ZOONOSES MONITORING

UNITED KINGDOM

The Report referred to in Article 9 of Directive 2003/ 99/ EC

TRENDS AND SOURCES OF ZOONOSES AND ZOONOTIC AGENTS IN HUMANS, FOODSTUFFS, ANIMALS AND FEEDINGSTUFFS

including information on foodborne outbreaks, antimicrobial resistance in zoonotic agents and some pathogenic microbiological agents

IN 2006

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **United Kingdom**
Reporting Year: **2006**
Institutions and laboratories involved in reporting and monitoring:

Laboratory name	Description	Contribution
Department for Environment, Food and Rural Affairs (Defra)	Competent Authority for Directive 2003/ 99	Co-ordination of report production
Department of Agriculture and Rural Development, (DARD) Northern Ireland	Competent Authority in Northern Ireland for Directive 2003/ 99	Co-ordination of information on zoonotic agents in animals, and feed
Health Protection Agency	The Health Protection Agency (HPA) is an independent body that protecte the health and well-being of everyone in England and Wales	Data on Zoonoses and zoonotic agents in humans, foodborne outbreaks, and antimicrobial resistance in humans and food isolates
National Public Service for Wales, Communicable Disease Surveillance Centre (Zoonoses Surveillance Unit)	National Public Service for Wales, Communicable Service for Wales. It protects the population from infection by surveillance and independent advice, outbreak investigation and applied research	Data on zoonotic agents in humans in England and Wales
Veterinary Laboratories Agency (VLA)	VLA is an Executive Agency of Defra. It has a regional network of veterinary laboratories and provides animal disease surveillance, diagnostic services and research	Data on zoonotic agents in animals and feed, collation of data from Scottish Agricultural College, antimicrobial resistance data on isolates from animals in GB
Department of Health	Government department . The aim of DH is to improve the health and well being of people in England	Overview
Scottish Agriculture college	Under contract provides surveillance information on range of animal diseases to the Scottish Executive Environment and Rural Affairs Department	Data on zoonotic agents in animals in Scotland
Scottish Executive Environment and Rural Affairs Department	Devolved Administration for Scotland	Overview

Food Standards Agency FSA	The Food Standards Agency is an independent government department set up by an act of parliament in 2000 to protect the public health and consumer interest in relation to food	Data on zoonotic agents in food in the UK
Health Protection Scotland HPS	Health Protection Scotland established by Scottish Executive to strengthen and coordinate health protection in Scotland. HPS was formed on 11 November 2004	
Health Protection Agency, Communicable Disease Surveillance Centre, Northern Ireland	Surveillance of communicable disease. Advice and support to public health authorities and health professionals, training, and research in Northern Ireland	Data on zoonotic agents in humans in Northern Ireland and foodborne outbreaks.
Welsh Assembly Government, Dept for Environment Planning and Countryside	Devolved Administration for Wales	Overview

PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/ 99/ EC[1]. The information has also been forwarded to the European Food Safety Authority (EFSA).
The report contains information on trends and sources of zoonoses and zoonotic agents in United Kingdom during the year 2006. The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal bacteria as well as information on epidemiological investigations of foodborne outbreaks. Complementary data on susceptible animal populations in the country is also given.
The information given covers both zoonoses that are important for the public health in the whole European Community as well as zoonoses, which are relevant on the basis of the national epidemiological situation.
The report describes the monitoring systems in place and the prevention and control strategies applied in the country. For some zoonoses this monitoring is based on legal requirements laid down by the Community Legislation, while for the other zoonoses national approaches are applied.
The report presents the results of the examinations carried out in the reporting year. A national evaluation of the epidemiological situation, with special reference to trends and sources of zoonotic infections, is given. Whenever possible, the relevance of findings in foodstuffs and animals to zoonoses cases in humans is evaluated.
The information covered by this report is used in the annual Community Summary Report on zoonoses that is published each year by EFSA.

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[1] Directive 2003/ 99/ EC of the European Parliament and of the Council of 12 December 2003 on the monitoring of zoonoses and zoonotic agents, amending Decision 90/ 424/ EEC and repealing Council Directive 92/ 117/ EEC, OJ L 325, 17.11.2003, p. 31

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1. ANIMAL POPULATIONS

The relevance of the findings on zoonoses and zoonotic agents has to be related to the size and nature of the animal population in the country.

A. Information on susceptible animal population

Sources of information:

Official National Statistics - 1st June 2006 Agricultural Census (annual)

Dates the figures relate to and the content of the figures:

The figures given relate to census data, mainly in June 2006, unless where stated in the table.

Definitions used for different types of animals, herds, flocks and holdings as well as the types covered by the information:

The information collected on national statistics analysis does not always correspond to the information breakdown in the table and where this has occured it is noted. It is not possible in many cases to give the number of herds or flocks per holding.

National evaluation of the numbers of susceptible population and trends in these figures:

In 2006, the number of dairy cows was 1% higher than in 2005, whilst the beef breeding cow herd reduced by 1.7% compared with 2005. Overall, the total number of cattle and calves in the UK fell by 1.2% in 2006. Total sheep and lambs also fell in 2006 by 2%. The total number of pigs in 2006 increased by 1.5% compared with 2005. Breeding pigs and gilts fell by 0.3%.
The layer flock numbers fell by 3% in 2006, with an even more dramatic reduction in growing pullet numbers by 11.9% for the year compared to 2005. There was also a decrease in broilers, and turkeys in 2006, showing a reduction of 0.7% and 11.&% respectively, compared with 2005.

Geographical distribution and size distribution of the herds, flocks and holdings

Cattle
The June 2005 Census data indicates that there are 86,100 holdings in the UK with dairy and/ or beef cattle present. This number has fallen in comparison with the data recorded in June 2000, where there were 99,300 holdings in the UK with cattle present. The June 2003 census indicated that 53% of cattle and calves were located in England, 11% in Wales, 19% in Scotland and 16% in Northern Ireland. In the UK almost 44% were in holdings with greater than 200 head of cattle.
Sheep
Census data from June 2005 shows that there were 79,900 sheep holdings in the UK in 2005, less than the number recorded in 2000 of 85,300 holdings. In June census 2003 43% of the number of sheep were in England, 28% in Wales, 22% in Scotland, 6% in Northern Ireland. Over 53% were on holding with 1000 or more head.
Pigs
There were a total of 5800 holdings with breeding pigs and 8600 holdings with fattening pigs in 2005. In the June 2002 census 83% of the total number of pigs was located in England, 0.01% in Wales, 9% in Scotland and 7% in Northern Ireland. Over 80% of the total number of pigs were on holdings with

1000 head or more.
There were approximately 40,500 holdings in the UK with chickens present (total for broilers and layers) in June 2005.

Table Susceptible animal populations

* Only if different than current reporting year

Animal species	Category of animals	Number of herds or flocks	Year*	Number of holdings	Year*	Number of slaughtered animals	Year*	Livestock numbers (live animals)	Year*
Cattle (bovine animals)	dairy cows and heifers			24600	2004			2863000	2006
	breeding bulls							101000	2006
	calves (under 1 year)							2622000	2006
	meat production animals			61500	2005			4612000	2006
	in total			86100	2005			10270000	2006
Deer	farmed - in total							36000	2006
Gallus gallus (fowl)	unspecified (1)							407000	2006
	laying hens (2)			37400	2005			38257000	2006
	broilers			3100	2005			110672000	2006
	breeding flocks for egg production line - in total (3)							3186000	2006
	breeding flocks for meat production line - in total (4)							4085000	2006
	in total			40500	2005			156607000	2006
Goats	in total							98000	2006
Pigs	fattening pigs (5)			8600	2005			4376000	2006
	breeding animals			5800	2005			557000	2006
	in total			14400	2005			4933000	2006
Sheep	animals under 1 year (lambs)							17058000	2006
	animals over 1 year							17664000	2006
	in total			79900	2005			34722000	2006
Turkeys	in total (6)							6123000	2006
Other poultry	in total							14879000	2006

(1): Cocks and cockerels. Great Britain only
(2): Includes growing pullets (from day old to point of lay) and laying flock (production stage)
(3): Great Britain only
(4): Great Britain only
(5): All other pigs excluding breeding pigs
(6): Data for England, Wales and Northern Ireland. Turkeys in Scotland are included in "other poultry" category

Footnote

Animal data based on Annual Agricultural Census 1st June 2006.
Number of holdings based on June 2005 Census data

2. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

Zoonoses are diseases or infections, which are naturally transmissible directly or indirectly between animals and humans. Foodstuffs serve often as vehicles of zoonotic infections. Zoonotic agents cover viruses, bacteria, fungi, parasites or other biological entities that are likely to cause zoonoses.

2.1. SALMONELLOSIS

2.1.1. General evaluation of the national situation

A. General evaluation

History of the disease and/ or infection in the country

Salmonellas have been recognised as important pathogens and Salmonella Enteritidis and Salmonella 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.

National evaluation of the recent situation, the trends and sources of infection

There was a moderate increase in the number of cases of human Salmonellosis in 2006 (14060), compared to 2005 (12831
cases in 2005), and S. Enteritidis and S. Typhimurium remain the two most common serotypes. However, there has been an overall trend of reduction of reports over recent years
In animals there was a reduction in the number of reported incidents of Salmonella in cattle and sheep, with an increase in reported incidents in pigs. There was also a reduction in reports of Salmonella in poultry in general in 2006. In Gallus gallus breeding flocks where a control plan is in operation in line with Directive 92/ 117 there were two confirmed cases of S. Enteritidis in 2006. In chickens the most common serotype reported in 2006 was S Livingston, followed by S. Senftenburg and S. Kedougou.
In cattle the most frequently isolated serotypes were S. Dublin and S. Typhimurium in the UK in 2006.
As in previous years, the most common serovar in sheep in the UK in 2006 was S. enterica subspecies diarizonae serovar 61:k:1,5,7 which made up over 71% of total reports.
In pigs in 2006 the most commonly isolated serovars were S. Typhimurium and S. Derby which comprised 66% and 14% of total, mainly clinical, reports respectively.
The most commonly isolated serovar from ducks and geese in 2006 was S. Indiana (29% of total reports).
The two most commonly isolated serovars in turkeys were S. Typhimurium (22%) and S. Derby (16% of total reports) and S. Kottbus 15%.
Food
A three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007) to provide surveillance data on the pathogens Salmonella and Campylobacter: surveillance of these pathogens in raw whole chicken on retail sale. A total of 854 raw whole chicken samples were tested in 2006, of which 7% (61) samples were contaminated with Salmonella spp. The isolates comprised 15 different serotypes, of which S. Ohio was the predominant serotype (25%). Two of the 53 samples that contained Salmonella spp. had two or more different types present, i.e. S. Gold-coast and S. Unnamed were recovered from one sample while the other sample contained S. Hadar with three different antimicrobial resistant profiles (ST, STNx and STNxCpL).
A survey of Campylobacter and Salmonella in raw retail chicken available to consumers in Wales and Northern Ireland:
A twelve-month Food Standards Agency/ Local Authorities from Wales and Northern Ireland

(January-December 2006) was carried out to produce an estimate of the Salmonella contamination in whole raw chickens available on retail sale to the consumer in Wales and Northern Ireland. In total, 31 (3.6%) out of the 860 chickens sampled tested positive for Salmonella.
Survey of Salmonella contamination of non-UK produced shell eggs on retail sale in the north west of England and London:
A 16 month Food Standards Agency survey investigated the prevalence of Salmonella in non-UK eggs available at the retail level. A total of 1,744 samples of 6 eggs were tested. 157 samples were contaminated with Salmonella spp. on the shell of the egg resulting in a weighted prevalence estimate of 3.3%. Of these 10 were also contents positive making a total of 173 distinct Salmonella isolates. There were 8 different serotypes of which the majority were S. Enteritidis (84.9%), with PT1 predominating (81.6%). 83.2% of isolates were resistant to one or more antimicrobial drugs (most resistant to nalidixic acid with reduced susceptibility to ciprofloxacin)

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Comparison of the Salmonella serotypes found in animals, feedingstuffs, food and man helps to sugget possible sources of infection in the food chain.
Antimicrobial resistance
The antimicrobial sensitivity of salmonella isolates from cattle, sheep, pigs, turkeys and chickens, in addition to a number of other species, was determined. The major difference in the antimicrobial susceptibility of Salmonellas in 2006, when compared to 2005, was the detection of resistance to nalidixic acid in 65% of 51 Salmonella Enteritidis isolates examined from chickens; no S. Enteritidis isolates resistant to nalidixic acid were detected in 2005 from chickens, when 46 isolates were examined. The nalidixic acid resistant isolates were all S. Enteritidis phage type 1 and the majority of nalidixic acid resistant isolates (91%) were resistant only to nalidixic acid, with 6% of isolates showing additional resistance to ampicillin and 3% additional resistance to sulphonamides. S. Enteritidis phage type 1 isolates resistant to nalidixic acid and neomycin were detected from horses (n=3) and sheep (n=1), though this particular resistance pattern was not observed in chickens. Nalidixic acid resistance is a marker for reduced susceptibility to fluoroquinolones and therefore, as would be expected, there was a reduction in the diameter of the zone of inhibition for ciprofloxacin obtained for S. Enteritidis isolates in 2006, compared to isolates tested in 2005. Reduced susceptibility to fluoroquinolones can lead to treatment failures and is therefore usually considered to be clinically significant. Resistance to the indicator third generation cephalosporins ceftazidime and cefotaxime was not confirmed in Salmonella isolates in 2006 and resistance to ciprofloxacin was detected only in a single Salmonella isolate from poultry; the isolate was a rough strain and could not be fully serotyped.

Additional information

Food
The UK government undertakes national microbiological food surveillance. The priorities of these surveys are closely linked to a strategy to reduce the level of foodborne disease. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.
The UK government also collates returns from all UK food authorities on official food enforcement

activities in line with Regulation (EC) No 882/ 20041 on official controls performed to ensure the verification of compliance with feed and food law, and animal health and animal welfare rules. The results of this food testing, which is done locally, are returned to the European Commission annually as required by the Regulation and therefore have not been included in this report.

Antimicrobial sensitivity

The surveillance programme for antimicrobial resistance in farm animals in England and Wales can be divided into three broad areas, providing different and complementary information. The first of these is the surveillance programme for antimicrobial resistance in bacteria recovered from animals after slaughter for human consumption, which in fact covers the whole of Great Britain. The Veterinary Laboratories Agency (VLA) Salmonella surveillance programme is the second and covers England and Wales, capturing data from incidents reported under statute (the Zoonoses Order 1989). All Salmonella isolates from new incidents of infection with this organism in farm animals are examined. The third comprises a national antimicrobial sensitivity database introduced to the network of 14 VLA regional laboratories throughout England and Wales in 1998 and which collects data from all of the sensitivity tests that are performed on clinical samples. These three data sets therefore complement each other, with the data from the diagnostic laboratories providing information on farms where clinical disease outbreaks are occurring (targeted surveillance) and the data gathered under the abattoir surveys providing information at the point at which animals (from a number of farms) enter the food chain. Statistically robust sampling schemes are important for the monitoring of abattoirs or sentinel farms. A national abattoir surveillance study of this type was not completed in 2006; surveys of broilers, slaughter pigs and turkeys are currently in progress. There is also a need to ensure that an alert system is in place to rapidly identify emergent resistance at the earliest opportunity. This is best achieved both by surveillance of herds with clinical disease problems, where the organisms are likely to be under greatest selective pressure having been subjected to treatment and by the surveillance of livestock at the point of slaughter.

2.1.2. Salmonellosis in humans

A. Salmonellosis in humans

Reporting system in place for the human cases

The reporting system is similar in England and Wales, Scotland, and Northern Ireland.
England and Wales
Ascertainment of cases is via mandatory notification of food poisoning and voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories (National Health Service and Health Protection Agency). The study of infectious intestinal disease in England, carried out between 1993 and 1996 suggested a (true) rate of Salmonellosis in the community of 2.2/ 1000 of which some 2/ 3rds consulted a doctor and 1/ 3rd reached national surveillance (British Medical. Journal 17 April 1999: Wheeler et al.). Almost all isolates are forwarded to the Health Protection Agency Laboratory of Enteric Pathogens (LEP), Centre for Infections for confirmation and phage typing.
Scotland
Food poisoning is a notifiable disease, however the organism responsible is not specified. The surveillance system for Salmonella is based on voluntary laboratory reporting of microbiologically confirmed cases. All isolates identified by routine microbiology laboratories are sent to the Scottish Salmonella Reference Laboratory for confirmation and further typing where appropriate.
Northern Ireland
The surveillance system for Salmonellosis is primarily based on laboratory reporting of microbiologically confirmed cases. Food poisoning is a notifiable disease but the organism is most often not specified. It is a widely held belief that there is significant under-reporting of food poisoning including Salmonellosis. However, whenever infected persons attend their general practitioners and specimens are obtained for culture, there is almost complete reporting of laboratory confirmed infections. Information is available from some of the laboratory reports to indicate if this was an imported case. However this information is incomplete. Therefore follow-up investigations are undertaken to determine if infection was acquired outside of the UK.

Case definition

The main method used is bacteriological examination of faecal specimens. Positive blood cultures are also reported.
Most of the isolates are from faecal specimens, however isolates from extra-intestinal sites are also reported.

Diagnostic/ analytical methods used

Microbiological culture and isolation

Notification system in place

See reporting system above.

History of the disease and/ or infection in the country

The increase in Salmonellosis started in the mid 1980s and since 1989 about 30,000 isolates have

been reported each year up to 1997. Since 1997 numbers reported have declined. Generally during this period over 60% of reports were Salmonella Enteritidis.

Results of the investigation

England and Wales
The incidence of Salmonellosis has been declining since 1997 when a total of 31480 laboratory confirmed cases were reported to national surveillance. In 2006 the annual total was 12822, of which 56% were due to S. Enteritidis. In comparison to 2005 this is an increase in overall number of cases, but a reduction in the number of cases due to S. Enteritidis (11529 cases, of which 58% were due to S. Enteritidis in 2005).
The overall decline in Salmonellosis since the late 1990's has been mainly driven by a decline in the incidence of S. Enteritidis PT 4 which has fallen from over 15000 reports in 1997 to 1973 reports in 2006 in England and Wales. This is a slight increase on the 1902 PT4 isolates reported in 2005. S. Typhimurium remains the second most commonly isolated serotype in humans accounting for 12% of all laboratory confirmed cases of Salmonellosis recorded in 2006 in England and Wales. There has also been a pronounced downward trend in the incidence of S. Typhimurium which has declined from 6554 cases in 1995 to 1485 cases in 2006. During this period the incidence of S. Typhimurium DT104 also fell from 3646 to 290 cases per year in England and Wales. This subtype frequently exhibits resistance to a number of antibiotics.
Scotland
Laboratory reports of Salmonellosis increased from 2015 in 1986 to 3349 in 1997. Since then the numbers have declined. In 2006 1035 cases were reported, a reduction compared to the 1127 cases reported in 2005 and the 1143 cases reported in 2004. S. Enteritidis accounted for 47% and S. Typhimurium for 20% of all cases. S. Enteritdis PT 4 was only the second most commonly isolated phagetype (83 isolates), while PT 1 was most common (97 isolates). Of the S. Typhimurium isolates, DT104 was most commonly detected (69 isolates).
Northern Ireland
The number of reports of Salmonella received in 2006 was 203, an increase on the 175 reported in 2005, which was the lowest annual reported since 1993. Reports of S. Enteritidis have decreased slightly each year between 2002 and 2005 with 83 reports being received in 2005 (98 in 2002). In 2006 there was an increase, with 92 cases reported. PT 1 was the most commonly isolated phagetype (34 isolates). In 2006 there was an increase in the number of S. Typhimurium reports to 45, compared to the 33 reports in 2005, although this is still less than the 146 reports due to one large outbreak during 2004.
Of the 203 Salmonella reports received in 2006, 67 (33%) were thought to have been acquired outside the UK

National evaluation of the recent situation, the trends and sources of infection

Overall there has been a continued trend of reduction in the number of cases of Salmonellosis in humans in the UK, but the number of cases increased in 2006 in the UK.

Relevance as zoonotic disease

Salmonella Enteritidis and Salmonella 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.

Table Salmonella in humans - Species/ serotype distribution

Salmonella	Cases 14060	Cases Inc. 0	Autochthon cases 3954	Autochthon Inc. 0	Imported cases 2818	Imported Inc. 0	Unknown status 7288
S. Enteritidis	7740		2453		1272		4015
S. Typhimurium	1735		592		298		845
Salmonella spp., unspecified	4585		909		1248		2428

Table Salmonella in humans - Age distribution

Age Distribution	S. Enteritidis			S. Typhimurium			Salmonella spp.		
	All	M	F	All	M	F	All	M	F
<1 year	175	83	77	88	40	43	662	314	307
1 to 4 years	817	386	385	273	140	118	1614	774	734
5 to 14 years	1045	550	442	200	102	84	1559	804	664
15 to 24 years	1062	491	531	208	104	100	1931	816	897
25 to 44 years	2035	945	1017	394	192	191	3658	1683	1849
45 to 64 years	1708	832	836	363	197	157	2947	1495	1543
65 years and older	820	377	422	195	85	105	1532	695	730
Age unknown	78	36	28	14	5	5	157	65	65
Total :	7740	3700	3738	1735	865	803	14060	6646	6789

Footnote

Some cases are gender unknown

Table Salmonella in humans - Seasonal distribution

Month	S. Enteritidis	S. Typhimurium	Salmonella spp.
	Cases	Cases	Cases
January	271	112	628
February	212	84	615
March	149	81	499
April	325	83	742
May	401	105	909
June	550	148	1044
July	795	172	1444
August	1033	199	1687
September	1372	200	2067
October	1259	228	1953
November	831	175	1440
December	542	148	1032
not known	0	0	0
Total :	7740	1735	14060

2.1.3. Salmonella in foodstuffs

A. Salmonella spp. in eggs and egg products

Monitoring system

Sampling strategy

The UK government undertakes national microbiological food surveillance. The results of a 16 month survey by the FSA of Salmonella contamination of non-UK produced shell eggs on retail sale in the north west of England and London are available for the 2006 report.

Type of specimen taken

Eggs at retail

Other: Egg shell and contents tested separately

Results of the investigation

Survey of Salmonella contamination of non-UK produced shell eggs on retail sale in the north west of England and London:
A 16 month Food Standards Agency survey investigated the prevalence of Salmonella in non-UK eggs available at the retail level. A total of 1,744 samples of 6 eggs were deemed acceptable for testing. The shell and content of eggs were tested separately for the presence of Salmonella. The overall finding was that 157 samples were contaminated with Salmonella spp. on the shell of the egg resulting in a weighted prevalence estimate of 3.3%. Of the 157 Salmonella shell positive samples, 10 were also contents positive making a total of 173 distinct Salmonella isolates recovered from the survey.
All isolates were referred for typing and antimicrobial susceptibility testing. Results are detailed in the tables. The isolates comprised eight different serotypes of which the majority were S. Enteritidis (84.9%), with PT1 predominating (81.6%).

B. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At retail

The UK government undertakes national microbiological food surveillance. The priorities of these surveys are closely linked to a strategy to reduce the level of foodborne disease. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.

The UK government also collates returns from all UK food authorities on official food enforcement activities in line with Regulation (EC) No 882/ 20041 on official controls performed to ensure the verification of compliance with feed and food law, and animal health and animal welfare rules. The results of this food testing, which is done locally, are returned to the European Commission annually as required by the Regulation and therefore have not been included in this report.
The results of 2 surveys carried out in the UK are available for the 2006 report:
1. LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP):
A three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007), which is designed to provide surveillance data on the pathogens Salmonella and Campylobacter. Part A covers the surveillance of these pathogens in raw whole chicken on retail sale. Samples were examined for the presence or absence of Salmonella spp. based on BS EN 1SO 6579:2002 Microbiology of food and animal feeding stuffs – Horizontal method for the detection of Salmonella spp. Participating laboratories were instructed to refer a selection of isolates to the HPA Laboratory of Enteric Pathogens (LEP) for confirmation and typing.
2. A survey of Campylobacter and Salmonella in raw retail chicken available to consumers in Wales and Northern Ireland:
A twelve-month Food Standards Agency study in partnership with the Local Authorities from Wales and Northern Ireland (January-December 2006) was carried out to produce an estimate of the Salmonella contamination in whole raw chickens available on retail sale to the consumer in Wales and Northern Ireland.

Frequency of the sampling

At retail

Sampling distributed evenly throughout the year

Type of specimen taken

At retail

Fresh meat

Diagnostic/ analytical methods used

At retail

Other: HPA Standard Microbiological Food Method for detection of Salmonella spp. which is based on the British Standard method BS EN 12824: 1998 Microbiological examination of food and animal feeding stuffs Horizontal method for the detection of Salmonella spp.

Results of the investigation

1. LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP):
A total of 854 raw whole chicken samples were tested in 2006, of which 7% (61) samples were contaminated with Salmonella spp. During this period, 68 isolates obtained from 53 chicken samples

were referred for typing and antimicrobial susceptibility testing. Results are detailed in 4.11, 4.15, 4.16, 4.17 & 4.19. The isolates comprised 15 different serotypes, of which S. Ohio was the predominant serotype (25%).
Two of the 53 samples that contained Salmonella spp. had different types present, i.e. S. Gold-coast and S. Unnamed were recovered from one sample while the other sample contained S. Hadar with three different antimicrobial resistant profiles (ST, STNx and STNxCpL).
2. A survey of Campylobacter and Salmonella in raw retail chicken available to consumers in Wales and Northern Ireland:
In total, 31 (3.6%) out of the 860 chickens sampled tested positive for Salmonella.

C. Salmonella spp. in turkey meat and products thereof

Results of the investigation

No results to report in 2006.

D. Salmonella spp. in pig meat and products thereof

Results of the investigation

No results to report in 2006.

E. Salmonella spp. in bovine meat and products thereof

Results of the investigation

No results to report in 2006.

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from broilers (Gallus gallus)								
fresh	LACORS / HPA CLASSP survey	single	25g	854	61	1	1	59
- at retail (1)	NPHS/ FSA	single	25g	860	31	0	1	29

(1) : Of the 31 Salmonella positive samples, 3 samples have more than 1 Salmonella isolated.

Table Salmonella in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Mbandaka
Eggs									
table eggs									
- at retail	FSA survey of non-UK eggs	single		1744	157	147		12	14

Footnote

FSA survey of non-UK eggs - sample unit = group of 6 eggs. Of the 157 shell positive samples, 10 were also contents positive and 6 samples had two separate Salmonellas

2.1.4. Salmonella in animals

A. Salmonella spp. in Gallus gallus - breeding flocks for egg production and flocks of laying hens

Monitoring system

Sampling strategy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

In Great Britain (England, Wales, Scotland) Directive 92/ 117 is implemented by the Zoonoses Order, 1989, and by the Poultry Breeding Flocks and Hatcheries Order, 1993.
Directive 92/ 117/ EEC is implemented in Northern Ireland through the Poultry Breeding Flocks and Hatcheries Scheme Order (Northern Ireland) 1994 and the Zoonoses Order (Northern Ireland) 1991.

Laying hens flocks

In layer flocks all isolations of Salmonella must be reported to the Competent authority (under the Zoonoses Order 1989 in Great Britain, and in Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991].
In Great Britain holdings of layer flocks where S. Enteritidis and S. Typhimurium have been isolated are given advice on Salmonella control and a visit to carry out an epidemiological enquiry as appropriate.

Frequency of the sampling

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Sampled at the hatchery by the operator each elite grandparent supply flock once per week, and official samples each 4 weeks. For parents supply flocks the sampling is each 2 weeks and each 8 weeks respectively.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Sampled by operator at 4 weeks and 2 weeks before prodcution. Samples to official laboratory.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Grandparents sampled weekly at hatchery by operator, officially each 4 weeks. Parent flocks sampled every 2 weeks by operator, every 8 weeks officially at hatchery.

Laying hens: Day-old chicks

Other: Day olds are sampled from each source flock every 2 weeks by operator at hatchery, and officially every 8 weeks at hatchery as the monitoring procedure for layer breeder parent flocks

Laying hens: Rearing period

Other: No official sampling.

Laying hens: Production period

Other: No official sampling.

Laying hens: Before slaughter at farm

Other: No official sampling

Laying hens: At slaughter

Other: No official sampling

Eggs at packing centre (flock based approach)

Other: No official sampling

Type of specimen taken

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Official samples are as in Directive 92/ 117. Private samples may be fluff, dust etc.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Official sample taken by operator is faeces. Private samples may be boot swabs, dust also.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Official samples as per Directive 92/ 117 - cull chicks, meconium taken at hatchery

Laying hens: Day-old chicks

Other: Cull chicks, meconium, private samples may be fluff, environmental samples and others, used as monitoring of parent layer breeder.

Laying hens: Production period

Other: No official sampling

Laying hens: Before slaughter at farm

Other: No official sampling

Laying hens: At slaughter

Other: No official sampling.

Eggs at packing centre (flock based approach)

Other: No official sampling.

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Samples taken by operators according to Directive 92/ 117 sent to authorised laboratory for examination. Official samples taken sent or delivered same day to National Reference Laboratory (Regional Laboratory) for culture. Isolates sent to NRL for serotyping and phage typing as priority if a Group B or Group D has been cultured.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Samples taken by operators according to Directive 92/ 117 sent to authorised laboratory for examination. Official samples taken sent or delivered same day to National Reference Laboratory (Regional Laboratory) for culture. Isolates sent to NRL for serotyping and phage typing as priority if a Group B or Group D has been cultured.

Breeding flocks: Production period

Samples taken by operators according to Directive 92/ 117 sent to authorised laboratory for examination. Official samples taken sent or delivered same day to National Reference Laboratory (Regional Laboratory) for culture. Isolates sent to NRL for serotyping and phage typing as priority if a Group B or Group D has been cultured.

Laying hens: Day-old chicks

No official sampling

Laying hens: Rearing period

No official sampling

Laying hens: Production period

No official sampling

Laying hens: Before slaughter at farm

No official sampling

Laying hens: At slaughter

No official sampling

Eggs at packing centre (flock based approach)

No official sampling

Case definition

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. In addition to investigation of the day old breeder chicks, the source flock/ s of the hatching eggs will be investigated. If the report is one of a number of isolates made at the same time from a hatchery, serological monitoring may be carried out if the birds in the source flocks have not been vaccinated. No further action will be taken if the flock proves to be serologically negative. If the flock proves to be serologically positive, if the birds have been vaccinated or it is the only isolate, the flock will be investigated by taking a statistical sample of birds and examining organs for Salmonellas (as per Directvie 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. The flock will be investigated by taking a statistical sample of birds and examining organs for Salmonellas (as per Directive 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. The flock will be investigated by taking a statistical sample of birds and examining organs for Salmonellas (as per Directvie 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Laying hens: Day-old chicks

Isolation of a Salmonella from the layer flock will be recorded as positive. Trace back

to the breeding flock which produced the day old layer chick will be conducted and the source breeding flock investigated as above.

Laying hens: Rearing period

No official testing is carried out. A report of Salmonella under the legislation is classed as positive on the monitoring database; no confirmatory testing is carried out.

Laying hens: Production period

No official testing is carried out. A report of Salmonella under the legislation is classed as positive on the monitoring database; no confirmatory testing is carried out.

Laying hens: Before slaughter at farm

No official testing is carried out. A report of Salmonella under the legislation is classed as positive on the monitoring database; no confirmatory testing is carried out.

Laying hens: At slaughter

No official testing is carried out. A report of Salmonella under the legislation is classed as positive on the monitoring database; no confirmatory testing is carried out.

Eggs at packing centre (flock based approach)

No official testing is carried out. A report of Salmonella under the legislation is classed as positive on the monitoring database; no confirmatory testing is carried out.

Diagnostic/ analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Bacteriological method: Modified ISO 6579

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Bacteriological method: Modified ISO 6579

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Bacteriological method: Modified ISO 6579

Laying hens: Day-old chicks

Bacteriological method: Modified ISO 6579

Laying hens: Rearing period

Other: Varius bacteriological

Laying hens: Production period

Bacteriological method: Various bacteriological

Laying hens: Before slaughter at farm

Bacteriological method: Various bacteriological

Laying hens: At slaughter

Bacteriological method: Various bacteriological

Eggs at packing centre (flock based approach)

Other: Various

Vaccination policy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

There are no restrictions on the use of Salmonella vaccines which have a marketing authorisation. Vaccine is less used in the layer breeder sector than in the broiler breeder sector.

Laying hens flocks

There are no restrictions on the use of Salmonella vaccines which have a marketing authorisation. A large proportion of the commercial layer flocks are vaccinated with a Salmonella vaccine.

Other preventive measures than vaccination in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Codes of good practice in the control of Salmonella on layer farms and in the production, handling and transport of feed, as well as advice on rodent control have been published in collaboration with the industry.

Laying hens flocks

Advice as per breeding flocks.

Control program/ mechanisms

The control program/ strategies in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Any breeding flock found to be infected with S. Typhimurium or S. Enteritidis according to the protocol outlined above is compulsorily slaughtered with compensation. When Salmonella Enteritidis or Salmonella Typhimurium is suspected in a breeding flock the holding is placed under official control. An investigation is carried out on all the flocks on the site. If the flock is compulsorily slaughtered the

holding remains under official control until cleaning and disinfection has been carried out and shown to be satisfactory by microbiological culture of samples taken from the empty house.

Laying hens flocks

There is no official control plan for Salmonella in layer flocks although there is an industry operated scheme which covers most of the egg production. If Salmonella Enteritidis or Salmonella Typhimurium is isolated from a commercial laying flock, the premises is normally visited and advice is given on measures that can be taken to control infection on the premises and to prevent transmission of infection to subsequent flocks.

Measures in case of the positive findings or single cases

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Any breeding flock found to be infected with S. Typhimurium or S. Enteritidis according to the protocol outlined above is compulsorily slaughtered with compensation. When Salmonella Enteritidis or Salmonella Typhimurium is suspected in a breeding flock the holding is placed under official control. An investigation is carried out on all the flocks on the site. If the flock is compulsorily slaughtered the holding remains under official control until cleaning and disinfection has been carried out and shown to be satisfactory by microbiological culture of samples taken from the empty house.

Laying hens flocks

If Salmonella Enteritidis or Salmonella Typhimurium is isolated from a commercial laying flock, the premises is normally visited and advice is given on measures that can be taken to control infection on the premises and to prevent transmission of infection to subsequent flocks.

Notification system in place

The main provisions of the Zoonoses Order 1989 are:
- a requirement to report to a veterinary officer of the Minister the results of tests which identify the presence of a Salmonella from an animal or bird, a carcase of an animal or bird, their surroundings or feedstuffs by the laboratory that carries out the test
- a culture must be provided to the official laboratory on request.
- samples (including live birds) may be taken for diagnosis
- movement restrictions and isolation requirements may be imposed
- provision for compulsory slaughter and compensation where salmonella infection is confirmed in a breeding flock of Gallus gallus.
- compulsory cleansing and disinfection of premises and vehicles

The main provisions of the Poultry Breeding Flocks and Hatcheries Order 1993 are:
- registration of breeding flocks and hatcheries on a once and for all basis free of charge
- minimum flock size requiring registration 250 birds
- hatchery with a total incubator capacity of 1000 eggs or more and which is used for hatching eggs must register
- monitoring of flocks and hatcheries using sampling regimes and bacteriological methods of sampling laid down in Directive 92/ 117/ EC

- testing of samples to be carried out at authorised laboratories.

Results of the investigation

In the UK in 2006 there were 5 incidents of Salmonella in layer breeder flocks. No S. Enteritidis, S. Hadar, S. Infantis, or S. Virchow were isolated from this sector. In a non-commercial back-yard layer breeding flock there was 1 report of a S. Typhimurium DT40 isolate confirmed in a clinical diagnostic sample. Advice was given but no further action could be taken as the flock, being less than 200 chickens, did not fall within the juristiction of relevent legislation for the control of Salmonella of human health significance in breeding flocks (Poultry Breeding Flocks and Hatcheries Order 1993). The isolate has therefore not been included in the table documenting reports of Salmonella isolates in layer breeder flocks.
During 2006 in commercial laying flocks in the UK there were 13
incidents of Salmonella recorded in Great Britain during routine monitoring carried out by the industry and private veterinarians. In 3 of these incidents S. Enteritidis was isolated. There were no reports of S. Typhimurium in layer flocks in 2006. Advice was given to the operators on control of Salmonella and the codes of good practice to help control the introduction of Salmonella and its spread.

National evaluation of the recent situation, the trends and sources of infection

The levels of Salmonella Enteridis in layer breeder flocks in the UK remains at very low levels with no confirmed reports in 2006. There was one reported case of S. Typhimurium in 2006 in layer breeders in a small (less than 200 birds) non commercial flock, from a clinical submission
In layers the total number of routine reports remains low and this coupled with the voluntary nature of the sampling makes it difficult to establish any trend.
There was a decrease of 48% in the number of reports of Salmonella from all chickens in the UK in 2006 compared with 2005. This may be related to the changes in the reporting of hatchery isolations since the start of 2006.
The majority of egg production in the UK has voluntarily operated to an industry code of practice for a number of years. In addition to a number of measures the code requires vaccination of flocks against Salmonella. The indications are that the level of Salmonella on layer farms is declining, if we take into account the number of reported cases of human Salmonellosis and the results of previous and recent surveys for the presence of Salmonella in UK produced eggs.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Salmonella Enteritidis and Salmonella Typhimurium are the most common isolates found in humans.

B. Salmonella spp. in Gallus gallus - breeding flocks for meat production and broiler flocks

Monitoring system

Sampling strategy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

In Great Britain (England, Wales, Scotland) Directive 92/ 117 is implemented by the Zoonoses Order, 1989, and by the Poultry Breeding Flocks and Hatcheries Order, 1993.
Directive 92/ 117/ EEC is implemented in Northern Ireland through the Poultry Breeding Flocks and Hatcheries Scheme Order (Northern Ireland) 1994 and the Zoonoses Order (Northern Ireland) 1991.
In broiler flocks all isolations of Salmonella must be reported to the Competent authority (under the Zoonoses Order 1989 in Great Britain, and in Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]. Under Northern Ireland controls, any broiler flock, where birds infected with Salmonella Typhimurium or Salmonella Enteritidis are located, is restricted and the birds moved to slaughter under licence. The breeder flock that contributed to the hatch will be traced and sampled as necessary.

Broiler flocks

In broiler flocks all isolations of Salmonella must be reported to the Competent authority (under the Zoonoses Order 1989 in Great Britain, and in Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]. Under Northern Ireland controls, any broiler flock, where birds infected with Salmonella Typhimurium or Salmonella Enteritidis are located, is restricted and the birds moved to slaughter under licence. The breeder flock that contributed to the hatch will be traced and sampled as necessary.
In Great Britain holdings of broiler flocks where S. Enteritidis and S. Typhimurium have been isolated are given advice on Salmonella control and a visit to carry out an epidemiological enquiry as appropriate.
Results of the UK Baseline Study on the Prevalence of Salmonella in Broiler Flocks of Gallus gallus in the EU for the UK are available for the 2006 report. The sampling stategy used was as per EU guidelines. A total of 398 holdings were sampled in the UK. However, 15 holdings did not meet exclusion criteria, leaving a final sample of 383 holdings.

Frequency of the sampling

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Sampled at the hatchery by the operator each elite grandparent supply flock once per week, and official samples each 4 weeks. For parents supply flocks the sampling is each 2 weeks and each 8 weeks respectively.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Sampled by operator at 4 weeks and 2 weeks before production. Samples to official laboratory.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Grandparents sampled weekly at hatchery by operator, officially each 4 weeks. Parent flocks sampled every 2 weeks by operator, every 8 weeks officially at hatchery.

Broiler flocks: Day-old chicks

Other: Day olds are sampled from each source flock every 2 weeks by operator at hatchery, and officially every 8 weeks.

Broiler flocks: Rearing period

Other: no official sampling

Broiler flocks: Before slaughter at farm

Other: No official sampling but private samling common 1 - 2 weeks before slaughter

Broiler flocks: At slaughter (flock based approach)

Other: No official sampling, private sampling may take place

Type of specimen taken

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Official samples are as in Directive 92/ 117. Private samples may be fluff, dust etc.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Official sample is faeces. Private samples may be boot swabs, dust also.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Official samples as per Directive 92/ 117 - cull chicks, meconium

Broiler flocks: Day-old chicks

Other: cull chicks, meconium, private samples may be fluff, environmental samples and others

Broiler flocks: Rearing period

Other: Private samples, range of types but faeces, boot swabs common

Broiler flocks: Before slaughter at farm

Other: Private samples, boot swabs common.

Broiler flocks: At slaughter (flock based approach)

Other: Private samples, neck skin common

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Samples taken by operators according to Directive 92/ 117 sent to authorised laboratory for examination. Official samples taken sent or delivered same day to National Reference Laboratory (Regional Laboratory) for culture. Isolates sent to NRL for serotyping and phage typing as priority if a Group B or Group D has been cultured.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

As above

Breeding flocks: Production period

As above

Broiler flocks: Day-old chicks

As above - these are sampled at the hatchery as a check on the source breeding flock as per Directive 92/ 117.

Broiler flocks: Rearing period

No official sampling undertaken.

Broiler flocks: Before slaughter at farm

No official sampling undertaken

Broiler flocks: At slaughter (flock based approach)

No official sampling undertaken

Case definition

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. In addition to investigation of the day old breeder chicks, the source flock/ s of the hatching eggs will be investigated. If the report is one of a number of isolates made at the same time from a hatchery, serological monitoring may be carried out if the birds in the source flocks have not been vaccinated. No further action will be taken if the flock proves to be serologically negative. If the flock proves to be serologically positive, if the birds have been vaccinated or it is the only isolate, the flock will be investigated by taking a statistical

sample of birds and examining organs for salmonellas (as per Directvie 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. The flock will be investigated by taking a statistical sample of birds and examining organs for salmonellas (as per Directvie 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

If Salmonella Enteritidis or Salmonella Typhimurium is reported under the Zoonoses Order 1989 further investigations are instituted. The flock will be investigated by taking a statistical sample of birds and examining organs for salmonellas (as per Directvie 92/ 117). On post-mortem examination all breeder flocks found to be culturally positive for Salmonella Enteritidis or Salmonella Typhimurium are slaughtered with compensation.

Broiler flocks: Day-old chicks

Isolation of a sample from the broiler flock will be recorded as positive, but no confirmation testing will be carried out as no official action is taken on the broiler flock. Trace back to the breeding flock which produced the day old broiler chick will be conducted and the source breeding flock investigated as above.

Broiler flocks: Rearing period

An isolation reported under the Zoonoses Order is recorded as positive. No confirmation testing is carried out as no official action is taken.

Broiler flocks: Before slaughter at farm

An isolation reported under the Zoonoses Order is recorded as positive. No confirmation testing is carried out as no official action is taken.

Broiler flocks: At slaughter (flock based approach)

An isolation reported under the Zoonoses Order is recorded as positive. No confirmation testing is carried out as no official action is taken.

Diagnostic/ analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Bacteriological method: Modified ISO 6579:2002

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Modified ISO 6579:2002

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Modified ISO 6579:2002

Broiler flocks: Day-old chicks

Other: Modified ISO 6579:2002

Broiler flocks: Rearing period

Bacteriological method: Various methods may be used

Broiler flocks: Before slaughter at farm

Bacteriological method: Various methods may be used

Broiler flocks: At slaughter (flock based approach)

Bacteriological method: Various methods may be used

Vaccination policy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation. In practice they tend to be used at the parent level.

Broiler flocks

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation. It is believed that vaccination of broiler flocks is rare.

Other preventive measures than vaccination in place

Broiler flocks

Codes of good practice in the contol of Salmonella on broiler farms and in the production, handling and transport of feed, as well as advice on rodent control have been published in collaboration with the industry.

Control program/ mechanisms

The control program/ strategies in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Any breeding flock found to be infected with S. Typhimurium or S. Enteritidis according to the protocol outlined above is compulsorily slaughtered with compensation. When Salmonella Enteritidis or Salmonella Typhimurium is suspected in a breeding flock the holding is placed under official control. An investigation is carried out on all the flocks on the site. If the flock is compulsorily slaughtered the holding remains under official control until cleaning and disinfection has been carried out and shown to be satisfactory by microbiological culture of samples taken from the empty house.

Broiler flocks

There is no official control plan for salmonella in broiler flocks. If Salmonella Enteritidis or Salmonella Typhimurium is isolated from a commercial laying flock, the premises is normally visited and advice is given on measures that can be taken to control infection on the premises and to prevent transmission of infection to subsequent flocks. When broiler flocks are found to be infected advice on the control of infection is given to the company involved and a proportion of premises which have had positive birds is visited.

Measures in case of the positive findings or single cases

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

As outlined in the control plan above.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

As in control plan

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

As in control plan

Broiler flocks: Day-old chicks

The suspicion of Salmonella Enteritidis or Salmonella Typhimurium in day old broiler chicks would lead to an investigation of the supply flock(s) as described above.

Broiler flocks: Rearing period

There is no official control plan for Salmonella in broiler flocks. If Salmonella Enteritidis or Salmonella Typhimurium is isolated from a commercial laying flock, the premises is normally visited and advice is given on measures that can be taken to control infection on the premises and to prevent transmission of infection to subsequent flocks. When broiler flocks are found to be infected advice on the control of infection is given to the company involved and a proportion of premises which have had positive birds is visited.

Notification system in place

The main provisions of the Zoonoses Order 1989 are:
- a requirement to report to a veterinary officer of the Minister the results of tests which identify the presence of a salmonella from an animal or bird, a carcase of an animal or bird, their surroundings or feedstuffs by the laboratory that carries out the test
- a culture must be provided to the official laboratory on request.
- samples (including live birds) may be taken for diagnosis
- movement restrictions and isolation requirements may be imposed
- provision for compulsory slaughter and compensation where salmonella infection is confirmed in a breeding flock of Gallus gallus.
- compulsory cleansing and disinfection of premises and vehicles

The main provisions of the Poultry Breeding Flocks and Hatcheries Order 1993 are:
- registration of breeding flocks and hatcheries on a once and for all basis free of charge
- minimum flock size requiring registration 250 birds
- hatchery with a total incubator capacity of 1000 eggs or more and which is used for hatching eggs must register
- monitoring of flocks and hatcheries using sampling regimes and bacteriological methods of sampling laid down in Directive 92/ 117/ EC
- testing of samples to be carried out at authorised laboratories.

Results of the investigation

In Elite and Grandparent flocks for meat production 2 Salmonella incidents were reported in the UK in 2006. These were S. Livingston and S. Kedougou. In parent broiler breeder flocks there were 47 Salmonella reports in 2006. Salmonella Enteritidis was confirmed in 2 flocks which were slaughtered. No Salmonella Typhimurium was confirmed in broiler breeder flocks in the UK in 2006 by voluntary monitoring.

Both monitoring on farm and at the hatchery takes place by the operator in addition to the official samples taken by the competent authority. Reports from hatchery environment monitoring include isolates which could not be linked to a specific breeding flock; some of these isolates may be from the same flock or residual infection in the hatchery environment, and may be reported more than once with repeated sampling. The most common serovars reported and associated with the meat production breeder sector were S. Livingstone (18 reports) and S. Senftenberg (22 reports). S. Virchow was reported on 5 occasions. There were no reports of S. Infantis and only 1 report of S. Hadar.

Reports of Salmonella in broilers is normally from samples taken by the industry before slaughter when the birds are 3 to 4 weeks old. During 2006 there were 226 reports of isolation of Salmonella from the UK broiler sector. 4 reports of S. Enteritidis and 2 reports of S. Typhimurium were recorded. The most common serovars recorded on broiler farms were S. Livingstone, S. Senftenberg and S. Kedougou.

Baseline Study on the Prevalence of Salmonella in Broiler Flocks of Gallus gallus in the UK:

In the UK survey, Salmonella spp. were isolated from 41 of the 383 holdings sampled to give a prevalence of 10.7%. A holding may have more than one serovar associated with it. Sixteen different Salmonella serovars were isolated from the 41 Salmonella positive broiler holdings. Salmonella Typhimurium was isolated from one of the 383 holdings sampled in the UK to give a prevalence of 0.3%. The holding was a conventional broiler farm in the 100,000 plus size category. The phage type was DT104. Salmonella Enteritidis was not isolated from any of the 383 holdings sampled in the UK. Salmonella serovars other than Enteritidis and Typhimurium were isolated from 40 of the 383 holdings sampled in the UK to give a prevalence of 10.4%. The 4 most commonly isolated serotypes were S. Ohio, S. Kedougou, S. Livingston and S. Senftenburg, isolated on 9, 7, 5 and 5 holdings

respectively. Isolates of Salmonella Virchow from the one positive holding were phage type 2.
The study was conducted according to the protocol in Decision 2004/ 665. The raw data was forwarded to the Commision for analysis by EFSA. An analysis of the UK data was carried out by the NRL. Small differences in the results of the 2 analyses may be expected due to inclusion or exclusion of certain data and the methods of data analysis.

National evaluation of the recent situation, the trends and sources of infection

The prevalence of S. Enteritidis and S. Typhimurium in breeding flocks in meat production remains at very low levels.
The baseline survey carried out under Decision 2004/ 665 does not provide enough data for meaningful analysis of trends at this stage

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

The common serotypes found associated with broilers are not commonly reported in cases of human salmonellosis.

C. Salmonella spp. in turkey - breeding flocks and meat production flocks

Monitoring system

Sampling strategy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

In England, Wales and Scotland (GB) all isolations of Salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]

Meat production flocks

As for breeding birds all Salmonella isolates must be reported.

Frequency of the sampling

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Voluntary

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Voluntary

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Voluntary

Meat production flocks: Day-old chicks

Other: Voluntary

Meat production flocks: Rearing period

Other: Voluntary

Meat production flocks: Before slaughter at farm

Other: Voluntary

Meat production flocks: At slaughter (flock based approach)

Other: Voluntary

Type of specimen taken

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Other: Voluntary

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Other: Voluntary

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Other: Voluntary

Meat production flocks: Day-old chicks

Other: Voluntary

Meat production flocks: Rearing period

Other: Voluntary

Meat production flocks: Before slaughter at farm

Other: Voluntary

Meat production flocks: At slaughter (flock based approach)

Other: Voluntary

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when

necessary): Day-old chicks

No official sampling undertaken. Voluntary sampling.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

No official sampling undertaken. Voluntary sampling.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Day-old chicks

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Rearing period

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Before slaughter at farm

No official sampling undertaken. Voluntary sampling.

Meat production flocks: At slaughter (flock based approach)

No official sampling undertaken. Voluntary sampling.

Case definition

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Day-old chicks

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Rearing period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Before slaughter at farm

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: At slaughter (flock based approach)

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Diagnostic/ analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

Bacteriological method: Various may be used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period

Bacteriological method: Various may be used

Meat production flocks: Day-old chicks

Bacteriological method: Various may be used

Meat production flocks: Rearing period

Bacteriological method: Various may be used

Meat production flocks: Before slaughter at farm

Bacteriological method: Various may be used

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: Various may be used

Case definition

An incident comprises the first isolation and all subsequent isolations of the same serotype or serotype and phage/ definitive type combination of a particular salmonella from an animal, group of animals or their environment on a single premises.

Vaccination policy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Meat production flocks

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Control program/ mechanisms

The control program/ strategies in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Breeding flocks are encouraged to monitor in the same way as Gallus gallus under Directive 92/ 117, but there is no official Salmonella control programme for turkeys.

Meat production flocks

Producers are encouraged to monitor, but there is no official sampling.

Measures in case of the positive findings or single cases

Public health authorities are advised of the isolation of Salmonellas, and the owner is given advice and visits will be made to the farm if the Salmonella is of public health significance.

Notification system in place

All isolations of Salmonella must be reported under the Zoonoses Order 1989 and related legislation in Great Britain and in Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]

Results of the investigation

All laboratories report the isolation of Salmonella but the number of samples examined which are negative is not reported and therefore not known. Most of the samples in turkeys are taken for monitoring purposes but diagnostic samples are also included.
There were 171 reported incidents of Salmonella in turkeys in 2006, a reduction on the 279 reported incidents in 2005 and the 243 cases in 2004. The most commonly reported serotypes were S. Typhimurium, S. Derby and S. Kottbus which comprised 22%, 16% and 15% of total reports respectively.
The phage types reported were mainly DT104 (32 incidents).

National evaluation of the recent situation, the trends and sources of infection

Reports of Salmonella in turkeys decreased by 39% in 2006, compared with 2005. Compared with 2005, the number of reports of S. Derby, S. Kottbus, S Newport and S. Indiana fell by 32.5%, 36%, 58% and 61.5% respectively, while reports of S. Virchow doubled from 5 to 10. In 2005 the two most commonly isolated serovars were S. Derby and S. Kottbus (20% and 15% of total reports). There was an increase in the number of reports of S. Typhimurium with 37 reports in 2006 compared with 24 in 2005 and 37 incidents in 2004. There were two reports of Salmonella Rissen during 2005, similar to 2004 when it had been first recorded in turkeys, but none in 2006.
The voluntary nature of sampling and the relatively low numbers involved make it difficult to detect trends. Laboratories are required to report all isolations of salmonella but the number of samples examined with negative results is not known. The results do indicate those serovars which are likely to be the most common in turkeys.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Apart from S. Typhimurium the other most common serotypes reported are not commonly found in human isolates.

D. Salmonella spp. in geese - breeding flocks and meat production flocks

Monitoring system

Sampling strategy

Breeding flocks

The monitoring system is the same as for other species which are not breeding flocks of Gallus gallus. There is no official control plan for the control of Salmonella in any of geese sectors.

Diagnostic/ analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: Various

Breeding flocks: Rearing period

Bacteriological method: Various

Breeding flocks: Production period

Bacteriological method: Various

Meat production flocks: Day-old chicks

Bacteriological method: Various

Meat production flocks: Rearing period

Bacteriological method: Various

Meat production flocks: Before slaughter at farm

Bacteriological method: Various

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: Various

Notification system in place

All Salmonellas isolated from geese must be reported to the Competent Authority.

Results of the investigation

Submission of samples from geese is most likely to be for diagnostic purposes. The results of testing in 2006 are combined with ducks into 1 category - see the section on ducks

E. Salmonella spp. in ducks - breeding flocks and meat production flocks

Monitoring system

Sampling strategy

Breeding flocks

In England, Wales and Scotland (GB) all isolations of Salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]

Meat production flocks

As for breeding birds all Salmonella isolates must be reported.

Frequency of the sampling

Breeding flocks: Day-old chicks

Other: No official sampling undertaken. Voluntary sampling.

Breeding flocks: Rearing period

Other: No official sampling undertaken. Voluntary sampling.

Breeding flocks: Production period

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Day-old chicks

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Rearing period

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Before slaughter at farm

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: At slaughter (flock based approach)

Other: No official sampling undertaken. Voluntary sampling.

Type of specimen taken

Breeding flocks: Day-old chicks

Other: No official sampling undertaken. Voluntary sampling.

Breeding flocks: Rearing period

Other: No official sampling undertaken. Voluntary sampling.

Breeding flocks: Production period

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Day-old chicks

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Rearing period

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Before slaughter at farm

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: At slaughter (flock based approach)

Other: No official sampling undertaken. Voluntary sampling.

Methods of sampling (description of sampling techniques)

Breeding flocks: Day-old chicks

No official sampling undertaken. Voluntary sampling.

Breeding flocks: Rearing period

No official sampling undertaken. Voluntary sampling.

Breeding flocks: Production period

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Day-old chicks

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Rearing period

No official sampling undertaken. Voluntary sampling.

Meat production flocks: Before slaughter at farm

No official sampling undertaken. Voluntary sampling.

Meat production flocks: At slaughter (flock based approach)

No official sampling undertaken. Voluntary sampling.

Case definition

Breeding flocks: Day-old chicks

An incident comprises the first isolation and all subsequent isolations of the same

serotype or serotype and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single premises.

Breeding flocks: Rearing period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Breeding flocks: Production period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Day-old chicks

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Rearing period

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: Before slaughter at farm

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Meat production flocks: At slaughter (flock based approach)

Reports of Salmonella isolate under the relevant legislation are classed as positive.

Diagnostic/ analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: Various methods may be used

Breeding flocks: Rearing period

Bacteriological method: Various methods may be used

Breeding flocks: Production period

Bacteriological method: Various methods may be used

Meat production flocks: Day-old chicks

Bacteriological method: Various methods may be used

Meat production flocks: Rearing period

Bacteriological method: Various methods may be used

Meat production flocks: Before slaughter at farm

Bacteriological method: Various methods may be used

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: Various methods may be used

Vaccination policy

Breeding flocks

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Meat production flocks

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Other preventive measures than vaccination in place

Breeding flocks

Breeding flocks are encouraged to monitor in the same way as Gallus gallus under Directive 92/ 117, but there is no official Salmonella control programme for ducks and geese.

Meat production flocks

Producers are encouraged to monitor, but there is no official sampling.

Measures in case of the positive findings or single cases

Public health authorities are advised of the isolation of Salmonellas, and the owner is given advice and visits will be made to the farm if the salmonella is of public health significance.

Notification system in place

In England, Wales and Scotland (GB) all isolations of Salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]

Results of the investigation

There were 505 reports of Salmonella isolations from ducks and geese in 2006. As in previous years, the most frequently isolated serovar was S. Indiana (29% of total incidents), with S. Kedougou, S. Typhimurium and S. Binza comprising 11.5%, 9.5% and 7% of total incidents respectively. There were 23 incidents of S. Enteritidis (4.6%) reported during 2006. Reports of S. Hadar, S. Senftenburg and S. Kottbus fell in 2006 compared to 2005.
The phage types reported for S. Typhimurium are mainly DT8, and for S. Enteritidis PT9B.

National evaluation of the recent situation, the trends and sources of infection

The number of reports of Salmonella in ducks and geese fell by 6% in 2006, compared with 2005. This decrease in reports may perhaps be related to the changes in the reporting of hatchery isolations since the start of 2006. The most commonly isolated serovar from ducks in 2005 and 2004 was also S. Indiana. There were 71 reports of S. Typhimurium in ducks in 2005 and 63 reports of S. Enteritidis.

The nature of the voluntary sampling makes it difficult to establish trends, but the serovars most common in 2004 and 2005 remained most commonly reported in 2006.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Salmonella Indiana is reported rarely in humans.

F. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

In England, Wales and Scotland (GB) all isolations of Salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]
Almost 90% of incidents are from the isolation of Salmonella in samples taken for diagnostic purposes (clinical samples).
There is no routine official sampling.

Multiplying herds

As for breeding herds

Fattening herds

As for breeding herds

Frequency of the sampling

Breeding herds

Other: Voluntary sampling.

Multiplying herds

Other: Voluntary sampling.

Fattening herds at farm

Other: Voluntary sampling.

Fattening herds at slaughterhouse (herd based approach)

Other: Voluntary sampling.

Type of specimen taken

Breeding herds

Other: Voluntary sampling.

Multiplying herds

Other: Voluntary sampling.

Fattening herds at farm

Other: Voluntary sampling.

Fattening herds at slaughterhouse (herd based approach)

Other: Voluntary sampling.

Methods of sampling (description of sampling techniques)

Breeding herds

Voluntary sampling.

Multiplying herds

Voluntary sampling.

Fattening herds at farm

Voluntary sampling.

Fattening herds at slaughterhouse (herd based approach)

Voluntary sampling.

Case definition

Breeding herds

An incident comprises the first isolation and all subsequent isolations of the same serotype or serotype and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single holding.

Multiplying herds

An incident comprises the first isolation and all subsequent isolations of the same serotype or serotype and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single holding.

Fattening herds at farm

As above

Fattening herds at slaughterhouse (herd based approach)

As above.

Diagnostic/ analytical methods used

Breeding herds

Other: various

Multiplying herds

Other: various

Fattening herds at farm

Other: various

Fattening herds at slaughterhouse (herd based approach)

Serological method: meat juice ELISA

Vaccination policy

Breeding herds

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Multiplying herds

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Fattening herds

There are no restrictions on the use of Salmonella vaccines which have a Marketing Authorisation.

Other preventive measures than vaccination in place

Breeding herds

Codes of good practice in the control of Salmonella on pig farms and in the production, handling and transport of feed, as well as advice on rodent control have been published in collaboration with the pig industry.

Multiplying herds

As above

Fattening herds

As above

Control program/ mechanisms

Recent actions taken to control the zoonoses

In Great Britain the Meat and Livestock Commission with the British Pig Executive has been developing a Zoonoses Action Plan for the monitoring of Salmonella in pigs. This is based on a meat-juice ELISA test at slaughterhouse and classing the farms into differnt levels for subsequent investigation of advisory visits. Northern Ireland has a similar programme operating in all slaughter plants. Funding of the montoring is initially through the industry with government support.

Measures in case of the positive findings or single cases

Public health authorities are advised of the isolation of salmonellas, and the owner is given advice and visits will be made to the farm if the salmonella is of public health significance.

Notification system in place

In England, Wales and Scotland (GB) all isolations of Salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of Salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]

Results of the investigation

There were 201 reports of Salmonella in pigs in 2006. S. Typhimurium remained the most commonly reported serovar, comprising 66% of total reports. The most frequently reported phage types were U288 (63 incidents) and DT 193 (26 incidents). There were 7 reports of DT 104 during the year.

National evaluation of the recent situation, the trends and sources of infection

The number of reports of Salmonella in pigs during 2006 increased by nearly 6% compared with reports during 2005 (194). There were 164 reports in 2004. The most commonly isolated serovars in 2005 were S. Typhimurium and S. Derby which comprised 70% and 12% of total reports respectively. The most commonly reported phage types of S. Typhimurium during 2005 were U288 (around 50%, and DT193 (27% of STM in pigs), indicating little change in trends for 2006.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Salmonella Typhimurium is the second most common serotype isolated from humans in the UK. Salmonella Derby is not common in isolates of Salmonella from humans.

Additional information

Codes of good practice for the prevention and control of salmonella in pig herds on farm have been published and widely circulated to pig producers in the UK.

G. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

England, Wales, Scotland

Salmonella isolated in a laboratory from cattle must be reported to the competent authority and the isolate provided on request (Zoonoses Order 1981). Over 90% of the isolates from cattle are from samples taken for diagnostic purposes.

Frequency of the sampling

Animals at farm

Other: Over 90% voluntary samples taken by veterianarian for diagnostic purposes

Type of specimen taken

Animals at farm

Other: Usually faeces or from organs at post mortem

Methods of sampling (description of sampling techniques)

Animals at farm

Voluntary samples usually taken by veterinarian for diagnostic purposes

Case definition

Animals at farm

Culture and isolation of Salmonella from sample taken from the animal, or associated with its environment. An incident comprises the first isolation and all subsequent isolations of the same serotype or serotype and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single premises.

Diagnostic/ analytical methods used

Animals at farm

Bacteriological method: Various

Animals at slaughter (herd based approach)

Bacteriological method: Various

Vaccination policy

Vaccination against Salmonella Dublin may be used on a voluntary basis. There is no restriction on using any authorised Salmonella vaccine

Control program/ mechanisms

The control program/ strategies in place

There is no statutory national control plan for Salmonella in cattle. All Salmonellas isolated must be reported to the competent authority. Advice is given and visits to the farm may be made, particularly if the salmonella is of public health significance or there is direct sale of

products to the public. The public health authorities are informed of isolations of Salmonella from cattle. Assistance is given to the public health authorities with on-farm investigations and epidemiological studies if there is a human outbreak of Salmonellosis associated with the farm.

Measures in case of the positive findings or single cases

Advice is given on contol of Salmonella and farm visits may be made by the veterinary and public health authorities.

Notification system in place

All Salmonellas isolated from cattle must be reported to the competent authority

Results of the investigation

During 2006 there were 750 reports of Salmonella isolated from cattle. The most commonly reported serotypes were S. Dublin (61% of total incidents), S. Typhimurium (21% of total incidents) and S. Anatum (4% of total incidents). There were no reports of S. Enteritidis in UK cattle during 2006. There were 4 reports of S. Butantan reported during 2006, the first time this serotype has been reported in cattle in the UK. All 4 reports were from different premises in 2 separate counties of England.

National evaluation of the recent situation, the trends and sources of infection

The number of reports of Salmonellosis in cattle in the UK in 2006 decreased to 750 from the 989 reports in 2005 and the 1218 reports in 2004. In Great Britain (England, Wales and Scotland), the relative proportions of S. Dublin and S. Typhimurium have changed compared with 2005 when they were 71% and 15% of total reports respectively. Reports of S. Dublin decreased by 18% during 2006 (454 reports) compared to the 553 reports in 2005 and by 40% compared with 2004 (759 reports). There were no reports of S. Enterititidis in 2006 compared with the 6 incidents in 2005 [phage types (incidents) PT1 (1), PT4 (2), PT6A (2), PT NOPT (1)].
As in previous years, the majority of Salmonella incidents in UK cattle in 2006 have been Salmonella Dublin, with Salmonella Typhimurium the second most commonly reported. The majority of incidents reported are from samples taken for diagnostic purposes, and not from samples from healthy animals. The number of recorded incidents may also have been affected by changes to the recording system (see 2004 report).

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Salmonella Dublin is the most common serotype recorded in the diagnostic samples taken. Salmonella Dublin is seldom isolated in samples from man.

Table Salmonella in breeding flocks of Gallus gallus

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Senftenberg	S. Livingstone	S. Havana	S. Gallinarum	S. Hadar	S. Kedougou	S. Montevideo
Gallus gallus (fowl)														
grandparent breeding flocks for egg production line	NRL	flock	9	0										
parent breeding flocks for egg production line (1)	NRL	flock	69	4				1		2	1			
grandparent breeding flocks for meat production line	NRL	flock	68	2					1				1	
parent breeding flocks for meat production line	NRL	flock	354	47	2			22	18			1	1	3

(1) : In a non-commercial back-yard layer breeding flock there was 1 report of a S. Typhimurium DT40 isolate confirmed in a clinical diagnostic sample. Advice was given but no further action could be taken as the flock, being less than 200 chickens, did not fall within the juristiction of relevent legislation for the control of Salmonella of human health significance in breeding flocks (Poultry Breeding Flocks and Hatcheries Order 1993). The isolate has therefore not been included in this table

Footnote

Data for Great Britain - England, Wales and Scotland.
In Northern Ireland there are no layer breeder flocks. There are approximately 170 broiler breeder flocks (15 of these grandparent flocks). During 2006 no Salmonella was isolated from any of these breeder flocks.

Table Salmonella in other poultry

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Gallus gallus (fowl)							
laying hens	NRL	flock		13	3	0	10
broilers	NRL	flock		226	4	2	220
Ducks	NRL	flock		504	23	48	433
Turkeys	NRL	flock		171	0	37	134
Pet animals, all (1)	NRL	animal		3	0	3	0

(1) : Pet chickens

Footnote

Only positive cases (ie where Salmonella is detected) are reported. Negative findings are not reported and hence data on the total number of units tested is unavailable

Table Salmonella in other birds

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Pigeons	NRL	animal	20	1	0	1	0
Guinea fowl	NRL	animal		1	0	0	1
Pheasants	NRL	animal		61	0	26	35
Partridges	NRL	animal		21	0	4	17

Footnote

NRL is National Reference Laboratory. All laboratories report the isolation of Salmonella. Units tested are not known because the laboratories do not report negative results unless as part of an official control program or survey.
Mainly clincal isolates.

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Cattle (bovine animals) (1)	NRL	herd		790	0	145	645
calves (under 1 year) (2)	NRL	herd		291	0	47	244
adult cattle over 2 years (3)	NRL	herd		332	0	84	248
Sheep	NRL	flock		221	2	22	197
Goats	NRL	flock		3	0	0	3
Pigs	NRL	herd		209	0	140	69
Solipeds, domestic	NRL	animal		45	2	23	20
Reindeers							
zoo animals	NRL	animal		1	0	0	1

(1) : UK data
(2) : GB data - England, Wales and Scotland
(3) : GB data - England, Wales and Scotland

Footnote

NRL is National Reference Laboratory
Mainly clinical isolates
All laboratories report the isolation of Salmonella. Units tested are not known because the laboratory does not report negative results, unless as part of an official control programme or survey.

2.1.5. Salmonella in feedingstuffs

A. Salmonella spp. in feed - all feedingstuffs

History of the disease and/ or infection in the country

Great Britian
In Great Britain the isolation of Salmonella spp. from animal feedingstuffs are reportable under the Zoonoses Order 1989.
Imported animal protein destined for feed production in GB is tested according to a risk assessment of the import.
Northern Ireland
All isolations of salmonella in a sample taken from an animal or bird or its surroundings, or from any carcase, product or feedingstuff must be reported to a veterinary inspector of the Department of Agriculture for Northern Ireland, [The Zoonoses Order (Northern Ireland) 1991]
All imported processed animal protein is sampled under the Diseases of Animals (Northern Ireland) Order 1981 and the Diseases of Animals (Importation of Processed Animal Protein) Order (Northern Ireland) 1989.

National evaluation of the recent situation, the trends and sources of infection

Salmonella was most commonly reported from cereals/ vegetable feed materials during the manufacturing process, and most reports were from samples of rape, and soya. The most common serotype reported was S. Rissen and S. Mbandaka. A wide range of other serotypes were reported. In soya no particular serovar predominated.
In 2006 there were no isolations of S. Enteritidis or S. Typhimurium reported from compound finished animal feed.
Salmonella Typhimurium was reported in barley (3 isolations DT 104), soya (one isolation of DT104) 4 isolations in unspecified feed materials. It is not possible to determine trends from these data, but they do indicate the wide variety of salmonella serotypes which may be present in feed materials and the need to manage this risk during the production process.
S. Enteritidis was isolated on one occasion from cocoa feed material.
S. Hadar was reported on two occasions, once in fishmeal and once in compound ruminant feed. S. Infantis was reported on 5 occasions, 4 isolations from soya and one from compound poultry feed. There was one report of S. Virchow from rape
It is not possible to determine trends from these data, but they do indicate the wide variety of salmonella serotypes which may be present in feed materials and the need to manage this risk during the production process.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Although salmonellas are found in feed materials the processes involved in animal feed production should normally eliminate them. Animal feed may become contaminated on farm if poorly stored and not kept vermin free. The most common Salmonella serovars reported in feed or feed materials in 2006 (S. Rissen, S. Mbandaka, S. Agona, and S. Montevideo are seldom found in humans. There is the potential if Salmonella serovars contaminate feed during the manufacturing process for the serovar to infect large number of animals. It is most important that the principles of HACCP are applied to

manage this risk.

Additional information

In Great Britain since 1992, laboratories have provided enhanced information on the results of monitoring for salmonella in animal feedingstuffs. The Department in conjunction with the feedingstuffs industry have introduced codes of practice for the control of salmonella. In addition to the Defra codes of practice for the control of salmonella in feedingstuffs, the Industry has also introduced codes of practice for the control of salmonella. Samples taken under the codes of practice form part of the HACCP process.

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Havana	S. 6,7:-:-	S. Cerro	S. Montevideo	S. Tennessee	S. Agona	S. Fresno	S. Hadar	S. 3,19:-:-	Not typeable
Feed material of marine animal origin																		
fish meal	NRL	batch	500g		14	0	0		2	2	1	1	3	1	1	1	1	1

Footnote

Samples taken by operator as part of HACCP, total units tested not known. Salmonella isolates sent to NRL for serotyping. 500g sample recommended but may vary. There were 242 batches (441 samples) of home processed animal protein tested under Animal By Product Regulations and 4 batches were positive - all S. Montevideo. There were 44 batches (165 samples) of imported protien (mainly fish meal) tested during 2006. No Salmonella were isolated.

Table Salmonella in other feed matter (Part A)

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Typhimurium	S. Enteritidis	Salmonella spp., unspecified	S. Bredeney	S. Havana	S. Cubana	S. Derby	S. Adelaide	S. Agama	S. Agona	S. Cerro	S. Corvallis	S. Dublin	S. Emek	S. Give
Feed material of cereal grain origin																				
barley derived	NRL	batch	500g		3	3	0													
other cereal grain derived (1)	NRL	batch			59	6	1	52												
Feed material of oil seed or fruit origin																				
rape seed derived	NRL	batch	500g		76	0	0			7	1				1					
palm kernel derived	NRL	batch	500g		4	0	0												1	
soya (bean) derived	NRL	batch	500g		38	1	0		1	2		1	1		4	1	1	1		1
sunflower seed derived	NRL	batch	500g		8															1
other oil seeds derived (2)	NRL	batch	500g		10	0	1							1						

(1) : Data from Northern Ireland
(2) : Cocoa

Footnote

The weight of sample recommended is 500g but operators may take more or less. Isolates of Salmonella are serotyped at NRL. Over 9393 tests were carried out on

oil seeds, and over 7,500 tests on cereals and grains during 2006.

Table Salmonella in other feed matter (Part B)

	S. 4,12:-:-	S. Kottbus	S. Okatie	S. Rissen	S. Schwarzengrund	S. Senftenberg	S. Stanleyville	S. Orion	S. 3,19:-:-	S. Infantis	S. Sundsvall	S. Tennessee	S. Umbilo	S. Ohio	S. 6,7:-:-	S. Ibadan	S. 3,10:l,v:-	S. 9,46:-:-	S. Meleagridis	S. Montevideo
Feed material of cereal grain origin																				
barley derived																				
other cereal grain derived (1)																				
Feed material of oil seed or fruit origin																				
rape seed derived	1			34		1	1	1				1	1	1						4
palm kernel derived				1		1						1								
soya (bean) derived		1		1	3	3		1	1	4	1	1						1	1	1
sunflower seed derived						5						1								
other oil seeds derived (2)			1												1	3	1			

(1) : Data from Northern Ireland
(2) : Cocoa

Footnote

The weight of sample recommended is 500g but operators may take more or less. Isolates of Salmonella are serotyped at NRL. Over 9393 tests were carried out on oil seeds, and over 7,500 tests on cereals and grains during 2006.

Table Salmonella in other feed matter (Part C)

	S. Virchow	S. Yoruba	Other serotypes	S. Livingstone	S. Lexington	S. Mbandaka
Feed material of cereal grain origin						
barley derived						
other cereal grain derived (1)						
Feed material of oil seed or fruit origin						
rape seed derived	1		1	2		18
palm kernel derived						
soya (bean) derived		2			1	2
sunflower seed derived					1	
other oil seeds derived (2)			2			

(1) : Data from Northern Ireland
(2) : Cocoa

Footnote

The weight of sample recommended is 500g but operators may take more or less. Isolates of Salmonella are serotyped at NRL. Over 9393 tests were carried out on oil seeds, and over 7,500 tests on cereals and grains during 2006.

Table Salmonella in compound feedingstuffs (Part A)

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Montevideo	S. Typhimurium	S. Enteritidis	Salmonella spp., unspecified	S. Rissen	S. Stanleyville	S. Agona	S. Cubana	S. Ealing	S. Kedougou	S. Senftenberg	S. 9,46:-:-	S. Agama	S. Hull	S. Anatum
Compound feedingstuffs for cattle																				
process control	NRL	batch	500g		3	1	0	0										1	1	
Compound feedingstuffs for pigs																				
process control	NRL	batch	500g		5		0	0		1		2								1
Compound feedingstuffs for poultry (non specified)																				
process control	NRL	batch	500g		19		0	0		3		2	1	1	1	2				
Compound feedingstuffs for sheep																				
- at feed mill - Monitoring - sampling by industry		batch	500g		4		0	0			2						1	1		

Footnote

The sample size recommended is 500g made up of a statistical number of sub samples from the batch. A sub sample of the 500 g is examined. The samples are taken by the industry and examined in private laboratories as part of HACCP. Total number of units tested are not known. Salmonella isolates are serotyped at the NRL

Table Salmonella in compound feedingstuffs (Part B)

	S. Tennessee	S. Infantis	S. Liverpool	S. Mbandaka	S. Ohio	S. Thompson
Compound feedingstuffs for cattle						
process control						
Compound feedingstuffs for pigs						
process control	1					
Compound feedingstuffs for poultry (non specified)						
process control		1	1	1	5	1
Compound feedingstuffs for sheep						
- at feed mill - Monitoring - sampling by industry						

Footnote

The sample size recommended is 500g made up of a statistical number of sub samples from the batch. A sub sample of the 500 g is examined. The samples are taken by the industry and examined in private laboratories as part of HACCP. Total number of units tested are not known. Salmonella isolates are serotyped at the NRL

2.1.6. Salmonella serovars and phagetype distribution

The methods of collecting, isolating and testing of the Salmonella isolates are described in the chapters above respectively for each animal species, foodstuffs and humans. The serotype and phagetype distributions can be used to investigate the sources of the Salmonella infections in humans. Findings of same serovars and phagetypes in human cases and in foodstuffs or animals may indicate that the food category or animal species in question serves as a source of human infections. However as information is not available from all potential sources of infections, conclusions have to be drawn with caution.

Table Salmonella serovars in animals

Serovars		Turkeys		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at farm - Monitoring - monitoring survey		Ducks		Solipeds, domestic		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=			383													
Number of isolates serotyped	N=	171	0	43	0	504	0	0	45	0	917	0	209	305	0	0	0
Number of isolates per type																	
S. Agama		1		0		1			7		16		0	2			
S. Agona		8		0		0			0		4		0	4			
S. Ajiobo		0		0		0			0		1		0	0			

S. Anatum	0		0		1			3		28		0	2			
S. Berta	0		0		0			0		1		0	0			
S. Bovismorbificans	0		0		0			2		3		2	0			
S. Braenderup	0		0		0			0		1		0	0			
S. Bredeney	0		0		1			0		1		2	0			
S. Butantan	0		0		0			0		4		0	0			
S. Cerro	0		0		0			0		0		0	3			
S. Coeln	0		0		0			0		2		0	0			
S. Concord	0		0		0			0		1		0	0			
S. Derby	27		0		7			0		1		28	0			
S. Dublin	0		0		0			0		454		1	0			
S. Durham	0		0		1			0		1		0	0			
S. Eboko	0		0		0			0		1		0	0			
S. Enteritidis	0		0		23			2		0		0	11			
S. Give	0		0		12					0			4			
S. Goldcoast	0		0		2			0		2		5	0			
S. Hadar	1		0		22			0		0		0	5			
S. Havana	0		0		3			0		0		0	9			
S. Idikan	0		1		0			0		0		0	2			
S. Indiana	10		0		145			0		0		0	3			
S. Infantis	0		0		0			0		2		1	2			
S. Kedougou	16		7		58					0		10	29			
S. Kentucky	0		0		1			0		2		0	1			
S. Kimuenza	0		0		0			0		2		0	0			
S. Kottbus	25		0		24			0		2		0	2			
S. Kua	0		0		0			1		0		0	0			
S. Liverpool	0		0		0			0		0		0	2			
S. Livingstone	0		5		8					0		1	53			
S. London	0		1		0			0		2		2	0			
S. Mbandaka	0		3		19			0		6		0	15			
S. Montevideo	4		1		0			2		17		0	12			
S. Nagoya	0		0		0			0		1		0	0			

S. Newport	14		1		1			3		12		1	2			
S. Ohio	0		9		2			0		3		0	36			
S. Orion	0		4		30			0		0		0	1			
S. Oslo	0		1		0			1					0			
S. Panama	0		0		0					0		1	0			
S. Reading	0		0		0			0		3		7	0			
S. Regent	0		0		0			0		0		0	0			
S. Riggil	0		0		0			0		1		0	0			
S. Rissen	0		0		0			0		0		0	0			
S. Saintpaul	0		0		10			0		0		0	1			
S. Schwarzengrund	0		0		0			0		0		0	1			
S. Senftenberg	1		5		24			0		0		0	37			
S. Stanley	0		0		0			0		0		1	0			
S. Stourbridge	0		0		0			1		2		0	2			
S. Taksony	2		0		0			0		0		0	1			
S. Thompson	0		1		0			0		0		0	13			
S. Typhimurium	37		1		48			23		175		140	6			
S. Virchow	10		1		0			0		0		0	4			
S. Worthington	0		0		0			0		0		0	1			
S. Yoruba	0		0		1			0		0		0	0			
S. 4,5,12:-:-	0		1		0			0		1		0	0			
S. enterica subsp. diarizonae	0		0		0			0		2		0	0			
S. Gallinarum	0		0		0			0		0		0	5			
Other serotypes (1)	2		0		35			0		163		6	34			
Salmonella spp., unspecified	13		1		25			0		0		1	0			

(1) : Including S. Binza

Footnote

(*) M : Monitoring, C : Clinical
Most isolates in cattle and pigs and all in horses are from clinical diagnostic samples.
Samples from chickens (Gallus Gallus), turkeys, ducks and geese are mainly taken by industry for monitoring. All Salmonellas are reportable to the competent

authority
In the table "ducks" refers to ducks and geese.

Table Salmonella serovars in food

Serovars		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Other poultry		Other products of animal origin		Meat from broilers (Gallus gallus) - fresh - at retail	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=					68						30	
Number of isolates serotyped	N=	0	0	0	0	68	0	0	0	0	0	30	0
Number of isolates per type													
S. Bredeney						8						2	
S. Derby						4						0	
S. Enteritidis						1						0	
S. Goldcoast						1						0	
S. Hadar						5						0	
S. Indiana												3	
S. Infantis						1						0	
S. Kedougou						3						0	
S. Kentucky						2						3	

S. Mbandaka					2						2	
S. Montevideo					6						1	
S. Ohio					17						9	
S. Schwarzengrund					1						0	
S. Senftenberg											1	
S. Thompson					7						0	
S. Typhimurium					1						1	
Salmonella spp. (1)					9						8	

(1) : Comprises S.Unnamed

Footnote

(*) M : Monitoring, C : Clinical
Meat from broilers data from LACORS/ HPA CLASSP study.
Meat from broilers fresh at retail data from FSA / Wales & Northern Ireland Local Authorities survey.

Table Salmonella Enteritidis phagetypes in animals

Phagetype		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Solipeds, domestic		Turkeys		Ducks	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=														
Number of isolates phagetyped	N=	0	0	0	0	11	0	0	0	0	2	0	0	23	0
Number of isolates per type															
PT 1						7					1				
PT 4						2									
PT 6						1								3	
PT 8											1				
PT 14b														1	
Not typable															
PT 3														1	
PT 6a														5	
PT 7														1	
Other (1)														3	
PT 28						1									
PT 9b														9	

(1) : 3 isolates in ducks were classified as "other" as the culture did not react with any of the phages in the typing scheme.

Footnote

(*) M : Monitoring, C : Clinical

In the table "ducks" refers to ducks and geese.

Table Salmonella Enteritidis phagetypes in food

Phagetype		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Other poultry		Other products of animal origin	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=					1					
Number of isolates phagetyped	N=	0	0	0	0	1	0	0	0	0	0
Number of isolates per type											
1						1					

Footnote

(*) M : Monitoring, C : Clinical

Table Salmonella Enteritidis phagetypes in humans

Phagetype		humans	
Sources of isolates (*)		M	C
Number of isolates in the laboratory	N=		7740
Number of isolates phagetyped	N=	0	7738
Number of isolates per type			
PT 1			1492
PT 4			2069
PT 5			7
PT 6			246
PT 8			1088
PT 14b			538
PT 21			609
Not typable			20
PT 1b			12
PT 3			14
PT 44			3
PT 13a			117
PT 2			2
PT 35			2
PT 4b			4
PT 56			93
PT 6a			218
PT 6b			1
Other			1058
PT 5c			3
PT 29			3
PT 34			4
PT 6d			1
PT 47			1
PT 24			1
PT 15			4
PT 13			1
PT 11			78
PT 1c			2
RDNC			46
PT 4a			1

Footnote

(*) M : Monitoring, C : Clinical

Table Salmonella Typhimurium phagetypes in animals

Phagetype		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Solipeds, domestic		Ducks		Turkeys	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=														
Number of isolates phagetyped	N=	0	175	0	140	6	0	0	0	0	22	48	0	37	0
Number of isolates per type															
DT 7			1												
DT 8			2									32		1	
DT 12			5												
DT 104			105		7	2					3			32	
DT 104b			9		3						1				
DT 120			2		1									1	
DT 193			8		26						2	1		1	
DT 208			1												
Not typable			7												
DT 40			1			2					3				
DT 41			4		1						3	3			
DT 193a					1										
DT 49			2												
U 310					5										
DT 195					2	1						4			
DT 30												5			
DT 135			6								2				

U 288 (1)				64						2	1			
other (2)		14		15	1					1	1		1	
DT 2		1									1			
DT 56 var.										4				
U 308				3										
DT 56										1				
DT U302		7		12									1	

(1) : DT U288 and DT U288 var
(2) : Isolates from Northern Ireland - no typing data available for S. Typhimurium isolates (14 in cattle, 7 in pigs).
8 isolates in pigs, 1 in chickens, 1 in turkeys and 1 in domestic solipeds were classified as "other" as the culture did not react with any of the phages in the typing scheme.
1 DT U309 in ducks

Footnote

(*) M : Monitoring, C : Clinical
In the table "ducks" refers to ducks and geese

Table Salmonella Typhimurium phagetypes in food

Phagetype		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Other poultry		Other products of animal origin	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=					1					
Number of isolates phagetyped	N=	0	0	0	0	1	0	0	0	0	0
Number of isolates per type											
other						1					

Footnote

(*) M : Monitoring, C : Clinical

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Table Salmonella Typhimurium phagetypes in humans

Phagetype	humans	
Sources of isolates (*)	M	C
Number of isolates in the laboratory N=		
Number of isolates phagetyped N=	0	1735
Number of isolates per type		
DT 7		2
DT 8		93
DT 12		2
DT 104		370
DT 104b		72
DT 120		73
DT 170		1
DT 193		108
DT 208		1
U 302		10
Not typable		13
DT 40		5
DT 41		9
DT 132		1
DT 193a		1
DT 49		1
U 311		38
U 310		2
DT 195		1
DT 30		1
DT 99		1
DT 135		44
U 288		37
other		688
DT 1		46
DT 2		9
DT 56 var.		8
U 313		1
U 291		1
DT 56		50
RDNC		46

Footnote

(*) M : Monitoring, C : Clinical

2.1.7. Antimicrobial resistance in Salmonella isolates

Antimicrobial resistance is the ability of certain microorganisms to survive or grow in the presence of a given concentration of antimicrobial agent that usually would kill or inhibit the microorganism species in question. Antimicrobial resistant Salmonella strains may be transferred from animals or foodstuffs to humans.

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling

In England, Wales and Scotland (GB) all isolations of salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]
The isolates tested for antimicrobial resistance were from these isolates.

Type of specimen taken

In cattle over 90% of the isolates were derived from private samples taken for diagnostic purposes on farm.

Methods of sampling (description of sampling techniques)

Mainly voluntary private sampling.

Procedures for the selection of isolates for antimicrobial testing

One isolate from each incident reported.

Methods used for collecting data

Isolates from England, Wales, Scotland and Northern Ireland laboratories are tested at the respective national reference laboratory.

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in national reference laboratory. Other methods may be used in private laboratories.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VLA historical standards based on British Society for Antimicrobial Chemotherapy standard method.
Antimicrobials used were
Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin, Neomycin (Kanamycin in Northern Ireland).

Breakpoints used in testing

Disc Diffusion 13mm breakpoint

Notification system in place

All Salmonellas isolated in a veterinary laboratory must be reported to the competent authority. Isolates are requested by the NRL and serotyping and antimicrobial sensitivity testing is carried out at the NRL.

Results of the investigation

In 2006 in England and Wales, 758 Salmonella isolates were tested from cattle. 77.3% were fully sensitive.
For S. Enteritidis no samples were available in England and Wales for testing in 2006.
For S. Typhimurium in cattle in England and Wales 174 isolates were available for testing and 17.2% were fully sensitive. 54.6% of S. Typhimurium isolates showed resistance to more than 4 antimicrobials. There were 112 S. Typhimurium DT104 isolates and 51 were pentaresistant ACSSuT only and 14 were ACSSuT plus one other antimicrobial (trimethoprim/ sulphonamides). No resistance to cefotaxime, ceftazidime or ciprofloxacin was detected in Salmonella isolates from cattle.

National evaluation of the recent situation, the trends and sources of infection

The generally high level of resistance of Salmonella Typhimurium isolates is partly a reflection of the numbers of DT104 and its variants DT 104B and U302, which are commonly resistant to five or more antimicrobials.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

There is a possibility that antimicrobial resistance in organisms in animals could be transferred to organisms in humans. It needs to be noted however that the isolates reported here were mainly clinical isolates.

B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

In England, Wales and Scotland (GB) all isolations of salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]
There is no official sampling of pigs. Almost 90% of incidents are recorded as the result of examining clinical samples.

Type of specimen taken

Voluntary sampling, usually taken for diagnostic purposes, and reported as above.

Methods of sampling (description of sampling techniques)

Mainly voluntary private sampling.

Procedures for the selection of isolates for antimicrobial testing

One isolate from each incident reported.

Methods used for collecting data

Isolates from England, Wales, Scotland and Northern Ireland laboratories are tested at the respective national reference laboratory.

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in national reference laboratory. Other methods may be used in private laboratories.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VLA historical standards based on British Society for Antimicrobial Chemotherapy standard method used for testing isolates from England and Wales. In Northern Ireland NCCLS is used.
Antimicrobials used were
Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin, Neomycin (Kanamycin in Northern Ireland).

Breakpoints used in testing

Disc Diffusion 13mm breakpoint

Results of the investigation

In England and Wales, in 2006, 869 Salmonella isolates were tested from pigs. 11,7% were fully sensitive, a slight decline from the figure of 16.6% observed in 2005. The contribution from S. Typhimurium influences the fully susceptible figure because this serotype commonly demonstrates antimicrobial resistance. In 2006, the next most prevalent serotypes in pigs (S. Derby and S. Kedougou) commonly showed resistance to tetracyclines (S. Derby) or to tetracyclines, sulphonamide and trimethoprim/ sulphonamides (S. Kedougou). Together with S. Typhimurium, these three serotypes accounted for 88% of the Salmonella isolates examined from pigs in 2006.
No isolates of S. Enteritidis were available for testing. For S. Typhimurium in pigs 555 isolates were available for testing and 2.7% were fully sensitive, lower than the figure observed in 2005 when 12.9% were fully sensitive. This decline in the numbers of S. Typhimurium isolates showing full susceptibility was mainly accounted for by a reduction in the numbers of fully susceptible DT 193 isolates from 26.9% in 2005 to 4.9% in 2006. 68.8% of S. Typhimurium isolates showed resistance to more than 4 antimicrobials. A total of 20 S. Typhimurium DT104 isolates were examined from pigs and 9 of these were pentaresistant ACSSuT, whilest one was ACSSuT plus trimethoprim/ sulphonamides.

National evaluation of the recent situation, the trends and sources of infection

It is evident that in general terms, that isolates from pigs tend to be more resistant than those from cattle or sheep and isolates from turkeys tend to be more resistant than isolates from chickens. There is a greater prevalence of resistance in porcine Salmonella isolates compared to isolates from sheep and cattle to several antimicrobials, including ampicillin, chloramphenicol, streptomycin, trimethoprim/ sulphonamides, sulphonamides, and tetracyclines. No resistance to cefotaxime, ceftazidime was detected in Salmonella isolates from pigs in 2006.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

There is a possibility that antimicrobial resistance in organisms in animals could be transferred to organisms in humans

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

In England, Wales and Scotland (GB) all isolations of salmonella must be reported - Zoonoses Order 1989.
In Northern Ireland all isolations of salmonella must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]
The isolates tested for antimicrobial resistance were from these isolates.

Type of specimen taken

In poultry over 75% of the isolates were derived from private samples taken for montitoring purposes on farm.

Methods of sampling (description of sampling techniques)

Mainly voluntary private sampling.

Procedures for the selection of isolates for antimicrobial testing

One isolate from each incident reported.

Methods used for collecting data

Isolates from England, Wales, Scotland and Northern Ireland laboratories are tested at the respective national reference laboratory.

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in national reference laboratory. Other methods may be used in prevate laboratories.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VLA historical standards based on British Society for Antimicrobial Chemotherapy standard method.
Antimicrobials used were
Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin, Neomycin (Kanamycin in Northern Ireland).

Breakpoints used in testing

Disc Diffusion 13mm breakpoint

Results of the investigation

In 2006 in England and Wales, 578 Salmonella isolates were tested from poultry (Gallus gallus). 44,6% were fully sensitive. For S. Enteritidis 51 isolates were available and 17 (33.3%) were fully sensitive. For S. Typhimurium in Gallus gallus 13 isolates were available for testing and 46,2% were fully sensitive. 53,8% showed resistance to more than 4 antimicrobials. 6 DT104 were resistant to another antimicrobial in addition to pentaresistant ACSSuT.
In England and Wales 499 Salmonella isolates were tested from turkeys. 50,1% were fully sensitive. There were no S. Enteritidis isolates recovered from this species. For S. Typhimurium in turkeys, 86 isolates were available for testing, with 15,1% of these fully sensitive. 75,6% showed resistance to more than 4 antimicrobials. A total of 57 S. Typhimurium DT104 isolates from turkeys were examined and 42 possessed the typical ACSSuT pattern of pentavalent resistance. 36 of these DT104 isolates were also resistant to another antimicrobial in addition to pentaresistant ACSSuT.

National evaluation of the recent situation, the trends and sources of infection

No resistance to cefotaxime or ceftazidime was detected in Salmonella isolates. However 1 isolate from fowl (Gallus gallus) was resistent to Ciprofloxacin. This is an important finding since third generation cephalosporins or fluoroquinolones are important antimicrobials in the treatment of salmonellosis in humans.
The percentage of fully susceptible Salmonella isolates from Gallus gallus declined slightly in 2006. This reflected in part a reduced contribution to the overall figures of serotypes that were mostly fully susceptible in previous years (particularly S. Senftenberg and S. Livingston) and an increase in prevalence of some serotypes which show some resistance (eg S. Kedougou and S. Ohio)

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

There is a possibility that antimicrobial resistance in organisms in animals could be transferred to organisms in humans.

D. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

Results of the investigation

No results to report in 2006.

E. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Results of the investigation

No results to report in 2006.

F. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

The UK government undertakes national microbiological food surveillance. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.
Antimicrobial susceptibility testing of Salmonella isolates derived from raw whole chicken on retail sale and from non UK produced shell eggs on retail sale was carried out in 2 studies in 2006 and results are given in the tables

Type of specimen taken

According to study protocol

Methods of sampling (description of sampling techniques)

See above

Laboratory methodology used for identification of the microbial isolates

Samples were examined for the presence or absence of Salmonella spp. based on BS EN 1SO 6579:2002 Microbiology of food and animal feeding stuffs – Horizontal method for the detection of Salmonella spp. Participating laboratories were instructed to refer a selection of isolates to the HPA Laboratory of Enteric Pathogens (LEP) for confirmation and typing.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Health Protection Agency, Colindale

Results of the investigation

Results in table
LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP): one sample contained S. Hadar with three different antimicrobial resistant profiles (ST, STNx and STNxCpL).
Survey of Salmonella contamination of non-UK produced shell eggs on retail sale in the north west of England and London: the majority of the of the Salmonella isolates were resistant to one or more

antimicrobial drugs (83.2%) of which most were NxCpL(78.6%)

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - at farm - animal sample - Monitoring - quantitative data [Diffusion method]

Number of resistant isolates (n) and number of isolates with the concentration µl/ ml) or zone (mm) of inhibition equal to

S. Enteritidis

Gallus gallus (fowl) - at farm - animal sample - Monitoring

Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	51

Antimicrobials:	**N**	**n**	**<=6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**>=35**
Tetracyclines																																
Tetracyclin	51	0																1	1	1	5	10	10	7	1	2	11	2				
Amphenicols																																
Chloramphenicol	51	0										4	4	6	12	5	1			2	1	2	2	1	7	1	1	1	1			
Florfenicol	0																															
Cephalosporins																																
3rd generation cephalosporins	0																															
Cefotaxim	51	0																	1									1			1	48
Ceftazidim	51	0																									4		5	10	5	27
Fluoroquinolones																																
Ciprofloxacin	51	0													1	3	7	16	5	1		1					1	4	3		1	8
Enrofloxacin	0																															
Quinolones																																
Nalidixic acid	51	33	9	22	1	1																	1		3	8	2	2	1			1
Sulfonamides																																
Sulfonamide	51	1							1											2			1		1	8	12	6	8	3	1	8
Trimethoprim	0																															
Aminoglycosides																																
Streptomycin	51	1		1															1		2	6	13	15	8	1	2	1	1			
Gentamicin	51	0																		1	2	5	6	7	16	8	3	3				
Neomycin	51	0														2	2	5	15	21	3	1			1		1					
Kanamycin	0																															
Penicillins																																
Ampicillin	51	2	1	1																	3	2	3	1	2	8	3	6	12	2		7
Trimethoprim + sulfonamides	51	0																							1		2	1	4	9	11	23

Table Antimicrobial susceptibility testing of S.Enteritidis in animals

n = Number of resistant isolates	S. Enteritidis									
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**		**Sheep**	
Isolates out of a monitoring programme					yes				yes	
Number of isolates available in the laboratory					51				2	
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines										
Tetracyclin					51	0			2	0
Amphenicols										
Chloramphenicol					51	0			2	0
Cephalosporins										
Cefotaxim					51	0			2	0
Ceftazidim					51	0			2	0
Fluoroquinolones										
Ciprofloxacin					51	0			2	0
Quinolones										
Nalidixic acid					51	33			2	0
Sulfonamides										
Sulfonamide					51	1			2	1
Aminoglycosides										
Streptomycin					51	1			2	1
Gentamicin					51	0			2	0
Neomycin					51	0			2	0
Penicillins										
Ampicillin					51	2			2	0
Trimethoprim + sulfonamides					51	0			2	0
Fully sensitive					51	17			2	1
Resistant to 1 antimicrobial					51	31			2	0
Resistant to 2 antimicrobials					51	3			2	1
Resistant to 3 antimicrobials					51	0			2	0
Resistant to 4 antimicrobials					51	0			2	0
Resistant to >4 antimicrobials					51	0			2	0

Footnote

Sheep samples mainly for clinical diagnosis, poultry samples mainly monitoring.

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - at farm - animal sample - Clinical investigations - quantitative data [Diffusion method]

Number of resistant isolates (n) and number of isolates with the concentration µl/ ml) or zone (mm) of inhibition equal to

S. Typhimurium

Cattle (bovine animals) - at farm - animal sample - Clinical investigations

Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	173

Antimicrobials:	**N**	**n**	**<=6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**>=35**
Tetracyclines																																
Tetracyclin	173	139	30	36	30	23	18	1	1								1	1		1	1			4	7	10	4	4	1			
Amphenicols																																
Chloramphenicol	173	130	34	63	20	12		1							1	2			5	8	3	4	5	3	3	3	4		1	1		
Florfenicol	0																															
Cephalosporins																																
3rd generation cephalosporins	0																															
Cefotaxim	173	0																					1	3	4	7	10	6	8	7	3	124
Ceftazidim	173	0																			2		7	3	10	11	12	17	8	9	24	70
Fluoroquinolones																																
Ciprofloxacin	173	0																	1			1	6	4	5	15	8	20	26	34	24	29
Enrofloxacin	0																															
Quinolones																																
Nalidixic acid	173	0																	2	4	4	9	15	13	29	40	25	19	11	2		
Sulfonamides																																
Sulfonamide	173	138	35	70	22	6	3	2								1		1	1	1	1	5		2	5	5	5	6	1	1		
Trimethoprim	0																															
Aminoglycosides																																
Streptomycin	173	83	2	3			3	11	34	30	15	21	11	3	2	3	2	6	9	8	7	2		1								
Gentamicin	173	0											1		1	4	7	8	6	20	27	52	23	16	7	1						
Neomycin	173	2	1		1						3	4	5	4	20	38	42	38	15		2											
Kanamycin	0																															
Penicillins																																
Ampicillin	173	135	39	67	24	2	1	1	1													1			3	4	3	8	11	4	2	2
Trimethoprim + sulfonamides	173	35	13	16	5				1									1		2	6	4		8	4	16	18	25	11	11	6	26

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

n = Number of resistant isolates	S. Typhimurium									
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**		**Sheep**	
Isolates out of a monitoring programme		yes		yes		yes		yes		yes
Number of isolates available in the laboratory		174		555		13		86		18
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines										
Tetracyclin	174	139	555	490	13	7	86	65	18	14
Amphenicols										
Chloramphenicol	174	130	555	388	13	6	86	66	18	14
Cephalosporins										
Cefotaxim	174	0	555	0	13	0	86	0	18	0
Ceftazidim	174	0	555	0	13	0	86	0	18	0
Fluoroquinolones										
Ciprofloxacin	174	0	555	0	13	0	86	0	18	0
Quinolones										
Nalidixic acid	174	0	555	22	13	3	86	45	18	0
Sulfonamides										
Sulfonamide	174	138	555	493	13	7	86	72	18	14
Aminoglycosides										
Streptomycin	174	83	555	415	13	7	86	58	18	9
Gentamicin	174	0	555	10	13	0	86	0	18	0
Neomycin	174	2	555	52	13	0	86	0	18	0
Penicillins										
Ampicillin	174	135	555	465	13	7	86	71	18	14
Trimethoprim + sulfonamides	174	35	555	384	13	2	86	6	18	5
Fully sensitive		30		15		6		13		4
Resistant to 1 antimicrobial		6		46				1		
Resistant to 2 antimicrobials		2		6				5		
Resistant to 3 antimicrobials		1		19				1		
Resistant to 4 antimicrobials		40		87				1		2
Resistant to >4 antimicrobials		95		382		7		65		12
Number of multiresistant S. Typhimurium DT104										
with penta resistance		51		9		0		6		5
resistant to other antimicrobials		14		1		6		36		2

Table Antimicrobial susceptibility testing of Salmonella in animals

n = Number of resistant isolates	Salmonella spp.									
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**		**Sheep**	
Isolates out of a monitoring programme		yes		yes		yes		yes		yes
Number of isolates available in the laboratory		758		869		578		499		229
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines										
Tetracyclin	758	149	869	708	578	125	499	197	229	18
Amphenicols										
Chloramphenicol	758	134	869	408	578	46	499	73	229	16
Cephalosporins										
Cefotaxim	758	0	869	0	578	0	499	0	229	0
Ceftazidim	758	0	869	0	578	0	499	0	229	0
Fluoroquinolones										
Ciprofloxacin	758	0	869	0	578	1	499	0	229	0
Quinolones										
Nalidixic acid	758	8	869	25	578	61	499	59	229	0
Sulfonamides										
Sulfonamide	758	151	869	632	578	195	499	223	229	16
Aminoglycosides										
Streptomycin	758	89	869	483	578	83	499	153	229	11
Gentamicin	758	0	869	11	578	5	499	0	229	0
Neomycin	758	4	869	57	578	38	499	2	229	0
Penicillins										
Ampicillin	758	142	869	508	578	33	499	137	229	17
Trimethoprim + sulfonamides	758	37	869	476	578	157	499	60	229	6
Fully sensitive		586		102		258		250		210
Resistant to 1 antimicrobial		22		125		100		23		1
Resistant to 2 antimicrobials		9		24		80		45		2
Resistant to 3 antimicrobials		2		105		87		70		1
Resistant to 4 antimicrobials		42		109		37		21		2
Resistant to >4 antimicrobials		97		404		16		90		13

Table Antimicrobial susceptibility testing of Salmonella spp. in food

n = Number of resistant isolates	Salmonella spp.							
	Meat from bovine animals		**Meat from pig**		**Meat from broilers (Gallus gallus)**		**Meat from other poultry species**	
Isolates out of a monitoring programme (1)					yes			
Number of isolates available in the laboratory					68			
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines								
Tetracyclin					68	12		
Amphenicols								
Chloramphenicol					68	0		
Florfenicol					0	0		
Cephalosporins								
3rd generation cephalosporins					0	0		
Fluoroquinolones								
Ciprofloxacin					68	7		
Enrofloxacin					0	0		
Quinolones								
Nalidixic acid					68	9		
Sulfonamides								
Sulfonamide					68	18		
Trimethoprim					68	16		
Aminoglycosides								
Streptomycin					68	7		
Gentamicin					68	0		
Neomycin					68	3		
Kanamycin					68	3		
Penicillins								
Ampicillin					68	4		
Trimethoprim + sulfonamides					0	0		
Fully sensitive					68	1		
Resistant to 1 antimicrobial					68	13		
Resistant to 2 antimicrobials					68	11		
Resistant to 3 antimicrobials					68	4		
Resistant to 4 antimicrobials					68	5		
Resistant to >4 antimicrobials					68	5		

(1) : LACORS/ HPA CLASSP study

Table Breakpoints for antibiotic resistance testing in Animals

Test Method Used

Disc diffusion

Agar dilution

Broth dilution

E-test

Standards used for testing

VLA_historical_standards_based_on_British_Society_for_Antimicrobial_Chemotherapy_standard

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	VLA						10	13		13
Florfenicol										
Tetracyclines										
Tetracyclin	VLA						10	13		13
Fluoroquinolones										
Ciprofloxacin	VLA						1	13		13
Enrofloxacin										
Quinolones										
Nalidixic acid	VLA						30	13		13
Trimethoprim										
Sulfonamides										
Sulfonamide	VLA						300	13		13
Aminoglycosides										
Streptomycin	VLA						25	13		13
Gentamicin	VLA						10	13		13
Neomycin	VLA						10	13		13
Kanamycin										
Trimethoprim + sulfonamides	VLA						25	13		13
Cephalosporins										
Cefotaxim	VLA						30	13		13
Ceftazidim	VLA						30	13		13
3rd generation cephalosporins										
Penicillins										
Ampicillin	VLA						10	13		13

Table Breakpoints for antibiotic resistance testing in Food

Test Method Used

Disc diffusion

Agar dilution

Broth dilution

E-test

Standards used for testing

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	8	8		8	8	8				
Florfenicol										
Tetracyclines										
Tetracyclin (1)	8	8		8	8	128				
Fluoroquinolones										
Ciprofloxacin (2)	0.125	0.125		0.125	0.125	1				
Enrofloxacin										
Quinolones										
Nalidixic acid	16	16		16	16	16				
Trimethoprim	2	2		2	2	2				
Sulfonamides										
Sulfonamide	64	64		64	64	64				
Aminoglycosides										
Streptomycin (3)	16	16		16	16	128				
Gentamicin	4	4		4	4	4				
Neomycin	8	8		8	8	8				
Kanamycin	16	16		16	16	16				
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim	1	1		1	1	1				
Ceftazidim	1	1		1	1	1				
3rd generation cephalosporins	1	1		1	1	1				
Penicillins										
Ampicillin (4)	8	8		8	8	128				

(1) : Breakpoint also at 128 microg/ ml
(2) : Breakpoint also at 1 microg/ ml
(3) : Breakpoint also at 128 microg/ ml
(4) : Breakpoint also at 128 microg/ ml

Table Breakpoints for antibiotic resistance testing in Feedingstuff

Test Method Used

Disc diffusion

Agar dilution

Broth dilution

E-test

Standards used for testing

VLA_historical_standards_based_on_British_Society_for_Antimicrobial_Chemotherapy_standard

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	VLA						10	13		13
Florfenicol										
Tetracyclines										
Tetracyclin	VLA						10	13		13
Fluoroquinolones										
Ciprofloxacin	VLA						1	13		13
Enrofloxacin										
Quinolones										
Nalidixic acid	VLA						30	13		13
Trimethoprim										
Sulfonamides										
Sulfonamide	VLA						300	13		13
Aminoglycosides										
Streptomycin	VLA						25	13		13
Gentamicin	VLA						10	13		13
Neomycin	VLA						10	13		13
Kanamycin										
Trimethoprim + sulfonamides	VLA						25	13		13
Cephalosporins										
Cefotaxim	VLA						30	13		13
Ceftazidim	VLA						30	13		13
3rd generation cephalosporins										
Penicillins										
Ampicillin	VLA						10	13		13

Table Breakpoints for antibiotic resistance testing in Humans

Test Method Used

- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

Standards used for testing

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol										
Florfenicol										
Tetracyclines										
Tetracyclin										
Fluoroquinolones										
Ciprofloxacin										
Enrofloxacin										
Quinolones										
Nalidixic acid										
Trimethoprim										
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin										
Neomycin										
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim										
Ceftazidim										
3rd generation cephalosporins										
Penicillins										
Ampicillin										

2.2. CAMPYLOBACTERIOSIS

2.2.1. General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/ or infection in the country

During the last 25 years reported cases of human illness caused by Campylobacter spp. have generally risen year on year, but have remained relatively stable lately. There was a slight increase in 2004 compared with 2003, minimal change between 2004 and 2005 but an increase in reported cases in 2006, although still less than the peak reached in 1998 of over 65000 cases
Campylobacter is the most commmonly isolated bacterial gastrointestinal pathogen. A proportion of Campylobacter isolates are speciated and indicate that Campylobacter jejuni accounts for the majority, followed by Campylobacter coli. Campylobacter are commonly found in animals but are seldom associated with disease in the animal.

National evaluation of the recent situation, the trends and sources of infection

In the UK as a whole there were 52126 cases reported in humans in 2006. This is an increase on the number of cases reported in 2005 (49871).
England and Wales:
Following the routine introduction of selective isolation media, the number of isolates rose steadily to peak with 58,059 cases reported in 1998. Since then the general trend in incidence has been downwards. In 2004 42,251 reports were received, however in 2005 that figure rose to 44,400 reports and has increased again in 2006 to 46,339 reports.
Scotland:
In 2006 there were 4857 reports of campylobacter infection in humans. In 2005 there were 4581 cases of Campylobacter in Scotland, denoting a nominal increase from 2004 when 4365 cases were recorded. The general trends appears to be downwards from 2000, with 5115 cases reported in 2002 (2003 there were 4445 isolates). This number in 2002 was a decrease of 6% on the level reported on the previous year, similarly, this followed a decrease of 16% in 2001 compared to 2000.
Northern Ireland:
Since 1991 this has been the most commonly reported cause of bacterial food poisoning in Northern Ireland. Reports increased during the last decade to a high of 1001 in 2000, before falling over the next three years by 12% to 743 in 2003. Reported cases increased in 2004 by 12% with 849 reports and again by 5% in 2005 to 890. There was a further increase to 930 cases reported in 2006. It is not known how many cases were imported.
Food:
In 2006 studies continued on examination of whole fresh chicken at retail in two studies as outlined below.
LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP):
A three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007) which is designed to provide surveillance data on the pathogens Salmonella and Campylobacter. Part A covers the surveillance of these pathogens in raw whole chicken on retail sale.
A total of 854 chicken samples were tested in 2006, of which 70% (595) samples were contaminated

with Campylobacter spp. 480 isolates were referred to HPA LEP for typing and speciation, of which 60% (289) were C. jejuni, 35% (167) were C. coli, and 0.2% (1) was C. lari. Both C. jejuni and C. coli were detected in 4.8% (23) of the samples.
FSA/ LA Wales and Northern Ireland Poultry surveillance:
A twelve month Food Standards Agency (FSA) study in partnership with the Local Authorities from Wales and Northern Ireland (January-December 2005) was carried out to produce an estimate of the Campylobacter contamination in whole chickens available to the consumer in Wales and Northern Ireland on retail sale. In total, 542 (63.0%) out of the 860 chickens sampled, tested positive for Campylobacter.
Animals:
No specific national studies were conducted in animals in 2006. Isolates obtained from a statistically based survey of cattle and pigs arriving at GB abattoirs was conducted in 2003 and has been reported in the 2004 report.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The route of transmission to humans in many sporadically occurring cases remains obscure. Campylobacter are commonly found in clinically healthy animals. Poultry have long been considered as a potential source of infection.

Recent actions taken to control the zoonoses

The Food Standards Agency has continued its campaign directed at broiler producers to reduce the number of infected poultry flocks arriving at slaughter. The campaign has a number of elements but an increased awareness of the need for the highest standards of biosecurity at farm level is seen as being of high importance.

Additional information

Surveillance system:
The UK government undertakes national microbiological food surveillance. The priorities of these surveys are closely linked to a strategy to reduce the level of foodborne disease. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.
The UK government also collates returns from all UK food authorities on official food enforcement activities in line with Regulation (EC) No 882/ 20041 on official controls performed to ensure the verification of compliance with feed and food law, and animal health and animal welfare rules. The results of this food testing, which is done locally, are returned to the European Commission annually as required by the Regulation and therefore have not been included in this report.

2.2.2. Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Reporting system in place for the human cases

Ascertainment of cases is via mandatory notification of food poisoning and voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories (Health Protection Agency, Centre for Infections, (Colindale), Health Protection Scotland, Health Protection Agency, Communicable Disease Surveillance Centre (Northern Ireland).

Case definition

Laboratory confirmed isolate, usually form a faeces sample.

Diagnostic/ analytical methods used

Microbiological culture. Only a proportion of isolates are speciated.

History of the disease and/ or infection in the country

During the last 25 years reported cases of human illness caused by Campylobacter spp. have generally risen year on year to a peak of 58,059 reports in 1998, but have remained relatively stable lately. There was a slight increase in 2004 compared with 2003, minimal change between 2004 and 2005 but an increase in reported cases in 2006.
Campylobacter is the most commmonly isolated bacterial gastrointestinal pathogen. A proportion of Campylobacter isolates are speciated and indicate that Campylobacter jejuni accounts for the majority, followed by Campylobacter coli.
England and Wales
Following the routine introduction of selective isolation media, the number of isolates rose steadily to peak with 58,059 cases reported in 1998. Since then the general trend in incidence has been downwards. In 2004 CfI received 42,251 reports, however in 2005 the figure rose to 44,400 reports and has increased again in 2006.
Scotland
In 2005 there were 4581 cases of Campylobacter in Scotland, denoting a nominal increase from 2004 when 4365 cases were recorded. The general trends appears to be downwards from 2000, with 5115 cases reported in 2002 (2003 there were 4445 isolates). This number in 2002 was a decrease of 6% on the level reported on the previous year, similarly, this followed a decrease of 16% in 2001 compared to 2000.
Campylobacter has remained the most frequently reported gastrointestinal pathogen reported from humans in Scotland.
Northern Ireland
Since 1991 this has been the most commonly reported cause of bacterial food poisoning in Northern Ireland. Reports increased during the last decade to a high of 1001 in 2000, before falling over the next three years by 12% to 743 in 2003. Reported cases increased in 2004 by 12% with 849 reports and again by 5% in 2005 to 890. It is not known how many cases were imported.

Results of the investigation

In the UK as a whole there were 52126 cases reported in humans in 2006.
England and Wales
There were 46339 cases of Campylobacter infection in 2006. Just under half of all of the reports received in 2006 (46%) came in the four months from June to September (a finding comparable to 2005).
Speciation is done only for a proportion of cases chosen at random from isolates from England and Wales. In 2006 327 cases (as a representative sample) were speciated giving a ratio of 92.4% C. jejuni to 7.6% C. coli isolates.
Scotland
In 2006 there were 4857 cases of Campylobacter in Scotland, denoting a nominal increase from 2005 when 4581 cases were recorded. Campylobacter has remained the most frequently reported gastrointestinal pathogen reported from humans in Scotland.
Northern Ireland
There were 930 laboratory reports in 2006. It is not known how many cases were imported.

National evaluation of the recent situation, the trends and sources of infection

The number of reports of Campylobacter in humans in the UK gradually increase during the 1980's and 1990's reaching a peak in the UK in 1998 of over 65,000 cases. There has been a general downward trend since then although it may be levelling off. The route of transmission to humans in many sporadically occurring cases remains obscure.

Relevance as zoonotic disease

Campylobacter remains the most commmonly isolated bacterial gastrointestinal pathogen. Although the route of infection in human cases is often not clear, the organism is common in livestock where it is seldom associated with disease (see survey of cattle, sheep and pigs eligible for slaughter reported in 2003).

Table Campylobacter in humans - Species/ serotype distribution

Campylobacter	Cases 52126	Cases Inc. 86.6	Autochthon cases 7447	Autochthon Inc. 0	Imported cases 731	Imported Inc. 0	Unknown status 43948
C. coli							
C. jejuni							
C. upsaliensis							
Campylobacter spp., unspecified	52126	86.6	7447		731		43948

Footnote

Speciation is done only for a proportion of cases chosen at random from isolates from England and Wales. In 2006 327 cases (as a representative sample) were speciated giving a ratio of 92.4% C. jejuni to 7.6% C. coli isolates.

Table Campylobacter in humans - Age distribution

Age Distribution	C. coli			C. jejuni			Campylobacter spp., unspecified		
	All	M	F	All	M	F	All	M	F
<1 year							799	471	306
1 to 4 years							2770	1615	1096
5 to 14 years							2838	1755	1034
15 to 24 years							6547	3416	3062
25 to 44 years							15780	8218	7429
45 to 64 years							15219	8107	7039
65 years and older							7683	3815	3829
Age unknown							490	198	158
Total :	0	0	0	0	0	0	52126	27595	23953

Footnote

Speciation is done only for a proportion of cases chosen at random from isolates from England and Wales. In 2006 327 cases (as a representative sample) were speciated giving a ratio of 92.4% C. jejuni to 7.6% C. coli isolates.

Table Campylobacter in humans - Seasonal distribution

Month	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp., unspecified
	Cases	Cases	Cases	Cases
January				3061
February				2789
March				2856
April				2702
May				4794
June				7043
July				6241
August				5474
September				4929
October				4886
November				4276
December				3075
not known				0
Total :	0	0	0	52126

Footnote

Only a proportion of isolates are speciated and this indicates that for 2006 92.4% were C. jejuni.

2.2.3. Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At retail

LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP)
A three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007), which is designed to provide surveillance data on the pathogens Salmonella and Campylobacter. Part A covers the surveillance of these pathogens in raw whole chicken on retail sale.
The enrichment method used was based on the Food and Drugs Administration Campylobacter method (Hunt JM, Abeyta C and Tran T. Campylobacter. In: US FDA Bacteriological Analytical Manual, 8th edition, current through revision A, 1998). Food treatments, such as heating, freezing or chilling can cause sub-lethal injury to Campylobacter spp., resulting in increased sensitivity to some antibiotics and lowered resistance to elevated incubation temperatures. The FDA enrichment culture method uses Bolton broth which allows resuscitation and recovery of injured organisms. This medium will be specified in the new version of ISO 10272.
All samples were tested for the presence or absence of Campylobacter and a selection of isolates speciated and screened for antimicrobial resistance.
A survey of Campylobacter and Salmonella in raw retail chicken available to consumers in Wales and Northern Ireland.
A twelve-month Food Standards Agency study in partnership with the Local Authorities from Wales and Northern Ireland (January-December 2006) was carried out to produce an estimate of the Campylobacter contamination in whole raw chickens available on retail sale to the consumer in Wales and Northern Ireland.

Frequency of the sampling

At retail

Other: Specific studies on going in 2006

Type of specimen taken

At retail

Other: fresh refrigerated poultry meat

Definition of positive finding

At retail

Isolation of the organism from the sample. In the first study The enrichment method

used was based on the Food and Drugs Administration Campylobacter method (Hunt JM, Abeyta C and Tran T. Campylobacter. In: US FDA Bacteriological Analytical Manual, 8th edition, current through revision A, 1998). Food treatments, such as heating, freezing or chilling can cause sub-lethal injury to Campylobacter spp., resulting in increased sensitivity to some antibiotics and lowered resistance to elevated incubation temperatures. The FDA enrichment culture method uses Bolton broth which allows resuscitation and recovery of injured organisms. This medium will be specified in the new version of ISO 10272.

In the second study samples were examined for the presence or absence of Campylobacter in accordance with the HPA Standard Microbiological Food Method F21 for detection of Campylobacter spp., which is based on the British Standard method BS 5763: Part 17: 1996, ISO 10272: 1995.Methods for microbiological examination of food and animal feeding stuffs: detection of thermotolerant Campylobacter.

Diagnostic/ analytical methods used

At retail

Bacteriological method: ISO 10272:1995

Control program/ mechanisms

Recent actions taken to control the zoonoses

Food Standards Agency has continued the campaign directed at broiler production and based on intensified biosecurity measures.

Results of the investigation

LACORS/ HPA Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP)
A three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007), which is designed to provide surveillance data on the pathogens Salmonella and Campylobacter.
A total of 854 chicken samples were tested in 2006, of which 70% (595) samples were contaminated with Campylobacter spp. 480 isolates were referred to HPA LEP for typing and speciation, of which 60% (289) were C. jejuni, 35% (167) were C. coli, and 0.2% (1) was C. lari. Both C. jejuni and C. coli were detected in 4.8% (23) of the samples (these have been included as separate results for table 7.7, but antimicrobial resistance data is not available due to their mixed presence in the samples).
A survey of Campylobacter and Salmonella in raw retail chicken available to consumers in Wales and Northern Ireland.
A twelve-month Food Standards Agency study in partnership with the Local Authorities from Wales and Northern Ireland (January-December 2006) was carried out to produce an estimate of the Campylobacter contamination in whole raw chickens available on retail sale to the consumer in Wales and Northern Ireland. In total, 542 (63.0%) out of the 860 chickens sampled tested positive for Campylobacter.

Additional information

Surveillance system:

The UK government undertakes national microbiological food surveillance. The priorities of these surveys are closely linked to a strategy to reduce the level of foodborne disease. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.
The UK government also collates returns from all UK food authorities on official food enforcement activities in line with Regulation (EC) No 882/ 20041 on official controls performed to ensure the verification of compliance with feed and food law, and animal health and animal welfare rules. The results of this food testing, which is done locally, are returned to the European Commission annually as required by the Regulation and therefore have not been included in this report.

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. lari	C. jejuni	C. upsaliensis	thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus)										
fresh	LACORS / HPA CLASSP	single	25g	854	595	190	1	312	0	138
- at retail - Surveillance	NPHS/ FSA	single	25g	860	542	33	0	57	0	452

Footnote

LACORS/ HPA CLASSP survey- figures include 23 mixed C.coli and C.jejuni
NPHS survey- Around 20% of the Campylobacter isolates were sent for full speciation

2.2.4. Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

No national surveys were carried out in poultry on farm in 2006.

2.2.5. Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Sampling strategy used in monitoring

Frequency of the sampling

Isolates were from a survey of GB cattle arriving for slaughter at the abattoir. See 2003 report for further details. The antimicrobial resistance in the isolates was reported in 2004.

Methods used for collecting data

.

Control program/ mechanisms

The control program/ strategies in place

Advice is available on the responsible use of medicines on farm.

Results of the investigation

The last survey was reported in 2004.

B. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Last survey was conducted in 2003 and the results were reported in 2004.

C. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

No surveys were conducted in 2006.

D. Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived from cattle

Results of the investigation

No surveys were conducted in 2006.

E. Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived

from pigs

Sampling strategy used in monitoring

Frequency of the sampling

No surveys were conducted in 2006.

F. Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

The isolates were derived from the study on whole chicken part of the three year Local Authority Co-ordinators of Regulatory Services (LACORS) and the Health Protection Agency (HPA) study (November 2004 to October 2007), designed to provide surveillance data on the pathogens Salmonella and Campylobacter. Part A covers the surveillance of these pathogens in raw whole chicken on retail sale.

Laboratory methodology used for identification of the microbial isolates

The enrichment method used was based on the Food and Drugs Administration Campylobacter method (Hunt JM, Abeyta C and Tran T. Campylobacter. In: US FDA Bacteriological Analytical Manual, 8th edition, current through revision A, 1998). Food treatments, such as heating, freezing or chilling can cause sub-lethal injury to Campylobacter spp., resulting in increased sensitivity to some antibiotics and lowered resistance to elevated incubation temperatures. The FDA enrichment culture method uses Bolton broth which allows resuscitation and recovery of injured organisms. This medium will be specified in the new version of ISO 10272

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Tetractycline, Ampicillin, Ciprofloxacin, Nalidixic acid, Gentamycin, Erythromycin.

Breakpoints used in testing

Health Protection Agency standards

Results of the investigation

None of the 457 isolates were fully sensitive to antimicrobials. Around 17.3% (79 isolates) were resistant to 4 or more antimicrobials.

Table Antimicrobial susceptibility testing of Campylobacter in food

n = Number of resistant isolates

Campylobacter spp., unspecified

	Meat from other poultry species		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)	
Isolates out of a monitoring programme								yes
Number of isolates available in the laboratory								480
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines								
Tetracyclin							457	199
Fluoroquinolones								
Ciprofloxacin							457	116
Quinolones								
Nalidixic acid							457	126
Aminoglycosides								
Gentamicin							457	0
Macrolides								
Erythromycin							457	38
Penicillins								
Ampicillin							457	320
Fully sensitive							457	0
Resistant to 1 antimicrobial							457	93
Resistant to 2 antimicrobials							457	142
Resistant to 3 antimicrobials							457	101
Resistant to 4 antimicrobials							457	42
Resistant to >4 antimicrobials							457	79

Footnote

LACORS/ HPA CLASSP survey - Of 480 isolates, AMR data was not available for 23 samples due to mixed presence of C.jejuni and C.coli.

Table Breakpoints used for antimicrobial susceptibility testing in Animals

Test Method Used

- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

Standards used for testing

Campylobacter	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines										
Tetracyclin										
Fluoroquinolones										
Ciprofloxacin										
Quinolones										
Nalidixic acid										
Aminoglycosides										
Gentamicin										
Neomycin										
Kanamycin										
Macrolides										
Erythromycin										
Penicillins										
Ampicillin										

Table Breakpoints used for antimicrobial susceptibility testing in Food

Test Method Used

- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

Standards used for testing

Campylobacter	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines										
Tetracyclin	8	8		8	8	8				
Fluoroquinolones										
Ciprofloxacin	1	1		1	1	1				
Quinolones										
Nalidixic acid	16	16		16	16	16				
Aminoglycosides										
Gentamicin	4	4		4	4	4				
Neomycin	8	8		8	8	8				
Kanamycin	16	16		16	16	16				
Macrolides										
Erythromycin	4	4		4	4	4				
Penicillins										
Ampicillin	8	8		8	8	8				

Table Breakpoints used for antimicrobial susceptibility testing in Humans

Test Method Used

- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

Standards used for testing

Campylobacter	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines										
Tetracyclin										
Fluoroquinolones										
Ciprofloxacin										
Quinolones										
Nalidixic acid										
Aminoglycosides										
Gentamicin										
Neomycin										
Kanamycin										
Macrolides										
Erythromycin										
Penicillins										
Ampicillin										

2.3. LISTERIOSIS

2.3.1. General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/ or infection in the country

Laboratory reports in UK in humans have fallen from a peak in the late 1980s following advice to pregnant women to avoid ripened soft cheeses and pates.
The number of human cases in 2006 of Listeria monocytogenes was 210, very similar to the 229 reported in 2005 and the 236 cases reported in 2004.

National evaluation of the recent situation, the trends and sources of infection

The UK government undertakes national microbiological food surveillance. The priorities of these surveys are closely linked to a strategy to reduce the level of foodborne disease. Surveys are carried out regularly on a variety of foods and processes to gather data on the possible effects of processing changes on pathogens and to monitor high-risk foods linked to human cases/ outbreaks and the emergence of new pathogens. In addition to national surveillance Wales, Scotland and Northern Ireland also have separate microbiological food surveillance programmes within their own regions.
The UK government also collates returns from all UK food authorities on official food enforcement activities in line with Regulation (EC) No 882/ 20041 on official controls performed to ensure the verification of compliance with feed and food law, and animal health and animal welfare rules. The results of this food testing, which is done locally, are returned to the European Commission annually as required by the Regulation and therefore have not been included in this report.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Results of the investigations published in 2006:
LACORS/ HPA Study of Sandwiches sampled from hospital and residential/ care home premises with a focus on Listeria monocytogenes and other Listeria spp:
There is a scarcity of information on the prevalence of L. monocytogenes in sandwiches purchased or provided within hospitals and care homes. The LACORS/ HPA study was designed to address this gap in current knowledge. In total 3249 samples of sandwiches were collected from hospitals and care homes between April 2005 and March 2006 and examined for the presence and levels of L. monocytogenes. All L. monocytogenes isolates were subtyped. L. monocytogenes was detected in 2.7% (88/ 3249) of samples, 87 at <10 cfu/ g and one at 20 cfu/ g.
The enrichment and enumeration methods used were the HPA Standard Microbiological Food Method for detection and enumeration of Listeria monocytogenes and other Listeria species which is based on the British Standard method BS EN ISO 11290 parts 1 and 2: Microbiological examination of food and animal feeding stuffs – Horizontal method for the detection and enumeration of Listeria monocytogenes, Parts 1 (1997) and 2 (1998).
Results are detailed in the table
The occurrence of Listeria monocytogenes in sandwiches available to hospital patients in Wales, UK:
A survey for Listeria monocytogenes in hospital sandwiches was carried out in Wales between October 2005 and March 2006. Of 1,538 samples, 950 were taken at hospitals. The positive rates for

hospital sandwiches were 2.84% for enriched culture and 0.21% for direct counts. The unsatisfactory rate (>100cfu/ g) was 0.1%. In addition to establishing the rates in hospital sandwiches, the study also compared these rates with the rates found in sandwiches sampled from retailers (4.42% for enriched and 0.85% for direct). The conclusion was that there was not a statistically significant difference in rates between sandwiches sampled from hospitals and retailers.

LACORS/ HPA Focused Shopping Basket Sampling of selected foods from retail premises with a focus on Listeria monocytogenes and other Listeria spp:

Although listeriosis is a rare disease in the UK, a rise in the number of listeriosis cases in the UK has occurred over the last five years in particular in people over 60 years. The reason for the increase in listeriosis is unclear. In an attempt to try and understand this increase, an on-going study focused on ready-to-eat foods that have been linked to the recent rise and/ or from case food histories was initiated from May 2006 onwards with the aim to investigate the microbiological quality of these products.

Ready-to-eat foods (sliced meats, sandwiches, cheeses, butter, probiotic drinks, and confectionery products containing cream) were sampled based upon a Shopping Basket approach from retail premises and examined for presence and levels of Listeria spp. including Listeria monocytogenes. All L. monocytogenes isolates were subtyped.

1894 samples were examined during the first six months data (May to October 2006), and 3% contained L. monocytogenes. 0.3% of samples failed EC legal food safety criteria due to L. monocytogenes presence in excess of 100 cfu/ g (range 10^2 - 10^4 cfu/ g) all of which were sliced pre-packed meats. The enrichment and enumeration methods used were as used above.

2.3.2. Listeriosis in humans

A. Listeriosis in humans

Reporting system in place for the human cases

Based on laboratory reports

Case definition

Positive laboratory reports

Diagnostic/ analytical methods used

Culture

History of the disease and/ or infection in the country

Laboratory reports have fallen from a peak in the late 1980s following advice to pregnant women to avoid ripened soft cheeses and pates.

Results of the investigation

In the UK there was a total of 210 laboratory reports.
England and Wales:
There were 9 pregnancy-associated cases reported in 2006. (Note that we do not call these 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, i.e., day 28 after birth). There were 9 congenital cases in 2002, 32 cases in 2003, 9 cases in 2004 and 7 in 2005.
There were a total of 187 cases in 2006, a decrease on the 198 cases in 2005, which was down from 217 cases the previous year. There were 59 recorded deaths for the year
Scotland:
In 2006 there were 17 laboratory confirmed cases of listeriosis - one of which was a pregnancy associated case. This is a 47% decrease on 2005 when there were 32 cases, but much closer to the 2004 total of 15 reports. There were 4 recorded deaths, but in the majority of cases there were also underlying conditions.
Northern Ireland:
There were 6 cases reported in 2006, all of which were L. monocytogenes. None of these were pregnancy-associated. 3 cases were between 45 and 64 years of age and 3 were over 65. There is no data available on listeria associated deaths.

National evaluation of the recent situation, the trends and sources of infection

The total number of reports for 2006 was 210, a similar level to the 232 reported in 2005 and the 236 in 2004.
In Northern Ireland from 1989 to 2004 the number of laboratory reports of listeriosis has fluctuated between 1 and 6 per annum. Likewise in Scotland Reports rose from 10 in 1986 to a peak of 40 in 1988. Since that date annual numbers have been approximately 12. In England and Wales peak infection was seen in the late 1980's.

Table Listeria in humans - Species/ serotype distribution

Listeria	Cases 210	Cases Inc. 0.349
Listeria spp.	210	0.349
Congenital cases	27	0.045
Deaths (1)	63	0.105

(1) : No information on deaths for Northern Ireland

Footnote

Data for the UK - England, Wales, Scotland and Northern Ireland.
Incidence calculated per 100,000 based on total UK population of 60,209,500 in 2006

Table Listeria in humans - Age distribution

Age Distribution	L. monocytogenes			Listeria spp.		
	All	M	F	All	M	F
<1 year	11	3	7	11	3	7
1 to 4 years	0	0	0	0	0	0
5 to 14 years	1	0	1	1	0	1
15 to 24 years	1	0	0	1	0	0
25 to 44 years	25	8	16	25	8	16
45 to 64 years	52	33	19	52	33	19
65 years and older	118	63	55	118	63	55
Age unknown	2	0	1	2	0	1
Total :	210	107	99	210	107	99

Footnote

Data for UK - England, Wales, Scotland and Northern Ireland
Only L. monocytogenes reported as Listeriosis

2.3.3. Listeria in foodstuffs

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Listeria monocytogenes presence in x g	> detection limit but =< 100 cfu/ g	L. monocytogenes > 100 cfu/ g
Dairy products (excluding cheeses)								
butter	LACORS/ HPA shopping basket survey	single	25g	240	3	3	0	0
cream								
dairy products, not specified								
ready-to-eat								
- at retail - Surveillance - surveillance survey (2)	LACORS/ HPA shopping basket survey	single	25g	114	0	0	0	0
Cheeses, made from unspecified milk or other animal milk								
hard								
- at retail - Surveillance - surveillance survey	LACORS/ HPA shopping basket survey	single	25g	385	6	6	0	0
unspecified (1)	LACORS/ HPA shopping basket survey	single	25g	217	0	0	0	0

(1) : Spreadable cheeses
(2) : Probiotic drinks

Footnote

All samples from the LACORS/ HPA surveys were tested using both detection adn enumeration methods. 25g of sample was used for detection and 25g for enumeration.

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Listeria monocytogenes presence in x g	> detection limit but =< 100 cfu/ g	L. monocytogenes > 100 cfu/ g
Other processed food products and prepared dishes (2)	HPA/ LACORS	single	25g	3249	88	87	1	0
sandwiches (1)	NPHS survey	single	25g	1538	53	53	4	3
unspecified (3)	HPA/ LACORS	single	25g	355	28	27	1	0
Meat, mixed meat meat products								
cooked, ready-to-eat (4)	HPA/ LACORS	single	25g	431	17	8	4	5
Confectionery products and pastes (5)	HPA/ LACORS	single	25g	152	4	4	0	0

(1) : Taken from retail and at hospitals
(2) : Sandwiches taken from hospitals and residential / care home premises
(3) : Sandwiches taken from a focused shopping basket survey at retail
(4) : Sliced meats taken from a focused shopping basket survey at retail
(5) : Taken from a focused shopping basket survey at retail

Footnote

HPA/ LACORS surveys - all samples were tested using both the detection and enumeration methods. 25g of sample was used for the detection and 25g for the enumeration method.

2.3.4. Listeria in animals

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria spp.	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals)	VLA	animal		21		
Sheep and goats	VLA	animal		97		
Birds	VLA	animal		6		
All animals						
unspecified	VLA	animal		4		

Footnote

Diagnoses made from clinical diagnostic material submitted to the VLA.
The numbers above are numbers of incidents. There may be more than 1 diagnosis in the same incident.

2.4. E. COLI INFECTIONS

2.4.1. General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/ or infection in the country

The first report in humans in England and Wales was in 1982 and in Scotland in 1984. Up to 1995 there was a rising trend in the reporting of VTEC O157 throughout the UK. Since then the number of reported cases has stabilised at approximately 1000 cases per year. Scotland has consistently recorded the highest rates per 100,000 population since the late 1980s.

National evaluation of the recent situation, the trends and sources of infection

Humans
In UK in total in 2006 there were 1234 cases of VTEC laboratory confirmed cases, an increase on the 1129 laboratory confirmed cases in 2005 and 898 reported in 2004. Of the cases, 1216 were caused by VTEC O157. There were 60 cases of HUS (1 clinical case and 59 confirmed laboratory reports – full breakdown was not available in all regions of the country). All 60 cases were caused by VTEC O157. This is an increase on the 38 cases of HUS reported in 2005.
In 2006, the HPA Laboratory of Enteric Pathogens confirmed 977 cases of VTEC O157 in England and Wales, an increase on the annual total of 938 for 2005. The increase seen in Scotland in the previous year was maintained in 2006. In Northern Ireland there was a slight decrease in the number of cases reported compared with the previous year.
Animals
No surveys were carried out in 2006. A survey of eligible cattle, sheep and pigs was carried out in 2003 - see report for 2003.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Foodborne outbreaks have been well documented, but many cases of VTEC O157 are sporadic (i.e., individual cases not known to be associated with any other cases) and 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.

2.4.2. E. Coli Infections in humans

A. Verotoxigenic Escherichia coli infections in humans

Reporting system in place for the human cases

In England and Wales systematic data based on voluntary laboratory reporting is only collected on verotoxigenic E. coli O157. Most laboratories examine faeces using Sorbitol MacConkey agar and anti-O157 latex agglutination kits. This serotype is usually associated with verocytotoxin production. Verotoxin is not specifically tested for.
In Scotland isolates of E.coli O157 and other serogroups are voluntarily reported to Health Protection Scotland (HPS) by diagnostic laboratories. The Scottish E.coli O157 Reference Laboratory (SERL) reports culture positive cases of E.coli O157 and other serogroups, and seropositives of E.coli O157. HPS combines laboratory data with exposure, clinical and outcome details obtained from local investigators, to compile an enhanced dataset.
In Northern Ireland reporting is based on laboratory reports.

Case definition

A person-infection episode, with microbiological confirmation of infection (culture or seropositive).

Diagnostic/ analytical methods used

Most laboratories examine faeces using Sorbitol MacConkey agar and anti-O157 latex agglutination kits. This serotype is usually associated with verocytotoxin production. Verotoxin is not specifically tested for.

History of the disease and/ or infection in the country

The first report in England and Wales was in 1982 and in Scotland in 1984. Up to 1995 there was a rising trend in the reporting of VTEC O157 throughout the UK. Since then the number of reported cases has stabilised at approximately 1000 cases per year. Scotland has consistently recorded the highest rates per 100,000 population since the late 1980s.

Results of the investigation

In 2006, the HPA Laboratory of Enteric Pathogens confirmed 1003 cases of VTEC O157 in England and Wales, including 26 cases of HUS, one an imported case. This was an increase over the 932 cases reported in 2005.
In Scotland in 2006 there were a total of 230 cases of VTEC O157, 34 of which were from cases of HUS. An additional case of HUS was identified on clinical signs and serology. In 2005 there were 167 VTEC O157 and 17 of those were from cases of HUS. Additionally in 2006 Scotland reported 18 cases of non-O157 VTEC. Of these one case was imported.
In Northern Ireland there were 46 reports of E. coli O 157 in 2006, 43 of which were VT positive. This compares with 49 reports of E. coli O 157 in 2005, 46 of which were VT positive and 19 in 2004, of which 18 were VT positive. There were no foodborne outbreaks reported in 2006 in Northern Ireland.

National evaluation of the recent situation, the trends and sources of infection

In Scotland reports of isolate and seropositive E.coli O157 cases fell in 2003 by 33% on the previous year, but rose again by 37% in 2004 to 210 cases and declined again in 2005, but in 2006 has increased to 230 cases. In 2006 in England and Wales there was an increase in the number of cases and in Northern Ireland there was a slight decrease in the number of cases reported compared with the previous year.
Scotland generally reports higher rates of E.coli O157 than the rest of the UK. On average 5.3 cases per 100,000 population were reported annually from 1995 to 2004 in Scotland, rising to 9.9 cases in 1996. Most cases are sporadic, with different aetiology related to farm animals and their environment. Over 98% of E.coli O157 isolates are verotoxigenic (VT). Background incidence of E.coli O157 averages 200 to 250 cases per year in Scotland and in 2005 there were 2.9 cases per 100,000 population compared with 2.2 and 1.7 cases per 100,000 population in Northern Ireland, and England and Wales, respectively.

Relevance as zoonotic disease

While foodborne outbreaks have been well documented, many cases of VTEC O157 are sporadic (i.e., individual cases not known to be associated with any other cases) and 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.

Table Escherichia coli, pathogenic in humans - Age distribution

Escherichia coli, pathogenic	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
HUS (1)						
- clinical cases (2)	1		1		0	
- lab. confirmed cases	60		58		2	
- caused by O157 (VT+)	60		58		2	
- caused by other VTEC	0		0		0	
E.coli infect. (except HUS)						
- clinical cases	0		0		0	
- laboratory confirmed	1234		1075		116	
- caused by 0157 (VT+)	1216		1058		117	
- caused by other VTEC	18		17		1	

(1) : Data on HUS not available from Northern Ireland
(2) : Great Britain data - clinical cases numbers not known for England and Wales. 1 clinical case for Scotland.

Footnote

2 of the 43 cases reported for Northern Ireland were imported, the other 41 were of unknown status

Table Escherichia coli, pathogenic in humans - Species/ serotype distribution

Age Distribution	Verotoxigenic E. coli (VTEC)			VTEC O157:H7			VTEC non-O157		
	All	M	F	All	M	F	All	M	F
<1 year	28	14	14	28	14	14	0	0	0
1 to 4 years	233	117	116	232	116	116	1	1	0
5 to 14 years	241	133	108	238	132	106	3	1	2
15 to 24 years	145	71	74	141	69	72	4	2	2
25 to 44 years	240	89	151	240	89	151	0	0	0
45 to 64 years	191	62	129	186	62	124	5	0	5
65 years and older	132	51	81	127	48	79	5	3	2
Age unknown	50	12	9	50	12	9	0	0	0
Total :	1260	549	682	1242	542	671	18	7	11

Footnote

HUS cases included under VTEC O157:H7 column. All cases of HUS were O157:H7. There were 35 HUS cases in Scotland (1 imported and one case serological but not confirmed bacteriologically). In E and W there were 26 cases of HUS (one imported). Included are 94 cases of VTEC O157 in England and Wales which were imported.
All the non-O157 cases were identified in Scotland (18 cases).

2.4.3. Escherichia coli, pathogenic in foodstuffs

2.4.4. Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

The last survey in cattle, sheep, and pigs was conducted in 2003, and results are in the report for 2003.

2.5. TUBERCULOSIS, MYCOBACTERIAL DISEASES

2.5.1. General evaluation of the national situation

A. Tuberculosis general evaluation

History of the disease and/ or infection in the country

Great Britain (England, Wales, and Scotland)
The dramatic progress achieved in controlling bovine TB in GB during the 1960s and 1970s stalled in the mid 1980s. The situation gradually regressed from the late 1980s and since the mid 1980s the number of TB herd breakdowns ('incidents') in GB has risen at an average annual rate of 16%, despite an intensive test and slaughter programme to curb cattle-to-cattle transmission. In 2006 there was an overall improvement in the key epidemiological parameters relative to 2005. Even so, 22,242 cattle were slaughtered in GB under the TB control scheme and 6.2% of herds tested contained tuberculin test reactors. At the end of 2006, the United Kingdom was one of 16 EU Member States not recognized as officially TB free (OTF) under Directive 64/ 432/ EEC due to the incidence of TB in its national cattle herd. In GB, the majority of cattle herds retain their individual OTF status as the distribution of bovine TB incidents in GB still shows a high degree of geographical clustering. Areas of the South West and the West Midlands of England and the South and West of Wales account for the vast majority of confirmed incidents and test reactors. Confirmed TB incidents occur sporadically outside those regions, usually as a result of the translocation of infected cattle from areas of endemic TB. Scientific evidence suggests that in the areas of endemically high TB incidence some wild mammal species (mainly the Eurasian badger, Meles meles) constitute a significant reservoir of infection for cattle.
Northern Ireland
The incidence of the disease fell rapidly to very low levels once a compulsory eradication programme was put in place in 1960. Since then the level of the disease has remained low but full eradication has not been achieved. Annual testing has been carried out since 1982 and following that, the incidence fell to a very low level in 1988. Since 1996, there has been evidence of an increase. 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, cattle movements and cattle contact between small, fragmented farm holdings. Details on the Northern Ireland situtation are included in a separate section

National evaluation of the recent situation, the trends and sources of infection

Great Britain (England, Wales and Scotland) – Provisional data for 2006 collated on 15 March 2007
At the end of 2006 approximately 3.6 per cent of British herds were under bovine TB restriction due to a bovine TB incident (not including herds under restriction for an overdue tuberculin test). Over 92 per cent of British herds were officially bovine TB-free at the end of 2006. The estimated confirmed herd incidence of bovine TB in Great Britain in 2006 was just under 4 per cent, with approximately 36 TB reactors found for every 10,000 animals tested.
There was a provisional 4.4% reduction in the number of new TB incidents in Great Britain in 2006 compared to 2005. The TB testing effort has remained consistently higher in 2006 than in 2005. The reduction in new incidents in 2006, when combined with an increase in the number of herds tested, equates to a provisional decrease in TB incidence of 22%.

The Chief Veterinary Officer carried out a review of the reduction in TB incidents in the first 6 months of 2006. It was concluded that monitoring the apparent reduction over a longer time period was required to determine whether this is a temporary phenomenon or part of a sustained trend. The decrease is likely to be caused by a complex combination of factors.
More information on TB control measures and statistics for GB are available on the Department for Environment, Food and Rural Affairs (Defra) website at:
http:/ / www.defra.gov.uk/ animalh/ tb/ index.htm.
Northern Ireland:
At the end of 2006 approximately 6.23 per cent of herds in Northern Ireland were under bovine TB restriction due to a bovine TB incident (not including herds under restriction for an overdue tuberculin test). Herd tuberculin testing coverage was just under 88%, with 1513 herds under restriction after one or more positive herd tests at the end of 2006.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The incidence of human TB in the UK has been rising gradually since the mid 1980s and it is highest in big conurbations, particularly in London. In the UK the vast majority of cases of human TB are caused by infection with M. tuberculosis, often acquired by direct contagion from an infected human. The advent of pasteurisation of virtually all the milk supply and a compulsory TB control programme in cattle has dramatically reduced the incidence of M. bovis infection in the UK population from the levels recorded prior to the 1950s.
The sale of raw milk from cows has been banned in Scotland since 1983. A small number of registered producers in England and Wales (163 dairy cow, 44 goat and 4 sheep establishments at the end of 2004) can still legally sell raw drinking milk directly to the consumer. In the absence of compulsory pasteurisation in England and Wales, dairy cattle and buffalo herds selling milk directly to consumers undergo annual TB testing by the SVS, on the assumption that any infected cows will be identified before M. bovis colonises the udder. When the OTF status of a dairy herd is suspended, the SVS will notify the Environmental Health Department of the Local Authority, as the body responsible for ensuring that all the milk sold from such herds undergoes heat treatment. The medical authorities are also informed once infection with M. bovis is confirmed in tuberculin reactors or in cattle carcases undergoing routine meat inspection.
Every year since 1990, between 20 and 50 (typically 40) people have been diagnosed with zoonotic TB in the UK. This represents between 1.0 and 1.5% of all culture-confirmed cases of TB in humans, a proportion similar to that reported in other industrialised countries. This figure has remained stable, with no discernible positive or negative trend despite the increasing incidence of TB in cattle. The vast majority of these cases represent infections contracted abroad (i.e. classes as imported cases) or reactivation of long-standing latent infection contracted before the introduction of milk pasteurisation in the 1950s. Their geographical distribution does not mirror that of bovine TB in the cattle population. There are no documented instances of infection associated with eating contaminated meat.
In 2006 there were 31 (provisional) cases of M bovis in humans in UK and none were known to be directly associated with contact with infected cattle. 6 cases were recorded as re-activation.

Recent actions taken to control the zoonoses

Great Britain
Once identified, reactor cattle (and, if necessary, any in-contacts) are valued and compulsorily removed. Compensation is paid to the cattle owner according to an average market value set by the

Department on a monthly basis for each category of cattle. Slaughtered reactors are subject to post mortem examination by official veterinarians for evidence of macroscopic lesions of TB. Tissue specimens are collected for bacteriological culture and molecular typing. In herds with multiple reactors only a representative number of carcases will normally be sampled for bacteriological examination.

Movements of cattle on and off affected premises are immediately restricted, except for those animals consigned to slaughter. Restrictions on cattle movements are withdrawn when the herd has undergone one (or two, if infection with M. bovis was confirmed) tuberculin test at 60-day intervals with negative results. Any cattle moved out of an infected herd between the last clear test and the disclosure of reactors are traced forward and tested (if still alive on another holding). Cattle on holdings that are contiguous to an infected herd are also tuberculin tested. Six months after the restoration of OTF status affected herds undergo tuberculin check testing. If this test is negative, a second check test takes place 12 months later and, if the results are negative, the herd reverts to the normal testing frequency for the area.

Pre-movement tuberculin tests for cattle over 15 months of age became compulsory in England in March 2006 and in Wales in May 2006. In Scotland, pre- and post-movement testing was introduced in September 2005 for cattle over 42 days of age.

Milk from dairy herds under TB restrictions destined for human consumption must undergo heat treatment (pasteurization). From 1 January 2006, the milk from tuberculin test reactors cannot enter the human food chain according to Regulation (EC) No. 853/ 2004 of the European Parliament. The local medical authorities are notified when M. bovis infection is confirmed in tuberculin reactors or in cattle during routine slaughter.

2.5.2. Tuberculosis, Mycobacterial Diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Surveillance system in humans in Great Britain
Access to reference laboratories able to differentiate M. bovis and M. tuberculosis exists for all publicly funded human diagnostic microbiology laboratories (National Health Service, Health Protection Agency and National Public Health Service for Wales) in England and Wales. Misclassification of cases of M.bovis as M. tuberculosis is believed to be extremely rare. Thus laboratory reports of M.bovis correctly reflect the order of magnitude of the zoonotic problem.
Surveillance system in humans in Northern Ireland
Enhanced surveillance of tuberculosis in humans in Northern Ireland is the same as that used in England and Wales: notification of clinical cases of pulmonary and non-pulmonary tuberculosis, reporting of mycobacterial isolates from confirmed cases and death certification.
The information collected on notified cases includes site of disease, bacteriology (smear positivity and culture results, including anti-microbial susceptibility) PCR and histology. In addition, outcome information is requested after nine months to one year on all notified cases to confirm the diagnosis, describe treatment outcome, chemotherapy prescribed and the occurrence of any drug reactions or resistance. Hospital diagnostic laboratories send all mycobacterial samples to reference laboratories for differentiation into M. bovis and M. tuberculosis and misclassification is likely to be very rare. Denominator data are not available on the number of persons investigated for tuberculosis or the number of samples cultured for mycobacteria.

Case definition

Cases are recorded according to the notification system.

Notification system in place

Tuberculosis is notifiable under public health legislation in all countries in UK.

History of the disease and/ or infection in the country

In England and Wales between 1993 and 2006, reports of M. bovis infection in humans have fluctuated between 6 and 37 per annum. The majority have occurred in older age groups and reflects reactivation of pre-existing infection. In Scotland since 1986 annual reports of M. bovis have varied between 2 and 14. In Northern Ireland between 1989 and 2006 the number of reports of M. bovis has varied from 0 to 7 per year.

Results of the investigation

In England and Wales in 2006 there were 22 (provisional) laboratory reports of tuberculosis due to M. bovis, compared to a total of 15 for the previous year. None of the reported cases were known to have had current links with agriculture or infected livestock, although one case identified in 2006, was part of a single cluster of six UK-born cases. The possible index case in this unusual cluster of 6 cases was reported in 2004 and had a history of occupational cattle contact and of unpasteurised milk consumption. Four further cases forming part of the cluster were identified in 2005, none of whom

had any known contact with infected cattle. With the exception of the first case, there was an absence of zoonotic links or consumption of unpasteurised dairy products, suggesting human-to-human transmission had occurred.
In 2006 in Scotland six cases of tuberculosis due to M. bovis were reported, compared with 4 cases in 2005
In Northern Ireland in 2006 there were 3 human cases of M. bovis notified. This compares with 5 in 2005 and 3 in 2004.
Six of the total cases were classed as reactivation of previous cases.

National evaluation of the recent situation, the trends and sources of infection

See results of the investigations above.

Relevance as zoonotic disease

As noted above the number of cases of M. bovis has remained low. In Scotland it was noted that numbers of human cases of M.bovis have steadily declined over recent years, and that no link has been established between recently confirmed human cases and infection in animals. In England and Wales in 2006 there was no definite link established between infected humans and infected cattle.

Additional information

Public health advice is given to herd keepers of infected herds and health authorities are advised of incidents. Purchasers of bulk milk are advised of application of restrictions to their suppliers.

Table Mycobacterium in humans - Species/ serotype distribution

Mycobacterium	Cases 5171	Cases Inc. 8.593	Autochthon cases 30	Autochthon Inc. 0	Imported cases 17	Imported Inc. 0
M. bovis	32	0.053	3		0	
M. tuberculosis	5139	8.54	27		17	
Reactivation of previous cases (1)	6	0.01	5		1	

(1) : Data for Northern Ireland only

Footnote

Data on reactivation of previous cases, autochtone and imported cases available for Northern Ireland only. Incidence per 100,000 based on population statistics of the UK reported as 60,209,500

Table Mycobacterium in humans - Age distribution

Age Distribution	M. bovis		
	All	M	F
<1 year	0	0	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	2	0	2
25 to 44 years	4	2	2
45 to 64 years	4	2	2
65 years and older	21	10	11
Age unknown			
Total :	31	14	17

2.5.3. Mycobacterium in animals

A. Mycobacterium bovis in bovine animals

Status as officially free of bovine tuberculosis during the reporting year

The entire country free

The UK is not officially free from TB (OTF).

Additional information

Great Britain, as a country, cannot be considered officially free from TB (OTF) under Directive 64/ 432/ EEC due to the incidence of TB in the national herd. Nevertheless, the majority of individual cattle herds in GB enjoy OTF status.
Further information on Northern Ireland is given in separate section.

Monitoring system

Sampling strategy

Great Britain (England, Wales, and Scotland)
The TB testing programme applied in Great Britain (i.e. England, Scotland and Wales) follows the principles of Council Directive 64/ 432/ EEC, last amended on 8 July 2002 by Commission Regulation 1226/ 2002.
Northern Ireland
Similar to Great Britain

Frequency of the sampling

Great Britain (England, Wales, and Scotland):
Compulsory tuberculin testing of cattle herds takes place every one to four years according to the proportion of herds in a specific area sustaining a confirmed TB breakdown over the previous 2, 4 or 6 years. At the end of 2006, 27.8 % of all cattle herds in GB were on an annual tuberculin testing frequency. The remainder were tested every two (14.3%), three (0.3%), or four (57.6%) years. TB testing intervals for the whole country are reviewed every year, to ensure compliance with Annex A of Directive 64/ 432/ EEC. Interim adjustments may take place locally in response to a rising TB incidence. Furthermore, individual herds in 2-, 3- and 4-yearly testing areas are subject to routine annual testing if they present an increased public or animal health risk (e.g. producers of raw drinking milk from cows, herds owned by dealers, bull hirers).
Northern Ireland:
All cattle herds are tested at least annually. Additional testing is carried out at the animal or herd level on a risk basis. All cattle carcases destined for human consumption are officially inspected post-mortem in accordance with the Fresh Meat Directives. Any affected carcases or parts of the carcase are disposed of and do not enter the food chain. The presence of disease is confirmed by the finding of lesions characteristic of TB in reactors, or by the culture of M. bovis in samples from any suspect carcase.

Methods of sampling (description of sampling techniques)

All testing of cattle for TB is by the single intradermal comparative cervical tuberculin (SICCT) test, using avian and bovine Weybridge purified protein derivative (PPD) tuberculin according to the procedure described in Annex B to Directive 64/ 432/ EEC. The interpretation of test results is in line with this Regulation, although a more severe interpretation is applied upon confirmation of TB in a herd. The SICCT test is the only diagnostic method approved for certification of UK herds as officially TB free (OTF). The in vitro gamma interferon blood test (BovigamTM) is deployed as an ancillary parallel test to help resolve persistent or severe TB breakdowns with confirmed infection, or as an alternative to a herd slaughter in Great Britain.
The programme of regular tuberculin herd testing is supplemented by veterinary inspection of cattle carcases during routine meat production at slaughterhouses. Where suspicious lesions of TB (granulomas) are detected at routine slaughter they are submitted for laboratory examination. Animals with tuberculous lesions at routine slaughter are traced back to the herd of origin, which is then subjected to tuberculin check testing.
Test reactors and contact animals presented for slaughter are subject to post mortem inspection. Lymph node samples or lesions of TB are submitted for laboratory examination. The affected organ or part of the carcase (or the whole carcase if more than one organ is affected) are removed and do not enter the food chain. Where inconclusive test reactors are disclosed, they are required to be isolated and retested up to two times at 60 day intervals. If reactors are found at retest, they are removed to slaughter.
All M. bovis isolates are routinely genotyped to enable epidemiological investigation of the spread and origin of TB breakdowns. Strain typing of M. bovis isolates is by spacer oligonucleotide typing (spoligotyping) and by analysis of variable number tandem repeats (VNTR).
Northern Ireland
The comparative intradermal tuberculin test as described in Annex B of Directive 64/ 432 is used to test all animals for tuberculosis.

Case definition

Great Britain (England, Wales, Scotland).
M. bovis infection is confirmed in test reactors and contact animals by the disclosure of characteristic gross lesions of TB and/ or by culture of the bacterium from cattle specimens. In suspect TB cases detected during routine meat inspection, infection is confirmed only if M. bovis can be isolated from the suspect lesions. A confirmed TB incident (breakdown) is one in which at least one confirmed animal has been found.

Vaccination policy

Vaccination of cattle against TB is not carried out in Great Britain and is expressly forbidden by the domestic animal health legislation. Vaccination of cattle against TB is not carried out in Northern Ireland.
A 3-year field study to evaluate the safety and efficacy of injectable Bacille Calmette-Guerin (BCG) vaccine in badgers commenced in 2006.

Other preventive measures than vaccination in place

As described under control program mechanisms.

Control program/ mechanisms

The control program/ strategies in place

Great Britain (England, Wales and Scotland)
A new Tuberculosis (England) Order 2006 came into force on 27 March 2006 brought about significant changes in relation to TB surveillance in animals other than cattle. The most relevant change enacted by the new Order was the introduction of pre-movement tuberculin testing, with the aim of reducing the risk of spreading bTB between herds. It became a statutory requirement for cattle over 15 months old moving out of a 1 or 2-yearly tested herd to receive a tuberculin test in the 60 days prior to the movement, although some exemptions apply. Routine TB surveillance tests also qualify as pre-movement tests if the animals are move within 60 days after that test. Other than these routine tests, pre-movement tests are arranged and paid for by the herd owner. With effect from 1 March 2007, pre-movement testing will be extended to all cattle over 42 days of age.
The Welsh Assembly Government introduced pre-movement testing in Wales on 2 May 2006. The policy is similar to that in England in its exemptions and phased introduction. The Scottish Executive Environment and Rural Affairs Department introduced compulsory pre- and post-movement testing requirements for Scotland in September 2005. This legislation requires Scottish keepers to ensure that all cattle over 42 days old, originating from 1 or 2 yearly testing parishes, have been pre-movement tested within 60 days prior to movement. Scottish keepers then need to make arrangements to conduct post-movement testing of these cattle 60-120 days after arriving on their holding.
These new Orders retained the obligation to notify to Divisional Veterinary Managers (DVMs) of the SVS any suspicion of TB in live cattle and deer and their carcases. They also introduced a new duty to report to DVMs the suspicion of TB in the carcase of any farmed mammal and mammals kept as pets. Furthermore, under the new Orders the identification of M. bovis in clinical or pathological specimens taken from any mammal (except humans) became notifiable to the VLA.

Recent actions taken to control the zoonoses

As described in General Evaluation above

Measures in case of the positive findings or single cases

Measures are taken as described under control programs above.

Results of the investigation

These are decribed in the National evaluation of the recent situation, the trends and sources of infection above and in the tables.

National evaluation of the recent situation, the trends and sources of infection

Great Britain (England, Wales and Scotland) – Provisional data for 2006 collated on 15 March 2007.
A total of 50,327 tuberculin tests were carried out in British herds in 2006, a 15.4% increase on the 43,627 tests performed in 2005. 12.9% more animals received a tuberculin test in 2006 than in the previous year (5.48 million against 4.85 million cattle). Sixty five percent of all herd tests are completed in the six-month period from November to April. Cattle herd numbers continued to decline

across GB in relation to previous years (just over 89,46 herds registered at the end of 2006).
At the end of 2006 approximately 3.6 per cent of British herds were under bovine TB restriction due to a bovine TB incident (not including herds under restriction for an overdue tuberculin test). Over 92 per cent of British herds were officially bovine TB-free at the end of 2006 . The estimated confirmed herd incidence of bovine TB in Great Britain in 2006 was just under 4 per cent. This figure refers to confirmed new bovine TB breakdowns as a per cent of tests on unrestricted herds in GB tested between 1st January and 31st December 2006. The total new bovine TB breakdowns as a per cent of tests on unrestricted herds in the same period was 6.1%. Approximately 36 TB reactors were found for every 10,000 animals tested.
There was a provisional 4.4% reduction in the number of new TB incidents in Great Britain in 2006 compared to 2005. The TB testing effort has remained consistently higher in 2006 than in 2005. The reduction in new incidents in 2006, when combined with an increase in the number of herds tested, equates to a provisional decrease in TB incidence of 22%.
A total of 22,242 cattle were slaughtered in 2006 for TB control purposes.
The number of cattle carcases with suspicious TB lesions detected at routine meat slaughter rose from 792 in 2005 (of which 64.1% were confirmed as M. bovis infections) to 852 in 2006 (of which 64.9% confirmed).
The Chief Veterinary Officer carried out a review of the reduction in TB incidents in the first 6 months of 2006. It was concluded that monitoring of the apparent reduction over a longer period is needed to determine whether this is a temporary phenomenon or part of a sustained trend. The decrease is likely to be caused by a complex combination of factors.
More information on TB control measures and statistics for GB are available on the Department for Environment, Food and Rural Affairs (Defra) website at:
http:/ / www.defra.gov.uk/ animalh/ tb/ index.htm.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

These are described in the General Evaluation above.
In 2006 there were 31 (provisional) cases of M bovis in humans in the UK and none were known to be directly associated with contact with infected cattle. 6 were considered to be re-activation (data from Northern Ireland).

Additional information

Public health advice is given to herd keepers of infected herds and health authorities are advised of incidents. Purchasers of bulk milk are advised of application of restrictions to their suppliers.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

Deer (Farmed and Park)
(England, Scotland, Wales)
Under the Tuberculosis (Deer) Order 1989 (as amended), TB in deer became notifiable in Great Britain on 1 June 1989. Any owner or person in charge of deer is required to notify the presence of affected or suspected animals to the State Veterinary Service. Under the same

order, the SVS have statutory powers to enforce TB testing at the expense of the owner. Premises on which TB is suspected or confirmed may be put under movement restrictions pending further investigations. However, post mortem, culture and epidemiological investigations from suspected animals are normally undertaken by the Agriculture Departments at public expense. The Tuberculosis (Deer) Notice of Intended Slaughter and Compensation Order, 1989 came into force on 1 September 1989 and requires the slaughter of reactors with the payment of compensation and, in appropriate circumstances, enables Defra to slaughter deer exposed to infection.

There is no compulsory routine tuberculin testing for the approximately 30,000 farmed and 25,000 park deer kept in GB. Any tuberculin testing is limited to deer placed under TB restrictions following reports of TB in carcases. Therefore, surveillance for TB in deer relies almost exclusively on post mortem inspections of farmed, park and wild deer culled for venison production and ad hoc submissions of wild deer carcases. Live deer intended for export to EC Member States are also tested in the 30 days prior to export, according to EC rules. As with cattle, tuberculin testing of deer is by the SICCT test. All testing of deer, apart from that for imported animals, is carried out at the expense of the owner. Reactors are compulsorily slaughtered and compensation paid at 50% of their market value up to a ceiling of £1,200 (i.e. the maximum compensation payable is £600).

Methods of sampling (description of sampling techniques)

If lesions suggestive of TB are found in farmed and park deer at slaughter the herd of origin is back traced and movements of animals and carcases onto or off the premises are restricted. Affected farmed deer herds are placed under movement restrictions and tuberculin testing is carried out at 120-day intervals until negative results are obtained. In park deer herds, where these testing requirements are almost impossible to fulfil, the premises may be under permanent restrictions unless de-stocked. Tuberculin testing is carried out on contiguous cattle premises.

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

If lesions suggestive of TB are reported in farmed and park deer at slaughter the herd of origin is back traced and movements of animals and carcases onto or off the premises are restricted. Affected farmed deer herds are placed under movement restrictions and tuberculin testing is carried out at 120-day intervals until negative results are obtained. In park deer herds, where these testing requirements are almost impossible to fulfil, the premises may be under permanent restrictions unless de-stocked. TB testing is carried out on contiguous cattle premises. Lesions suggestive of TB found in wild deer by stalkers and huntsmen are sent for bacteriological culture to identify the causative organism. If M. bovis is isolated, all cattle herds located within 3 km of the tuberculous carcase must undergo tuberculin check testing.

Notification system in place

TB in deer became notifiable in Great Britain on 1 June 1989, under the Tuberculosis (Deer) Order 1989 (as amended).

Results of the investigation

During 2006, M. bovis was isolated in 51 of 100 deer carcases presenting with lesions suspicious of TB and reported to Animal Health and the VLA. This included a random sample of 16 deer carcases from an infected private herd of 37 fallow park deer in Cumbria, which was culled at the beginning of 2006. Other cases of infection in ornamental park deer were detected in Devon, Somerset and two different premises in Gloucestershire. M. bovis infection was also detected in five farmed red deer (Cervus elaphus) from a small deer herd in East Cornwall. The remaining confirmed cases involved wild deer (red, fallow, roe and sika). Virtually all of the infected wild deer carcases were found in counties of southwest England and southeast Wales where there is a high incidence of bovine TB.

National evaluation of the recent situation, the trends and sources of infection

Due to the persistence of M. bovis infection in cattle and badgers in parts of England and Wales, occasional spillover of infection to other mammals is to be expected. Lesions typical of TB have been observed sporadically in deer in GB for many years. M. bovis infection has been confirmed in five of the six species of wild deer present in the country, with variable frequency depending on the species and geographical area. Every year about 20% of the national wild deer population is culled. Statutory submissions of deer carcases with suspect TB lesions suggest that the incidence of bovine TB in wild deer herd is low and localised. Meat inspection of farmed deer provides an additional source of surveillance data to support the view that TB is not widespread in the farmed deer population. Although meat from wild deer destined for the domestic market was not be subject to statutory meat inspection until 1st January 2006, stalkers and deer managers may receive training in carcase inspection and have a statutory obligation to report suspicion of disease to the local DVM.
Northern Ireland
There are 3 species of wild or feral deer in the province and surveys in the mid-1990s demonstrated widespread TB infection, principally in red deer (Cervus elaphus) and fallow deer (Dama dama) with a prevalence of 8% (4.8% if one heavily infected locality was excluded). However, the low number of deer (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role is likely to be limited if not entirely insignificant.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

No cases have ever been reported in the UK of human M. bovis infection attributable to close contact with tuberculous deer, their carcases or ingestion of deer meat.

C. M. bovis in animal - Cattle (bovine animals) - Control programme (Northern Ireland)

Monitoring system

Sampling strategy

All cattle herds are tested at least annually. Additional testing is carried out at the animal or herd level on a risk basis. All cattle carcases destined for human consumption are officially inspected post-mortem in accordance with the Fresh Meat Directives. Any affected carcases or parts of the carcase are disposed of and do not enter the food chain. The presence of disease is confirmed by the finding of lesions characteristic of TB in reactors, or by the culture of M. bovis in samples from any suspect carcase.

Frequency of the sampling

As detailed in sampling strategy

Methods of sampling (description of sampling techniques)

The comparative intradermal tuberculin test as described in Annex B of Directive 64/ 432 is used to test all animals for tuberculosis.

Case definition

The presence of disease is confirmed by the finding of lesions characteristic of TB in reactors, or by the culture of M. bovis in samples from any suspect carcase.

Diagnostic/ analytical methods used

Measures in case of positive findings:
Where inconclusive reactors to tests are detected, they are required to be isolated and retested until their status has been resolved. If positive reactors are detected at test, they are removed to slaughter. Lymph node samples or lesions of tuberculosis are submitted for laboratory examination. Where lesions of tuberculosis are suspected at routine slaughter they are also submitted for laboratory examination.

Vaccination policy

Vaccination of animals against TB is not carried out.

Other preventive measures than vaccination in place

Movement restrictions are placed on the herd and remain in place until the status of the herd has been resolved. Removal of restrictions are dependent upon the herd giving negative results to one herd test if the disease is not confirmed, or negative results to two consecutive herd tests in infection is confirmed. Cleansing and disinfection of the premises where the disease has been identified in the herd is also required. A trace on the movements of animals into and out of the herd prior to the detection of infection are carried out using a computerised database which records all animal movements as well as tuberculosis, brucellosis and other disease data. Traced animals or herds may be placed under movement restriction until appropriate tests have been carried out. Public health advice is given to the herd keeper and health authorities are informed.

Measures in case of the positive findings or single cases

Where inconclusive reactors to tests are detected, they are required to be isolated and retested until their status has been resolved. If positive reactors are detected at test, they are removed to slaughter. Lymph node samples or lesions of tuberculosis are submitted for laboratory examination. Where lesions of tuberculosis are suspected at routine slaughter they are also submitted for laboratory examination.
Movement restrictions are placed on the herd and remain in place until the status of the herd has been resolved. Removal of restrictions are dependent upon the herd giving negative results to one herd test if the disease is not confirmed, or negative results to two consecutive herd tests in infection is confirmed. Cleansing and disinfection of the premises where the disease has been identified in the herd is also required. A trace on the movements of animals into and out of the herd prior to the

detection of infection are carried out using a computerised database which records all animal movements as well as tuberculosis, brucellosis and other disease data. Traced animals or herds may be placed under movement restriction until appropriate tests have been carried out. Public health advice is given to the herd keeper and health authorities are informed.

Results of the investigation

Results of the investigations in 2006 in Northern Ireland are included in the tables in this report.

National evaluation of the recent situation, the trends and sources of infection

Epidemiological history:
The epidemiological history was described in the 2004 report.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

There were 3 human cases of M. bovis notified in Northern Ireland in 2006, compared with 5 in 2005 and 3 in 2004. See Section on M. bovis in humans for further details.

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium spp.	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Goats (1)	NRL	animal	2	1	0	0	1
Pigs (2)	NRL	animal	110	45	2	0	43
Badgers (3)	NRL	animal	457	60	55	0	5
Wild boars							
farmed (4)	NRL	animal	4	2	2	0	0
Alpacas							
farmed (5)	NRL	animal	6	4	1	0	3
Lamas							
farmed (6)	NRL	animal	27	8	8	0	0
Cats (7)	NRL	animal	135	52	14	0	38
All animals							
unspecified (8)	NRL	animal	17	2	0	0	2

(1) : Routine meat inspection at abattoirs and individual animals with suspicious lesions or clinical signs
(2) : Routine meat inspection at abattoirs and individual animals with suspicious lesions or clinical signs
(3) : Examinations of found-dead (including road traffic accidents) badgers in Wales in 2006
(4) : Routine meat inspection at abattoirs and individual animals with suspicious lesions or clinical signs
(5) : Submission of tissue specimens by state or private veterinarians
(6) : Submission of tissue specimens by state or private veterinarians
(7) : Submission of tissue specimens by state or private veterinarians
(8) : Submission of tissue specimens by state or private veterinarians

Footnote

Data for Great Britain - England, Wales and Scotland
There were 2 isolates in pigs that were not possible to speciate, 1 in alpacas, 6 in domestic cats and 5 in badgers. These are included in the Mycobacterium spp. unspecified total.

Table Bovine tuberculosis - data on herds - Community co-financed eradication programmes

Region	Total number of herds	Total number of herds under the programme	Number of herds checked	Number of positive herds	Number of new positive herds	Number of herds depopulated	% positive herds depopulated	Indicators		
								% herd coverage	% positive herds - period herd prevalence	% new positive herds - herd incidence
NORTHERN IRELAND (1)	27694	27694	24301	1513	1513	0	0	87.748	6.226	6.226
Total	27694	27694	24301	1513	1513	0	0	87.748	6.226	6.226
Total - 1										

(1) : All herds tested once per year

Footnote

Data for Northern Ireland

Table Bovine tuberculosis - data on animals - Community co-financed eradication programmes

Region	Total number of animals	Number of animals to be tested under the programme	Number of animals tested	Number of animals tested individually	Number of positive animals	Slaughtering		Indicators	
						Number of animals with positive result slaughtered or culled	Total number of animals slaughtered	% coverage at animal level	% positive animals - animal prevalence
NORTHERN IRELAND	1676640	1676640	2685940	1711678	9383	9383	10071	160.198	0.349
Total	1676640	1676640	2685940	1711678	9383	9383	10071	160.198	0.349
Total - 1			1776064		10479	10479	11687	0	0.59

Footnote

Data for Northern Ireland

Table Bovine tuberculosis - data on status of herds at the end of the period - Community co-financed eradication programmes

Region	Status of herds and animals under the programme													
	Total number of herds and animals under the programme		Unknown		Not free or not officially free				Free or officially free suspended		Free		Officially free	
					Last check positive		Last check negative							
	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals
NORTHERN IRELAND	27694	1676640	0	0	1513		26181							
Total	27694	1676640	0	0	1513	0	26181	0	0	0	0	0	0	0
Total - 1														

Footnote

Data from Northern Ireland

Table Bovine tuberculosis in countries and regions that do not receive Community co-financing for eradication programmes

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/ 432/ EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests (*)	Number of animals tested			
UNITED KINGDOM (1)	89461	8500000	82605	92.336	3229	3.609		5475466	239599	852	553
Total	89461	8500000	82605	92.336	3229	3.609		5475466	239599	852	553

(1) : England, Wales and Scotland data only. 27.8% tested once per year, 14.3% every 2 years, 0.3% every 3 years, 57.6% every 4 years.
Pre-movement testing for all cattle over 15 months of age became compulsory in England in March 2006 and Wales in May 2006. In Scotland pre-and post-movement testing was introduced in September 2005 for all cattle over 42 days of age.
852 carcasses investigated after disclosure of lesions at routine slaughter (test reactors excluded). Mycobacterium bovis was isolated from 553 of these carcasses. Test reactors are excluded from the 553 figure

Footnote

Data for Great Britain - England, Wales and Scotland.

(*) Legend:

In column "Interval between routine tuberculin tests" use the following numeric codes: (0) no routine tests; (1) tests once a year; (2) tests each two years; (3) tests each three years concerning 24 month-old animals; (4) tests each 4 years; (5) others (please give details).

Table Tuberculosis in farmed deer

Region	Total number of existing farmed deer		Free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests (*)	Number of animals tested			
UNITED KINGDOM	300	30000								32	5
Total	300	30000	0	0	0	0		0	0	32	5

Footnote

Great Britain (England, Scotland and Wales). Values for number of animals and herds listed are approximate.
No routine tuberculin testing of deer is carried out in GB and there is no data available on tuberculin tests in deer.
Official post mortem examination of all slaughtered animals is implemented. Lesions suspicious of TB were detected in 32 animals. Confirmation of TB was obtained from 5 animals, all from the same infected herd.

(*) Legend:

In column "Interval between routine tuberculin tests" use the following numeric codes: (0) no routine tests; (1) tests once a year; (2) tests each two years; (3) tests each three years concerning 24 month-old animals; (4) tests each 4 years; (5) others (please give details).

2.6. BRUCELLOSIS

2.6.1. General evaluation of the national situation

A. Brucellosis general evaluation

History of the disease and/ or infection in the country

Great Britain - England, Wales, Scotland
All cattle herds within Great Britain achieved Officially Brucellosis Free (OBF) status on 1 October 1985. As this status was maintained up to 1989, Great Britain moved to biennial testing in accordance with Directive 64/ 432/ EC in 1989. GB achieved regional freedom in 1996.
Northern Ireland
During the period 1990 to 1996, outbreaks of Brucellosis were sporadic, with significant clustering restricted to the southern part of the province. During 1997, three primary outbreaks resulted in secondary and tertiary spread to more than 60 farms; infection was largely resolved in two of the areas but between-herd spread continued in Counties Down and Armagh.
In general, there has been a reduction in cattle herd incidence within the regions, particularly in the southern and western parts.
Other Brucella species UK
Brucella melitensis, B. ovis, and B. suis have never been recorded in United Kingdom.

National evaluation of the recent situation, the trends and sources of infection

Great Britain - England, Wales, Scotland
During the year 2006 there were no cases of brucellosis of cattle in Great Britain which has retained its Officially Brucellosis Free Status.
There continued to be herds detected as infected with Brucella abortus in Northern Ireland during the year

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Great Britain England, Wales, Scotland
Cases of brucellosis in humans are usually recorded associated with infection acquired outside Great Britain. In 2006 there was one recorded case of brucellosis in Scotland (spp unspecified) in a 79 year old male patient with no history of travel reported
Northern Ireland
In Northern Ireland cases of brucellosis are associated with infection in cattle. From 1986 to 1997 there were no reported cases of brucellosis in humans. During 1998 one case was reported in a member of a family whose cattle herd was also confirmed with Brucella abortus. Between 1999 and 2004 there were 101 reported cases of human brucellosis, 80 of which were thought to have been acquired occupationally. Five cases were female, and the remainder were male. Those affected included farmers (n=69), abattoir workers (n=6) and veterinarians (n=2).In 2005 there were 2 cases reported, both of whom were male, and one was thought to have been occupationally acquired.
During 2006 there were 4 laboratory-confirmed cases of human brucella abortus infection. Complete epidemiological enquiries are still underway.

2.6.2. Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

England, Wales, Scotland
Surveillance system
Brucellosis notification is not mandatory in England, Wales, and Scotland, unless believed acquired as a result of occupation. Diagnoses are made by serology or blood culture. Disease caused by Brucella in humans is not notifiable. Ascertainment of cases is through voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories (National Health Service, Health Protection Agency and National Public Health Service for Wales) and Health Protection Scotland. Specialist reference facilities are available.

Case definition

Positive serology or blood culture

Diagnostic/ analytical methods used

Serology or blood culture

Notification system in place

See reporting system above.

History of the disease and/ or infection in the country

Epidemiological history:
Human brucellosis in Britain has become rare since the introduction in 1967 of a scheme to eradicate the disease in cattle. 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. In England and Wales the number of indigenously acquired infections has fallen from over 200 a year in the early 1970s to low levels at present. Currently most reports are of Brucella melitensis, which does not occur in UK. Most cases occur in people who are believed to have acquired their infections overseas, mainly in Middle Eastern and Mediterranean countries.
In England and Wales, between 1989 and 2006, total reports have ranged from 5 to 21 per year. Under ascertainment of imported infection may occur but has not been systematically studied. In Scotland Laboratory reports of human cases have declined from a peak of 400 per year in 1970 to approximately 1 or 2 cases per year. This has mirrored the decline in disease in cattle brought about by compulsory eradication.
Northern Ireland
In Northern Ireland cases of brucellosis are associated with infection in cattle. From 1986 to 1997 there were no reported cases of brucellosis in humans. During 1998 one case was reported in a member of a family whose cattle herd was also confirmed with Brucella abortus. Between 1999 and 2004 there were 101 reported cases of human brucellosis, 80 of which were thought to have been acquired occupationally. Five cases were female, and the remainder were male. Those affected included farmers (n=69), abattoir workers (n=6) and veterinarians (n=2). There were 2 cases of human

brucellosis in 2005.

Results of the investigation

Results of the investigations in 2006:
In England and Wales in 2006, 11 cases of brucellosis were recorded, 8 of which were Brucella mellitensis infections. This is an increase on the total of 8 in the previous year. All of the cases occurred in people believed to have acquired their infections overseas. One case was known to have contracted infection in the Middle East from raw dairy products and meat; two cases had travelled from Somalia; one case from Cyprus and one case from Turkey, where they had consumed raw goat's cheese. None were believed to have been associated with occupation. No cases of Brucella abortus were recorded.
In 2006 in Scotland there was one recorded case of brucellosis in a 79 year old male patient, with no reported history of travel.
In Northern Ireland during 2006 there were 4 laboratory-confirmed cases of human Brucella abortus infection, an increase of 2 compared with the previous year. Complete epidemiological enquiries have not yet been completed, but all four cases are thought to have aquired the infection occupationally.

National evaluation of the recent situation, the trends and sources of infection

In England, Wales and Scotland cases of brucellosis in humans usually occur as a result of infection acquired outside the countries. In Northern Ireland infection has been recorded in those whose work may bring them into close contact with infected cattle.

Table Brucella in humans - Species/ serotype distribution

Brucella	Cases 16	Cases Inc. 0.024	Autochthon cases 5	Autochthon Inc. 0	Imported cases 8	Imported Inc. 0
B. abortus	2	0.003	2			
B. melitensis	8	0.013			8	
B. suis	0	0				
Brucella spp., unspecified	6	0.008	3			
Occupational cases	4	0.006	4			

Footnote

11 cases in England and Wales. 8 of theses B. mellitensis, in all cases infection thought to have been aquired abroad.
One case reported in Scotland in 2006.
4 cases in Northern Ireland, all thought to have been aquired occupationally, although complete epidemiological investigations still underway

Table Brucella in humans - Age distribution

Age Distribution	B. abortus			B. melitensis			Brucella spp.		
	All	M	F	All	M	F	All	M	F
<1 year									
1 to 4 years									
5 to 14 years									
15 to 24 years									
25 to 44 years				4	2	2	8	5	3
45 to 64 years	2	2		2		1	4	3	1
65 years and older				1	1		2	1	
Age unknown				1			2		
Total :	2	2	0	8	3	3	16	9	4

2.6.3. Brucella in foodstuffs

2.6.4. Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

(England, Scotland, Wales)
GB is officially free of infection from Brucella abortus, Brucella melitensis, Brucella ovis and Brucella suis.

Free regions

England, Wales, Scotland. The situation in Northern Ireland is described separately.

Monitoring system

Sampling strategy

Great Britain (England, Wales, Scoland)
As in previous years, the principle surveillance system in 2006 was monthly testing of bulk milk samples from dairy herds by the ELISA test, together with biennial blood testing, by indirect ELISA, of adult cattle in beef herds and non-milking cattle in dairy
herds. All abortions and premature calvings are required to be reported. These are investigated by a veterinary surgeon in all beef herds and in some dairy herds based on risk analysis. Samples are taken from aborting animals and those calving prematurely (271 days or less from insemination), and tested both serologically and culturally.

Frequency of the sampling

See sampling strategy

Type of specimen taken

Other: Blood, milk, organ/ tissues as appropriate

Case definition

Infection is confirmed on culture and isolation of the organism.

Diagnostic/ analytical methods used

Serology and culture.

Vaccination policy

Vaccination of animals is not allowed.

Measures in case of the positive findings or single cases

England, Wales, Scotland
Herds giving positive results to the milk ELISA test are subjected to follow-up investigations by blood testing individual cattle. Cattle sera giving positive results to the indirect ELISA are also subjected to the serum agglutination test and complement fixation test.
Herd restrictions which stop the movement of animals off the premises, except under the authority of a licence, are imposed once a reactor is identified (before laboratory confirmation). The animal is required to be kept in isolation and slaughtered within 21 days. Other animals on the farm can be sent, under licence, to a slaughterhouse, but no other movements are permitted until the incident is resolved. Investigations into contact with contiguous herds are undertaken to assess the risk of the infection spreading. Tracing is carried out and animals which have left the infected herd since the last negative herd test are tested. The most recent female calf of a reactor is slaughtered as a dangerous contact unless testing makes it unlikely that the dam was positive at the last calving. For confirmed breakdowns in Great Britain, a herd slaughter is usually carried out. All contiguous herds are tested as well as herds with cattle movements to and from the affected herd. Before restrictions can be lifted the premises has to be cleansed and disinfected with an approved disinfectant and subjected to veterinary inspection.
Animals (reactors, infected and contact) are valued before compulsory slaughter. The amount of compensation paid for reactors and contacts is in accordance with a table of values based on the current average market price for the type of animal.
Whenever the OBF status of a dairy herd is suspended, the Environmental Health Department of the Local Authority is informed so that a heat treatment order may be served to ensure all milk is heat treated before human consumption.

Notification system in place

All herds within Great Britain achieved Officially Brucellosis Free (OBF) status on 1 October 1985. All abortions and premature calvings are required to be reported. These are investigated by a veterinary surgeon in all beef herds and in some dairy herds based on risk analysis. Samples are taken from aborting animals and those calving prematurely (271 days or less from insemination), and tested both serologically and culturally.

Results of the investigation

England, Wales, Scotland
Results of the investigations in 2006:
During the year the Veterinary Laboratories Agency tested 943,107 blood samples from 34,850 herds as part of the national surveillance programme.
Routine monitoring of 6,649 cattle abortions and premature calvings was carried out; all results were negative.
Sixteen (16) ELISA positive bulk milk samples were reported from 187,207 bulk milk samples collected from 17,641 dairy herds. None of these led to identification of infection in cattle on subsequent investigation.

National evaluation of the recent situation, the trends and sources of infection

England, Wales, Scotland
All herds within Great Britain achieved Officially Brucellosis Free (OBF) status on 1 October 1985. As this status was maintained up to 1989, Great Britain moved to biennial testing in accordance with Directive 64/ 432/ EC in 1989. GB achieved regional freedom in 1996; this has been retained since

then.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

England, Wales, Scotland.
As livestock in GB are officially free of infection from Brucella abortus, Brucella melitensis, Brucella ovis and Brucella suis, they are not regarded as likely sources of new cases of infection in humans.
Some cases of chronic human infections may have been acquired from cattle before B. abortus was eradicated.
Further information is given in the section on brucellosis in humans in Great Britain.

B. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Brucella melitensis and Brucella ovis have never been recorded in animals in United Kingdom. The country remains Officially Brucellosis-free.

Monitoring system

Sampling strategy

During 2006, surveillance for freedom from B. melitensis was provided for by the national sheep and goat survey in addition to routine surveillance of samples submitted from cases of abortions.

Vaccination policy

No vaccination is permitted.

Notification system in place

Brucella in sheep is a notifiable disease under the national legislation. Isolation of the organism in a laboratory must also be reported to the competent authority.

Results of the investigation

During the year 2006, surveillance for brucellosis was provided by the national sheep and goat survey. 35,783 blood samples from 2,073 flocks were tested, all with negative results.
In addition, samples from 12,195 sheep abortions were investigated. All were negative on tests for brucellosis

National evaluation of the recent situation, the trends and sources of infection

The country remains officially brucellosis free. Brucella melitensis and Brucella ovis have never been recorded in animals in United Kingdom.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a

source of infection)

There is no evidence of humans being infected with brucellosis associated with sheep in the UK.

C. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

The UK is officially free of caprine brucellosis. Brucella melitensis has never been recorded in the UK.

Monitoring system

Sampling strategy

A sample of flocks is checked each year.

Frequency of the sampling

Annual sampling.

Case definition

Isolation of the organism.

Diagnostic/ analytical methods used

Microbiological techniques to confirm. Serology to monitor.

Vaccination policy

Vaccination is not permitted.

Results of the investigation

During the year 2006, surveillance for brucellosis was provided by the national sheep and goat survey. 1,042 blood samples from 248 goat herds were tested, all with negative results.

National evaluation of the recent situation, the trends and sources of infection

UK remains free of Brucella melitensis.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Brucella melitensis infection in man is acquired from outside the UK.

D. B. suis in animal - Pigs

Results of the investigation

Epidemiological history
Brucella suis has never been recorded in animals in Great Britain or Northern Ireland. Boars intended to be used as donors for Artificial Insemination are tested. During 2006 2,427 boars were blood tested, all with negative results.

National evaluation of the recent situation, the trends and sources of infection

Brucella suis has never been recorded in the UK.

E. B. abortus in animal - Cattle (bovine animals) - Control programme - mandatory (Northern Ireland)

Monitoring system

Sampling strategy

Surveillance system:
The Department of Agriculture and Rural Development for Northern Ireland carries out a programme of blood and milk testing of all herds containing breeding stock. In the 3 divisions with the highest incidence of brucellosis the blood sampling is carried out annually. The remainder of the regions have biennial sampling. The blood samples are tested by means of a serum agglutination test (SAT) in accordance with Annex C of Directive 64/ 432/ EEC. If any SAT reading > 30 iu is detected at this test, the sample is again tested by means of an SAT (EDTA) test and complement fixation test (CFT). Any animal giving an SAT test result of >30 i.u. of agglutination per ml or any CFT reading is classified as an inconclusive reactor and is required to be isolated and retested. In addition, monthly bulk milk samples, which are collected by the dairies, are tested at the central government laboratory using an ELISA kit. Premovement testing of BR eligible cattle was introduced in the autumn of 2004.
Notification of Abortions:
Herd keepers and veterinary surgeons are required under the Brucellosis Control Order (Northern Ireland) 1972 to notify a Divisional Veterinary Office if any bovine animal has aborted or, on calving, has retained the afterbirth for a period in excess of 24 hours. A restriction notice is issued for these animals, prohibiting their movement off the premises and requiring them to be isolated. The animals are tested by the DARD Veterinary Service using both SAT and CFT until a negative test at 21 days post calving is obtained.

Frequency of the sampling

As described in surveillance strategy.

Type of specimen taken

Other: blood, milk, tissues/ organs

Case definition

Culture and isolation of the organism.

Vaccination policy

Vaccination policy:
Vaccination of animals is not allowed.

Control program/ mechanisms

The control program/ strategies in place

The control program and strategies in place were described in detail in the 2004 report.

Measures in case of the positive findings or single cases

Measures in case of positive findings:
Herd restrictions, which stop the movement of animals onto and off the premises, except under the authority of a licence issued by the Department, are imposed once a reactor is identified. The reactor/ s is required to be kept in isolation until slaughtered.
When the presence of Brucella abortus is confirmed by culture of tissue samples taken at point of slaughter either:
all breeding and potential breeding animals (reactors, infected and contact) are valued and slaughtered; or
the breeding animals in the herd are subject to routine testing.
The OBF status of the herd is not restored until at least two clear herd tests have been completed, the last test being at least 21 days after any animals pregnant at the time of the outbreak have calved. In practice, this may mean the restriction and testing of all breeding cattle in a herd through an entire calving cycle.
The amount of compensation varies depending on whether the animal is a reactor or a contact. In the case of reactors, compensation is paid to a limit of 75% of the average market value subject to a ceiling based on market returns. In the case of contact animals, 100% of the value is paid with no upper limit. Where a herd keeper does not agree with the valuation as assessed by a DARD valuation officer, there is recourse to an independent valuer.
Investigations into contact with contiguous herds are undertaken to assess the risk of spread of infection. Herds of origin, transit herds or other herds considered to be at risk are tested. Forward tracing is carried out and animals which have left the infected herd since the last negative herd test, are tested. All contiguous herds are tested as well as herds with cattle movements to and from the affected herd. Before restrictions can be lifted, the premises has to be cleansed and disinfected with an approved disinfectant and subjected to veterinary inspection.

Results of the investigation

In 2006 24,423 herds were checked; 120 herds were positive with 118 new herds positive during the period. 928,445 animals were tested individually and 313 were positive.

National evaluation of the recent situation, the trends and sources of infection

Historical data on the epidemiological evolution of the disease:
There are over 1.6 million cattle in Northern Ireland.
Results of tests carried out in 2006 are given in the tables.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

In Northern Ireland human cases of brucellosis occur which are associated with occupational contact with infected cattle. Further details are given in the section on brucellosis in humans in Northern Ireland.

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. melitensis	B. abortus	B. suis	Brucella spp., unspecified
Pigs	NRL	animal	2427	0	0	0	0	0
Dogs	NRL	animal	1777	0	0	0	0	0
Marine mammals	NRL	animal	112	4				4

Footnote

Data for England, Wales and Scotland
NRL is the National Reference Laboratory

Table Bovine brucellosis - data on herds - Community co-financed eradication programmes

Region	Total number of herds	Total number of herds under the programme	Number of herds checked	Number of positive herds	Number of new positive herds	Number of herds depopulated	% positive herds depopulated	Indicators		
								% herd coverage	% positive herds - period herd prevalence	% new positive herds - herd incidence
NORTHERN IRELAND (1)	27694	27694	24423	120	118	57	47.5	88.189	0.491	0.483
Total	27694	27694	24423	120	118	57	47.5	88.189	0.491	0.483
Total - 1	28263	28263	25392	94	88	22	23.404	89.842	0.37	0.347

(1) : Total number of herds is the number of herds in which cattle were presented at a Br test during the last 4 years. Number of herds checked is herds where number of cattle is greater than or equal to 0

Table Bovine brucellosis - data on animals - Community co-financed eradication programmes

Region	Total number of animals	Number of animals to be tested under the programme	Number of animals tested	Number of animals tested individually	Number of positive animals	Slaughtering		Indicators	
						Number of animals with positive result slaughtered or culled	Total number of animals slaughtered	% coverage at animal level	% positive animals - animal prevalence
NORTHERN IRELAND	1635727	938061	985127	928445	313	313	4986	105.017	0.032
Total	1635727	938061	985127	928445	313	313	4986	105.017	0.032
Total - 1	1665608	924687	973570	911791	384	384	2964	105.286	0.039

Footnote

Number of animals to be tested under the programme is based on the average number of cattle presented at BR tests over the last 4 years. 99.0% animal coverage for individual tests. Indicators greater than 100% because of repeat herd testing and births and deaths throughout the year. Denominator also an estimate based on average herd size over the last 4 years.

Table Bovine brucellosis - data on status of herds at the end of the period - Community co-financed eradication programmes

Region	Status of herds and animals under the programme													
	Total number of herds and animals under the programme		Unknown		Not free or not officially free				Free or officially free suspended		Free		Officially free	
					Last check positive		Last check negative							
	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals
NORTHERN IRELAND	27694	938061			118	313	27574		118		24185		24185	
Total	27694	938061	0	0	118	313	27574	0	118	0	24185	0	24185	0
Total - 1	28263	924687			28	3050	89	6890	53	1870			28093	912877

Table Bovine brucellosis in countries and regions that do not receive Community co-financing for eradication programme

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk samples			Information about abortions			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds tested	Number of bovine herds tested	Number of animals or pools tested	Number of infected herds	Number of notified abortions whatever cause	Number of isolations of Brucella infection	Number of abortions due to Brucella abortus	Number of animals tested with serological blood tests	Number of suspended herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Serologically	BST		
UNITED KINGDOM (1)	87000	10000000	87000	100	0	0	34850	943107	0	17641	187207	0	6649	0	0	240	5	5		5	0
Total	87000	10000000	87000	100	0	0	34850	943107	0	17641	187207	0	6649	0	0	240	5	5	0	5	0

(1) : Great Britain - England, Wales and Scotland only

Ovine or Caprine Brucellosis in countries and regions that do not receive Community co-financing for eradication programme

Region	Total number of existing ovine / caprine		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
UNITED KINGDOM (1)	117000	35000000	117000	100	0	0	2332	36825	0	0	0	0	0	0
Total	117000	35000000	117000	100	0	0	2332	36825	0	0	0	0	0	0

(1) : Great Britain - England, Wales and Scotland only

Footnote

Table gives results of the National Sheep and Goat Survey, which is carried out annually and involves the sampling of approximately 200 flocks to confirm disease free status

2.7. YERSINIOSIS

2.7.1. General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/ or infection in the country

A small number of human cases are reported each year on a voluntary basis.

National evaluation of the recent situation, the trends and sources of infection

There has been a slight decreasing trend in the number of reports in the last few years. A total of 62 cases were recorded in 2006, compared with 64 in 2005 and 68 in 2004.
No food or animal surveys were conducted in 2006. A survey of cattle, sheep and pigs in GB eligible for slaughter was carried out in 2003 (see 2003 report).
The animal table shows number of incidents of yersiniosis detected from examination of clinical diagnostic samples in animals. The number of diagnoses was small and it is therefore difficult to comment on trends.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Trasmission usually occurs by ingestion of contaminated food or water and less commmonly by direct contact with infected animals, and rarely from person-to-person spread by the faecal oral route.

2.7.2. Yersiniosis in humans

A. Yersinosis in humans

Reporting system in place for the human cases

Surveillance is based on voluntary laboratory reporting but the extent to which the organism is looked for varies.

Case definition

Confirmed laboratory report

History of the disease and/ or infection in the country

A small number of cases are reported each year.
In England and Wales in 2005 there were 26 reported cases of Yersiniosis, compared with 68 in 2004, 32 in 2003, 28 cases in 2002, 29 in 2001, 43 cases in 2000, 88 cases in 1999 and 68 cases in 1998.
In Scotland laboratory reports of Yersinia enterocolitica have varied between 28 and 109 since 1986.
In Northern Ireland reports have fluctuated between 3 and 17 per annum from 1992-2006.

Results of the investigation

In 2006 in the UK 62 cases of Yersiniosis were recorded.
There were 32 cases of recorded in England and Wales, of which 26 were typed as Y. enterocolitica. In Scotland in 2006, 27 cases of yersiniosis were recorded, 22 of these infections were due to Y. enterocolitica. In Northern Ireland there were 3 cases of Y. enterocolitica reported in 2006.

National evaluation of the recent situation, the trends and sources of infection

The number of cases reported has remained much the same with no obvious trend.

Table Yersinia in humans - Species/ serotype distribution

Yersinia	Cases 62	Cases Inc. 1.03	Autochthon cases 29	Autochthon Inc. 0	Imported cases 1	Imported Inc. 0
Y. enterocolitica	51	0.847	25		0	
Yersinia spp., unspecified	11	0.183	4		1	
Y. enterocolitica - O:3						
Y. enterocolitica - O:9						

Table Yersinia in humans - Age distribution

Age Distribution	Y. enterocolitica			Yersinia spp.		
	All	M	F	All	M	F
<1 year	2	2	0	2	2	0
1 to 4 years	4	2	2	5	2	3
5 to 14 years	1	0	1	2	1	1
15 to 24 years	1	0	1	1	0	1
25 to 44 years	10	7	3	13	9	4
45 to 64 years	16	11	5	18	13	5
65 years and older	17	5	12	20	6	14
Age unknown	0	0	0	1	0	1
Total :	51	27	24	62	33	29

Footnote

UK data - England, Wales, Scotland and Northern Ireland

Table Yersinia in humans - Seasonal distribution

Month	Y. enterocolitica	Yersinia spp.
	Cases	Cases
January	8	9
February	4	5
March	3	3
April	2	5
May	10	13
June	1	1
July	6	6
August	3	4
September	4	4
October	5	5
November	3	5
December	2	2
not known	0	0
Total :	51	62

2.7.3. Yersinia in foodstuffs

2.7.4. Yersinia in animals

A. Yersinia enterocolitica in pigs

Monitoring system

Sampling strategy

Animals at farm

The last survey of pigs was conducted in 2003 and reported in 2003. It consisted of statistically based survey and examination of faeces of pigs arriving for slaughter in GB abattoirs.

Table Yersinia in animals

	Source of information	Sampling unit	Units tested	Total units positive for Yersinia spp.	Y. enterocolitica	Yersinia spp., unspecified	Y. enterocolitica - O:9	Y. enterocolitica - O:3	Y. enterocolitica - unspecified
Sheep and goats	VLA	animal		3					
Birds	VLA	animal		8					
All animals									
unspecified	VLA	animal		8					

Footnote

Data for Great britain - England, Wales and Scotland only.
Above are the number of incidents of yersiniosis, from clinical diagnostic samples

2.8. TRICHINELLOSIS

2.8.1. General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/ or infection in the country

Humans
No known cases of human Trichinellosis acquired from infected meat from animals reared in the UK have been identified since 1975.
There were no laboratory-confirmed cases of Trichinellosis between 1987 and 2000. An outbreak of 8 cases was reported in 2000 and was traced to pork salami sent as a gift from outside the UK. One case, believed to have been acquired overseas, was recorded in 2001. No cases were recorded in 2002, 2003, 2004, 2005 or 2006.
Animals
There was no evidence to indicate that trichinellosis exists in the UK domesticated pig population or in horses in 2006. The last positive diagnosis in pigs in Great Britain was in 1978. The last confirmed case of Trichinellosis was in 1979 in pig meat from a farm in Northern Ireland. This case was linked to suspected illegally imported meat. An on-going survey of foxes has not idenified Trichinella.

National evaluation of the recent situation, the trends and sources of infection

There is no evidence to indicate that Trichinella exists in pigs or horses in the UK, as shown by the negative results from the large proportion of carcasses that are tested annually for export. From 2000 to 2005 this is estimated to be 12% in GB and 66% in NI of all fattening pigs which corresponds to 4.6 million tests in GB and 4.3 million tests in NI. This view was supported by a 2002-2004 survey of 1048 foxes in GB in which no Trichinella were found in muscle digests. A similar survey was carried out in Northern Ireland during 2003/ 04 in which all 150 muscle digests were also negative for Trichinella.
Pigs and horses are routinely monitored for the presence of Trichinella at the slaughterhouse. In 2006, 204,792 breeding sows and boars , 4863 horse and 2488 farmed wild boar muscle samples were examined for Trichinella in Great Britain, together with a large proportion of pigs destined for export(the actual number of which is not recorded centrally). In Northern Ireland 83,8822 pigs and 92 horses were tested during 2006. All samples examined were negative.
A continuing survey programme of Trichinella in foxes was carried out by the FSA in Great Britain during September 2004 to March 2005 and September 2005 to March 2006. 700 foxes were tested in each season , all were negative for Trichinella.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Finding of cases in humans would be as a result of imported cases.

Additional information

From January 2006, enhanced testing for Trichinella spiralis, by the EU approved pepsin digest method, was extended to the domestic slaughter of all boars, sows and farmed wild boar. Testing of

samples by small abattoirs was undertaken by the National Reference Laboratory (VLA), under contract to the Meat Hygiene Service.
Between January and December 2006, a total of 16,803 individual samples (from 3771 submissions) were recieved by the VLA for testing in pools. There were 278 equine submissions, 2879 from boars/ sows and 614 from farmed wild boar.
All testing in Northern Ireland is done directly under the auspices of DARD. There were 838724 samples tested from pigs and 92 from horses.
700 foxes were tested between September 2005 and March 2006.
All testing carried out in 2006 gave negative results

2.8.2. Trichinellosis in humans

A. Trichinellosis in humans

Reporting system in place for the human cases

Disease caused by Trichinella in humans is not notifiable. Ascertainment of cases is through voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories (National Health Service, Health Protection Agency and National Public Health Service for Wales).

Case definition

Isolation of the parasite

Notification system in place

The disease is not notifiable in humans in UK

History of the disease and/ or infection in the country

No known cases of human trichinellosis acquired from infected meat from animals reared in the UK have been identified since 1975.
There were no laboratory-confirmed cases of Trichinellosis between 1987 and 2000. An outbreak of 8 cases was reported in 2000 and was traced to pork salami sent as a gift from outside the UK. One case, believed to have been acquired overseas, was recorded in 2001. No cases were recorded in 2002, 2003, 2004, 2005 or 2006.

Results of the investigation

No human cases of Trichinellosis were recorded in 2006.

Table Trichinella in humans - Species/ serotype distribution

Trichinella	Cases 0	Cases Inc. 0	Autochthon cases 0	Autochthon Inc. 0	Imported cases 0	Imported Inc. 0
Trichinella spp.	0	0	0	0	0	0

Table Trichinella in humans - Age distribution

Age Distribution	Trichinella spp.		
	All	M	F
<1 year	0	0	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	0	0	0
25 to 44 years	0	0	0
45 to 64 years	0	0	0
65 years and older	0	0	0
Age unknown	0	0	0
Total :	0	0	0

Footnote

There were no cases of Trichinellosis diagnosed in humans in the UK in 2006

2.8.3. Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

General

Surveillance system:
Under the Fresh Meat (Hygiene and Inspection) Regulations 1995 the appropriate Minister has powers to direct that, where required, pig meat must be tested for trichinellae in accordance with one of the methods specified in Council Directive 77/ 96/ EEC (as amended). If fresh meat from swine is not examined for trichinellosis, the appropriate Minister has the power to direct where required that such meat is subjected to cold treatment in accordance with Annex 1 of Directive 77/ 96/ EEC. Currently all pig meat destined for Germany or Denmark is required to be tested or cold treated. All pig meat used in meat preparations or minced meat destined for an EEA state is required to be tested or cold treated for trichinellae.

National evaluation of the recent situation, the trends and sources of infection

There is no evidence to indicate that Trichinella exists in pigs or horses in the UK, as shown by the negative results from the large proportion of carcasses that are tested annually for export. From 2000 to 2005 this is estimated to be 12% in GB and 66% in NI of all fattening pigs which corresponds to 4.6 million tests in GB and 4.3 million tests in NI.
Pigs are routinely monitored for the presence of Trichinella at the slaughterhouse. In 2006, 204,792 breeding sows and boars and 2488 farmed wild boar muscle samples were examined for Trichinella in Great Britain, together with a large proportion of pigs destined for export(the actual number of which is not recorded centrally). In Northern Ireland 83,8822 pigs were tested during 2006. All samples examined were negative.

B. Trichinella in horses

Monitoring system

Sampling strategy

Surveillance system:
Under the Fresh Meat (Hygiene and Inspection) Regulations 1995 all horse meat must be tested for trichinellae in accordance with one of the methods specified in Council Directive 77/ 96/ EEC (as amended).
Sampling:
Examination for the parasite at slaughterhouse under meat hygiene regulations.

Frequency of the sampling

Each carcase

Type of specimen taken

As per legislation.

Case definition

Isolation of parasite.

Results of the investigation including the origin of the positive animals

A total of 4955 samples were tested in 2006, 92 in Northern Ireland and 4863 in Great Britain. No positive findings in 2006.

Notification system in place

Notified to the Meat Hygiene Service and the Veterinary Services.

National evaluation of the recent situation, the trends and sources of infection

No Trichinella was reported in any samples examined in 2006

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella spp.	T. spiralis	Trichinella spp., unspecified
Pigs						
fattening pigs						
raised under controlled housing conditions in integrated production system	DARD	animal	838724	0	0	0
breeding animals						
unspecified						
sows and boars	MHS/ NRL	animal	204792	0	0	0
Solipeds, domestic	MHS/ NRL	animal	4863	0	0	0
horses	DARD	animal	92	0	0	0
Wild boars						
farmed	MHS/ NRL	animal	2488	0	0	0
Foxes (1)	FSA	animal	700	0	0	0

(1) : GB data- period from September 2005 to March 2006

Footnote

MHS reports from self-testing establishments in Great Britain. NRL (VLA) reports from other approved establishments. DARD reports from Northern Ireland
The data from some establishments is based on MHS financial periods, which do not exactly correlate with calendar months. Data that is not included in a particulr quarter is included in the following quarter

2.9. ECHINOCOCCOSIS

2.9.1. General evaluation of the national situation

A. Echinococcus spp. general evaluation

History of the disease and/ or infection in the country

Echinococcus granulosus is present in restricted geographical areas in Scotland and in England and Wales. The incidence in humans is highest in mid-Wales. E. multilocularis is not known to be present in the UK .
In England and Wales in humans voluntary reports fluctuated between 5 and 26 per annum from 1989 to 1996 when 44 were recorded, the highest total in recent years. Laboratory reports totalled 14 in 1997, a large fall from 1996. In Scotland reports of cases are infrequent, averaging less than 1 per year. A study covering hospital records over the period 1968-89 identified 66 cases of whom 36 were managed surgically. There were no deaths.
Animals
Echinococcosis (hydatid disease) in animals is not reportable in Great Britain and the identification of the parasite in animal tissues is not reportable. Identification of the cyst at meat inspection in animal tissues requires the condemnation of all or part of the carcase and/ or the offal as may be judged appropriate to the circumstances of the case by an inspector or Official Veterinary Surgeon.
In Northern Ireland Veterinary Service staff are situated in all meat plants and carry out post mortem inspection of all carcases, including inspection for evidence of hydatid cysts.
No cases of hydatidosis (echinococcosis) were detected in Northern Ireland in 2006. The last cases recorded were from imported Alpacas over 10 years ago.

National evaluation of the recent situation, the trends and sources of infection

Humans
There were 12 cases of Echinococcus granulosus in the UK in 2006 - all in England and Wales. This is a small increase on the 9 cases recorded in 2005.
Animals
In GB hydatid disease is present in the sheep population. Findings at post mortem are not recorded centrally.
No cases of hydatidosis (echinococcosis) were detected in Northern Ireland in 2006. The last cases recorded were from imported Alpacas over 10 years ago.
E. multilocularis is not known to be present in the UK

2.9.2. Echinococcosis in humans

A. Echinococcus spp. in humans

Reporting system in place for the human cases

Disease caused by Echinococcus granulosus in humans is not notifiable. Ascertainment of cases is through voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories

Case definition

Positive laboratory report.

History of the disease and/ or infection in the country

In England and Wales for 1984-1990 only in a circumscribed area of mid Wales was the incidence higher than 1/ 100,000/ year and in other areas was less than 0.25/ 100,000.
Voluntary reports fluctuated between 5 and 26 per annum from 1989 to 1996 when 44 were recorded, the highest total in recent years. Laboratory reports totalled 14 in 1997, a large fall from 1996.
In Scotland Echinococcus granulosus is present in restricted geographical areas. Reports of cases are infrequent, averaging less than 1 per year. A study covering hospital records over the period 1968-89 identified 66 cases of whom 36 were managed surgically. There were no deaths.

Results of the investigation

In the UK 12 cases (9 cases in 2005) of Echinococcus granulosus were recorded in 2006 - these were all in England and Wales and as in 2005 no cases were reported in Scotland or Northern Ireland. No occupational or travel histories were recorded.

National evaluation of the recent situation, the trends and sources of infection

The number of cases reported have remained low in 2006. E. multilocularis is believed to be absent from animals in UK.

Table Echinococcus in humans - Species/ serotype distribution

Echinococcus	Cases 12	Cases Inc. 0.02	Autochthon cases 0	Autochthon Inc. 0	Imported cases 0	Imported Inc. 0
E. granulosus	12	0.02				
E. multilocularis						
Echinococcus spp.						

Table Echinococcus in humans - Age distribution

Age Distribution	E. granulosus			E. multilocularis			Echinococcus spp.		
	All	M	F	All	M	F	All	M	F
<1 year	0	0	0	0	0	0	0	0	0
1 to 4 years	0	0	0	0	0	0	0	0	0
5 to 14 years	1	1	0	0	0	0	1	1	0
15 to 24 years	2	2	0	0	0	0	2	2	0
25 to 44 years	5	4	1	0	0	0	5	4	1
45 to 64 years	0	0	0	0	0	0	0	0	0
65 years and older	4	2	2	0	0	0	4	2	2
Age unknown	0	0	0	0	0	0			
Total :	12	9	3	0	0	0	12	9	3

2.9.3. Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus spp.	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals) (1)	MHS	single	1830241	1275			
Sheep	MHS	single	15462285	96243			
Goats	MHS	single	6625	3			
Pigs	MHS	single	7898653	38			
Deer		single	77987	7			

(1) : Cattle are >6weeks but =>30months

Footnote

OTMS/ OCDS cattle (not for human consumption) 161732 units tested of which 3066 positive for Echinococcus spp.
The sampling unit is the individual animal.
E. granulosus has not ever been recorded in the UK.

2.10. TOXOPLASMOSIS

2.10.1. General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/ or infection in the country

Toxoplasmosis is only notifiable in humans in Scotland. In the rest of UK the human cases relate to voluntary laboratory reporting. In animals in the UK toxoplasmosis is not notifiable or reportable. In animals surveillance relates to examination of samples received for diagnostic reasons at government veterinary laboratories. Toxoplasmosis appears to be endemic in the Northern Ireland sheep population, and the situation is similar in the rest of the UK. The DARDNI Veterinary Sciences Division records the cases submitted for diagnostic purposes through their laboratories. They report that in 2004, 30% of all samples submitted as a result of ovine abortion were due to toxoplasma infection. Isolates from private laboratories are not reported. The situation is similar in the rest of UK where 238 incidents of abortion in sheep were recorded in 2004 and 247 in 2005 at government or agent laboratories.

National evaluation of the recent situation, the trends and sources of infection

The number of laboratory reports recorded in humans in the UK in 2006 was 127, and there is no obvious trend. Toxoplasmosis remains the second most common cause of abortion in sheep when a diagnosis has been confirmed with 232 incidents recorded in 2006 in diagnostic samples from sheep in GB.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The disease may be acquired through the consumption of undercooked infected meat, or food contaminated with cat faeces, or from handling contaminated soil or cat litter trays. A vaccine is available for sheep but not for humans.

2.10.2. Toxoplasmosis in humans

A. Toxoplasmosis in humans

Reporting system in place for the human cases

In England and Wales disease caused by Toxoplasma gondii in humans is not notifiable. Ascertainment of cases is through voluntary reporting of isolations by publicly funded human diagnostic microbiology laboratories. Most reported cases will be of clinical disease rather than asymptomatic infection. There is currently no formal programme of antenatal or postnatal screening for congenitally acquired Toxoplasma infection in England and Wales. Congenitally acquired Toxoplasma infection or congenital toxoplasmosis are not notifiable under public health regulations.
In Scotland, however, Toxoplasmosis is a notifiable disease. During 2006, 33 notifications were made.
In Northern Ireland the surveillance system is based on laboratory reports. There were no cases of Toxoplasmosis reported in 2006 in Northern Ireland

Case definition

As described above.

History of the disease and/ or infection in the country

In England and Wales there were 94 voluntary reports in 2006, compared with 102 in 2005. It is known that they underestimate the level of infection when compared with systematic serosurveys. Seroprevalence is known, from serosurveys, to increase with age and to be higher in rural populations. In Scotland laboratory reports have varied between 10 and 47 since 1986 with 33 in 2006. In Northern Ireland there were no cases reported in 2006, compared to 2 cases in 2005.

Results of the investigation

In total in UK there were 127 laboratory reports in 2006. In England and Wales 94 cases of toxoplasmosis were reported under the surveillance system, compared with 102 in 2005. In Scotland in 2006 there were 33 laboratory reports compared with 11 in 2005, 20 in 2004, 32 in 2002, 16 in 2001, 20 in 2000, 24 in 1999 and 19 in 1998. In Northern Ireland there was one case reported in 2004, 2 cases in 2005, but no cases reported in 2006.

National evaluation of the recent situation, the trends and sources of infection

The Health Protection Agency, in collaboration with the National Public Health Service for Wales (NPHSW), is reviewing the number of cases of toxoplasmosis diagnosed by the Toxoplasma Reference Unit (TRU) in Swansea. This follows a recent publication addressing the epidemiology of congenital toxoplasmosis [1].
A total of 667 cases were diagnosed by TRU over a recent 12 month period (July 2005 to June 2006), compared with an average of 117 cases reported annually to the HPA by NHS laboratories. This would suggest that the decrease in the incidence of toxoplasmosis in the UK during the mid-1990s may have been due to changes in reporting arrangements. Comparison of numbers of reference unit reports between the early 1990s and the present provides no evidence to support a significant reduction over this period.

More detailed analysis of the data provided by TRU reveals that 185 of the 667 cases identified were in patients either classed as known HIV positive, or considered to be at high risk for HIV infection (based upon indication by the referring laboratory). Further analysis will follow in subsequent reports in CDR Weekly.

[1] Gilbert R, Tan HK, Cliffe S, Guy E, Stanford M. Symptomatic toxoplasma infection due to congenital and postnatally acquired infection. Arch Dis Child 2006;91:495-8

Table Toxoplasma in humans - Species/ serotype distribution

Toxoplasma	Cases 127	Cases Inc. 0.211
Toxoplasma spp.	127	0.211
Congenital cases	1	0.001

Footnote

Incidence per 100,000 based on UK population of 60,209500 in 2006

Table Toxoplasma in humans - Age distribution

Age Distribution	Toxoplasma spp.		
	All	M	F
<1 year	1	1	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	21	13	10
25 to 44 years	52	17	35
45 to 64 years	32	16	15
65 years and older	15	4	8
Age unknown	6	2	4
Total :	127	53	72

2.10.3. Toxoplasma in animals

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma gondii
Sheep and goats				
- in total - Clinical investigations	VLA	animal		232

Footnote

Table shows the number of incidents of Toxoplasma fetopathy diagnosed in England, Wales and Scotland during clinical investigations in 2006.

2.11. RABIES

2.11.1. General evaluation of the national situation

A. Rabies general evaluation

History of the disease and/ or infection in the country

The United Kingdom is recognised as having rabies free status by the O.I.E.
Human rabies is extremely rare in the UK. In the UK the last indigenous human death from classical rabies occurred in 1902 and the last case of indigenous terrestial rabies in an animal was in 1922. In 2005 one case was reported. The Patient had suffered a dog bite whilst on holiday in Goa.

National evaluation of the recent situation, the trends and sources of infection

No cases of human rabies were recorded in 2006.
There were no cases of classical rabies in the UK in 2006. There was one case of European Bat Lyssavirus-2 confirmed in 2006 in a bat.
The VLA has a long-standing programme of scanning (passive) surveillance for EBLVs in bats. This programme involves testing dead bats usually submitted by bat workers. Between 1987 and December 2005, the VLA tested 5,838 bats for lyssavirus and in that time, only four cases tested positive for live EBLV. 859 bats were tested during 2006 with one testing positive.
Following the death of a Scottish bat handler in 2002, programmes of targeted (active)surveillance in England and Scotland were begun. This work involves taking samples of both blood and saliva from live bats in their roosts for laboratory analysis to check for the presence of live virus or antibodies to EBLV. The aim of the programmes is to assess the prevalence of EBLV type 1 and EBVL type 2 in England and Scotland. On 21 May 2005, Defra released preliminary results from the first year of a three year longitudinal study into the prevalence of bat variants of rabies from 2004 work in England. This indicated a prevalence of antibodies to EBLV 2 in Daubenton's bats of about 4.2%. A single serotine bat in southern England was also found to have antibodies to EBLV 1. Full results of the study will be available in 2007.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

European Bat Lyssavirus (EBLVs) are related to the classical rabies virus. They have been known to infect not only the primary hosts (insectivorous bats) but on very rare occasions other animal hosts and humans. EBLV 1 and EBLV 2 have been identified in 12 bats species,
with over 90% of EBLV 1 identified in serotine bats, with Myotis species (including Daubenton's) associated with EBLV 2. EBLV 2 is found mainly in the UK. EBLVs are normally only transmitted by the bite of an infected bat. There is no risk to humans if bats are not approached or handled by them. Bats are a protected species and must not be deliberately disturbed, captured or killed, or their roosts damaged or destroyed.

Recent actions taken to control the zoonoses

Although free of classical rabies for many decades there is still concern about the disease being reintroduced into the UK by imported animals. In December 2005 a draft rabies contingency plans

was published for consultation.
A targeted surveillance programme in a small number of bats and bat roosts was conducted in 2003 to try and establish the prevalence of EBLVs in the bat population in England. This mirrored the targeted surveillance carried out in Scotland. The results showed a low level of antibodies in Daubenton bats in some areas of England and Scotland. In order to investigate the incidence further, a three year longitudinal study commenced in England in 2004 and another study is in progress in Scotland. The full results of the longer term study will not become available until 2007.

2.11.2. Rabies in humans

A. Rabies in humans

Reporting system in place for the human cases

Rabies is notifiable in humans under public health legislation. If rabies is suspected on the basis of clinical appearance and/ or behaviour it is compulsory to notify the competent authority and further investigations are carried out. Doctors in the United Kingdom have a statutory duty to notify a proper officer of the local authority in which the case was reported who is then obliged to inform the Centre for Infections Communicable Disease Surveillance Centre (CfI) of behalf of the Office of National Statistics (ONS).

Case definition

The case criteria are based on a clinical picture of acute encephalomyelitis that progresses to coma or death within 10 days and detection of viral antigen in a clinical specimen, identification of neutralising antibody in an unvaccinated person or virus isolation from tissues of teh patient.

History of the disease and/ or infection in the country

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 terrestial rabies was in 1922.

Results of the investigation

One case was reported in 2005. The Patient had suffered a dog bite whilst on holiday in Goa. No further medical attention was sought until the case presented with clinical symptoms back in the UK. The patient died after admission to hospital.

National evaluation of the recent situation, the trends and sources of infection

The last indigenously acquired case of classical human rabies in the United Kingdom was in 1902. Cases occurring since then have all been acquired abroad, usually through dog bites. Since 1946, some 20 cases have been reported in England and Wales, all imported; prior to 2005, the last imported case was in 2001. In 2002 a man in Scotland who was a licensed bat handler died from infection with European Bat Lyssavirus-2, a rabies-like virus. No cases were reported in 2006.

2.11.3. Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

Rabies is compulsorily notifiable if the animal's clinical appearance is such that rabies is considered as a possible cause of the animal's condition.

Case definition

Rabies is confirmed if serological or histological tests or virus isolation reveals the presence of the rabies virus in the animal's tissues.

Diagnostic/ analytical methods used

Other: A number of tests may be used FAT, Mouse innoculation test, histology, PCR

Vaccination policy

Vaccination is now permitted in the United Kingdom in accordance with the Pet Travel Scheme, for those animals being exported, and those undergoing quarantine.

Results of the investigation

No cases of rabies were confirmed in dogs in 2006.

National evaluation of the recent situation, the trends and sources of infection

No cases of classical rabies in terrestrial animals were confirmed in the United Kingdom during 2006 and the country is recognised as having rabies free status by the O.I.E. There was one case of European Bat Lyssavirus-2 detected in a bat during the year.
Although free of classical rabies for many decades there is still concern about the disease being reintroduced into the UK by imported animals.

Table Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	unspecified Lyssavirus	European Bat Lyssavirus - unspecified	classical rabies virus (genotype 1)	European Bat Lyssavirus 2 (EBL 2)
Dogs	NRL	animal	21	0	0	0	0	
Cats	NRL	animal	23	0	0	0	0	
Bats								
wild	NRL	animal	859	1	0	0	0	1
Foxes								
wild	NRL	animal	1	0	0	0	0	0
Wolves								
zoo animal	NRL	animal	2	0	0	0	0	0
All animals								
unspecified	NRL	animal	19	0	0	0	0	0

Footnote

NRL is National Reference Laboratories

2.12. Q-FEVER

2.12.1. General evaluation of the national situation

2.12.2. Coxiella (Q-fever) in animals

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1. ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1. General evaluation of the national situation

A. Escherichia coli general evaluation

National evaluation of the recent situation, the trends and sources of infection

A survey was carried out in 2003 on a statically based sample of cattle, sheep and pigs arriving for slaughter at abattoirs in GB to determine the prevalence of foodborne pathogens in faecal samples (see report for 2003). Isolates of commensal E.coli were used from this survey for studies of antimicrobial resistance and these results were reported in 2004.
No similar survey has since been carried out, but a number of isolates resulting from submission of diagnostic samples have been tested for antimicrobial resistance in 2006 and the results are presented in the tables.

3.1.2. Antimicrobial resistance in Escherichia coli, non-pathogenic isolates

A. Antimicrobial resistance of E. coli in animal - All animals - Monitoring

Sampling strategy used in monitoring

Frequency of the sampling

Currently sampling mostly consists of clinical diagnostic cases.

Type of specimen taken

The results given for E. coli from animals relate to E. coli isolates from various isolation sites in each animal species, though most isolates will originate from faecal samples from clinically diseased animals under veterinary investigation (for cattle, isolates from mastitis cases have not been included in this year's report).

Control program/ mechanisms

The control program/ strategies in place

In 2006, a system was put in place in England and Wales to examine veterinary E. coli isolates for resistance to the indicator third generation cephalosporins cefpodoxime or ceftazidime and cefotaxime This testing regime was instituted because of the increasing prevalence of third generation cephalosporin resistance due to the possession of extended-spectrum beta-lactamases (ESBLs) that has been noted in human clinical E. coli isolates in many parts of Europe and also because of the increasing reports from a number of European countries of the initial detection of this type of resistance in animals. Resistance to the indicator third generation cephalosporins is used as a screening test in the programme to identify isolates for further examination for the presence of ESBLs.

Results of the investigation

In 2006, a system was put in place in England and Wales to examine veterinary E. coli isolates for resistance to the indicator third generation cephalosporins cefpodoxime or ceftazidime and cefotaxime (ie isolates are tested for resistance to either cefpodoxime or both ceftazidime and cefotaxime). This testing regime is based on that commonly used in medical surveillance and was instituted because of the increasing prevalence of third generation cephalosporin resistance due to the possession of extended-spectrum beta-lactamases (ESBLs) that has been noted in human clinical E. coli isolates in many parts of Europe and also because of the increasing reports from a number of European countries of the initial detection of this type of resistance in animals. Resistance to the indicator third generation cephalosporins is used as a screening test in the programme to identify isolates for further examination for the presence of ESBLs. Although resistance to the indicator cephalosporins was detected in very low numbers of E.coli isolates from pigs and chickens, further confirmatory tests showed that these isolates did not possess ESBLs. The situation is different in cattle, where some of the isolates resistant to the indicator third generation cephalosporins have been shown to possess ESBLs of the CTX-M family, mainly CTX-M-14 and CTX-M-15. However, overall figures show that a very low number of bovine isolates possess these enzymes and these are mainly isolates from calves. Visits to some affected premises have in some cases demonstrated clear links to potential

human sources of infection for cattle.
No resistance was detected to ceftiofur in isolates from pigs, chickens or turkeys. Resistance to enrofloxacin was only detected in E. coli isolates from pigs; no resistance was detected to enrofloxacin in E. coli isolates from cattle, chickens, turkeys or sheep.
Resistance to enrofloxacin was detected at a low or very low prevalence in E. coli isolates from pigs, cattle, chickens, turkeys and sheep in 2006 - a difference from the situation in 2005, when resistance was only detected in isolates from pigs.

Table Antimicrobial susceptibility testing of E. coli in animals

n = Number of resistant isolates

E. coli

	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Sheep	
Isolates out of a monitoring programme		yes		yes		yes		yes		yes
Number of isolates available in the laboratory		2260		305		88		36		302
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Tetracyclines										
Tetracyclin	2260	1668	305	230	88	41	36	26	302	144
Amphenicols										
Chloramphenicol	590	249								
Florfenicol	590	138							14	0
Cephalosporins										
Cefotaxim	590	44								
Ceftazidim	590	20								
Cefpodoxime			130	5	35	1	15	0	19	0
Fluoroquinolones										
Enrofloxacin	2256	146	305	18	88	3	36	1	296	1
Aminoglycosides										
Streptomycin	590	330								
Gentamicin	590	12								
Neomycin	2232	833	304	33	87	4	36	0	286	28
Penicillins										
Ampicillin	2260	1582	304	136	88	25	36	19	302	105
Trimethoprim + sulfonamides	2258	844	304	156	88	17	36	12	301	52
Resistant to >4 antimicrobials		990		95		7		2		34

Footnote

Isolates from England and Wales, mainly from diagnostic samples

Table Breakpoints used for antimicrobial susceptibility testing in Animals

Test Method Used

Disc diffusion

Agar dilution

Broth dilution

E-test

Standards used for testing

VLA_historical_standards_based_on_British_Society_for_Antimicrobial_Chemotherapy_standard_method

Escherichia coli, non-pathogenic	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	VLA							13		13
Florfenicol	VLA							13		13
Tetracyclines										
Tetracyclin	VLA							13		13
Fluoroquinolones										
Ciprofloxacin										
Enrofloxacin	VLA							13		13
Quinolones										
Nalidixic acid	VLA							13		13
Trimethoprim										
Sulfonamides										
Sulfonamide	VLA							13		13
Aminoglycosides										
Streptomycin	VLA							13		13
Gentamicin										
Neomycin	VLA							13		13
Kanamycin										
Trimethoprim + sulfonamides	VLA							13		13
Cephalosporins										
Cefotaxim	BSAC									
Ceftazidim	BSAC									
3rd generation cephalosporins										
Penicillins										
Ampicillin	VLA							13		13

Table Breakpoints used for antimicrobial susceptibility testing in Feedingstuff

Test Method Used

Disc diffusion

Agar dilution

Broth dilution

E-test

Standards used for testing

Escherichia coli, non-pathogenic	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol										
Florfenicol										
Tetracyclines										
Tetracyclin										
Fluoroquinolones										
Ciprofloxacin										
Enrofloxacin										
Quinolones										
Nalidixic acid										
Trimethoprim										
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin										
Neomycin										
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim										
Ceftazidim										
3rd generation cephalosporins										
Penicillins										
Ampicillin										

Table Breakpoints used for antimicrobial susceptibility testing in Humans

Test Method Used

- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

Standards used for testing

Escherichia coli, non-pathogenic	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol										
Florfenicol										
Tetracyclines										
Tetracyclin										
Fluoroquinolones										
Ciprofloxacin										
Enrofloxacin										
Quinolones										
Nalidixic acid										
Trimethoprim										
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin										
Neomycin										
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim										
Ceftazidim										
3rd generation cephalosporins										
Penicillins										
Ampicillin										

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1. HISTAMINE

4.1.1. General evaluation of the national situation

4.1.2. Histamine in foodstuffs

4.2. ENTEROBACTER SAKAZAKII

4.2.1. General evaluation of the national situation

4.2.2. Enterobacter sakazakii in foodstuffs

4.3. STAPHYLOCOCCAL ENTEROTOXINS

4.3.1. General evaluation of the national situation

4.3.2. Staphylococcal enterotoxins in foodstuffs

5. FOODBORNE OUTBREAKS

Foodborne outbreaks are incidences of two or more human cases of the same disease or infection where the cases are linked or are probably linked to the same food source. Situation, in which the observed human cases exceed the expected number of cases and where a same food source is suspected, is also indicative of a foodborne outbreak.

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of foodborne outbreaks

Health Protection Agency CDSC Colindale, Health Protection Scotland, and Health Protection Agency CDSC Northern Ireland receive preliminary reports of general outbreaks of Infectious Intestinal Disease (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.

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.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

The full analysis of outbreak data are often not completed until some time after the outbreak has finished. A summary of the outbreaks in the UK is given in table 12. The most common causative agent identified in the outbreaks was Salmonella species.

Relevance of the different causative agents, food categories and the agent/ food category combinations

A full evaluation is not yet available.

Table Foodborne outbreaks in humans

Causative agent	General outbreak	Household outbreak	Total Number of persons			Food implicated			Type of evidence for implication of the food	Place where food was consumed	Contributing factors
			ill (in total)	died	in hospital	Food (sub)category	Suspected as a source	Confirmed as a source			
1	2	3	4	5	6	7			8	9	10
Clostridium - C. perfringens	Yes	No	7	0	0		Side order and starter menu		Descriptive	Residential	Inappropriate storage; other
Clostridium - C. perfringens	Yes	No	17		1	Red meat; sauces	Re-heated meats; re-heated gravy			Hotel	Infected food handler; cross contamination; other
Clostridium - C. perfringens	Yes	No	17	0	0	Poultry	Chicken curry		Microbiological; descriptive	Shop retailer	Cross contamination; other
Clostridium - C. perfringens	Yes	No	22	0	1	Red meat; sauces	Meat pie; gravy		Microbiological; descriptive	Restaurant	Inadequate heat treatment; cross contamination; other
Clostridium - C. perfringens	Yes	No	46	1	1	Red meat	Lamb joint			Restaurant	Inadequate heat treatment; cross contamination; inappropriate storage; other
Clostridium - C. perfringens	Yes	No	14	0	0	Poultry	Turkey		Microbiological	Restaurant	Cross contamination; other
Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC) - VTEC O157	Yes	No	6	0	0					Restaurant	
Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC) - VTEC O157	Yes	No	8	0	2	Desserts	Strawber flan			Shop retailer	
Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC) - VTEC O157	Yes	No	8	0	3					Residential	

Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC) - VTEC O157	Yes	No	30	0	17	Red meat	Cooked meat; cooked roast beef		Club/ centre	
Food borne viruses - calicivirus (including norovirus)	Yes		4	0	0	Fish and shellfish	Oysters and mussels	Microbiological	Restaurant	
Food borne viruses - calicivirus (including norovirus)	Yes	No	4	0	0	Fish and shellfish	Raw oysters	Microbiological; descriptive	Community	Other
Food borne viruses - calicivirus (including norovirus)	Yes	No	5			Fish and shellfish	Oysters	Descriptive	Restaurant	Other
Food borne viruses - calicivirus (including norovirus)	Yes	No	7	0	0	Fish and shellfish	Oysters	Microbiological; descriptive	Restaurant	Other
Salmonella - S. Ajiobo	Yes		8	0	2	Miscellaneous	Salad vegetables	Descriptive	Community	
Salmonella - S. Ajiobo	Yes	No	153	0	11	Miscellaneous	sandwiches/ bagged salad leaves	Descriptive	Restaurant	Other
Salmonella - S. Enteritidis	Yes	No	4					Microbiological; descriptive	Restaurant	Other
Salmonella - S. Enteritidis - Not typable	Yes	No	9	0	0			Descriptive	Private	Cross contamination
Salmonella - S. Enteritidis - PT 1	Yes	No	2	0	0				Restaurant	Inadequate heat treatment; cross contamination; inappropriate storage
Salmonella - S. Enteritidis - PT 1	Yes	No	10	0		Miscellaneous	Various		Pub/ bar	Other
Salmonella - S. Enteritidis - PT 13a	Yes	No	8	0	0	Miscellaneous	Egg mayo bagels	Descriptive	Restaurant	Inadequate heat treatment; cross contamination; inappropriate storage
Salmonella - S. Enteritidis - PT 13a	Yes	No	50	0	1	Eggs	Eggs	Descriptive	Restaurant	Inadequate heat treatment; cross contamination; inappropriate storage
Salmonella - S. Enteritidis - PT 14b	Yes	No	2	0	0				Other	Inappropriate storage
Salmonella - S. Enteritidis - PT 14b	Yes	No	9	0		Eggs	Egg	Microbiological	Restaurant	Inappropriate storage
Salmonella - S. Enteritidis - PT 14b	Yes	No	12	0	1	Miscellaneous	Multiple foods	Descriptive	Restaurant	Inappropriate storage
Salmonella - S. Enteritidis - PT 21	Yes	No	3	0	1			Microbiological	School	Inappropriate storage
Salmonella - S. Enteritidis - PT 21	Yes	No	3	0	2				Shop retailer	Inappropriate storage
Salmonella - S. Enteritidis - PT 4	Yes		13	0	0	Miscellaneous	Meringue	Descriptive	Private house	

Salmonella - S. Enteritidis - PT 4	Yes	No	5	0	1	Eggs	Egg	Microbiological	Restaurant	Inadequate heat treatment; cross contamination
Salmonella - S. Enteritidis - PT 4	Yes	No	10	0	3	Miscellaneous	Meat feast pizza	Descriptive	Restaurant	Inadequate heat treatment; cross contamination
Salmonella - S. Enteritidis - PT 4	Yes	No	17	1	3	Desserts	Tiramisu (raw shell egg)	Descriptive	Private	Inadequate heat treatment; cross contamination
Salmonella - S. Enteritidis - PT 4	Yes	No	25	0	2	Sauces	Mayonnaise (raw shell egg)		Residential	Infected food handler; inadequate heat treatment; cross contamination
Salmonella - S. Enteritidis - PT 5a	Yes	No	2			Desserts	Cake (raw shell egg)		Restaurant	Inadequate heat treatment; cross contamination
Salmonella - S. Enteritidis - PT 5c	Yes	No	7	0	0	Miscellaneous	Miscellaneous		Restaurant	Cross contamination
Salmonella - S. Enteritidis - PT 6a	Yes	No	16	0	0			Descriptive	Restaurant	Cross contamination
Salmonella - S. Enteritidis - PT 8	Yes	No	9	0	0	Eggs	Eggs		Private	Cross contamination
Salmonella - S. Enteritidis - PT 8	Yes	No	25	0	1			Microbiological	Private	Cross contamination
Salmonella - S. Enteritidis - PT 8	Yes	No	58		8	Poultry; eggs	White sauce; Spanish eggs	Descriptive	Shop caterer	Cross contamination
Salmonella - S. Montevideo	Yes		10	0	2	Miscellaneous	Chocolate	Microbiological; descriptive	Chocolate factory	
Salmonella - S. Montevideo	Yes	No	42	0	3	Miscellaneous	Chocolate		Hall; caterers	Cross contamination
Salmonella - S. Typhimurium - DT 104b	Yes	No	4	0					Hotel	
Salmonella - S. Typhimurium - U 288	Yes	No	2	0	0				Restaurant	Cross contamination
Staphylococcus - S. aureus	Yes	No	5	0	0	Poultry; salad; vegetable	Cooked chicken salad		Restaurant	Infected food handler; inadequate heat treatment; cross contamination
Toxins - marine biotoxins (1)	Yes	No	3			Fish and shellfish	Mussels	Microbiological	Restaurant	Infected food; cross contamination; other
Toxins - marine biotoxins (2)	Yes	No	139	0		Fish and shellfish	Mussels		Restaurant	Inadequate heat treatment; cross contamination; other
Toxins - scrombotoxin	Yes	No	2	0		Fish and shellfish	Tuna		Residential	

Unknown	Yes	No	2			Fish and shellfish	Oysters		Microbiological	Restaurant	
Unknown	Yes	No	3			Fish and shellfish	Oysters		Descriptive	Restaurant	
Unknown	Yes	No	3	0	0	Fish and shellfish	Tuna		Descriptive	Shop retailer	
Unknown	Yes	No	3	0	1				Descriptive	Restaurant	
Unknown	Yes	No	4			Fish and shellfish	Oysters		Descriptive	Restaurant	
Unknown	Yes	No	4	0	0	Rice	Cooked rice		Descriptive	Private	
Unknown	Yes	No	5			Fish and shellfish	Oysters		Microbiological	Restaurant	
Unknown	Yes	No	5	0	0					Other	Other
Unknown	Yes	No	5	0	0					Residential	
Unknown	Yes	No	7			Fish and shellfish	Oysters		Descriptive	Restaurant	
Unknown	Yes	No	7			Fish and shellfish	Oysters		Descriptive	Restaurant	
Unknown	Yes	No	8	0	0				Descriptive	Restaurant	
Unknown	Yes	No	9	0	0					Restaurant	
Unknown	Yes	No	9	0	0				Descriptive	Restaurant	
Unknown	Yes	No	10	0	0				Descriptive	Hotel	
Unknown	Yes	No	11	0	0					Restaurant	
Unknown	Yes	No	12	0	0					Restaurant	
Unknown	Yes	No	19	0						Restaurant	
Unknown	Yes	No	60	0						Hotel	
Unknown	Yes	No	90	0	0					Restaurant	

(1) : Dinophysis spp - okadaic acid (Diarrhoeic Shellfish poison)
(2) : Dinophysis spp - okadaic acid (Diarrhoeic Shellfish poison)

Footnote

GB data - England, Wales and Scotland