
HR1 2ER

PHLS Lyme Disease Reference Unit
Level B South Laboratory Block
Southampton General Hospital
Southampton
SO16 6YD

APPENDIX 2

Zoonoses which may be reported to national surveillance centres UK (humans)

- non-typhoidal salmonellae (over 2000 serotypes)
- Vero cytotoxin-producing *Escherichia coli* O157
- *Campylobacter jejuni, C. coli, C. lari, C. upsaliensis*
- *Cryptosporidium parvum*
- *Yersinia enterocolitica, Y. fredriksenii, Y. pseudotuberculosis*
- *Listeria monocytogenes*
- *Leptospira hardjo, L. icterohaemorrhagiae, L. saxkoebing, L. ballum*
- *Borrelia burgdorferi*
- *Chlamydophila psittaci*
- *Coxiella burnettii*
- *Bacillus anthracis*
- *Pasteurella multocida*
- *Streptococcus suis*
- *Toxocara canis, T. cati*
- *Toxoplasma gondii*
- *Taenia saginata, T. solium*
- Brucellosis – *Brucella* spp.
- *Mycobacterium bovis*
- *Echinococcus granulosus*
- Orf
- Rabies
- *Trichinella* spp.
- *Erysipelothrix rhusiopathiae*

APPENDIX 3

Notifiable zoonotic disease in people in the UK

Disease	Notifiable under public health legislation in England & Wales	Notifiable under public health legislation in Scotland	Notifiable under public health legislation in N. Ireland	Reportable under RIDDOR* to HSE
Anthrax	✓	✓	✓	✓
Brucellosis				✓
Chlamydiosis (avian)				✓
Chlamydiosis (ovine)				✓
Food poisoning	✓	✓	✓	
Leptospirosis	✓	✓	✓	✓
Lyme disease		✓		✓
Q-fever				✓
Rabies	✓	✓	✓	✓
Streptococcus suis				✓
Toxoplasmosis		✓		
Tuberculosis	✓	✓	✓	✓

* RIDDOR: Reporting of Injuries, Diseases and Dangerous Occurrences Regulations

APPENDIX 4

Notifiable diseases in animals which are potential zoonoses

Notifiable Disease	**Species**	**Last Occurred in UK**
Anthrax (*Bacillus anthracis)*	Cattle/other mammals	1997
Avian Influenza [1] (Fowl plague)	Poultry	1992
Bovine Spongiform Encephalopathy	Cattle	Present
Brucellosis (*Brucella abortus*)	Cattle	1993 [2]
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
Rabies	Dogs and mammals	1970
Rift Valley Fever	Cattle, sheep and goats	Never
Tuberculosis (*Mycobacterium bovis*)	Cattle and deer	Present

Notes [1] certain strains [2] present in Northern Ireland

Some other notifiable diseases such as Newcastle Disease and Foot and Mouth Disease may, in exceptional circumstances, cause infection in humans.

Examples of some zoonotic organisms notifiable or reportable under other animal health legislation

The Zoonoses Order, 1989 and the Zoonoses Order, 1991 (Northern Ireland)
Salmonella spp. and *Brucella* spp.

The Specified Animal Pathogens Order, 1998 and the Specified Animal Pathogens Order (NI), 1999
Echinococcus multilocularis
Equine morbillivirus
Trichinella spiralis

APPENDIX 5

Animal population

Provisional UK results from the June 2002 Agricultural and Horticultural Census[18] showed that cattle and calves numbers reduced in the previous 12 months by 2.4%, total pig numbers reduced by 4.4% and sheep and lamb numbers reduced by 2.4%.

Number of livestock for each country in UK, June 2002

	England	Wales	Scotland	N. Ireland	UK
Cattle	5,530,948	1,195,000	1,934,678	1,684,486	10345164
Sheep	15,396,780	10,050,000	8,063,187	2234161	35744128
Pigs	4,629,703	44,000	526,276	387174	5587153
Poultry*	130,971,000	6,072,000	15,544,135	16413046	169000181
Goats	76407	7000	6,834		
Deer	25,000	1000	7,739		
Horses	232000	40000	250578	10054	532632

*Includes turkeys, ducks, geese and other birds

Number of pets in the UK 2001 (2002 data not available)

Species	Number (Millions)
fish	24.7
cats	7.5
dogs	6.1
rabbits	1.1
other birds	1.06
hamsters	0.86
budgerigars	0.75
guinea pigs	0.73
canaries	0.26

[18] http://statistics.defra.gov.uk/esg/publications/auk/2002/default.asp

APPENDIX 6

Further reading

Interim report on Campylobacter HMSO ISBN 0 11 321662 9

Report on Vero cytotoxin-Producing *E. coli* HMSO ISBN 0 11 321909 1

Report on poultry meat HMSO ISBN 0 11 321969 5

Zoonoses (Palmer, Soulsby and Simpson) OUP ISBN 0 19 262380 X

Salmonella in Livestock Production in GB 2002, VLA ISBN 1 8995 1319 1
http://defra.gov.uk/corporate/vla/science/science-salm-rep.htm

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

HSE Agriculture Information Sheet 23rev 'Avoiding ill health at open farms – Advice to farmers (with teachers' supplement)' available free from HSE Books, tel. 01787 881165

The Occupational Zoonoses, available from HSE Books, ISBN 0 1188 6397 5

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

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

Task Force on *E. coli* O157 – Final Report Scottish Executive publication
http://www.scotland.gov.uk/library3/health/ecoli-00.asp

Zoonoses Report UK 1998 Defra publication PB 5137
http://www.defra.gov.uk/animalh/diseases/zoonoses/zoonoses_reports/zoonoses1998.pdf

Zoonoses Report UK 1999 Defra publication PB 5577
http://www.defra.gov.uk/animalh/diseases/zoonoses/zoonoses_reports/zoonoses1999.pdf

Zoonoses Report UK 2000 Defra publication PB 6652
http://www.defra.gov.uk/animalh/diseases/zoonoses/zoonoses_reports/zoonoses_2000.pdf

Zoonoses Report UK 2001 Defra publication PB 7995 ISBN 0-85521-022
http://defraweb/animalh/diseases/zoonoses/zoonoses_reports/zoonoses2001.pdf

APPENDIX 7

Sources of data

Human infection

There are four main sources of data which help to build a picture of the burden of zoonotic infection in the human population. These are:

- Notification of infectious disease
- National surveillance schemes for laboratory-confirmed infections
- National surveillance schemes for general outbreaks of infectious intestinal disease
- Enhanced surveillance for specific zoonoses

The main characteristics of each of these sources of data are outlined below.

Notification of infectious disease

Notifications relate to clinical disease. All doctors in clinical practice in England and Wales have a statutory duty to notify the proper officer of the local authority of all clinically diagnosed cases of diseases specified under the Public Health (Infectious Diseases) Regulations 1988. These include the following zoonoses: anthrax, leptospirosis and rabies. In Northern Ireland the equivalent legislation is the Public Health Notifiable Diseases Order (Northern Ireland) 1989. In Scotland the Public Health (Notification of Infectious Diseases)(Scotland) Regulations 1988 require similar notification but also include Lyme disease and toxoplasmosis. Zoonotic notifiable diseases are shown in Appendix 3.

Tuberculosis is also notifiable. However clinical tuberculosis can result from either *Mycobacterium tuberculosis* or *M. bovis* (bovine tuberculosis) infection. *M. tuberculosis* is primarily person-to-person spread. Notifications do not include information on the aetiology of disease. Therefore it is not possible to use tuberculosis notification data to assess the burden of human infection with bovine tuberculosis in England and Wales.

Food poisoning, while not defined in legislation, is also notifiable. The Department of Health's Advisory Committee on the Microbiological Safety of Food put forward the following definition for food poisoning, "any disease of an infectious or toxic nature caused by or thought to be caused by the consumption of food or water". Therefore it can be seen that infections caused by zoonotic agents including non-typhoidal salmonellae, campylobacters and *Cryptosporidium parvum* should be notified as food poisoning provided that the consulting clinician suspects that foodborne or waterborne transmission of infection occurred. Similarly diseases caused by non-zoonotic agents including both micro-organisms and toxins should also be notified as food-poisoning if foodborne or waterborne transmission is suspected. As with tuberculosis, notifications do not normally include information on the aetiology of disease and source of infection. Therefore it is not possible to determine the number of cases of notified food poisoning which are attributable to specific zoonotic agents.

National surveillance schemes for laboratory-confirmed infections

Laboratory report surveillance is conducted for each of the constituent countries of the UK by the following national surveillance centres:

Surveillance centre	Surveillance area
Communicable Disease Surveillance Centre (CDSC), Colindale	England and Wales
Scottish Centre for Infection & Environmental Health (SCIEH), Glasgow	Scotland
Communicable Disease Surveillance Centre (CDSC NI), Belfast	Northern Ireland
Communicable Disease Surveillance Centre (CDSC), Wales	Wales

Clinical microbiology laboratories voluntarily report data on microbiologically confirmed cases of infectious disease to the appropriate national surveillance centre. The data usually reported include:

- organism
- source laboratory (laboratory at which the specimen is initially examined)
- reference laboratory
- specimen date
- case identifier (name or laboratory identification number)
- date of birth
- sex

The national surveillance centres in the UK maintain surveillance on nearly 4000 species, subspecies and subtypes of microbial pathogens. Zoonoses under laboratory report surveillance are listed in Appendix 2.

The following events must occur for data on a given case to be included in a national surveillance database for laboratory confirmed-infections:

- an infected individual must consult a clinician (GP or hospital doctor)
- the doctor must arrange for a specimen to be taken (faeces, blood etc.) and referred to a clinical microbiology laboratory
- the laboratory must isolate or identify a pathogen
- the laboratory must submit a report to the national surveillance centre.

The national surveillance schemes for laboratory confirmed infections are not designed to provide direct measures of the numbers of cases of infection in the population caused by those pathogens under surveillance. There are a number of factors that influence the degree of the disparity between the number of recorded laboratory reports for any given pathogen and the number of cases of infection in the population. These include:

- severity of disease
- duration of symptoms
- selectivity of screening protocols employed by diagnostic laboratories
- sensitivity of available diagnostic techniques.

The severity of the disease and the duration of symptoms associated with infection dictates both the proportion of cases that consult clinicians and the proportion of presenting cases from whom specimens are collected. Both severity and duration of disease vary widely across the range of zoonoses under surveillance in the UK.

Laboratory screening protocols determine the investigations that are conducted on any given specimen. Not all of the zoonoses listed in Appendix 2 are routinely tested for by all laboratories. As such ascertainment of cases for any given pathogen is directly related to the laboratory screening protocols in operation.

There are marked variations in the sensitivity of the routine diagnostic techniques employed for different species and subtypes of pathogen. The sensitivity determines the proportion of cases that are identified by laboratory investigation. A range of microbiological techniques is used to identify the different types of zoonotic pathogens. These vary greatly in sensitivity and specificity. These include light microscopy, isolation, immunoassays, novel techniques based on molecular biology.

The disparity between laboratory report surveillance data and infection in the community is lessened for pathogens that cause severe disease because these infections are more often screened for, and laboratories use more sensitive methods.

National surveillance schemes for general outbreaks of infectious intestinal disease

CDSC, SCIEH, and CDSCNI receive preliminary reports of general outbreaks of IID from laboratories, health authorities or boards and local authority environmental health departments. Standardised questionnaires are then sent to the appropriate health authority/board in order to collect a minimum dataset on each outbreak. The investigating consultant is asked to complete the questionnaire when the outbreak investigation is complete. The completed questionnaires are returned to the national surveillance centre and the data entered onto a database. The following data are collected on the questionnaires:

- Health authority/board
- Date of outbreak
- Place of outbreak (hospital, restaurant, school, community etc.)
- Pathogen
- Mode of transmission (foodborne, person to person, mixed, other)
- For foodborne outbreaks
- Food
    - Evidence (microbiological, epidemiological)
    - Numbers of cases, admitted to hospital, deaths

Surveillance of general outbreaks of IID provides information on the specific risk factors associated with different pathogens and also trends in the importance of these factors. However the completeness of the surveillance data is mainly dependent on the sensitivity of detecting outbreaks at local level. The ease of identification of outbreaks is associated with the same factors that affect laboratory report surveillance (see above).

Enhanced surveillance
From time to time additional data are collected or specific surveillance studies set up, either nationally or localised, to provide information on certain aspects of a zoonosis.

Animal infection

Sources of data on animal infections can be broadly divided up as follows:
- reports of notifiable disease
- laboratory reports of organisms specified in the relevant legislation
- reports from statutory monitoring and control programmes
- reports from government veterinary laboratories on diagnostic samples
- reports from inspections carried out at abattoirs
- reports from specific surveillance and research studies

The various sources of data provide information on the zoonoses in animals. Some of the information is comprehensive, e.g., the information on notifiable diseases gives a clear picture of the occurrence of the diseases in animals and likewise information arising out of disease control programmes. The information on diagnostic samples provides data on the occurrence of pathogens in animals which are ill, but may not reflect the occurrence of these organisms in healthy animals. The numbers of reports is influenced by the number of samples submitted during a given time period. A number of factors may influence submission rates such as the particular presentation of a suspected disease, the level of awareness of a suspected disease and its perceived importance, the value of the animals affected, and the general economic climate. Sources of information on zoonoses in animals are:

Department for Environment, Food and Rural Affairs (DEFRA)
Veterinary Laboratories Agency (VLA)
Scottish Agriculture College (SAC)
Meat Hygiene Service (MHS)
Department of Agriculture and Rural Development, Northern Ireland (DARDNI)

Information may also be available from universities, veterinary research organisations, and other private veterinary laboratories.

Reports of suspected notifiable animal diseases
Notifiable animal diseases are those where there is a statutory duty for the suspicion of disease to be notified to the Government. A number of these notifiable diseases are potentially zoonotic. They are listed in Appendix 4.

Laboratory reports of organisms specified in the relevant legislation
The Zoonoses Order, 1989 and the Zoonoses Order, 1991 (Northern Ireland) requires that the person in charge of a laboratory reports the isolation of salmonella or brucella organisms in samples from food producing animals, their products, environment or feeding stuffs. These reports provide information on the serotypes of salmonella (and brucella) which occur in animals.

Reports from statutory monitoring and control programmes

Government programmes for the control of certain animal diseases e.g., tuberculosis, brucellosis, and salmonella in breeding flocks of domestic fowl, require continuous monitoring and surveillance.

Reports from veterinary laboratories on diagnostic and other samples

Samples from animals are submitted by veterinary surgeons to laboratories as an aid to diagnosis of disease, for animal health monitoring, and as a requirement for trade purposes. The results of samples submitted to government veterinary laboratories, and those approved or contracted to carry out work on behalf of the government, are collated and analysed. (For ease of reference all such laboratories will be referred to in this report as government veterinary laboratories).

Reports from inspections carried out at abattoirs

Samples may be taken for examination from animals at slaughter as part of the inspection process for fitness for human consumption.

Reports from specific surveillance and research studies

Surveillance is carried out on a national scale to determine the presence of a zoonotic organism in the animal population, e.g., a statistically valid number of sheep and goats are sampled each year to give assurance that the national flock remains free of brucella organisms. For organisms which do not cause disease in animals, e.g., Vero cytotoxin-producing *Escherichia coli* O157 (VTEC O157), it is necessary to carry out specific surveys to establish the extent of the infection in animals.

Reports from voluntary surveillance programmes

In recent years the UK livestock industry has increasingly undertaken voluntary monitoring of livestock for the presence of zoonoses, particularly Salmonella in poultry. The scope of monitoring, sampling protocols and microbiological techniques varies between commercial enterprises and over time.

Nobel House
17 Smith Square
London SW1P 3JR

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Department for Environment Food and Rural Affairs