European Food Safety Authority

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 2008

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **United Kingdom**

Reporting Year:

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 Health 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 Government	Devolved Administration for Scotland	Overview

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
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	Data on zoonotic agents in humans in Scotland
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*. 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 2008 .

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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* 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:

Cattle data for Great Britain is sourced from the British Cattle Movement Services' (BCMS) Cattle Tracing System (CTS). Information is sourced from the Animal and Public Health Information System (APHIS) for the cattle population in Northern Ireland. It is mandatory that every bovine animal is given a passport and an ear tag and that owners report every movement of these animals onto and off their premises. This is done to enable all cattle in the UK to be traceable for disease control purposes. CTS/APHIS records births, deaths and all movements of cattle as well as breed types and gender.

The Rapid Analysis and Detection of Animal Related Risk (RADAR) system of surveillance information management captures and processes CTS data so that population statistics can be derived and analysed for the cattle population in Great Britain.

Counts of the number of premises for sheep and goats are from the annual Sheep and Goat Inventory – this is a census of keepers in Great Britain. Population numbers and all data from Northern Ireland is from the annual June surveys of agriculture.

Counts of the number of premises with poultry are from the Great Britain Poultry Register. Population numbers and all data from Northern Ireland is from the annual June surveys of agriculture.

Information on the remaining categories is sourced from the June Survey of Agriculture in each of England, Wales, Scotland and Northern Ireland.

Figures on slaughterings are collected via surveys in each of England and Wales, Scotland and Northern Ireland.

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

Data on livestock populations are as at 1 June 2008, as are the counts of holdings for cattle, pigs, turkey, geese, ducks, horses and farmed deer.

The number of holdings with sheep and goats is as at 1 December 2007.

The number of poultry and poultry holdings for GB are taken from the Great Britain Poultry Register and refers to 1 June 2008. The data from Northern Ireland is as at 1 June 2008.

Data on slaughterings are annual totals.

Breeding flocks of Gallus gallus are adult flocks subject to monitoring and control procedures for Salmonella under implementation of the Control of Salmonella in Poultry Order 2007 (Reg. 2160/2003/EC and Reg. 1003/2005/EC). Only flocks on holdings eligible for inclusion in the NCP included in the total flock count (ie premises with 250 or more breeding chickens)

Laying flocks of Gallus gallus are adult flocks subject to monitoring and control procedures for Salmonella under implementation of the Control of Salmonella in Poultry Order 2007 (Reg. 2160/2003/EC and Reg. 1168/2006/EC). Number of flocks of laying hens derived from the Great Britain Poultry Register and data held by the Department of Agriculture and Rural Development Northern Ireland. Only flocks on holdings eligible for inclusion in the NCP included in the total flock count.

Definitions used for different types of animals, herds, flocks and holdings as well as

Cattle data:
For cattle data, the breed is recorded on an animal's passport, RADAR categorises the animal to a purpose (beef or dairy or dual purpose). Around 2% of all female cattle do not have an assigned breed purpose or are of dual breed. These cattle have been allocated to either dairy or beef at holding level based on the other cattle on the holding. Where there are no other cattle on the holding, they are allocated on the basis of the national split between dairy and beef in that age band. The Cattle Tracing System (CTS) database does not capture data at ‘herd’ level, so no data is available for herd numbers in Great Britain. Calves are defined as animals less than or equal to 12 months of age

Holdings are defined as agricultural holdings assigned a unique identification number on the database. The number of holdings is a snapshot of premises which had animals present on the 1st June 2008. These agricultural premises include markets, holding centres and abattoirs.

All poultry keepers with 50 or more birds (in total of any species) are required to register their premises with the Great Britain Poultry Register (even if the premises is only stocked with 50 or more birds for part of the year). At present, premises with fewer than 50 birds are not required to register, but keepers are encouraged to do so voluntarily and those registered, even if less than 50 birds are kept, are included in the poultry data.

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

There were 10.1 million cattle in the UK on 1 June 2008. This was a decrease of 2% on the June 2007 total. Similar decreases of around 2% were recorded in both the beef and dairy herds.

There were 4.7 million pigs on 1 June 2008 which was a decrease on the June 2007 total figure of 2.5%. The pig breeding herd also saw a decrease of 8% to 495 thousand.

On 1 June 2008 there were 33.1 million sheep in the UK, a reduction of 2% on the June 2007 figure. The female breeding flock also saw a reduction of around 3% on the June 2007 figures to 15.6 million.

Although there were variations across the individual categories the number of total poultry remained largely unchanged on 2007.

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

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Cattle (bovine animals)	**calves (under 1 year)** [1]			44216		2836696		82972	
	dairy cows and heifers [2]					2809518		31629	
	in total			2631816		10106985		97394	
	meat production animals [3]					4460771		91877	
	mixed herds [4]					5280638		28240	
Deer	**farmed - in total**					31386		362	
Ducks	**breeding flocks, unspecified - in total** [5]					423660		839	
	in total			14746543		5473498		7061	
	meat production flocks [6]					3208413		545	
	mixed flocks/holdings [7]							306	
Gallus gallus (fowl)	**breeding flocks for egg production line - in total**	199							
	breeding flocks for meat production line - in total	1444							
	breeding flocks, unspecified - in total [8]					17483867		2266	
	broilers			784383781		131338277		2177	

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Gallus gallus (fowl)	**elite breeding flocks for egg production line**	4							
	elite breeding flocks for meat production line	97							
	grandparent breeding flocks for egg production line	73							
	grandparent breeding flocks for meat production line	106							
	in total [9]			822795297		201840918		16426	
	laying hens [10]	5523		38411517		33189152		9540	
	mixed flocks/holdings [11]							1171	
	parent breeding flocks for egg production line	122							
	parent breeding flocks for meat production line	1241							
Geese	**breeding flocks, unspecified - in total** [12]					16403		612	
	in total [13]			411177		273901		4048	
	meat production flocks [14]					173408		583	
	mixed flocks/holdings [15]							197	
Goats	**in total**			8446		96156		5680	

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Pigs	**breeding animals** [16]			223906		494564		7958	
	breeding animals - unspecified - sows and gilts							8151	
	fattening pigs			9191753		4218948		10770	
	in total			9415659		4713512		12279	
Sheep	**animals over 1 year** [17]			2344534		16556690			
	animals under 1 year (lambs)			14352351		16574319			
	in total			16696885		33131009		78394	2007
Solipeds, domestic	**horses - in total** [18]					370225		56684	
Turkeys	**breeding flocks, unspecified - in total**					718763		283	
	in total [19]			14925338		9475952		2561	
	meat production flocks [20]					7236222		1527	
	mixed flocks/holdings [21]							64	

Comments:

[1] All calves (dairy, beef and dual purpose)

[2] Dairy breeds aged 1 year or more

Table Susceptible animal populations

[3] Female beef breeds aged 1 year or more, all male cattle aged 1 year or more
[4] GB only - premises with both beef and dairy animals
[5] GB data only
[6] GB data only
[7] GB data only - premises with multiple production purposes (breeding/laying/meat production)
[8] All premises with 50 or more breeding chickens included in total number of premises
[9] All premises with 50 or more chickens included in totals for livestock numbers and number of holdings
[10] Number of flocks derived from GB Poultry Register and DARD. Includes adult laying flocks elligible for inclusion in the Salmonella NCP only. Other population data includes growing pullets (from day old to point of lay) and laying flocks (production stage). All premises with 50 or more laying chickens included in total number of premises
[11] Figure for GB only - holdings with mixed production type for chickens (mixed breeding hens, laying hens, rearing or meat production hens)
[12] GB data only
[13] Slaughter figures for England, Scotland and Northern Ireland only
[14] GB data only
[15] GB data only. Premises with multiple production purposes (breeding/laying/rearing/meat production)
[16] Sows in pig, gilts in pig, gilts not yet in pig, pther sows being suckled or dry sows kept for further breeding and boars for service
[17] Includes breeding ewes, rams and other sheep over 1 year old
[18] Horses on agricultural holdings
[19] All premises with 50 or more turkeys included in totals for livestock numbers and number of holdings
[20] GB data only
[21] GB data only. Figures for turkey premises with multiple production purposes (mixed breeding/rearing/meat)

Footnote:

Breeding flocks of Gallus gallus are adult flocks subject to monitoring and control procedures for Salmonella under implementation of the Control of Salmonella in Poultry Order 2007 (Reg. 2160/2003/EC and Reg. 1003/2005/EC). Only flocks on holdings eligible for inclusion in the NCP included in the total flock count (ie premises with 250 or more breeding chickens). Other population data above derived from Agricultural Census and GB Poultry Register - includes all premises of 50 or more poultry.

Laying flocks of Gallus gallus are adult flocks subject to monitoring and control procedures for Salmonella under implementation of the Control of Salmonella in Poultry Order 2007 (Reg. 2160/2003/EC and Reg. 1168/2006/EC). Number of flocks of laying hens derived from the Great Britain Poultry Register and data held by the Department of Agriculture and Rural Development Northern Ireland. Only flocks on holdings eligible for inclusion in the NCP included in the total flock count.

“Flock” is defined as poultry of the same health status kept on the same holding or in the same enclosure and constituting a single epidemiological unit and, in the case of housed poultry, includes all birds sharing the same airspace

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 no information available on the total number of reported cases of salmonellosis in humans in the UK in 2008. There was a decrease in the number of cases of human salmonellosis in 2007 (13,213) compared to 2006 (14,060), and S. Enteritidis and S. Typhimurium remained the two most common serotypes. There has been an overall trend of reduction of reports over recent years.

National Control Programme in breeding flocks:
Eight adult breeding flocks were confirmed as infected with S. Typhimurium during 2008. Six flocks were located on one holding, 2 others on one other holding. No other Salmonella serotypes of public health significance (SOPHS) as designated in the legislation, were identified in testing under the National Control Programme in adult breeding flocks in production. Using a total tested flocks figure of 1,636 the estimated prevalence is 0.49% [8/1,6369] which is below the Community target of 1% of adult breeding flocks to remain SOPHS positive by end of 2009.

Only 1 positive incident of Salmonella of one of the Top-5 serovars was discovered in adult breeding flocks in 2007. This was a positive result for S. Typhimurium in a parent Broiler Breeder (Meat Production Line) flock.

The Salmonella National Control Programme for laying flocks:
The layer NCP was implemented in the UK at the beginning of 2008. In total for the year, 51 adult flocks of egg laying hens of Gallus gallus were positive for S. Enteritidis &/or S. Typhimurium. In total 47 flocks were positive for S. Enteritidis and 4 flocks were positive for S. Typhimurium. One adult flock of egg laying hens of Gallus gallus were positive for S. Virchow RDNC. No adult flocks were

positive for S. Infantis or S. Hadar. Fifteen adult flocks were positive for Salmonella serovars other than Salmonellas designated of specific public health significance in the legislation (SOPHS)

Two baseline surveys for Salmonella prevalence were carried out in 2008 - one in breeding pigs (Decision 2008/55/EC) and one in broiler flocks at slaughter (2007/516/EC)

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

Comparison of the Salmonella serotypes found in animals, feedingstuffs, food and man helps to sugget possible sources of infection in the food chain.

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 882/2004 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.

2.1.2 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.

England and Wales:
The incidence of Salmonellosis has been declining since 1997 when a total of 31,480 laboratory confirmed cases were reported to national surveillance. In 2007, the annual total was 12,029, of which 54% were due to S. Enteritidis. In comparison to 2006, this is an overall decrease in the number of cases and a reduction in the number of cases due to S. Enteritidis (12,822 cases of which 56% were due to S. Enteritidis in 2006). There were 1691 PT4 cases. S. Typhimurium was the second most commonly isolated serotype in humans accounting for 13% of all laboratory confirmed cases of Salmonellosis recorded in 2007 in England and Wales.

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 15,000 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. 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.

Northern Ireland:
The number of reports of Salmonella received in 2007 was 154, (47 of these or 31% were S. Enteritidis infection and 40 (26%) were S. Typhimuirum infections). 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 2008 there were 186 cases of Salmonellosis. There were 65 cases of 65 S.Enteritidis and 35 for S.Typhimurium of these there were 4 DT 104.

Results of the investigation

There is no data available for total number of human cases of salmonellosis for 2008. There were 13,213 reported cases of salmonellosis in humans in 2007, 52.5% of which were S. Enteritidis infections and 13.6% were S. Typhimurium infections. Of the Salmonella reports received in 2007, 2776 (21%) were thought to have been acquired outside the UK.

Scotland:
There were 1011 reports of non-typhoidal Salmonella in Scotland in 2008. This is consistent with the general downward trend and constitutes a small reduction of 19 cases on the number reported in 2007 (1030 cases).

Northern Ireland:
There were 186 reports of Salmonella infection in Northern Ireland in 2008. Of these, 65 or 35% were S.Enteritidis infection and 35 (19%) were S.Typhimurium infections.

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.

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.

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in eggs and egg products

Results of the investigation

No results to report in 2008

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.

Frequency of the sampling

At retail

According to specific survey protocol

Type of specimen taken

At retail

Other: Cold sliced cooked poultry meat - ready to eat

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 6579 Microbiological examination of food and animal feeding stuffs - Horizontal method for the detection of Salmonella spp. London: British Standards Institution (BSI) 2002

Results of the investigation

Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as were not available in time for inclusion in the 2007 report.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria and other micro-

organisms, including Salmonella, in ready-to-eat cold sliced cooked meats and ready-to-eat pâtés on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were purchased, 402 were poultry and 54 were mixed variety. Salmonella was not detected in any of the cold sliced cooked meats sampled.

C. Salmonella spp. in turkey meat and products thereof

Results of the investigation

No results to report in 2008.

D. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At retail

Surveys carried out in 2007 and reported for 2008:
A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected , of which 1,693 were pork. All samples were tested for a range of microorganisms including the presence of Salmonella.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and a range of other microorganisms including Salmonella in ready-to-eat cold sliced cooked meats on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were purchased, of which 1,096 were pork.

Results of the investigation

Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as were not available in time for inclusion in the 2007 report.

In the 15 month (March 2006 to June 2007) survey to investigate the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK, Salmonella was detected in 9 of the 1,693 were pork samples in total. These included four isolations of S. Typhimurium, three isolations of S. Cerro, one isolation of S. Derby and one isolation of S. Virchow.

The survey on the the prevalence of Listeria spp. and a range of other microorganisms including Salmonella in ready-to-eat cold sliced cooked meats on retail sale in the UK did not result in any positive Salmonella results in the pork products sampled (Salmonella was not detected in any of the cold sliced cooked meats sampled in total).

E. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At retail

Surveys carried out in 2007 and reported for 2008:
A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected , of which 3,249 were beef. All samples were tested for a range of microorganisms including the presence of Salmonella.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria and other micro-organisms, including Salmonella, in ready-to-eat cold sliced cooked meats and ready-to-eat pâtés on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were purchased, of which 134 were beef. A total of 1,648 ready-to-eat pâtés were purchased, of which 1,535 were meat.

Results of the investigation

Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as were not available in time for inclusion in the 2007 report.

A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected , of which 3,249 were beef, 1,693 were pork and the remaining 1,056 were lamb. Salmonella was detected in 6 beef samples - there was one isolation of S. Dublin, one of S. Schwartzengrund and four isolations of S. Cerro.

In the 6 month (March to September 2007) survey, commissioned by the Food Standards Agency to measure the prevalence of Listeria and other micro-organisms, including Salmonella, in ready-to-eat cold sliced cooked meats and pâtés on retail sale in the UK, none of the 134 beef samples and none of the 1,535 meat pâtés sampled were positive for Salmonella.

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 poultry, unspecified - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1)]	FSA	single	25g	402	0	0	0	0

Comments:

[1)] Cold sliced cooked poultry meat

Footnote:

FSA data derived from the cooked sliced meats and pate survey - unpublished data.

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Cerro	S. Derby	S. Dublin	S. Enteritidis	S. Schwarzengrund	S. Typhimurium
Meat from bovine animals - fresh - at retail - Survey - national survey	FSA	single	Swab	3249	6	4	0	1	0	1	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1]	FSA	single	25g	134	0	0	0	0	0	0	0
Meat from pig - fresh - at retail - Survey - national survey	FSA	single	Swab	1693	9	3	1	0	0	0	4
Meat from pig - meat products - cooked, ready-to-eat - at retail - Survey - national survey [2]	FSA	single	25g	1096	0	0	0	0	0	0	0
Meat from sheep - fresh - at retail - Survey - national survey	FSA	single	Swab	1056	0	0	0	0	0	0	0
Meat, mixed meat - meat products - cooked, ready-to-eat - at retail - Survey - national survey [3]	FSA	single	25g	54	0	0	0	0	0	0	0
Meat, mixed meat - meat products - pâté - at retail - Survey - national survey	FSA	single	25g	1535	0	0	0	0	0	0	0

	S. Virchow	Salmonella spp., unspecified
Meat from bovine animals - fresh - at retail - Survey - national survey	0	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1]	0	0
Meat from pig - fresh - at retail - Survey - national survey	1	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - Survey - national survey [2]	0	0

Table Salmonella in red meat and products thereof

	S. Virchow	Salmonella spp., unspecified
Meat from sheep - fresh - at retail - Survey - national survey	0	0
Meat, mixed meat - meat products - cooked, ready-to-eat - at retail - Survey - national survey [3)]	0	0
Meat, mixed meat - meat products - pâté - at retail - Survey - national survey	0	0

Comments:

[1)] Cold sliced cooked meat
[2)] Cold sliced cooked meat
[3)] Cold sliced cooked meat

Footnote:

FSA data derived from the Red Meat Survey and Cooked sliced meats and pate survey - both unpublished.

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
Fish - smoked - cold-smoked - at retail - Survey - national survey	FSA	single	25g	1344	0	0	0	0
Fish - smoked - hot-smoked - at retail - Survey - national survey	FSA	single	25g	1878	0	0	0	0
Fishery products, unspecified - seafood pate - at retail - Survey - national survey	FSA	single	25g	79	0	0	0	0
Other processed food products and prepared dishes - vegetarian pate - at retail - Survey - national survey	FSA	single	25g	34	0	0	0	0

Footnote:

FSA data derived from the Listeria and Cooked sliced meats and pate survey - both unpublished.

2.1.4 Salmonella in animals

A. 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 (Great Britain) all isolations of Salmonella must be reported under the 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]

Monitoring for Salmonella in turkey fattening and breeding flocks is carried out on a voluntary basis by the food business operator. This is also performed by operators who are members of some farm assurance schemes

In Northern Ireland nearly all of the turkey breeding flocks are registered with the Northern Ireland Poultry Health Assurance Scheme (NIPHAS) and so do serological tesing for Salmonella.

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

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Monitoring system

Case definition

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

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

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

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

Meat production flocks: Day-old chicks

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

Meat production flocks: Rearing period

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

Meat production flocks: Before slaughter at farm

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

Meat production flocks: At slaughter (flock based approach)

Reports of Salmonella isolates 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

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 99/2003, but there wass no official Salmonella control programme for turkeys operating in 2008.

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 Salmonella, and visits will be made to the farm to carry out an epidemiological investigation and provide advice to the food business operator on the control of Salmonella if the Salmonella isolated 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]

All figures for Northern Ireland based on total number of isolations of Salmonella.
Figures from Great Britain based on total number of incidents. 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 within a 30 day period.
Units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey.

Results of the investigation

Most of the samples in turkeys are taken for monitoring purposes but diagnostic samples are also included. 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.

There were 56 reports of Salmonella in turkeys in 2008. This is a reduction of 49.5% during 2008 compared with the same period in 2007. There was a

decrease in S. Typhimurium, S. Derby, S. Kottbus, S. Newport and S. Senftenberg. The most commonly reported serotypes were S. Kedougou (39.3% of all turkey incidents) and S. Derby (35.7% of all turkey incidents). There was only one report of S. Typhimurium (U302) during January – December 2008 compared with 12 in January – December 2007. The number of reports of S. Kedougou increased in January – December 2008 to 22 reports compared with 14 reports in the same period in 2007. Reports of S. Derby decreased in January – December 2008 from 37 to 20 as did reports of S. Kottbus (25 reports to 8 reports). There were no reports of S. Newport in turkeys compared with 7 in January – December 2007.

The reduction in reports is considered to be mainly due to the voluntary application and improvement of Salmonella control measures on turkey farms following the EU wide baseline survey carried out in 2006-2007 and in preparation for the start of the turkey Salmonella NCP, due to be implemented in 2010.

In Northern Ireland, there were no positives for S. Enteriditis or S. Typhimurium during 2008 as a result of serological testing of turkey breeding flocks under the NIPHAS scheme.

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

Reports of Salmonella in turkeys decreased by 49.5% in January – December 2008 compared with the same period in 2007 (56 reports in 2008 and 111 in 2007). The most commonly reported serotypes in 2007 were S. Derby (37 isolations) and S. Kottbus (25 isolations) which comprised 32.4% and 21.9% of total reports respectively. There were 12 isolations of S. Typhimurium from turkeys during 2007, compared to only 1 in 2008.

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).

In 2005 the two most commonly isolated serovars were S. Derby and S. Kottbus (20% and 15% of total reports). There were 37 reports of S. Typhimurium 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.

From October 2006 to September 2007, the baseline Study on the Prevalence of Salmonella in Turkey Flocks of in the EU was carried out in accordance with Commission Decision 2006/666 and Technical Specification SANCO/2083/2006. 317 fattening turkey holdings were sampled. Twelve different Salmonella serovars were isolated from the 113 Salmonella positive fattening turkey holdings, giving a prevalence of 35.6%. Some holding had more than one serovar associated with them. Of the five Salmonella serovars considered of public health importance by the EU, only Salmonella Typhimurium was isolated from fattening turkey holdings in the UK. Salmonella serovars Enteritidis, Hadar, Infantis and Virchow were not isolated from any fattening turkey holdings. Salmonella Typhimurium was isolated from 16 of the 317 fattening turkey holdings sampled in the UK to give a prevalence of 5.0%. The most common phagetypes were DT 104 and DT135. Salmonella serovars other than Enteritidis and Typhimurium were isolated from 100 of the 317 holdings sampled in the UK to give a prevalence of 31.5%. (Note that a holding may have had more than one Salmonella serovar isolated from it.)

Breeding turkeys on each of the 29 eligible holdings in the UK were sampled for the survey, resulting in a total of 116 flocks sampled. Four different Salmonella serovars were isolated from the five Salmonella positive breeding turkey holdings (4 S. Kottbus, 2 S. Heidelberg, 2 S. Derby and 1 S. Typhimurium. Of the five Salmonella serovars considered of public health importance by the EU, only Salmonella Typhimurium was isolated from one breeding turkey holding in the UK. Salmonella serovars Enteritidis, Hadar, Infantis and Virchow were not isolated from any breeding turkey holdings.

Relevance of the findings in animals to findings in foodstuffs and to human cases

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

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

Monitoring system

Sampling strategy

Breeding flocks

In England, Wales and Scotland (Great Britain) all isolations of Salmonella must be reported under the 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]

Reports of Salmonella in geese usually arise from voluntary samples taken by a private veterinarian for diagnostic purposes. There is no official control plan for the control of Salmonella in any of geese sectors.

Notification system in place

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

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Results of the investigation

Submission of samples from geese is most likely to be for diagnostic purposes. There was only 1 isolation of Salmonella reported from geese during the year in the UK - S. Typhimurium, DT8 form a pet goose.

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

Monitoring system

Sampling strategy

Breeding flocks

In England, Wales and Scotland (Great Britain) all isolations of Salmonella must be reported under the 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]

Monitoring for Salmonella in duck fattening and breeding flocks is carried out on a voluntary basis by the food business operator. There is no official Salmonella control programme in the duck industry sector

Meat production flocks

As for breeding birds all Salmonella isolates must be reported.

Frequency of the sampling

Breeding flocks: Production period

Other: No official sampling undertaken. Voluntary sampling.

Meat production flocks: Before slaughter at farm

Other: No official sampling undertaken. Voluntary sampling.

Methods of sampling (description of sampling techniques)

Meat production flocks: Before slaughter at farm

Culture and isolation of Salmonella from sample taken from the animal/flock or associated with its environment.

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Case definition

Breeding flocks: Rearing period

As above. Reports of Salmonella isolates under the relevant legislation are classed as positive.

Breeding flocks: Production period

Culture and isolation of Salmonella from sample taken from the animal/flock or

associated with its environment. Reports of Salmonella isolates under the relevant legislation are classed as positive.

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Meat production flocks: Day-old chicks

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

Meat production flocks: Rearing period

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

Meat production flocks: Before slaughter at farm

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

Meat production flocks: At slaughter (flock based approach)

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

Diagnostic/analytical methods used

Breeding flocks: Production period

Bacteriological method: Various methods may be used

Meat production flocks: Before slaughter at farm

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 Regulation 2160/2003/EC and Regulation 1003/2005/EC, but there is no official Salmonella control programme for ducks.

Meat production flocks

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

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]

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Results of the investigation

There were 277 reports of Salmonella recorded in ducks during 2008. These were all incidents recorded in Great Britain.

Great Britain:
The number of reports of Salmonella in ducks fell by 22.4% in January – December 2008 compared with January – December 2007 (277 incidents in 2008; 357 in 2007). The most commonly reported serotype was once again S. Indiana (34.4% of all duck incidents). S. Orion was the second most commonly reported serotype (18.0% of all duck incidents) and the number of reports of this serotype had increased compared with the same period last year (50 reports in January - December 2008; 32 reports in January - December 2007). The number of reports of S. Kedougou (24 reports) had also increased this year compared with January – December 2007 in which there were only five reported. The phagetypes of S. Hadar reported during January – December 2008 were PT10 (6 incidents), PT11 (15 incidents), PT18 (1 incident), PT20 (5 reports), PT22 (4 reports) and UNTY (3 reports). There was a big decrease seen in the number of reports of S. Indiana (95 reports compared with 149 in January – December 2007) and S. Binza (19 reports compared with 42 in January –

December 2007). Smaller decreases were noted in the number of reports of S. Mbandaka (28 reports compared with 36 in January – December 2007) and S. Give (10 reports compared with 17 in January – December 2007).

There was one incident of S. Enteritidis in ducks (PT9b) compared with ten during January – December 2007. There were 4 incidents of S. Typhimurium reported in ducks during the year.

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

There were 363 reports of Salmonella isolations from ducks in Great Britain in 2007. As in previous years, the most frequently isolated serovar was S. Indiana (150 isolations or 41% of total incidents), with S. Hadar detected in 29 incidents (8.0%). There were 10 incidents of S. Enteritidis (2.7%) and 4 incidents of S. Typhimurium (1.1%) reported during 2007.

There were no reports of isolations of Salmonella from ducks in Northern Ireland during 2007.

There were 405 reports of Salmonella in ducks in 2006. 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 2006, 2005 and 2004 was also S. Indiana.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Salmonella Indiana is reported rarely in humans.

D. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

In the UK, all isolations of Salmonella must be reported. Almost 90% of incidents are from the isolation of Salmonella in samples taken for diagnostic purposes (clinical samples).

There is no routine official sampling.

The EU baseline survey of Salmonella and MRSA in breeding pigs was carried out during 2008 according to the requirements of Commission Decision 2008/55/EC

Multiplying herds

As for breeding herds

Fattening herds

In the UK, all isolations of Salmonella must be reported. Almost 90% of incidents are from the isolation of Salmonella in samples taken for diagnostic purposes (clinical samples).

There is no routine official sampling.

The Zoonoses National Control Programme for Salmonella in pigs is a voluntary industry operated Salmonella monitoring programme carried out by means of meat juice ELISA testing at slaughter.

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)

Meat juice

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

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Multiplying herds

As for breeding herds

Fattening herds at farm

As for breeding herds

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

Following recognition that the ZAP Salmonella Programme had not achieved its objective for reducing Salmonella in pigs (positive meat juice samples from farm assured herds in the year to 31st March 2008 stood at 29.4%1), the British Pig Executive (BPEx) launched the Zoonoses National Control Programme for pigs (ZNCP) in Great Britain April 2008. Under this new programme producers are sent a new style report showing their rolling annual meat juice ELISA results (detecting Group B and Group C1 Salmonellas), and are encouraged to aim for <10 per cent of results in the positive or weak-positive categories. Irrespective of scores all producers must maintain a Salmonella Action Plan and be able to show progress at annual reviews. Those with persistently high levels of positives are invited to request an investigatory visit from the VLA.

Northern Ireland has a similar programme operating in all slaughter plants. Funding of the montoring is initially through the industry with government support.

Since December 2007, BPEX has also supported some 30 farms which have elected to undertake interventions to control Salmonella. These interventions include vaccination, feed acidification, addition of probiotic to feed, use of meal feed, and others.

Measures in case of the positive findings or single cases

Public health authorities are advised of the isolation of Salmonella, 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]

All figures for Northern Ireland based on total number of isolations of Salmonella.
Figures from Great Britain based on total number of incidents. 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 within a 30 day period.
Units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey.

Results of the investigation

The number of pig Salmonella incidents and isolations dropped slightly in 2008, to 219 reports in the UK in total for the year. However, specifically in Great Britain there was an increase in number of incidents recorded with 174 recorded incidents compared to 163 in 2007. Salmonella Typhimurium remains the most commonly found isolate, though its relative contribution in 2008 – 67% of all incidents in the UK - is lower than at any time since 1998. S. Derby was the second most common serovar again, though at 7.5% of incidents in Great Britain, its relative contribution is almost half that of incidents recorded in Great Britain in 2004. S. London was the third most common serovar, increasing for the second successive year to nearly 6% of pig incidents in GB in 2008.

Salmonella Enteriditis and S. Montevideo were reported in pigs for first time under routine surveillance since 2003, with three and one incidents respectively. S. Carno has been reintroduced to the list with its first reported incident since

1998 while S. Orion appears here for the first time (one incident). The number of reports of S. Bovismorbificans continues to rise, with five incidents in 2008, compared to four in 2007 and one in 2006. There were no more reports of S. Anatum in pigs in 2008, following its re-appearance in 2007 for the first time since 2002.

The main definitive (DTs) and undefined (U) phage types (DTs) of S. Typhimurium, DT193 and U288 were found again in 2008. The number of incidents of DT193 recorded in GB rose by over 27% on 2007 (76% on 2006) while the number of incidents of U288 decreased slightly. There were two uncommon DTs of S. Typhimurium reported during 2008: DT8 (not reported in routine surveillance in the last ten years) and DT208 (last reported in 2004). DT8 does get reported occasionally in poultry, especially in ducks, in which historically it has been one of the most common S. Typhimurium definitive types. DTs 15a and 170b, unusual reports in 2007, were not found in 2008.

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

The number of Salmonella reports from routine reporting during 2007 (226) was an increase on the number seen in 2006 (201) and 2005 (194). There were 164 reports in 2004. In 2007, S. Typhimurium was the most commonly reported serovar, comprising 70% of total reports, with a total of 158 incidents reported during the year. The most frequently reported phage types were U288 (77 incidents) and DT 193 (30 incidents). There were 8 reports of DT 104 during the year.

The most commonly isolated serovars in 2006 were S. Typhimurium (140) and S. Derby (28) which comprised 70% and 14% of total reports respectively. The most commonly reported phage types of S. Typhimurium during 2006 were DT193 and .

During 2007 the baseline study on the prevalence of Salmonella in slaughter pigs sampled in abattoirs (Commission Decision 2006/68/EC) was carried out between October 2006 and September 2007. The survey sampled 660 pigs at 18 UK abattoris which together represented at least 80% of the slaughtered fattening pig population in the UK. Lymph node samples, carcass swabs and meat juice samples were taken. Sampling was equally distributed between months to cover the different seasons. Salmonella was isolated from 21.8% (139/639) of the ileo-caecal lymph node samples and 15.1% (97/641) of the

carcass swabs. The meat juice samples yielded a seroprevalence of 25.5% (163/640). Overall, 31.4% (201/641) of pigs showed evidence of current Salmonella infection or contamination, testing positive on carcass swabs or lymph node samples. The prevalence of Salmonella in pigs varied considerably between abattoirs.

Relevance of the findings in animals to findings in foodstuffs and to human cases

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.

E. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

Salmonella isolated in a laboratory from cattle must be reported to the competent authority and the isolate provided on request (Zoonoses Order 1989 and Zoonoses Order (Northern Ireland) 1991). Over 90% of the isolates from cattle are from samples taken for diagnostic purposes.

Frequency of the sampling

Animals at farm

Over 90% voluntary samples taken by private veterianarians 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 a private veterinarian for diagnostic purposes

Animals at slaughter (herd based approach)

A national survey of cattle in Great Britain arriving for slaughter at the abattoir was carried out in 2003.

Case definition

Animals at farm

Culture and isolation of Salmonella from sample taken from the animal, or associated with its environment.

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

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

Units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey.

Results of the investigation

There is no routine Salmonella monitoring of cattle in Great Britain, therefore the majority of isolates come from cattle with clinical disease. The number of reports is dependent on the total cattle population and the number of diagnostic submissions to government veterinary laboratories. As in previous years, the majority (> 90%) of Salmonella reports in cattle were from samples taken from clinical diagnostic purposes and came from cattle on farms.

Great Britain:
There were ~ 4% fewer Salmonella incidents in cattle reported in 2008 (595) compared to 2007 (619). Incidents of Salmonella Typhimurium decreased by 11% compared to 2007 (from 83 to 74). Salmonella Dublin incidents increased by 0.5% (from 375 to 377). Of the 595 incidents in cattle, 48% were in adult cattle, 33% in calves and 19% in cattle of unknown age. Salmonella Dublin remains the most common serotype isolated from cattle (63% of incidents), followed by S. Typhimurium (12% of incidents), S. Mbandaka (5% of incidents), S. Montevideo and S. Anatum (3% each). There was only one reported incident involving S. Enteritidis in 2008 in cattle in 2008.

For the tenth consecutive year, S. Dublin was the most common serotype in adult cattle (51.6% of incidents) and in calves (76.8% of incidents). Like in

previous years, there was a seasonal association of incidents due to S. Dublin, although the peak was observed towards the last months of 2008 unlike in previous years, when this peak was more marked in the autumn. Salmonella Dublin is the most common serotype associated with abortion in cattle. During 2008 the number of incidents of S. Dublin abortion in cattle was similar to 2007.

Salmonella Typhimurium continued to be the second most common serotype in cattle in 2008, and was responsible for about 15.9% of incidents in adult cattle (Table 12) and 8.6% of incidents in calves (Table 14). During 2007 S. Typhimurium was responsible for 15.8% and 10.9% incidents in adult cattle and calves, respectively).

Of all S. Typhimurium incidents in 2008, 60% (45) were recorded in adult cattle, 23% (17) in calves and the remainder in cattle of unknown age. As in previous years, DT104 was the most frequently recorded definitive type, representing 46.7% of S. Typhimurium incidents in adult cattle and 29.4% of S. Typhimurium incidents in calves.

Unlike in 2007, no distinctive summer seasonal peak was observed, and the largest number of incidents were recorded in January and June.

The number of incidents due to S. Typhimurium DT104 was slightly lower (n=27) than in 2007 (n=34). This confirmed a decreasing trend since 2005-2006 (over 100 incidents each year). The number of incidents due to a phage type of the DT104 lineage (which includes DT12, DT104b, DT120 and DT302) was 50, compared with 53 in 2007. S. Typhimurium DT193 was responsible for 9 incidents during 2008 (11 in 2007), being the third most common definitive type, behind DT104 and DT104b.

Once incident due to S. Typhimurium definitive type DT1 was reported also in 2008 (one in 2007), and two incidents of DT191a were reported in 2008 for the first time since reporting began in 1985. No incidents due to S. Infantis, S. Hadar or S. Virchow were reported.

In 2008, S. Cerro and S. Alachua, were isolated from cattle for the first time since 1994 and 1985 respectively, and S. Oslo was isolated from cattle for the first time since reporting began in 1985.

Northern Ireland:
There were a total of 229 reports of isolation of Salmonella from cattle in Northern Ireland in 2008. The majority of these were S. Dublin (213)

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

The number of reports of Salmonellosis in cattle in the UK in 2007 increased to 857 compared to 750 reported in 2006. There were 989 reports in 2005 and 1218 reports in 2004.

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

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

F. Salmonella spp. in Gallus Gallus - breeding flocks

Monitoring system

Frequency of the sampling

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

Other: All consignments sampled on arrival

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

Other: When birds are 4 weeks old and 2 weeks before moving to laying phase/laying unit

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

Every 2 weeks during the production period

Type of specimen taken

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

Other: Hatchery tray liners, chick box liners or chicks dead on arrival or culls

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

Other: Boot swabs or composite faeces

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

Other: Boot swabs or composite faeces

Methods of sampling (description of sampling techniques)

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

According to the requirements of the NCP, mandatory sampling is required on the day of arrival - samples must be taken from each flock within 72 hours of age, comprising of at least the following from each hatchery supplying the chicks:
- Hatchery tray liners, chick box liners: one liner for each 500 chicks delivered, up to a maximum of 10 liners
- All chicks dead on arrival and culls at day old, up to a maximum of 60.

Operator voluntary monitoring can include hatchery debris, dust, fluff etc samples.

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

According to the requirements of the NCP, mandatory sampling is required at 4 weeks old and then 2 weeks before moving to the laying phase or laying unit as follows:
- A minimum of 2 pairs of boot swabs or
- A composite faeces sample made up from individual 1g faeces samples selected at random from sites to represent the whole building/space available to the birds. The size of the sample required is determined by the number of birds in the building/flock.

Other operator voluntary monitoring can include boot swabs, dust samples etc.

Breeding flocks: Production period

According to the requirements of the NCP, mandatory sampling is required every 2 weeks during the laying/production period as follows:
- A minimum of 5 pairs of boot swabs or
- A composite faeces sample made up from individual 1g faeces samples selected at random from sites to represent the whole building/space available to the birds. The size of the sample required is determined by the number of birds in the building/flock

In addition to the sampling above, 3 sets of Official Control Samples are collected from each breeding flock as follows: a) within 4 weeks of moving to the laying accommodation, b) in the middle of the lay, and c) within the last 8 weeks of production.

Other operator voluntary monitoring can include hatchery debris, fluff, boot swabs, dust samples etc.

Case definition

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

Culture and isolation of Salmonella (non vaccine strain) from sample taken from the animal, or associated with its environment.

"Flock" is defined as poultry of the same health status kept on the same holding or in the same enclosure and constituting a single epidemiological unit and, in the case of housed poultry, includes all birds sharing the same airspace

Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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.

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 in breeding flocks, in rodent control on poultry farms and in the production, handling and transport of feed have been published in collaberation with the industry

Control program/mechanisms

The control program/strategies in place

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

Directive 99/2003/EC and Regulation 2160/2003/EC lay down harmonised rules for the monitoring and control of Salmonella in breeding flocks of domestic fowl. The Regulation was implemented in the UK through the Poultry Breeding Flocks and Hatcheries Order, now the Control of Salmonella in Poultry Order (England) 2007 (and equivalent legislation in Scotland, Wales and Northern Ireland). This implements the National Control Programme (NCP) for Breeding Flocks (of chickens – Gallus gallus) required by Regulation (EC) No. 2160/2003, to meet the target for reduction in Salmonella prevalence set out in Regulation (EC) No. 1003/2005.

Regulation (EC) No. 1003/2005 sets a target for the breeding flock sector to ensure that no more than 1% of adult breeding flocks with more than 250 birds remain positive for Salmonellas of human health significance by the end of 2009. The EU target for breeding flocks is based on the 5 most frequent serotypes in human cases which are: S.Enteritidis, S. Typhimurium, S. Virchow, S. Hadar and S. Infantis. Any breeding flock found to be infected with Salmonella according to the protocol outlined above is placed under official control and the requirements of the Regulation 2160/2003/EC are carried out.

Measures in case of the positive findings or single cases

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

Public health authorities are advised of the isolation of Salmonella, and visits will be made to the farm to carry out an epidemiological investigation and provide advice to the food business operator on the control of Salmonella if the Salmonella isolated is of public health significance.

Any breeding flock found to be infected with S. Typhimurium or S. Enteritidis 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. In the case of detection of S. Hadar, S. Infantis or S. Virchow, a control plan for eradication of

infection is put in place, in collaberation with government experts on Salmonella control and the operator's private veterinary surgeon.

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.
- 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 Control of Salmonella in Poultry Order 2007 are:
- Under the NCP owners of poultry breeding flocks of more than 250 birds must be registered unless officials have access to flock information from another source (e.g. the GB Poultry Register). Information supplied should include the name and address of the holding, the number (and species) of breeding flocks on the holding, the number of poultry in each breeding flock, their status in the breeding pyramid (e.g. Parent, Elite) and whether layer breeders or meat (broiler) breeders.
- It is a requirement of the NCP that owners record the movements of birds, chicks or eggs onto and off the premises, including dates of movements, numbers of poultry, chicks or eggs moved, their ages, building/ flock identity and the addresses of source or destination premises. This information must be made available for inspection on request by a government authorised official. Owners must also inform officials with 2 weeks notice of the expected date of movements to the laying phase or laying unit and also the date on which the flock is expected to reach the end of the production cycle. This is done to facilitate the collection of official samples.
- The owner/operator is required to maintain records of the dates of sampling, type of samples collected, the identity of building, flock or holding sampled and the age of each flock sampled. Owners should also keep a record of the test result and name of laboratory used.

Results of the investigation

Eight adult breeding flocks were confirmed as infected with S. Typhimurium during 2008. Six flocks were located on one holding, 2 others on one other holding. No other Salmonella serotypes of public health significance (SOPHS) as designated in the legislation, were identified in testing under the National Control Programme in adult breeding flocks in production. Using a total tested flocks figure of 1636, the estimated prevalence for the top 5 servars for the UK for 2008 is 0.49% [8/1636], which is below the Community target of 1% of adult breeding flocks to remain SOPHS positive by the end of 2009.

A further 13 adult breeding flocks on 10 holdings were identified with non-SOPHS Salmonella during the year.

There were a 3 immature breeding flocks in the rearing stage detected as positive for Salmonella under the NCP sampling requirements in 2008. One flock was positive for S. Enteritidis, one for S. Typhimurium and one flock for a mixed S. Mbandaka/S. Tennessee infection

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 2008. Likewise there were no reports of S. Typhimurium, S. Infantis, S. Virchow or S. Hadar. In total the only reports Salmonella isolated from the layer breeder line in 2008 was 2 flocks detected positive for S. Thompson. In total in 2007, the only report of a Salmonella isolated from the layer breeder line was 1 S. Dublin isolation.

In total 8 flocks of the broiler breeder line were detected positive for Salmonella Typhimurium in 2008. Only 1 positive incident of Salmonella of one of the Top5 serovars was discovered in adult breeding flocks in 2007. This was a positive result for S. Typhimurium in a parent Broiler Breeder (Meat Production Line) flock.

In the UK in 2006 there were no S. Enteritidis, S. Hadar, S. Infantis, or S. Virchow isolated from the breeding sector. In a non commercial backyard 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 jurisdiction of relevent legislation for the control of Salmonella of human health significance in breeding flocks.

G. Salmonella spp. in Gallus Gallus - flocks of laying hens

Monitoring system

Frequency of the sampling

Laying hens: Day-old chicks

Other: all consignments sampled on arrival

Laying hens: Rearing period

_2 weeks prior to moving to the laying unit/ start of lay

Laying hens: Production period

Every 15 weeks during the production period

Type of specimen taken

Laying hens: Day-old chicks

Hatchery tray liners, chick box liners, chicks dead on arrival and cull chicks

Laying hens: Rearing period

Other: Boot swabs or composite faeces

Laying hens: Production period

Other: Boot swabs or composite faeces (dust sample on official test)

Methods of sampling (description of sampling techniques)

Laying hens: Day-old chicks

According to the requirements of the NCP, mandatory sampling is required on the day of arrival, comprising of at least the following from each hatchery supplying the chicks:
- Chick box liners: one liner for each 500 chicks delivered, up to a maximum of 10 liners for every batch of chicks delivered.
- All chicks dead on arrival and culls at day old, up to a maximum of 60 from each hatchery delivery.

Laying hens: Rearing period

According to the requirements of the NCP, mandatory sampling is required 2 weeks before moving to the laying phase or laying unit as follows:
- A minimum of 2 pairs of boot swabs (for floor reared birds) to be representative of the whole area in the house to which the birds have access or
- A large composite faeces sample (for cage reared) selected at random from sites to represent the whole building/space available to the birds.

Other operator voluntary monitoring can include rodent droppings, dust samples etc.

Laying hens: Production period

According to the requirements of the NCP, mandatory sampling is required every

15 weeks during the laying/production period of the flock starting at 22-26 weeks of age as follows:
- A minimum of 2 pairs of boot swabs to be representative of the whole area in the house to which the birds have access or
- Two x 150g composite faeces sample taken to represent the whole building/space available to the birds.

In addition to the sampling above, one Official Control Sample is collected annually from one laying flock on all premises with more than 1000 birds (two pairs of boot swabs or two composite faeces samples, and a dust sample)

Other operator voluntary monitoring can include rodent faeces and other environmental samples, dust samples etc.

Case definition

Laying hens: Production period

Culture and isolation of Salmonella (non vaccine strain) from sample taken from the animal, or directly associated with its environment.

"Flock" is defined as poultry of the same health status kept on the same holding or in the same enclosure and constituting a single epidemiological unit and, in the case of housed poultry, includes all birds sharing the same airspace

Diagnostic/analytical methods used

Laying hens: Day-old chicks

Bacteriological method: ISO 6579:2002

Laying hens: Rearing period

Bacteriological method: ISO 6579:2002

Laying hens: Production period

Bacteriological method: ISO 6579:2002

Laying hens: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

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 in the UK are vaccinated with a Salmonella vaccine

Other preventive measures than vaccination in place

Laying hens flocks

Codes of good practice in the control of Salmonella in laying flocks, in rodent control on poultry farms and in the production, handling and transport of feed have been published in collaberation with the industry

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

Directive 99/2003/EC and Regulation 2160/2003/EC lay down harmonised rules for the monitoring and control of Salmonella in laying flocks of domestic fowl. The legislation sets out enhanced monitoring and controls for Salmonella in laying flocks which has been implemented by the National Control Programme (NCP) for laying flocks. The Regulation was implemented in the UK through the Control of Salmonella in Poultry Order (England) 2007 (and equivalent legislation in Scotland, Wales and Northern Ireland). This implements the National Control Programme (NCP) for laying flocks (of chickens – Gallus gallus) required by Regulation (EC) No. 2160/2003, to meet the target for reduction in Salmonella prevalence set out in Regulation (EC) No. 1168/2006. The NCP applies to all those who produce eggs unless all the eggs are for private domestic use or are supplied in small quantities by the producer to the final consumer/local retail shops.

Regulation (EC) No. 1168/2006 sets a target for the laying flock sector to ensure that a 10% reduction year on year is achieved from the baseline of 8% prevalence set by the EU survey. The EU target for laying flocks is based on the 5 most frequent serotypes in human cases which are: S.Enteritidis and S. Typhimurium. Any laying flock found to be infected with Salmonella according to the protocol outlined above is placed under official control and the requirements of the Regulation 2160/2003/EC are carried out.

According to Commission Regulation (EC) 1177/2006, the administration of antimicrobials to any bird of the species Gallus gallus as a specific method to control Salmonella is prohibited. The same legislation also prohibits the administration of any live Salmonella vaccine to any bird of the species Gallus gallus where the manufacturer does not provide an appropriate method to distinguish bacteriologically wild-type strains of Salmonella from vaccine strains.

Measures in case of the positive findings or single cases

Laying hens flocks

In 2008, if a flock was confirmed infected with S. Enteritidis or S. Typhimurium, a Salmonella advisory and investigation visit was carried out to the premises. All other flocks on the holding were sampled officially. Following depopulation of a S. Enteritidis/S. Typhimurium positive flock another official sample was required in the follow-on flock at 22-26 weeks of age.

In some cases in 2008 enhanced/more sensitive sampling (10 dust and 10

faecal hand swab samples) was taken from all layer flocks on the holding with the farmer's agreement. The purpose of this voluntary enhanced sampling was to assist the farmers to identify where infection was present on the infected holdings and control Salmonella infection before the heat treatment of eggs from S. Enteritidis/S. Typhimurium infected flocks became a requirement in 2009.

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.
- Samples (including live birds) may be taken for diagnosis.
- Movement restrictions and isolation requirements may be imposed where relevent.
- Compulsory cleansing and disinfection of premises and vehicles where relevent

The main provisions of the Control of Salmonella in Poultry Order 2007 are:
- Owners of chicken laying flocks of more than 250 birds must be registered unless officials have access to flock information from another source (e.g. the GB Poultry Register). Information supplied should include the name and address of the holding, the number of laying hens on the holding.
- It is a requirement of the NCP that owners record the movements of birds, chicks or eggs onto and off the premises, including dates of movements, numbers of poultry, chicks or eggs moved, their ages, building/ flock identity and the addresses of source or destination premises. This information must be made available for inspection on request by a government authorised official.
- The owner/operator is required to maintain records of the dates of sampling, type of samples collected, the identity of building, flock or holding sampled and the age of each flock sampled. Owners should also keep a record of the test result and name of laboratory used.

Results of the investigation

51 adult flocks of egg laying hens of Gallus gallus were positive for S. Enteritidis &/or S. Typhimurium. In total 47 flocks were positive for S. Enteritidis and 4 flocks were positive for S. Typhimurium. There were 2 flocks on the same holding found positive for both S. Enteritidis and S. Typhimurium. These flocks were only counted as postive once with the initially detected serovar as per the requirements of the legislation.

One adult flock of egg laying hens of Gallus gallus were positive for S. Virchow

RDNC. No adult flocks were positive for S. Infantis or S. Hadar.

Fifteen adult flocks were positive for Salmonella serovars other than Salmonellas designated of specific public health significance in the legislation (SOPHS). Two flocks were found infected with S. Agona, two with S. Livingstone, two with S. Agama, one with S. Saintpaul, one with S. Newport, one with S. Anatum, two with S. Tennessee, one with S. Seftenberg, one with S. Ordonez and two Salmonella rough strains.

Fourteen immature (in-rear) flocks of egg laying hens of Gallus gallus were positive for any Salmonella serovar. Four were positive for S. Enteritidis. One was positive for S. Typhimurium. No immature (in-rear) flocks were positive for S. Hadar, S. Infantis or S. Virchow.

In total, nine immature (in-rear) flocks were positive for Salmonella serovars other than SOPHS. Six flocks were positive for S. Senftenberg (five of the six S. Senftenberg positive in-rear flocks resulted from chick-box liner sampling at day old), one for S. Poona, two for S. Agama and one for S. Kedougou. There was 1 immature flock positive for S. Enteritidis & S. Agama, and that was included once in the flock count for S. Enteritidis only.

The UK population denominator for adult laying flocks was derived from the Great Britain Poultry Register and from records held by the Department of Agriculture and Rural Development (DARD) for Northern Ireland. In total records showed 5523 registered houses on premises with more than 350 laying hens and elligible for compliance with the requirements of the NCP.

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

The majority of egg production in the UK has voluntarily operated to an industry code of practice for a number of years. In addition, enhanced surveillance for Salmonella occurred during 2007 in preparation for the start of the National Control Programme in 2008.

During 2007 there were 67 incidents of Salmonella recorded in commercial egg laying flocks in the UK during routine monitoring/ surveilance carried out by farm business operators. Of these, 31 were S. Enteritidis and 3 were S. Typhimurium. Overall, in layers up to the start of 2008, the total number of routine reports was low and this coupled with the voluntary nature of the sampling makes it difficult to establish any trend.

H. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

Monitoring for Salmonella in broilers is carried out on a voluntary basis by the food business operator. This is also performed by operators who are members of some farm assurance schemes

Case definition

Broiler flocks: Before slaughter at farm

Culture and isolation of Salmonella from sample taken from the animal, or associated with its environment.

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Vaccination policy

Broiler flocks

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

Other preventive measures than vaccination in place

Broiler flocks

Codes of good practice in the control 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 poultry industry.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

There was no official Salmonella Control Programme in broilers in the UK in 2008. The NCP for broilers will be implemented in the UK according to EU regulations from January 2009.

Measures in case of the positive findings or single cases

Broiler flocks: Before slaughter at farm

Public health authorities are advised of the isolation of Salmonella, and visits will be made to the farm to carry out an epidemiological investigation and provide advice to the food business operator on the control of Salmonella if the Salmonella isolated is of public health significance.

It is the responsibilty of the food business operator to notify the Official Veterinarian at the slaughterhouse of the Salmonella status of the flock prior to slaughter so that suitable precautions can be put in place to prevent the possiblity of cross-contamination and to minimise the risk to public health.

Notification system in place

In England, Wales and Scotland (Great Britain) all isolations of Salmonella must be reported under the 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].

Units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey.

Results of the investigation

There were in total 74 incidents of Salmonella detected in broilers reported during 2008. Of these, S. Typhimurium was isolated twice and S. Enteritidis once.

There were four reports of S. Virchow during January – December 2008. All incidents came from chicken broiler flocks and were PT54 (2 reports), PT2 (1 report) and PT26 (1 report)

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Dublin	S. Enteritidis	S. Hadar	S. Infantis	S. Mbandaka	S. Tennessee
Gallus gallus (fowl) - elite breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	4	NRL/AH/DAR	flock	4	0	0	0	0	0	0	0
Gallus gallus (fowl) - elite breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	97	NRL/AH/DAR	flock	97	0	0	0	0	0	0	0
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	73	NRL/AH/DAR	flock	73	1	0	0	0	0	0	0
Gallus gallus (fowl) - grandparent breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	106	NRL/AH/DAR	flock	106	6	0	0	0	0	0	0
Gallus gallus (fowl) - parent breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	122	NRL/AH/DAR	flock	117	1	0	0	0	0	0	0
Gallus gallus (fowl) - parent breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	1241	NRL/AH/DAR	flock	1239	13	2	0	0	0	6	0
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes - official and industry sampling - selective sampling [1)]		NRL/AH/DAR	flock		3	0	1	0	0	1	1

Table Salmonella in breeding flocks of Gallus gallus

	S. Thompson	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - elite breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	0	0	0	0
Gallus gallus (fowl) - elite breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	0	0	0	0
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	1	0	0	0
Gallus gallus (fowl) - grandparent breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	0	6	0	0
Gallus gallus (fowl) - parent breeding flocks for egg production line - during production period - at farm - Control and eradication programmes - official and industry sampling	1	0	0	0
Gallus gallus (fowl) - parent breeding flocks for meat production line - during production period - at farm - Control and eradication programmes - official and industry sampling	3	2	0	0
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes - official and industry sampling - selective sampling [1)]	0	1	0	0

Comments:

[1)] Number of flocks in rear not known

Footnote:

NRL= National Reference Laboratory for Salmonella. AH is the Animal Health Agency. DARD is the Department for Agriculture and Rural Development, Northern Ireland. Data on Salmonella for 2008 is provided in collaberation with these institutions

Table details testing of adult breeding flocks across broiler breeder and layer breeder lines in fulfilment of the requirements of the National Control Programme and monitoring of the achievement of the EU designated target for breeding flocks.

The number of flocks in layer- and broiler breeder line categories that were registered and therefore subject to at least one official test in Jan-end December 2008 is used as the denominator population.

“Flock” is defined as poultry of the same health status kept on the same holding or in the same enclosure and constituting a single epidemiological unit and, in the case of housed poultry, includes all birds sharing the same airspace.

One immature (rearing-stage) flock was identified with S. Tennessee and S. Mbandaka infection during the year. A further two immature broiler breeder flocks were detected positive during rear - one with S. Enteritidis and one with S. Typhimurium.

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Ducks - breeding flocks - at farm - Monitoring - industry sampling [1]		NRL	flock		4	0	0	4
Ducks - laying ducks - at farm - Monitoring - industry sampling [2]		NRL	flock		5	1	3	1
Ducks - meat production flocks - at farm - Monitoring - industry sampling [3]		NRL	flock		265	0	0	265
Ducks - unspecified - at farm - Monitoring - industry sampling [4]		NRL	flock		3	0	1	2
Gallus gallus (fowl) - broilers - at farm - Monitoring - industry sampling [5]		NRL	flock		74	1	2	71
Gallus gallus (fowl) - laying hens - during production period - at farm - Control and eradication programmes - industry sampling - census sampling [6]	5523	NRL/approve	flock		37	22	3	14
Gallus gallus (fowl) - laying hens - during production period - at farm - Control and eradication programmes - official and industry sampling [7]	5523	NRL/AH/DAR	flock		67	49	4	16
Gallus gallus (fowl) - laying hens - during production period - at farm - Control and eradication programmes - official sampling - objective sampling [8]	4035	NRL/AH/DAR	flock	182	6	5	1	0
Gallus gallus (fowl) - laying hens - during production period - at farm - Control and eradication programmes - official sampling - suspect sampling [9]	5523	NRL/AH/DAR	flock		24	22	0	2
Gallus gallus (fowl) - laying hens - during rearing period - at farm - Control and eradication programmes - industry sampling [10]		NRL	flock		14	4	1	9
Gallus gallus (fowl) - unspecified - in total - Clinical investigations [11]		NRL	animal		1	0	1	0

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Geese - unspecified - at farm - Clinical investigations [12)]		NRL	animal		1	0	1	0
Turkeys - breeding flocks - at farm - Monitoring - industry sampling [13)]		NRL	flock		2	0	0	2
Turkeys - meat production flocks - at farm - Monitoring - industry sampling [14)]		NRL	flock		51	0	1	50
Turkeys - unspecified - at farm - Monitoring - industry sampling [15)]		NRL	flock		3	0	0	3

Comments:

[1)] Total incidents reported
[2)] Total incidents reported
[3)] Total incidents reported
[4)] Total incidents reported
[5)] Total incidents reported
[6)] Total units tested not known as negative approved private laboratory testing returns derived from operator sampling may include duplication of flocks in the overall total.

[7)] Number of positive flocks reported. Population data derived from the Great Britain Poultry Register for GB and from DARD for Northern Ireland. Only flocks elligible for inclusion under the Salmonella NCP included in the total. Total units tested not known
[8)] Total number of premises where 1 flock elligible for annual sampling is 1202. Number of positive flocks reported. Number of flocks derived from the Great Britain Poultry Register for GB and from DARD for Northern Ireland. Only flocks elligible for annual official testing under the Salmonella NCP included in the total.

[9)] Total number of flocks sampled unknown
[10)] Number of positive flocks reported, Includes flocks in rear and chicks. Total number of rearing flocks unknown.
[11)] Pet poultry
[12)] Pet goose
[13)] Total incidents reported
[14)] Total incidents reported
[15)] Total incidents reported

Footnote:

NRL= National Reference Laboratory for Salmonella. AH is the Animal Health Agency. DARD is the Department for Agriculture and Rural Development, Northern Ireland. Data on Salmonella for 2008 is provided in collaberation with these institutions

Most isolates in poultry are derived from voluntary industry monitoring for Salmonella.

All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.

Units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey.

Table details testing of adult laying flocks in fulfilment of the requirements of the National Control Programme. There were approximately 5523 laying flocks elligible for testing under the requirements of the NCP in the UK during 2008. This includes all flocks on all UK premises with the exception of producers producing small quatntities of primary product for own use or for direct supply to the final consumer as per Regulation No 2160/2003/EC. As this figure includes flocks on premises with under 1000 laying hens, which are not subject to annual official sampling, this population figure is derived from the GB Poultry Register where the number of recorded houses per premise is assumed to approxinmately equate to number of flocks present and records on population held at DARD.

There were 2 flocks detected as positive to both Salmonella Enteritidis and Salmonella Typhimurium. These flocks have only been recorded in the total figure once as per legislative requirements but the isolations of both serotypes are included in the relevent columns

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
Partridges - in total - Clinical investigations	NRL	animal		5	0	2	3
Pheasants - in total - Clinical investigations	NRL	animal		11	0	4	7
Pigeons - in total - Clinical investigations	NRL	animal		31	0	31	0

Footnote:

NRL= National Reference Laboratory for Salmonella.
Isolates from Great Britain only.
Mainly clinical isolates.
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.
Total number of incidents reported. 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 within a 30 day period.

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
All animals - unspecified - at farm - Clinical investigations	NRL	animal		9	0	1	8
Cattle (bovine animals) - at farm - Clinical investigations	NRL	animal		824	1	78	745
Pigs - at farm - Clinical investigations	NRL	animal		219	3	147	69
Sheep - at farm - Clinical investigations	NRL	animal		143	0	3	140
Solipeds, domestic - at farm - Clinical investigations	NRL	animal		35	1	24	10

Footnote:

NRL= National Reference Laboratory for Salmonella. UK data - England, Wales, Scotland and Northern Ireland.
In the table "All animals - unspecified" refers to isolates from Northern Ireland from non-defined miscellaneous animal species.
Most isolates in cattle, sheep and pigs and all in horses are from clinical diagnostic samples.
All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents. 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 within a 30 day period.
Units tested are not known because the laboratories do 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 Britain:
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 Great Britain 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

In the three years from 2006 until 2008 there has been little change in the isolation rate of Salmonella. In 2006 it was 1.1%, in 2007 0.9% and in 2008 1.1%. An increase in the total numbers of tests recorded between 2007 and 2008 is noted with approximately 5,500 extra tests reported (2007 – 35,999; 2008 – 41,537).

The number of reported isolations of Salmonella considered to be of greatest potential public health significance (S. Typhimurium, S. Enteritidis, S. Hadar, S. Virchow, S. Infantis) was fourteen in 2008 as compared with four in 2007. Although over a four fold increase in isolation is evident, the low numbers involved does not allow for any significance to be attached to this increase.

S. Typhimurium: in 2008 seven isolates were recorded of various Definitive Types. The isolates were from a variety of material with no obvious trend or pattern to the types or material from which they were isolated. In previous years similar numbers and spread of phage types were recorded – 2006 in 9 and 4 in 2007.

S. Enteritidis: one Phage Type 4 was isolated in 2008.

S. Hadar: one isolate recorded in 2008.

S. Virchow: none in 2008.

S. Infantis: five isolates recorded in 2008.

Amongst the other serotypes no especial conclusions can be drawn, there being no obvious trends visible in the data.

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

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. 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
Feed material of land animal origin - bone meal - in total - Monitoring - official sampling	NRL	batch	500g		1	1	0	0
Feed material of land animal origin - meat and bone meal - in total - Monitoring - official sampling	NRL	batch	500g		8	0	0	8
Feed material of marine animal origin - fish meal - in total - Monitoring - official sampling	NRL	batch	500g		2	0	0	2
Feed material of marine animal origin - fish meal - in total - Surveillance - HACCP and own checks	NRL	batch	500g		24	0	0	24
Other feed material - miscellaneous - in total - Monitoring - official sampling	NRL	batch	500g		2	0	0	2

Footnote:

Home produced feed material of animal origin are subjected to official testing under the Animal Byproducts Regulations 2005.
Isolates derived from non official sampling are from samples taken by feed business operators as part of HACCP. Total units tested are not known. 500g sample recommended but may vary.
Salmonella isolates are sent to the National Reference Laboratory (NRL) for serotyping.

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Feed material of cereal grain origin - wheat derived - in total - Surveillance - HACCP and own checks	NRL	batch	500g		8	0	0	8
Feed material of oil seed or fruit origin - palm kernel derived - in total - Surveillance - HACCP and own checks	NRL	batch	500g		1	0	0	1
Feed material of oil seed or fruit origin - rape seed derived - in total - Surveillance - HACCP and own checks	NRL	batch	500g		8	0	0	8
Feed material of oil seed or fruit origin - soya (bean) derived - in total - Surveillance - HACCP and own checks	NRL	batch	500g		72	0	2	70
Feed material of oil seed or fruit origin - sunflower seed derived - in total - Surveillance - HACCP and own checks	NRL	batch	500g		13	0	0	13
Other feed material - miscellaneous - at feed mill - environmental sample - Surveillance - HACCP and own checks	NRL	single			3	0	0	3
Other feed material - other plants - in total - Surveillance - HACCP and own checks	NRL	batch	500g		79	0	2	77

Footnote:

Isolates derived from non official sampling are from samples taken by feed business operators as part of HACCP. Total units tested are not known. 500g sample recommended but may vary (operators may take more or less).
Salmonella isolates are sent to the National Reference Laboratory (NRL) for serotyping.

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Compound feedingstuffs for cattle - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		13	0	0	13
Compound feedingstuffs for fish - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		2	0	0	2
Compound feedingstuffs for pigs - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		5	0	0	5
Compound feedingstuffs for poultry (non specified) - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		17	0	1	16
Compound feedingstuffs for sheep - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		3	0	1	2
Compound feedingstuffs, not specified - in total - Surveillance - HACCP and own checks	NRL	batch	500g		7	0	1	6
Pet food - process control - in total - Surveillance - HACCP and own checks	NRL	batch	500g		2	0	0	2

Footnote:

Table contains data for Great Britain - England, Wales and Scotland only.
The sample size recommended is 500g made up of a statistical number of sub-samples from the batch. A sub-sample of the 500g 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 National Reference Laboratory (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	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		All animals - unspecified		Birds - wild - Game birds, farmed		Ducks
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**824**		**219**	**376**					**9**		**16**	**277**
Number of isolates serotyped	**0**	**824**	**0**	**219**	**376**	**0**	**0**	**0**	**0**	**9**	**0**	**16**	**277**
Number of isolates per serovar													
S. Agama		16			5								
S. Agona		1			7								
S. Ajiobo		1											
S. Alachua		1											
S. Anatum		20			4								1
S. Bovismorbificans				5						1			
S. Bredeney				1	1								

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		All animals - unspecified		Birds - wild - Game birds, farmed		Ducks
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**824**		**219**	**376**					**9**		**16**	**277**
Number of isolates serotyped	**0**	**824**	**0**	**219**	**376**	**0**	**0**	**0**	**0**	**9**	**0**	**16**	**277**
Number of isolates per serovar													
S. Butantan		1											
S. Carno				1									
S. Cerro		1											
S. Derby		1		13	1					1		1	
S. Dublin		590		1	4					3		1	
S. Duesseldorf		1											
S. Durham		3			1								
S. Enteritidis		1		3	80								1
S. Give				3	1								10
S. Goldcoast		1		1	1								
S. Hadar													35
S. Havana					4								2

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		All animals - unspecified		Birds - wild - Game birds, farmed		Ducks
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**824**		**219**	**376**					**9**		**16**	**277**
Number of isolates serotyped	**0**	**824**	**0**	**219**	**376**	**0**	**0**	**0**	**0**	**9**	**0**	**16**	**277**
Number of isolates per serovar													
S. Indiana					1								95
S. Infantis				1	6								
S. Kedougou				6	13								24
S. Kentucky					1					1			
S. Kimuenza		2											
S. Kottbus		6										1	
S. Livingstone					16								
S. London				10									
S. Mbandaka		29		1	73								28
S. Montevideo		19		1	3								
S. Nagoya		1											
S. Newport		17		1	1								1

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		All animals - unspecified		Birds - wild - Game birds, farmed		Ducks
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**824**		**219**	**376**					**9**		**16**	**277**
Number of isolates serotyped	**0**	**824**	**0**	**219**	**376**	**0**	**0**	**0**	**0**	**9**	**0**	**16**	**277**
Number of isolates per serovar													
S. Nottingham		1			2								
S. Ohio		3			16								3
S. Ordonez					1								
S. Orion				1	1								50
S. Oslo		1											
S. Panama				1									
S. Poona					1								
S. Reading				9									
S. Rissen					1								
S. Saintpaul					1								
S. Senftenberg					24								1
S. Tennessee					42								

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		All animals - unspecified		Birds - wild - Game birds, farmed		Ducks
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**824**		**219**	**376**					**9**		**16**	**277**
Number of isolates serotyped	**0**	**824**	**0**	**219**	**376**	**0**	**0**	**0**	**0**	**9**	**0**	**16**	**277**
Number of isolates per serovar													
S. Thompson					9								
S. Typhimurium		78		147	36					1		6	4
S. Virchow					6								
S. IIIb61:k:1,5,7		2											
S. Paratyphi B var. Java					1								
S. IIIb 61:-:1,5,7		1								2			
S. enterica subsp. arizonae													
Not typeable		13		12	6								3
Salmonella spp., unspecified		6											
S. enterica subsp. enterica, rough		7		1	5								
S. Binza					1							7	19

Table Salmonella serovars in animals

Serovars	Ducks	Geese		Solipeds, domestic		Sheep		Turkeys	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**1**		**35**		**143**	**56**	
Number of isolates serotyped	**0**	**0**	**1**	**0**	**35**	**0**	**143**	**56**	**0**
Number of isolates per serovar									
S. Agama					1				
S. Agona									
S. Ajiobo									
S. Alachua									
S. Anatum					2				
S. Bovismorbificans									
S. Bredeney									
S. Butantan									
S. Carno									
S. Cerro									
S. Derby							3	20	
S. Dublin							9		

Table Salmonella serovars in animals

Serovars	Ducks	Geese		Solipeds, domestic		Sheep		Turkeys	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**1**		**35**		**143**	**56**	
Number of isolates serotyped	**0**	**0**	**1**	**0**	**35**	**0**	**143**	**56**	**0**
Number of isolates per serovar									
S. Duesseldorf									
S. Durham					1				
S. Enteritidis					1				
S. Give									
S. Goldcoast									
S. Hadar									
S. Havana									
S. Indiana							2	2	
S. Infantis					1				
S. Kedougou								22	
S. Kentucky									
S. Kimuenza									

Table Salmonella serovars in animals

Serovars	Ducks	Geese		Solipeds, domestic		Sheep		Turkeys	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**1**		**35**		**143**	**56**	
Number of isolates serotyped	**0**	**0**	**1**	**0**	**35**	**0**	**143**	**56**	**0**
Number of isolates per serovar									
S. Kottbus								8	
S. Livingstone									
S. London									
S. Mbandaka									
S. Montevideo							23	1	
S. Nagoya									
S. Newport					4		1		
S. Nottingham									
S. Ohio								1	
S. Ordonez									
S. Orion									
S. Oslo									

Table Salmonella serovars in animals

Serovars	Ducks	Geese		Solipeds, domestic		Sheep		Turkeys	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**1**		**35**		**143**	**56**	
Number of isolates serotyped	**0**	**0**	**1**	**0**	**35**	**0**	**143**	**56**	**0**
Number of isolates per serovar									
S. Panama									
S. Poona									
S. Reading									
S. Rissen									
S. Saintpaul									
S. Senftenberg									
S. Tennessee									
S. Thompson									
S. Typhimurium			1		24		3	1	
S. Virchow									
S. IIIb61:k:1,5,7							62		
S. Paratyphi B var. Java									

Table Salmonella serovars in animals

Serovars	Ducks	Geese		Solipeds, domestic		Sheep		Turkeys	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**1**		**35**		**143**	**56**	
Number of isolates serotyped	**0**	**0**	**1**	**0**	**35**	**0**	**143**	**56**	**0**
Number of isolates per serovar									
S. IIIb 61:-:1,5,7							36		
S. enterica subsp. arizonae							1		
Not typeable					1		2	1	
Salmonella spp., unspecified									
S. enterica subsp. enterica, rough							1		
S. Binza									

Footnote:

UK data - England, Wales, Scotland and Northern Ireland.
In the table "All animals - unspecified" refers to isolates from Northern Ireland from non-defined miscellaneous animal species.
All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents.
Not typable = structure only.
Most isolates in cattle, sheep, pigs and game birds and all in horses are from clinical diagnostic samples. The one isolation from geese was a clinical diagnostic sample from a pet bird.
Samples from chickens (Gallus gallus), turkeys and ducks are mainly from national control programme or voluntary industry monitoring schemes.
The isolation of all Salmonellas is reportable to the Competent Authority

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	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory	**6**		**9**							
Number of isolates serotyped	**6**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Number of isolates per serovar										
S. Cerro	4		3							
S. Derby	0		1							
S. Dublin	1		0							
S. Schwarzengrund	1		0							
S. Typhimurium	0		4							
S. Virchow	0		1							

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of land animal origin - bone meal - Monitoring		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived		Feed material of cereal grain origin - wheat derived		Feed material of marine animal origin - fish meal		Other feed material
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory	**5**		**2**		**70**		**13**		**8**		**24**		**42**
Number of isolates serotyped	**5**	**0**	**2**	**0**	**70**	**0**	**13**	**0**	**8**	**0**	**24**	**0**	**42**
Number of isolates per serovar													
S. Agama													2
S. Agona					7		2				4		5
S. Brandenburg											1		
S. Cannstatt													1
S. Cerro	1				1								
S. Derby					1								4
S. Ealing					1								
S. Enteritidis			1										1
S. Gombe					1								
S. Hadar	1												
S. Havana					2								

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of land animal origin - bone meal - Monitoring		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived		Feed material of cereal grain origin - wheat derived		Feed material of marine animal origin - fish meal		Other feed material
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory	**5**		**2**		**70**		**13**		**8**		**24**		**42**
Number of isolates serotyped	**5**	**0**	**2**	**0**	**70**	**0**	**13**	**0**	**8**	**0**	**24**	**0**	**42**
Number of isolates per serovar													
S. Infantis	1				3								
S. Kedougou	2												
S. Kentucky											4		
S. Kottbus													1
S. Lexington					1								
S. Livingstone									5				
S. Mbandaka					20		1				1		3
S. Montevideo											2		2
S. Newlands					1								
S. Newport									2				
S. Ohio													
S. Orion													1

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of land animal origin - bone meal - Monitoring		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived		Feed material of cereal grain origin - wheat derived		Feed material of marine animal origin - fish meal		Other feed material
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory	**5**		**2**		**70**		**13**		**8**		**24**		**42**
Number of isolates serotyped	**5**	**0**	**2**	**0**	**70**	**0**	**13**	**0**	**8**	**0**	**24**	**0**	**42**
Number of isolates per serovar													
S. Ouakam					1								
S. Reading													1
S. Rissen					2								
S. Schwarzengrund													3
S. Senftenberg					3		2		1		3		1
S. Stanleyville					1								
S. Stockholm													1
S. Taksony													
S. Tennessee											4		1
S. Typhimurium					2								2
S. 13,23:-:-					1								
S. 4,12:-:-					1								

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of land animal origin - bone meal - Monitoring		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived		Feed material of cereal grain origin - wheat derived		Feed material of marine animal origin - fish meal		Other feed material
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory	**5**		**2**		**70**		**13**		**8**		**24**		**42**
Number of isolates serotyped	**5**	**0**	**2**	**0**	**70**	**0**	**13**	**0**	**8**	**0**	**24**	**0**	**42**
Number of isolates per serovar													
S. 6,7:-:l,w					1								
S. 6,7:d:-					1								
Other serotypes					18		8				5		13
Salmonella spp., unspecified			1										
S. 13:-:-					1								

Serovars	Other feed material	Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Compound feedingstuffs for poultry (non specified)	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**		**8**		**17**	
Number of isolates serotyped	**0**	**1**	**0**	**8**	**0**	**17**	**0**
Number of isolates per serovar							
S. Agama						2	

Table Salmonella serovars in feed

Serovars	Other feed material	Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Compound feedingstuffs for poultry (non specified)	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**		**8**		**17**	
Number of isolates serotyped	**0**	**1**	**0**	**8**	**0**	**17**	**0**
Number of isolates per serovar							
S. Agona							
S. Brandenburg							
S. Cannstatt							
S. Cerro							
S. Derby							
S. Ealing							
S. Enteritidis							
S. Gombe							
S. Hadar							
S. Havana							
S. Infantis							
S. Kedougou						2	

Table Salmonella serovars in feed

Serovars	Other feed material	Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Compound feedingstuffs for poultry (non specified)	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**		**8**		**17**	
Number of isolates serotyped	**0**	**1**	**0**	**8**	**0**	**17**	**0**
Number of isolates per serovar							
S. Kentucky							
S. Kottbus							
S. Lexington							
S. Livingstone				2			
S. Mbandaka						3	
S. Montevideo							
S. Newlands							
S. Newport						2	
S. Ohio						2	
S. Orion							
S. Ouakam							
S. Reading							

Table Salmonella serovars in feed

Serovars	Other feed material	Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Compound feedingstuffs for poultry (non specified)	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**		**8**		**17**	
Number of isolates serotyped	**0**	**1**	**0**	**8**	**0**	**17**	**0**
Number of isolates per serovar							
S. Rissen							
S. Schwarzengrund							
S. Senftenberg						5	
S. Stanleyville							
S. Stockholm							
S. Taksony				1			
S. Tennessee							
S. Typhimurium						1	
S. 13,23:-:-							
S. 4,12:-:-							
S. 6,7:-:l,w							
S. 6,7:d:-							

Table Salmonella serovars in feed

Serovars	Other feed material	Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Compound feedingstuffs for poultry (non specified)	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**		**8**		**17**	
Number of isolates serotyped	**0**	**1**	**0**	**8**	**0**	**17**	**0**
Number of isolates per serovar							
Other serotypes				5			
Salmonella spp., unspecified		1					
S. 13:-:-							

Footnote:

Salmonella isolates are sent to the National Reference Laboratory (NRL) for serotyping/phagetyping.
Home produced feed material of animal origin are subjected to official testing under the Animal Byproducts Regulations 2005. Isolates derived from non official sampling are from samples taken by feed business operators as part of HACCP.

Table Salmonella Enteritidis phagetypes in animals

Phagetype	Solipeds, domestic		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**				**3**	**80**				**1**	
Number of isolates phagetyped	**0**	**1**	**0**	**1**	**0**	**3**	**80**	**0**	**0**	**0**	**1**	**0**
Number of isolates per type												
PT 1							3					
PT 4						1	37					
PT 6						2	11					
PT 8				1			7					
PT 14b							2					
Not typeable							3					
PT 35							2					
PT 6a							5					
PT 12							1					
PT 22							1					
PT 7							7					
PT 5a							1					

Table Salmonella Enteritidis phagetypes in animals

Phagetype	Solipeds, domestic		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**				**3**	**80**				**1**	
Number of isolates phagetyped	**0**	**1**	**0**	**1**	**0**	**3**	**80**	**0**	**0**	**0**	**1**	**0**
Number of isolates per type												
PT 9b											1	
PT 11		1										

Footnote:

UK data - England, Wales, Scotland and Northern Ireland.
Most isolates in cattle, sheep, pigs and game birds and all in horses are from clinical diagnostic samples. Samples from chickens (Gallus gallus), turkeys and ducks are mainly from national control programme or voluntary industry monitoring schemes.

Table Salmonella Typhimurium phagetypes in animals

Phagetype	All animals - unspecified		Sheep		Turkeys		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**1**		**3**	**1**			**78**		**147**	**36**		
Number of isolates phagetyped	**0**	**1**	**0**	**3**	**1**	**0**	**0**	**78**	**0**	**147**	**36**	**0**	**0**
Number of isolates per type													
DT 8				1						1	1		
DT 12								1					
DT 104				2				27		7	3		
DT 104b								19		8	1		
DT 120								1			1		
DT 193								9		41	15		
DT 208										2			
Not typeable		1						9		5			
DT 41								2			2		
DT 22										1			
DT 193a								1					
U 310								1					

Table Salmonella Typhimurium phagetypes in animals

Phagetype	All animals - unspecified		Sheep		Turkeys		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**1**		**3**	**1**			**78**		**147**	**36**		
Number of isolates phagetyped	**0**	**1**	**0**	**3**	**1**	**0**	**0**	**78**	**0**	**147**	**36**	**0**	**0**
Number of isolates per type													
DT 194										1			
DT 30													
DT 99										1			
DT 35											2		
DT 135													
U 288										66			
Other								1		12	8		
DT 1								1					
DT 2											1		
DT 12a											1		
DT 56													
DT U302					1			4		2	1		

Table Salmonella Typhimurium phagetypes in animals

Phagetype	All animals - unspecified		Sheep		Turkeys		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**1**		**3**	**1**			**78**		**147**	**36**		
Number of isolates phagetyped	**0**	**1**	**0**	**3**	**1**	**0**	**0**	**78**	**0**	**147**	**36**	**0**	**0**
Number of isolates per type													
DT 191a								2					
DT 101													
DT 111													

Phagetype	Other poultry	Ducks		Geese		Birds - wild - Game birds, farmed		Solipeds, domestic	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**4**			**1**		**6**		**24**
Number of isolates phagetyped	**0**	**4**	**0**	**0**	**1**	**0**	**6**	**0**	**24**
Number of isolates per type									
DT 8		2			1				1
DT 12									
DT 104									3
DT 104b									

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry	Ducks		Geese		Birds - wild - Game birds, farmed		Solipeds, domestic	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**4**			**1**		**6**		**24**
Number of isolates phagetyped	**0**	**4**	**0**	**0**	**1**	**0**	**6**	**0**	**24**
Number of isolates per type									
DT 120									1
DT 193							1		6
DT 208									
Not typeable									
DT 41									1
DT 22									
DT 193a									1
U 310							2		3
DT 194									
DT 30		2							
DT 99									1
DT 35									

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry	Ducks		Geese		Birds - wild - Game birds, farmed		Solipeds, domestic	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**4**			**1**		**6**		**24**
Number of isolates phagetyped	**0**	**4**	**0**	**0**	**1**	**0**	**6**	**0**	**24**
Number of isolates per type									
DT 135									2
U 288									
Other									
DT 1									
DT 2							1		
DT 12a									1
DT 56									1
DT U302							2		
DT 191a									
DT 101									1
DT 111									2

Footnote:

UK data - England, Wales, Scotland and Northern Ireland.
In the table "other" refers to isolates from Northern Ireland for which no result is available.
In the table "All animals - unspecified" refers to isolates from Northern Ireland from non-defined miscellaneous animal species.
All figures for Northern Ireland based on total number of isolations of Salmonella. Figures from Great Britain based on total number of incidents.
Most isolates in cattle, sheep, pigs and game birds and all in horses are from clinical diagnostic samples. Samples from chickens (Gallus gallus), turkeys and ducks are mainly from national control programme or voluntary industry monitoring schemes.

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	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory	**0**		**4**							
Number of isolates phagetyped	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Number of isolates per type										
DT 120			1							
U 311			2							
DT 109			1							

2.1.7 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling

In England, Wales and Scotland (Great Britain) all isolations of Salmonella must be reported under the 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 during 2008 for antimicrobial resistance were mainly selected from isolates tested under the Zoonoses Order from Great Britain, derived from clinical diagnostic samples.

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 Laboratories (NRLs).

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in the 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 were used to test Salmonella isolates obtained under the Zoonoses Order from England and Wales. In Northern Ireland CLSI 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

Testing was performed using the disc diffusion method of the British Society for Antimicrobial Chemotherapy (BSAC). For ceftazidime, cefotaxime and ciprofloxacin, BSAC breakpoints were used (27, 29 and 19mm respectively). For other antimicrobials the historical VLA veterinary breakpoint of 13mm was used.

Control program/mechanisms

The control program/strategies in place

Control is based on effective surveillance for antimicrobial resistance in Salmonella isolates and reporting of findings to the Competent Authority. Follow up action taken in the event of detection of resistance depends on the type of resistance, the relevance to human public health and the serotype, phage type and characteristics of the organism involved. In Great Britain, visits are conducted by Veterinary Laboratories Agency/ Animal Health Agency staff to farms where follow-up sampling and epidemiological investigation may be carried out, control measures as appropriate may be put in place and relevent advice is given to the farmer

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 England and Wales in 2008, 625 Salmonella isolates were tested from cattle. 81.8% were fully sensitive. Two S. Enteritidis isolates were recovered from cattle in England and Wales for testing in 2008 and one of these isolates was resistant to ampicillin only the remaining isolate was fully susceptible. For S. Typhimurium in cattle 76 isolates were available for testing and 7% were fully sensitive. 68% of S. Typhimurium isolates showed resistance to more
than 4 antimicrobials. There were 46 S. Typhimurium DT104 or DT104B isolates tested and 40 had the pentaresistant ACSSuT pattern of resistance frequently associated with DT104 single isolates of both DT104 and DT104B were detected from cattle with this pentaresistance pattern together with additional resistance to nalidixic acid. Resistance to nalidixic acid was detected in 7.9% of S. Typhimurium isolates from cattle and a single isolate was resistant to ciprofloxacin. Resistance to cefotaxime or ceftazidime was not 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. In previous years, a proportion of S. Typhimurium DT104 isolates from cattle have usually shown resistance to trimethoprim/ sulphonamides however, resistance to trimethoprim/ sulphonamide was not detected in 2007 or 2008 in S. Typhimurium DT104 isolates from cattle.

In England and Wales in 2008, 625 Salmonella isolates were tested from cattle. 81.8% were fully sensitive, compared to 592 Salmonella isolates with 82.8% fully sensitive in 2007 and 758 Salmonella isolates, with 77.3% fully sensitive during 2006. Seven S. Enteritidis isolates were recovered from cattle for testing in 2007 and four of these isolates were resistant to ampicillin only; the remaining isolates were fully-susceptible. For S. Typhimurium in cattle, 86 isolates were available for testing and 16.3% were fully sensitive. 47.7% of S. Typhimurium isolates showed resistance to more than 4 antimicrobials. There were 33 S. Typhimurium DT104 isolates tested and 29 had the pentaresistant ACSSuT pattern of resistance frequently associated with DT104; there were no DT104 isolates with this pattern plus additional resistance from cattle. Resistance to nalidixic acid was detected in 3.5% of S. Typhimurium isolates from cattle. Resistance to cefotaxime, ceftazidime or ciprofloxacin was not detected in Salmonella isolates from cattle in 2007.

Relevance of the findings in animals to findings in foodstuffs and to human cases

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 (Great Britain) all isolations of Salmonella must be reported under the 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 was official sampling of breeding pigs in 2008 in the EU baseline survey for Salmonella. Some of the isolates tested for antimicrobial resistance during 2008 (approximately 35%), were derived from the EU baseline survey samples. Other isolates were obtained from incidents recorded as the result of examining clinical samples.

Type of specimen taken

Voluntary sampling, usually taken for diagnostic purposes, and reported as above. EU baseline survey samples for the Salmonella baseline survey in breeding pigs 2008.

Methods of sampling (description of sampling techniques)

Voluntary private sampling. Isolates from the Salmonella survey of breeding pigs were also tested in 2008.

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 Laboratories (NRLs).

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in the 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 CLSI 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

Testing was performed using the disc diffusion method of the British Society for Antimicrobial Chemotherapy (BSAC). For ceftazidime, cefotaxime and ciprofloxacin, BSAC breakpoints were used (27, 29 and 19mm respectively). For other antimicrobials the historical VLA veterinary breakpojnt of 13mm was used.

For the Salmonella baseline survey of slaughter pigs in 2007, the antimicrobial susceptibility testing methods described in SANCO /431/2007 were used. These methods utilise epidemiological cut-off values derived by EUCAST.

Results of the investigation

In England and Wales in 2008, 1231 Salmonella isolates were tested from pigs. 34% were fully sensitive, an increase compared to the figure of 11% observed in 2007. This increase reflects in part a change in surveillance in 2008 as the data in that year includes isolates from the breeding pig survey, whereas in the previous year it will have consisted mainly of isolates from clinical material and the survey of pigs at slaughter. The contribution of S. Typhimurium to the total number of Salmonella isolates tested influences the fully susceptible figure because this serotype commonly demonstrates antimicrobial resistance. In 2008, the next most prevalent named serotypes in pigs (Derby and London) commonly showed resistance to tetracyclines. Together with S. Typhimurium, these three serotypes accounted for 55% of the Salmonella isolates examined from pigs in 2008.
There were five isolates of S. Enteritidis available for testing and these were fully-susceptible to the panel of antimicrobials tested. For S. Typhimurium in pigs, 404 isolates were available for testing and 4.5% were fully sensitive, higher than the figures observed in 2007 and 2006 when 1.4% and 2.7% respectively were fully sensitive. The fluctuations in the numbers of S. Typhimurium isolates showing
full susceptibility reflected the fluctuations in the numbers of fully susceptible DT 193 isolates from 4.9% in 2006 to 0% in 2007 and to 1.3% in 2008. 49% of S.Typhimurium isolates showed resistance to more than 4 antimicrobials in 2008. A total of 46 S. Typhimurium DT 104 and 104B isolates were examined from pigs and 37 of these were pentaresistant ACSSuT, whilst two were ACSSuT with additional resistance to trimethoprim/ sulphonamides and one had additional resistance to neomycin.

Resistance to ciprofloxacin was observed in one isolate of S. Typhimurium this isolate was DT193. Ciprofloxacin resistance was also detected in Salmonella Kedougou and the incomplete serotype 6,7:c:- from pigs in 2008. Resistance to third generation cephalosporins was detected in a single isolate of S. Kedougou from pigs, which was also resistant to trimethoprim/ sulphonamides, sulphonamides and ampicillin.

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

It is evident that in general terms, isolates from pigs tend to be more resistant than those from cattle or sheep. A single S. Kedougou isolate resistant to cefotaxime was detected in pigs in 2008. A very low prevalence of resistance to ciprofloxacin was detected in Salmonella isolates from pigs. The decline in the proportion of isolates of S. Typhimurium which are fully-susceptible to the panel of antimicrobials tested, which had been observed since 2005, showed a slight reverse in 2008. In England and Wales in 2008, the proportion of fully sensitive Salmonella isolates increased compared to the figure observed in 2007. This increase may reflect in part a change in surveillance in 2008 regarding the population sampled.

Relevance of the findings in animals to findings in foodstuffs and to human cases

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 (Great Britain) all isolations of Salmonella must be reported under the 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 in laying hens were collected from samples taken under the National Control Plan in 2008. Isolates selected for antimicrobial resistance testing in broilers (Gallus gallus), turkeys and other poultry were selected from isolates submitted under the Zoonoses Order.

Type of specimen taken

In laying chickens, all isolates tested were derived from the Salmonella National Control Programme. In other poultry most of the isolates were derived from private samples taken for monitoring purposes on farm.

Methods of sampling (description of sampling techniques)

Some voluntary private sampling. Isolates from the National Control Programme in laying hens were also tested in 2008

Procedures for the selection of isolates for antimicrobial testing

For national monitoring programme, one isolate from each incident reported. 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 within a 30 day period. Disc diffusion method used for the testing of these isolates.

Salmonella isolates reported according to Decision 2007/407/EC for laying hens for 2008. One isolate per positive flock selected for testing by dilution method. All isolates collected through the Salmonella National Control Programme for laying hens in 2008.

Methods used for collecting data

Isolates from England, Wales, Scotland and Northern Ireland laboratories are tested at the respective National Reference Laboratories (NRLs).

Laboratory methodology used for identification of the microbial isolates

Modified ISO 6579:2002 in the 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 were used to test Salmonella isolates obtained

under the Zoonoses Order from England and Wales. In Northern Ireland CLSI is used.
Antimicrobials used were
Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin, Neomycin (Kanamycin in Northern Ireland).

Salmonella isolates recovered from laying hens under the National Control Plan and selected and tested according to the requirements of Decision 2007/407/EC were tested by the broth microdilution (MIC) method, as recommended by EFSA.

Breakpoints used in testing

Testing was performed using the disc diffusion method of the British Society for Antimicrobial Chemotherapy (BSAC). For ceftazidime, cefotaxime and ciprofloxacin, BSAC breakpoints were used (27, 29 and 19mm respectively). For other antimicrobials the historical VLA veterinary breakpoint of 13mm was used.

Salmonella isolates recovered from laying hens under the National Control Plan were tested by the broth microdilution (MIC) method, using the epidemiological cut-off values to discriminate between resistant and susceptible isolates, recommended by EFSA and described in SANCO / 431/ 2007.

Control program/mechanisms

The control program/strategies in place

Control is based on effective surveillance for antimicrobial resistance in Salmonella isolates and reporting of findings to the Competent Authority. Follow up action taken in the event of detection of resistance depends on the type of resistance, the relevance to human public health and the serotype, phage type and characteristics of the organism involved. In Great Britain, visits are conducted by Veterinary Laboratories Agency/ Animal Health Agency staff to farms where follow-up sampling and epidemiological investigation may be carried out, control measures as appropriate may be put in place and advice is relevent given to the farmer

Results of the investigation

Considering monitoring performed under the Zoonoses Order and National

Control Plans (for laying hens) in 2008, 446 Salmonella isolates in total were tested from poultry (Gallus gallus), including 157 isolates from broilers and 289 from layers. 77% of the isolates were fully sensitive. For S. Enteritidis 206 isolates were tested and 180 (87%) were fully sensitive. Considering the S. Enteritidis isolates from layers (n=205), low numbers were resistant to ampicillin (0.5%), chloramphenicol (0.5%) streptomycin (1%), sulphonamides (1.5%) and/ or trimethoprim/ sulphonamides (1%) whilst the prevalence of resistance to tetracyclines was higher at 11%. No S. Enteritidis isolates from layers were resistant to nalidixic acid. There was only one isolate of S. Enteritidis from broilers recovered under Zoonoses Order monitoring and this was resistant to streptomycin and sulphonamides. For S. Typhimurium in Gallus gallus 34 isolates were available for testing (14 from layers and 20 from broilers) and of those, 16 isolates from broilers and 13 from layers were fully sensitive. Four of the S. Typhimurium isolates were resistant to more than 4 antimicrobials.

For antimicrobial resistance testing of Salmonella isolates in laying hens according to the requirements of Decision 2007/407/EC, only one isolate per positive flock was selected for testing and the results are reported separately in the tables. This is in order to distinguish this monitoirng from the standard national approach to monitoring for resistance in Salmonella organsism which are selected based on incidents, which do not necessarily correspond with the actual number of positive flocks.

141 Salmonella isolates were tested from turkeys under Zoonoses Order monitoring in 2008 and 18% were fully sensitive. There were no S. Enteritidis isolates recovered from this species. For S. Typhimurium in turkeys, 20 isolates were available for testing and none of these were fully sensitive. 80% showed resistance to more than 4 antimicrobials. Two S. Typhimurium DT104 isolates from turkeys were examined and both possessed the typical ACSSuT
pattern of pentavalent resistance typically associated with DT104. No resistance was detected to the third generation cephalosporins cefotaxime or ceftazidime in Salmonella isolates from turkeys. Resistance to nalidixic acid was detected in S. Senftenberg and S. Newport, with some S. Newport isolates also showing resistance to ciprofloxacin.

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

During 2008, no resistance to ciprofloxacin, cefotaxime or ceftazidime was detected in Salmonella isolates from chickens (Gallus gallus). Resistance to ciprofloxacin was detected in Salmonella isolates from turkeys. The percentage of fully-susceptible Salmonella isolates from Gallus gallus was relatively stable

over the period 2007-2008.

Relevance of the findings in animals to findings in foodstuffs and to human cases

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

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.

Results of the investigation

There were no results available for 2008. Results from surveys carried out in 2007 are given in the relevent table.

E. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

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.

Results of the investigation

There were no results available for 2008. Results from surveys carried out in 2007 are given in the relevent table

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.

Results of the investigation

No results to report for 2008

Table Antimicrobial susceptibility testing of S. Anatum - qualitative data

S. Anatum		All animals		Cattle (bovine animals)	
Isolates out of a monitoring program (yes/no)				yes	
Number of isolates available in the laboratory				30	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin			30	0
	Streptomycin			30	5
Amphenicols	Chloramphenicol			30	3
Cephalosporins	Cefotaxim			30	0
	Ceftazidim			30	0
Fluoroquinolones	Ciprofloxacin			30	0
Fully sensitive	Fully sensitive			30	25
Penicillins	Ampicillin			30	4
Quinolones	Nalidixic acid			30	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			30	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			30	1
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			30	0
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			30	1
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			30	3
Sulfonamides	Sulfonamide			30	4
Tetracyclines	Tetracyclin			30	4
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide			30	1

Table Antimicrobial susceptibility testing of S. Cerro - qualitative data

S. Cerro		Meat from pig - at retail - Survey - national survey		Meat from bovine animals - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		3		4	
Antimicrobials:		N	n	N	n
Aminoglycosides	Streptomycin	3	0	4	0
Amphenicols	Chloramphenicol	3	0	4	0
Fully sensitive	Fully sensitive	3	3	4	4
Penicillins	Ampicillin	3	0	4	0
Sulfonamides	Sulfonamide	3	0	4	0
Tetracyclines	Tetracyclin	3	0	4	0
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	3	0	4	0

Table Antimicrobial susceptibility testing of S. Derby - qualitative data

S. Derby		Pigs		Turkeys		All animals	
Isolates out of a monitoring program (yes/no)				yes			
Number of isolates available in the laboratory		168		29			
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin	168	0	29	0		
	Streptomycin	168	51	29	26		
Amphenicols	Chloramphenicol	168	1	29	0		
Cephalosporins	Cefotaxim	168	0	29	0		
	Ceftazidim	168	0	29	0		
Fluoroquinolones	Ciprofloxacin	168	0	29	0		
Fully sensitive	Fully sensitive	168	30	29	3		
Penicillins	Ampicillin	168	4	29	0		
Quinolones	Nalidixic acid	168	1	29	0		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	168	47	29	0		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	168	5	29	0		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	168	81	29	26		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	168	5	29	0		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	168	0	29	0		
Sulfonamides	Sulfonamide	168	91	29	26		
Tetracyclines	Tetracyclin	168	131	29	26		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	168	41	29	0		

Footnote:

Pigs: isolates selected for antimicrobial resistance testing during 2008 included isolates from pig clinical diagnostic samples and isolates obtained during the EU baseline survey of Salmonella in breeding pigs carried out in 2008 (disc diffusion method).
Turkeys: routine surveillance samples obtained through voluntary industry Salmonella monitoring (disc diffusion test).

Table Antimicrobial susceptibility testing of S. Derby - qualitative data

S. Derby		Meat from pig - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		1	
Antimicrobials:		N	n
Aminoglycosides	Streptomycin	1	0
Amphenicols	Chloramphenicol	1	0
Fully sensitive	Fully sensitive	1	1
Penicillins	Ampicillin	1	0
Sulfonamides	Sulfonamide	1	0
Tetracyclines	Tetracyclin	1	0
Trimethoprim	Trimethoprim	1	0

Table Antimicrobial susceptibility testing of S. Dublin - qualitative data

S. Dublin		All animals		Cattle (bovine animals)	
Isolates out of a monitoring program (yes/no)				yes	
Number of isolates available in the laboratory				367	
Antimicrobials:		N	n	N	n
Amphenicols	Chloramphenicol			367	1
Cephalosporins	Cefotaxim			367	0
	Ceftazidim			367	0
Fluoroquinolones	Ciprofloxacin			367	0
Fully sensitive	Fully sensitive			367	351
Penicillins	Ampicillin			367	1
Quinolones	Nalidixic acid			367	1
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			367	13
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			367	2
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			367	1
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			367	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			367	0
Sulfonamides	Sulfonamide			367	1
Tetracyclines	Tetracyclin			367	2
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide			367	0

Footnote:

Bovine routine surveillance samples:- selection of clinical diagnostic sample isolates for monitoring programme (disc diffusion method).

Table Antimicrobial susceptibility testing of S. Dublin - qualitative data

S. Dublin		Meat from bovine animals - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		1	
Antimicrobials:		N	n
Aminoglycosides	Streptomycin	1	0
Amphenicols	Chloramphenicol	1	0
Fully sensitive	Fully sensitive	1	1
Penicillins	Ampicillin	1	0
Sulfonamides	Sulfonamide	1	0
Tetracyclines	Tetracyclin	1	0
Trimethoprim	Trimethoprim	1	0

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - laying hens - at farm - Control and eradication programmes - official and industry sampling - quantitative data [Dilution method]

S. Enteritidis		Gallus gallus (fowl) - laying hens - at farm - Control and eradication programmes - official and industry sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		55																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	55	0						44	9	2													0.25	32
	Kanamycin		0	0																						
	Neomycin		0	0																						
	Streptomycin	32	55	0									41	12	1	1									2	128
Amphenicols	Chloramphenicol	16	55	0										27	27	1									2	64
	Florfenicol	16	0	0																						
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	55	0				34	17	4															0.06	4
	Ceftazidim	2	55	0						47	8														0.250	16
Fluoroquinolones	Ciprofloxacin	0.06	55	0		5	49	1																	0.008	8
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	55	2								8	43	2			2								0.5	32
Quinolones	Nalidixic acid	16	55	0										55											4	64
Sulfonamides	Sulfonamide	256	55	1												5	31	18				1			8	1024
Tetracyclines	Tetracyclin	8	55	4								20	31					4							1	64
Trimethoprim	Trimethoprim	2	55	3							49	3			1		2								0.5	32
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide		0	0																						
	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - laying hens - at farm - Control and eradication programmes - official and industry sampling - quantitative data [Dilution method]

Footnote:

Salmonella isolates reported according to Decision 2007/407/EC for laying hens for 2008. One isolate per positive flock selected for testing by dilution method. All isolates collected through the Salmonella National Control Programme for laying hens in 2008.
The number of isolates at the highest concentration of the dilution range includes isolates with an MIC at that value as well as isolates with an MIC > that value

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - at farm - Surveillance (All poultry (Gallus gallus)) - quantitative data [Diffusion method]

S. Enteritidis		Gallus gallus (fowl) - at farm - Surveillance (All poultry (Gallus gallus))																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		207																								
Antimicrobials:		break points	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
Aminoglycosides	Gentamicin	19	207	0															2		4	5	12	31	43	63	30
	Kanamycin		0	0																							
	Neomycin	13	0	0																							
	Streptomycin	13	207	3	1	2										1	2	13	37	28	74	37	9	2		1	
Amphenicols	Chloramphenicol	20	207	1								1								1			2	3	8	25	32
	Florfenicol		0	0																							
Cephalosporins	3rd generation cephalosporins		0	0																							
	Cefotaxim	29	207	0																							
	Ceftazidim	29	207	0																							
Fluoroquinolones	Ciprofloxacin	19	207	0																					1	7	8
	Enrofloxacin		0	0																							
Penicillins	Ampicillin	13	207	1	1															1			2	3	11	26	27
Quinolones	Nalidixic acid	13	207	1		1														1	2	5	10	23	43	54	35
Sulfonamides	Sulfonamide	13	207	4		4									1	1	1	5	10	2	14	10	16	21	20	17	25
Tetracyclines	Tetracyclin	13	207	22	4	8	9	1										1		6	7	6	16	17	39	37	35
Trimethoprim	Trimethoprim		0	0																							
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	15	207	2	2															1		1	2	2	2	5	1
	Trimethoprim + sulfonamides		0	0																							

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - at farm - Surveillance (All poultry (Gallus gallus)) - quantitative data [Diffusion method]

S. Enteritidis		Gallus gallus (fowl) - at farm - Surveillance (All poultry (Gallus gallus))						
Isolates out of a monitoring program (yes/no)		yes						
Number of isolates available in the laboratory		207						
Antimicrobials:		29	30	31	32	33	34	>=35
Aminoglycosides	Gentamicin	13	3			1		
	Kanamycin							
	Neomycin							
	Streptomycin							
Amphenicols	Chloramphenicol	48	42	22	12	6	2	3
	Florfenicol							
Cephalosporins	3rd generation cephalosporins							
	Cefotaxim		1	2	4	2	4	194
	Ceftazidim		3	3	9	11	9	172
Fluoroquinolones	Ciprofloxacin	10	15	16	43	41	41	25
	Enrofloxacin							
Penicillins	Ampicillin	35	33	27	20	14	5	2
Quinolones	Nalidixic acid	20	8	3	2			
Sulfonamides	Sulfonamide	23	10	8	13	3		3
Tetracyclines	Tetracyclin	13	7	1				
Trimethoprim	Trimethoprim							
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	14	8	5	11	12	27	114
	Trimethoprim + sulfonamides							

Footnote:

All isolates from poultry (Gallus gallus) incidents selected and tested for antimicrobial resistance for national monitoring programme. This includes multiple isolations from individual flocks. 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 within a 30 day period.

Table Antimicrobial susceptibility testing of S.Enteritidis in animals

S. Enteritidis		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers		Gallus gallus (fowl) - laying hens (Flock level Dec.2007/407/EC -	
Isolates out of a monitoring program (yes/no)		yes		yes						yes		yes		yes	
Number of isolates available in the laboratory		2		5						205		1		55	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	2	0	5	0					205	0	1	0		
	Streptomycin	2	0	5	0					205	2	1	1		
Amphenicols	Chloramphenicol	2	0	5	0					205	1	1	0		
Cephalosporins	Cefotaxim	2	0	5	0					205	0	1	0		
	Ceftazidim	2	0	5	0					205	0	1	0		
Fluoroquinolones	Ciprofloxacin	2	0	5	0					205	0	1	0		
Fully sensitive	Fully sensitive	2	1	5	5					205	180	1	0		
Penicillins	Ampicillin	2	1	5	0					205	1	1	0		
Quinolones	Nalidixic acid	2	0	5	0					205	0	1	0		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	2	1	5	0					205	22	1	0		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	2	0	5	0					205	1	1	1		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	2	0	5	0					205	1	1	0		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	2	0	5	0					205	1	1	0		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	2	0	5	0					205	0	1	0		
Sulfonamides	Sulfonamide	2	0	5	0					205	3	1	1		
Tetracyclines	Tetracyclin	2	0	5	0					205	22	1	0		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	2	0	5	0					205	2	1	0		

Footnote:

Bovine surveillance clinical diagnostic samples(disc diffusion test).
Pigs: isolates selected for antimicrobial resistance testing during 2008 included isolates from pig clinical diagnostic samples and isolates obtained during the EU baseline survey of Salmonella in breeding pigs carried out in 2008 (disc diffusion method).
Isolates from laying hens (N=205) incidents selected and tested for antimicrobial resistance for national monitoring programme (disc diffusion test). This may include multiple isolations from individual flocks.
Broilers: isolates obtained through voluntary industry Salmonella monitoring and isolates derived from the EU baseline survey for Salmonella in broiler carcasses survey 2008 (disc diffusion)

Table Antimicrobial susceptibility testing of S. Kedougou - qualitative data

S. Kedougou		All animals		Turkeys	
Isolates out of a monitoring program (yes/no)				yes	
Number of isolates available in the laboratory				37	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin			37	0
	Streptomycin			37	17
Amphenicols	Chloramphenicol			37	0
Cephalosporins	Cefotaxim			37	0
	Ceftazidim			37	0
Fluoroquinolones	Ciprofloxacin			37	0
Fully sensitive	Fully sensitive			37	2
Penicillins	Ampicillin			37	1
Quinolones	Nalidixic acid			37	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			37	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			37	17
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			37	17
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			37	1
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			37	0
Sulfonamides	Sulfonamide			37	35
Tetracyclines	Tetracyclin			37	34
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide			37	1

Footnote:

Isolates from turkeys selected and tested for antimicrobial resistance mostly derived from voluntary industry monitoring for Salmonella (disc diffusion method)

Table Antimicrobial susceptibility testing of S. London - qualitative data

S. London		Pigs		All animals	
Isolates out of a monitoring program (yes/no)		yes			
Number of isolates available in the laboratory		109			
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	109	0		
	Streptomycin	109	1		
Amphenicols	Chloramphenicol	109	0		
Cephalosporins	Cefotaxim	109	0		
	Ceftazidim	109	0		
Fluoroquinolones	Ciprofloxacin	109	0		
Fully sensitive	Fully sensitive	109	76		
Penicillins	Ampicillin	109	0		
Quinolones	Nalidixic acid	109	0		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	109	30		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	109	2		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	109	0		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	109	1		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	109	0		
Sulfonamides	Sulfonamide	109	3		
Tetracyclines	Tetracyclin	109	31		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	109	3		

Footnote:

Isolates selected for antimicrobial resistance testing during 2008 included isolates from pig clinical diagnostic samples and isolates obtained during the EU baseline survey of Salmonella in breeding pigs carried out in 2008 (disc diffusion method)

Table Antimicrobial susceptibility testing of S. Mbandaka - qualitative data

S. Mbandaka		Gallus gallus (fowl) - broilers		All animals	
Isolates out of a monitoring program (yes/no)		yes			
Number of isolates available in the laboratory		21			
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	21	0		
	Streptomycin	21	5		
Amphenicols	Chloramphenicol	21	5		
Cephalosporins	Cefotaxim	21	0		
	Ceftazidim	21	0		
Fluoroquinolones	Ciprofloxacin	21	0		
Fully sensitive	Fully sensitive	21	12		
Penicillins	Ampicillin	21	0		
Quinolones	Nalidixic acid	21	0		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	21	4		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	21	0		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	21	0		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	21	5		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	21	0		
Sulfonamides	Sulfonamide	21	5		
Tetracyclines	Tetracyclin	21	9		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	21	0		

Footnote:

Broilers: isolates obtained through voluntary industry Salmonella monitoring and isolates derived from the EU baseline survey for Salmonella in broiler carcasses survey 2008 (disc diffusion method)

Table Antimicrobial susceptibility testing of S. Ohio - qualitative data

S. Ohio		All animals - Monitoring		Gallus gallus (fowl) - broilers - at farm	
Isolates out of a monitoring program (yes/no)				yes	
Number of isolates available in the laboratory				25	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin			25	0
	Streptomycin			25	9
Amphenicols	Chloramphenicol			25	0
Cephalosporins	Cefotaxim			25	0
	Ceftazidim			25	0
Fluoroquinolones	Ciprofloxacin			25	0
Fully sensitive	Fully sensitive			25	10
Penicillins	Ampicillin			25	0
Quinolones	Nalidixic acid			25	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			25	9
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			25	3
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			25	1
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			25	2
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			25	0
Sulfonamides	Sulfonamide			25	4
Tetracyclines	Tetracyclin			25	0
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide			25	4

Footnote:

Broilers: isolates obtained through voluntary industry Salmonella monitoring and isolates derived from the EU baseline survey for Salmonella in broiler carcasses survey 2008 (disc diffusion method)

Table Antimicrobial susceptibility testing of S. Schwarzengrund - qualitative data

S. Schwarzengrund		Meat from bovine animals - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		1	
Antimicrobials:		N	n
Aminoglycosides	Streptomycin	1	0
Amphenicols	Chloramphenicol	1	0
Fully sensitive	Fully sensitive	1	1
Penicillins	Ampicillin	1	0
Sulfonamides	Sulfonamide	1	0
Tetracyclines	Tetracyclin	1	0
Trimethoprim	Trimethoprim	1	0

Table Antimicrobial susceptibility testing of S. Senftenberg - qualitative data

S. Senftenberg		All animals - Surveillance		Gallus gallus (fowl) - laying hens (Flock level Dec.2007/407/EC -		Gallus gallus (fowl) - laying hens	
Isolates out of a monitoring program (yes/no)				yes		yes	
Number of isolates available in the laboratory				8		16	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin			8	0	16	0
	Streptomycin			8	0	16	0
Amphenicols	Chloramphenicol			8	0	16	0
Cephalosporins	Cefotaxim			8	0	16	0
	Ceftazidim			8	0	16	0
Fluoroquinolones	Ciprofloxacin			8	0	16	0
Fully sensitive	Fully sensitive			8	7	16	16
Penicillins	Ampicillin			8	0	16	0
Quinolones	Nalidixic acid			8	0	16	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			8	1	16	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			8	0	16	0
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			8	0	16	0
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			8	0	16	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			8	0	16	0
Sulfonamides	Sulfonamide			8	1	16	0
Tetracyclines	Tetracyclin			8	0	16	0
Trimethoprim	Trimethoprim			8	0		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide					16	0

Table Antimicrobial susceptibility testing of S. Senftenberg - qualitative data

Footnote:

Isolates from laying hens (N=16) incidents selected and tested for antimicrobial resistance for national monitoring programme (disc diffusion test). This may include multiple isolations from individual flocks.

Laying hens - flock level data: according to Decision 2007/407/EC one isolate per Salmonella serovar from the same epidemiological unit (ie flock) per year selected for antimicrobial resistance testing (microdilution) N=8

Table Antimicrobial susceptibility testing of S. Thompson - qualitative data

S. Thompson		Gallus gallus (fowl) - laying hens		All animals - Monitoring	
Isolates out of a monitoring program (yes/no)		yes			
Number of isolates available in the laboratory		8			
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	8	0		
	Streptomycin	8	0		
Amphenicols	Chloramphenicol	8	0		
Cephalosporins	Cefotaxim	8	0		
	Ceftazidim	8	0		
Fluoroquinolones	Ciprofloxacin	8	0		
Fully sensitive	Fully sensitive	8	0		
Penicillins	Ampicillin	8	0		
Quinolones	Nalidixic acid	8	0		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	8	0		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	8	0		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	8	0		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	8	0		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	8	0		
Sulfonamides	Sulfonamide	8	0		
Tetracyclines	Tetracyclin	8	0		
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	8	0		

Footnote:

Isolates from laying hens (N=8) incidents selected and tested for antimicrobial resistance for national monitoring programme (disc diffusion test). This may include multiple isolations from individual flocks.

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

S. Typhimurium		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers		Gallus gallus (fowl) - laying hens (Flock level Dec.2007/407/EC -	
Isolates out of a monitoring program (yes/no)		no		yes				yes		yes		yes		yes	
Number of isolates available in the laboratory		76		404				20		14		20		5	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	76	0	404	4			20	0	14	0	20	0	5	0
	Streptomycin	76	64	404	310			20	19	14	0	20	4	5	0
Amphenicols	Chloramphenicol	76	53	404	190			20	16	14	0	20	4	5	0
Cephalosporins	Cefotaxim	76	0	404	0			20	0	14	0	20	0	5	0
	Ceftazidim	76	0	404	0			20	0	14	0	20	0	5	0
Fluoroquinolones	Ciprofloxacin	76	1	404	1			20	0	14	0	20	0	5	0
Fully sensitive	Fully sensitive	76	5	404	18			20	0	14	13	20	16	5	5
Penicillins	Ampicillin	76	60	404	326			20	16	14	0	20	4	5	0
Quinolones	Nalidixic acid	76	6	404	7			20	0	14	0	20	0	5	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	76	5	404	38			20	1	14	1	20	0	5	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	76	2	404	13			20	3	14	0	20	0	5	0
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	76	1	404	10			20	0	14	0	20	0	5	0
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	76	11	404	129			20	0	14	0	20	0	5	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	76	52	404	196			20	16	14	0	20	4	5	0
Sulfonamides	Sulfonamide	76	66	404	343			20	19	14	0	20	4	5	0
Tetracyclines	Tetracyclin	76	69	404	358			20	17	14	1	20	4	5	0
Trimethoprim	Trimethoprim													5	0
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	76	0	404	171			20	0	14	0	20	0		

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

Footnote:

Bovine surveillance clinical diagnostic samples (disc diffusion test).
Pigs: isolates from pig clinical diagnostic samples and isolates obtained during the EU baseline survey of Salmonella in breeding pigs carried out in 2008 (disc diffusion method).
Turkeys routine surveillance samples - voluntary industry Salmonella monitoring (disc diffusion test).
Isolates from laying hens (N=14) incidents selected and tested for antimicrobial resistance for national monitoring programme (disc diffusion test). This may include multiple isolations from individual flocks.
Laying hens - flock level data: according to Decision 2007/407/EC one isolate per Salmonella serovar from the same epidemiological unit (ie flock) per year selected for antimicrobial resistance testing (microdilution) N=5
Broilers: isolates obtained through voluntary industry Salmonella monitoring and isolates derived from the EU baseline survey for Salmonella in broiler carcasses survey 2008 (disc diffusion method)

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

S. Typhimurium		Cattle (bovine animals) - at farm - Surveillance																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		76																								
Antimicrobials:		break points	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
Aminoglycosides	Gentamicin	19	76	0															1	1	2	2	22	23	18	4	1
	Kanamycin		0	0																							
	Neomycin	13	0	0																							
	Streptomycin	13	76	64	23	26	9	2	2		1	1	1	1	4	2	1	2									
Amphenicols	Chloramphenicol	20	76	53	26	18	6	2	1											1	1			3		3	5
	Florfenicol		0	0																							
Cephalosporins	3rd generation cephalosporins		0	0																							
	Cefotaxim	29	76	0																							
	Ceftazidim	29	76	0																							
Fluoroquinolones	Ciprofloxacin	19	76	1												1			1	2		1	1	1	3	2	2
	Enrofloxacin		0	0																							
Penicillins	Ampicillin	13	76	60	29	21	8	1	1									1								1	2
Quinolones	Nalidixic acid	13	76	6	2	2				1		1			1			1	1		1	4	3	3	10	15	13
Sulfonamides	Sulfonamide	13	76	66	31	29	4		1		1								4		3					1	
Tetracyclines	Tetracyclin	13	76	69	46	6	11	5	1												1	3		1		2	
Trimethoprim	Trimethoprim		0	0																							
Trimethoprim + sulfonamides	Trimethoprim + Sulfonamide	15	76	0												1						1		1	2	5	
	Trimethoprim + sulfonamides		0	0																							

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

S. Typhimurium		Cattle (bovine animals) - at farm - Surveillance						
Isolates out of a monitoring program (yes/no)		yes						
Number of isolates available in the laboratory		76						
Antimicrobials:		**29**	**30**	**31**	**32**	**33**	**34**	**>=35**
Aminoglycosides	**Gentamicin**	2						
	Kanamycin							
	Neomycin							
	Streptomycin					1		
Amphenicols	**Chloramphenicol**	5	1	3	1			
	Florfenicol							
Cephalosporins	**3rd generation cephalosporins**							
	Cefotaxim				1	1		74
	Ceftazidim		3	1	6	3	11	52
Fluoroquinolones	**Ciprofloxacin**	5	3	6	14	12	9	13
	Enrofloxacin							
Penicillins	**Ampicillin**	3	3	3	1		1	1
Quinolones	**Nalidixic acid**	12	3	3				
Sulfonamides	**Sulfonamide**	1		1				
Tetracyclines	**Tetracyclin**							
Trimethoprim	**Trimethoprim**							
Trimethoprim + sulfonamides	**Trimethoprim + Sulfonamide**	11	10	19	13	3	4	6
	Trimethoprim + sulfonamides							

Footnote:

Bovine surveillance clinical diagnostic sample:- isolates selected from all recorded S. Typhimurium incidents in Great Britain for testing for the monitoring programme.
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 within a 30 day period.

Table Antimicrobial susceptibility testing of S. Typhimurium - qualitative data

S. Typhimurium		Meat from pig - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		4	
Antimicrobials:		N	n
Aminoglycosides	Streptomycin	4	4
Amphenicols	Chloramphenicol	4	2
Fully sensitive	Fully sensitive	4	0
Penicillins	Ampicillin	4	3
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	4	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	4	0
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	4	1
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	4	1
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	4	2
Sulfonamides	Sulfonamide	4	4
Tetracyclines	Tetracyclin	4	4
Trimethoprim	Trimethoprim	4	2

Table Antimicrobial susceptibility testing of S. Virchow - qualitative data

S. Virchow		All animals - Monitoring		Gallus gallus (fowl) - laying hens (Flock level Dec.2007/407/EC -	
Isolates out of a monitoring program (yes/no)				yes	
Number of isolates available in the laboratory				2	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin			2	0
	Streptomycin			2	0
Amphenicols	Chloramphenicol			2	0
Cephalosporins	Cefotaxim			2	0
	Ceftazidim			2	0
Fluoroquinolones	Ciprofloxacin			2	0
Fully sensitive	Fully sensitive			2	2
Penicillins	Ampicillin			2	0
Quinolones	Nalidixic acid			2	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			2	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			2	0
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			2	0
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			2	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			2	0
Sulfonamides	Sulfonamide			2	0
Tetracyclines	Tetracyclin			2	0
Trimethoprim	Trimethoprim			2	0

Footnote:

Laying hens - flock level data: according to Decision 2007/407/EC one isolate per Salmonella serovar from the same epidemiological unit (ie flock) per year selected for antimicrobial resistance testing (microdilution) N=2

Table Antimicrobial susceptibility testing of S. Virchow - qualitative data

S. Virchow		Meat from pig - at retail - Survey - national survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		1	
Antimicrobials:		N	n
Aminoglycosides	Streptomycin	1	0
Amphenicols	Chloramphenicol	1	0
Fully sensitive	Fully sensitive	1	1
Penicillins	Ampicillin	1	0
Sulfonamides	Sulfonamide	1	0
Tetracyclines	Tetracyclin	1	0
Trimethoprim	Trimethoprim	1	0

Table Breakpoints for antibiotic resistance testing

Test Method Used	
Disc diffusion	◉
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
EUCAST/EFSA VLA/BSAC

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	EFSA/BSAC	2		2	0.25	32	10	19		19
	Neomycin	VLA						10	13		13
	Streptomycin	EFSA/VLA	32		32	2	128	10	13		13
Amphenicols	**Chloramphenicol**	EFSA/BSAC	16		16	2	64	30	20		20
	Florfenicol	EFSA	16		16	2	64				
Cephalosporins	**Cefotaxim**	EFSA/BSAC	0.5		0.5	0.06	4	30	29		29
	Ceftazidim	EUCAST/BSAC	2		2	0.25	16	30	29		29
Fluoroquinolones	**Ciprofloxacin**	EFSA/BSAC	0.06		0.06	0.008	8	1	19		19
Penicillins	**Ampicillin**	EFSA/VLA	4		4	0.5	32	10	13		13
Quinolones	**Nalidixic acid**	EFSA/VLA	16		16	4	64	30	13		13
Sulfonamides	**Sulfonamide**	EFSA/VLA	256		256	8	1024	300	13		13
Tetracyclines	**Tetracyclin**	EFSA/VLA	8		8	1	64	10	13		13
Trimethoprim + sulfonamides	**Trimethoprim + Sulfonamide**	BSAC						25	15		15
Trimethoprim	**Trimethoprim**	EFSA	2		2	0.5	32				

Table Breakpoints for antibiotic resistance testing

Footnote:

Standard for breakpoint broth dilution is EUCAST/EFSA.
Standard for breakpoint disc diffusion is VLA for tetracycline, ampicillin, nalidixic acid, sulphonamide, streptomicin and neomycin.
Standard for breakpoint disc diffusion is BSAC for sulphonamide/TMP, gentamicin, cefotaxime, ceftazidime, chloramphenicol and ciprofloxacin.

Broth dilution method used for investigation of isolates from animals. Disc diffusion method used for investigation of isolates from animals and feedingstuffs.

Table Breakpoints for antibiotic resistance testing

Test Method Used	
Disc diffusion	◉
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
EUCAST/EFSA VLA/BSAC

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	EFSA/BSAC						10	19		19
	Neomycin	VLA						10	13		13
	Streptomycin	EFSA/VLA						10	13		13
Amphenicols	**Chloramphenicol**	EFSA/BSAC						30	20		20
Fluoroquinolones	**Ciprofloxacin**	EFSA/BSAC						1	19		19
Penicillins	**Ampicillin**	EFSA/VLA						10	13		13
Quinolones	**Nalidixic acid**	EFSA/VLA						30	13		13
Sulfonamides	**Sulfonamide**	EFSA/VLA						300	13		13
Tetracyclines	**Tetracyclin**	EFSA/VLA						10	13		13
Trimethoprim + sulfonamides	**Trimethoprim + Sulfonamide**	BSAC						25	15		15

Footnote:

Standard for breakpoint broth dilution is EUCAST/EFSA.

Standard for breakpoint disc diffusion is BSAC for sulphonamide/TMP, gentamicin, cefotaxime, ceftazidime, chloramphenicol and ciprofloxacin.

Broth dilution method used for investigation of isolates from animals. Disc diffusion method used for investigation of isolates from animals and feedingstuffs.

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. In 2007 there was again a slight increase in human cases compared to 2006, although still less than the peak reached in 1998 of over 65,000 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. Most isolations of Campylobacter in animals are due to investigations into abortion cases (Campylobacter foetopathy)

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

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 increased again in 2006 to 46,339 reports. In 2007 there was a further increase by 5175 cases compared to 2006, with a total of 51,514 cases reported for the year. Data on recorded cases of Campylobacter in 2008 in England and Wales is not currently available

Scotland:
In 2008, there were 4878 laboratory reports of Campylobacter. In recent years laboratory confirmations have decreased from the 2000 peak of 6482, with 4365 recorded in 2004, 4558 in 2005, 4857 in 2006 and 5194 laboratory reports in 2007. Campylobacter has remained the most frequently reported gastrointestinal pathogen reported from humans in Scotland.

Northern Ireland:
Since 1991 Campylobacter infection 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 2005 by 5% with 890 reports and again by 4% in 2006 to 930 reports. In 2007, the number of cases decreased to 882. There was again a decrease in Campylobacter cases in 2008, with a total of 848 cases reported during the year. There were 64 imported cases during the year.

Food:
Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as these were not available in time for inclusion in the 2007 report. Results of the surveys are included under additional information below.

Animals:
The EU baseline survey on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and the prevalence of Campylobacter spp. and Salmonella spp in broiler carcasses was carried out during 2008 (Commission Decision 516/2007/EC). No other specific national studies were conducted in animals in 2008.

Clinical diagnostic samples from Great Britain, submitted to the Veterinary Laboratories Agency in 2008, were predominantly Campylobacter foetopathy cases. During the year, 244 putative Campylobacter spp isolates from bovine and ovine abortions were submitted for confirmation and speciation within VLA. Of the 88 bovine abortion isolates, 27 (31%) were thermophilic campylobacters (largely C. jejuni or C. coli) compared with 18% in 2007. Of the 156 ovine abortion samples, 32 (21%) were thermophilic campylobacters (11% in 2007). Two goat isolates were thermophilic campylobacters. The remaining isolates associated with bovine and ovine abortions were predominately C. fetus. C.jejuni/coli isolates were also identified from various other host species, including a great bustard and a rhea with enteritis but their role in the etiology of the disease was unclear.

In 2007, clinical diagnostic samples from Great Britain, were also predominantly Campylobacter foetopathy cases, with 299 (84%) of the 356 isolates submitted from ovine and bovine abortion cases. There were a larger number of submissions during 2007 compared to 2006, which appeared to reflect an increase in ovine Campylobacter abortions due to Campylobacter fetus fetus, with a relative fall in the number of abortions due to C. coli and C. jejuni

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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.

Campylobacter on fresh red meat:
A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected, of which 3,249 were beef, 1,693 were pork and the remaining 1,056 were lamb. All samples were tested for a range of microorganisms including the presence of Campylobacter. The overall finding was that 21 meat samples were contaminated with Campylobacter spp. Campylobacter was found on 4 beef, 10 pork and 7 lamb samples.

Campylobacter in ready-to-eat cold sliced cooked meats and pâtés:
A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and a range of other microorganisms including Campylobacter in ready-to-eat cold sliced cooked meats and ready-to-eat pâtés on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were sampled, of which 134 were beef, 1,096 were pork, 402 were poultry and 54 were mixed variety. Campylobacter was not detected in any of the cold sliced cooked meats sampled. A total of 1,648 ready-to-eat pâtés were purchased, of which 1,535 were meat, 79 were seafood and 34 were vegetarian pâtés. Campylobacter was not detected in any of the pâtés sampled.

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 from 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, 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. In the UK as a whole there were 57,590 cases reported in humans in 2007. This is an increase on the number of cases reported in 2006 (52,126).

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, 42,251 reports were received, however in 2005 that figure rose to 44,400 reports and increased again in 2006 to 46,339 reports. There were 51,514 cases of Campylobacter infection in 2007. Just under half of all of the reports received in 2007 (45%) came in the four months from June to September (a finding comparable to 2006). There were 705 imported cases during the year

Speciation is done only for a proportion of cases chosen at random from isolates from England and Wales. In 2007, 493 cases (as a representative sample) were speciated giving a ratio of 66.3% C. jejuni to 33.7% C. coli isolates.

Scotland:
In recent years laboratory confirmations have decreased from the 2000 peak of 6482, with 4365 in 2004. In 2006 there were 4857 cases of Campylobacter in Scotland, denoting a nominal increase from 2005 when 4581 cases were recorded. In 2007, an increase was again seen with 5194 recorded cases for the year.

Northern Ireland:
Since 1991 Campylobacter infection 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 2005 by 5% to 890 reports and again by 4% in 2006 to 930 reports. There was a decrease in Campylobacter cases in 2007, with a total of 882 cases reported during the year. There were 52 imported cases during the year. 4 isolates were speciated: 3 were C. jejuni and 1 was C. coli.

Results of the investigation

England and Wales:
Data for England and Wales for 2008 is not currently available.

Scotland:
In 2008, there were 4878 laboratory reports of Campylobacter. Campylobacter has remained the most frequently reported gastrointestinal pathogen reported from humans in Scotland.

Northern Ireland
In 2008 there was a decrease in Campylobacter cases, with a total of 848 cases reported during the year. There were 64 imported cases during the year.

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

The number of reports of Campylobacter in humans in the UK gradually increased 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.

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At retail

Campylobacter in ready-to-eat cold sliced cooked meats:
A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and a range of other microorganisms including Campylobacter in ready-to-eat cold sliced cooked meats and ready-to-eat pâtés on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were sampled, of which 134 were beef, 1,096 were pork, 402 were poultry and 54 were mixed variety.

Frequency of the sampling

At retail

Type of specimen taken

At retail

cold sliced cooked meat - ready to eat

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

Campylobacter was not detected in any of the cold sliced cooked meats sampled.

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. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from poultry, unspecified - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1)]	FSA	single		402	0	0	0	0	0	0

Comments:

[1)] Cold sliced cooked meat

Footnote:

FSA data derived from the Cooked sliced meats and pate survey - unpublished data

Table Campylobacter in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Fishery products, unspecified - seafood pate - at retail - Survey - national survey	FSA	single	25g	79	0	0	0	0	0	0
Meat from bovine animals - fresh - at retail - Survey - national survey	FSA	single	Swab	3249	4	0	4	0	0	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1)]	FSA	single	25g	134	0	0	0	0	0	0
Meat from other animal species or not specified - meat products - pâté - at retail - Survey - national survey	FSA	single	25g	1535	0	0	0	0	0	0
Meat from pig - fresh - at retail - Survey - national survey	FSA	single	Swab	1693	10	1	9	0	0	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - Survey - national survey [2)]	FSA	single	25g	1096	0	0	0	0	0	0
Meat from sheep - fresh - at retail - Survey - national survey	FSA	single	Swab	1056	7	0	7	0	0	0
Meat, mixed meat - meat products - cooked, ready-to-eat - at retail - Survey - national survey [3)]	FSA	single	25g	54	0	0	0	0	0	0
Other processed food products and prepared dishes - vegetarian pate - at retail - Survey - national survey	FSA	single	25g	34	0	0	0	0	0	0

Comments:

[1)] Cold sliced ccoked meat
[2)] Cold sliced cooked meat
[3)] Cold sliced cooked meat

Footnote:

FSA data derived from the Red Meat Survey and Cooked sliced meats and pate survey - unpublished data.

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

During 2008, the EU baseline survey for the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses was carried out according to Decision 516/2007/EC. The sampling strategy was carried out as in Annex I (technical specifications) of this Decision

Results of the investigation

The UK results from the survey were submitted to the Commission and are currently being analysed by EFSA

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. hyointestinalis	C. jejuni	C. lari	C. upsaliensis	C. fetus	Thermophilic Campylobacter spp., unspecified
All animals - unspecified - in total - Clinical investigations	VLA	animal		14	2	2	8	0	0	4	0
Birds - wild - in total - Clinical investigations	VLA	animal		5	2	0	2	1	0	0	0
Cattle (bovine animals) - at farm - Clinical investigations	VLA	animal		39	5	11	13	1	0	90	15
Goats - at farm - Clinical investigations	VLA	animal		1	0	0	0	0	0	0	1
Pigs - at slaughterhouse - Survey - national survey (animal sample - caecum) [1)]	VLA	animal									
Sheep - at farm - Clinical investigations	VLA	animal		89	30	3	43	0	0	218	34

	C. sputorum-C. sputorum subsp. bubulus
All animals - unspecified - in total - Clinical investigations	0
Birds - wild - in total - Clinical investigations	0
Cattle (bovine animals) - at farm - Clinical investigations	9
Goats - at farm - Clinical investigations	0
Pigs - at slaughterhouse - Survey - national survey (animal sample - caecum) [1)]	
Sheep - at farm - Clinical investigations	12

Comments:

[1)] Survey in 2007

Footnote:

Table contains data from Great Britain (England, Wales and Scotland).
Data from clinical sample submissions. Units tested are not known because the laboratory does not report negative results, unless as part of an official control programme or survey.

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

No national survey was carried out in 2008.

Isolates from a survey of cattle in Great Britain arriving for slaughter at the abattoir was carried out in 2003 and the antimicrobial resistance in the isolates was reported in the 2004 report.

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

The last survey was conducted in 2007: the results are reported in this 2008 report and relate to isolates recovered from the caecum of pigs at slaughter. Prior to the 2007 survey, a survey was performed in 2003 and the results are reported in the 2004 annual report.

Results of the investigation

Results of the survey are reported in the tables

C. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

During 2008, the EU baseline survey for the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses was carried out according to Decision 516/2007/EC. The sampling strategy was carried out as in Annex I (technical specifications) of this Decision

Type of specimen taken

Campylobacter spp. isolates recovered from the caecum of broilers after slaughter were examined in accordance with the latest EFSA recommendations

Methods of sampling (description of sampling techniques)

36 slaughterhouses representing 88% of the annual kill in the UK were recruited into the survey. Of the 36 abattoirs participating in the baseline survey, 25 were selected for sampling by the randomisation programme. The number of batches sampled by region was found to be proportionate to the annual slaughter throughput; 74% in England (538 million broilers), 13% in Ireland (96 million), 6% in Scotland (43 million) and 6% in Wales (43 million). The majority of the slaughter batches (94.0%) originated from conventionally produced broilers with the remainder coming from free-range (standard) and organic farms (4.0% and 2.0% respectively). Sampling for the survey was spread evenly across the year, sampling commenced on 7 January 2008 and ended on 17 December 2008. Over this period, samples were received from 445 of the 451 slaughter batches scheduled for sampling across the UK.

Apart from the stratification by month, sampling was based on random selection regarding the slaughterhouse, the sampling days and the slaughter batch to be sampled on a selected day. The primary sample was drawn in proportion to the number of broiler chickens processed annually by each of the 36 slaughterhouses participating in the survey using a weighted randomised selection of abattoirs. Each slaughterhouse was notified in advance of its quarterly sampling schedule.

Intact and full caeca were collected at evisceration from 10 broilers taken at random from the selected slaughter batch, avoiding the first part of the batch. Consecutive birds were not to be sampled. Samples were taken from the selected poultry slaughterhouses in England, Wales and Scotland by the Meat Hygiene Service (MHS), which is an executive agency of the Food Standards Agency (FSA). In Northern Ireland, samples were taken by the Veterinary Public Health Unit of the Department of Agriculture and Rural Development (DARD).

After collection, samples were double-wrapped, chilled and transported to the laboratory as soon as possible by courier in an insulated shipping box that was designed specifically for the survey. The boxes and contents were designed to keep the samples between +2oC and +8oC for up to 72 hours. Samplers were instructed to include a gel freezer pack in the insulated box which had been frozen at least 48 hours before packaging. Each sampled batch was accompanied by a standardised data questionnaire that met the EU survey specifications and collected information on attributes which could affect the Campylobacter status of the slaughter batch.

A total of 401 slaughter batches were eligible for inclusion in the survey.

Procedures for the selection of isolates for antimicrobial testing

Overall, 304 of 401 eligible slaughter batches were found to be positive for Campylobacter spp.

A random selection of 170 isolates was chosen to be included in the UK antimicrobial resistance monitoring scheme. Isolate selection was stratified by month and Campylobacter species so that the number of isolates chosen was spread evenly across the year and was proportional to the prevalence of C. jejuni and C. coli isolated per month. Only one isolate per slaughter batch was included for antimicrobial resistance testing, each slaughter batch relates to a separate flock.

Laboratory methodology used for identification of the microbial isolates

Isolates were prepared for broth microdilution susceptibility tests in compliance with EN ISO 20776-1. Isolates, which had been received and stored as growth originating from a single colony, were recovered from frozen storage (-80oC) on to non-selective Columbia blood agar (CBA). Plates were incubated for 40 to 48 hours at 37 degrees C in a microaerobic atmosphere and a small loopful of growth then further subcultured onto CBA and incubated for 18 to 24 hours as before, prior to testing.

For the broth microdilution test, several colonies, typically 5-6, were transferred from the CBA plate into 5 ml sterile distilled water and adjusted to a density of 0.5 McFarland using a calibrated nephelometer according to EN ISO 20776-1. The suspension was mixed and within 15 minutes 100l was transferred and mixed into 11ml cation - adjusted Mueller-Hinton broth (CAMHBT) (Trek Diagnostic Systems, East Grinstead, UK) containing 2.5% lysed horse blood, to give an inoculum of 5X105 cfu/ml. Again within 15 min 100l was transferred to each well of a customized Sensititre microtitre plate by Sensititre AutoInoculator (Trek Diagnostics) according to the manufacturer’s instructions. The plate was

sealed with the perforated seals supplied with the plates. Care was taken to seal around the edges of the plate to avoid evaporation. Plates were incubated in a modular atmosphere controlled system incubator (MACS, Don Whitley Scientific, Shipley, UK) set to 5% CO2, 5% O2, 3% H2 and 87% N2) at 37oC for 40 to 48 hours. Plates were stacked no more than 2 plates high.

After incubation, results were read by eye using a SensiTouch reader (Trek Diagnostic Systems). Growth appeared as turbidity or as a deposit of cells at the bottom of a well and the MIC was recorded as the lowest concentration of antimicrobial that inhibited visible growth. Positive growth control wells were always read first and if any showed no growth, results were considered invalid and the test repeated for the isolate in question. Inoculum density and purity checks were carried out as described by EN ISO 20776-1. In brief, viable counts of the inoculum were obtained by spreading 10µl of a 1:200 dilution onto CBA agar which was incubated alongside the test plates. Plates yielding between 20 and 80 colonies of a single type indicated a pure culture of correct density. If either of these conditions was not met the test plate was rejected and the test repeated. The tests were interpreted and performed according to the proposals set out by EFSA (EFSA 2007).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

A total of 7 antimicrobials (Erythromycin, Ciprofloxacin, Tetracycline, Streptomycin, Gentamicin, Ampicillin and Nalidixic acid) were included in the panel for Campylobacter spp.

Breakpoints used in testing

EFSA published epidemiological cut-off values (recommended by EUCAST) for Erythromacin, Ciprofloxacin, Tetracycline, Streptomycin and Gentamicin.
EUCAST designated cut-off values for Nalidixic acid and Ampicillin.

The MIC distributions differ for some antimicrobials for C. coli and C. jejuni, consequently the epidemiological cut-off values for each organism differ for those antimicrobials.

Results of the investigation

The results of antimicrobial sensitivity testing of C. coli are shown in the tables. The highest rates of resistance observed amongst C. jejuni and C. coli isolates from broilers in the UK, in 2008, were for tetracycline and ampicillin. The proportion of C. coli and C. jejuni isolates resistant to at least 4 antimicrobials was 15% and 17%, respectively.

The proportion of C. jejuni isolates resistant to tetracycline and ampicillin was 69% (90/130) and 63% (82/130), respectively, compared to 53% (21/40) and 48% (19/40) for C coli. None of the isolates tested was found to be resistant to gentamicin or erythromycin.

Of the 40 C. coli isolates included in the antimicrobial monitoring scheme, 22.5% were fully sensitive to all 7 antimicrobials tested, a similar proportion (18%) of C. jejuni isolates were fully sensitive to the same antimicrobials.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Poultry is recognised as the most common source of Campylobacter in humans and resistance among Campylobacter in poultry could have consequences for the treatment of infections in humans. There are no internationally accepted performance standards for antimicrobial susceptibility testing for Campyobacter. Consequently, discrepancies are often observed in the scientific literature reporting on Campylobacter susceptibility patterns and comparison between studies should be made with caution.

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

Results of the investigation

No data is available for 2008.

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

Sampling strategy used in monitoring

Frequency of the sampling

No data is available for 2008.

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

Results of the investigation

No data is available to report for 2008.

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		All animals		Gallus gallus (fowl) - broilers - Survey - EU baseline survey		Pigs - at slaughterhouse - animal sample - caecum - Survey	
Isolates out of a monitoring program (yes/no)				yes		yes	
Number of isolates available in the laboratory				40		287	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin			40	0	287	1
	Streptomycin			40	1	287	217
Fluoroquinolones	Ciprofloxacin			40	10	287	49
Fully sensitive	Fully sensitive			40	17	287	17
Macrolides	Erythromycin			40	0	287	102
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			40	15	287	56
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			40	7	287	122
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			40	1	287	72
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			40	0	287	20
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			40	0	287	0
Tetracyclines	Tetracyclin			40	21	287	227

Footnote:

Pigs - national survey carried out in 2007.

Broilers - EU baseline survey on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks (2008) according to Decision 516/2007/EC

Table Antimicrobial susceptibility testing of C. coli in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		40																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	1	40	0					14	24	2														
	Streptomycin	2	40	1						3	18	17	1				1								
Fluoroquinolones	Ciprofloxacin	1	42	12			1	12	9	7		1		4	2	3	1		2						
Macrolides	Erythromycin	4	40	0						8	9	10	9	4											
Penicillins	Ampicillin		0	0																					
Quinolones	Nalidixic acid		0	0																					
Tetracyclines	Tetracyclin	2	40	21						10	4	5						2	2	17					

Footnote:

Broilers - EU baseline survey on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks (2008) according to Decision 516/2007/EC

Table Antimicrobial susceptibility testing of C. jejuni in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		130																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	1	130	0					54	68	7	1													
	Streptomycin	2	130	2						14	84	27	3			1		1							
Fluoroquinolones	Ciprofloxacin	1	130	24				28	54	23	1			1	14	3	6								
Macrolides	Erythromycin	4	130	0						12	27	52	35	4											
Penicillins	Ampicillin		0	0																					
Quinolones	Nalidixic acid		0	0																					
Tetracyclines	Tetracyclin	2	130	90					3	19	14	3	1				4	8	27	51					

Footnote:

Broilers - EU baseline survey on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks (2008) according to Decision 516/2007/EC

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		All animals		Pigs - at slaughterhouse - animal sample - caecum - Survey		Gallus gallus (fowl) - broilers - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)				yes		yes	
Number of isolates available in the laboratory				3		130	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin			3	0	130	0
	Streptomycin			3	0	130	2
Fluoroquinolones	Ciprofloxacin			3	0	130	24
Fully sensitive	Fully sensitive			3	2	130	38
Macrolides	Erythromycin			3	0	130	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			3	1	130	69
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			3	0	130	22
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			3	0	130	1
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			3	0	130	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			3	0	130	0
Tetracyclines	Tetracyclin			3	1	130	90

Footnote:

Pigs - national survey carried out in 2007.

Broilers - EU baseline survey on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks (2008) according to Decision 516/2007/EC

Table Breakpoints used for antimicrobial susceptibility testing

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
EFSA/EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	EFSA	1		1	0.125	32				
	Streptomycin	EFSA	2		2	0.25	64				
Fluoroquinolones	**Ciprofloxacin**	EFSA	1		1	0.032	32				
Macrolides	**Erythromycin**	EFSA	4		4	0.125	128				
Tetracyclines	**Tetracyclin**	EFSA	2		2	0.125	256				

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 the 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 of Listeria monocytogenes in 2007 was 259, similar to the 210 reported cases in 2006, 229 cases in 2005 and 236 cases in 2004.

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, a 12 month 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. Results of the shopping basket survey were reported in the 2007 annual report.

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

Humans:
The data for recorded Listeriosis cases in England and Wales is not yet available for 2008. There were 15 Listeriosis cases reported in Scotland and 11 reported in Northern Ireland in 2008.

Food:
Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as were not available in time for inclusion in the 2007 report.

Animals:
During 2008, listeriosis was diagnosed in 191 incidences in animals in Great Britain, in all cases from clinical diagnostic samples submitted by private veterinarians to the Veterinary Laboratories Agency. This included 50 incidences in cattle, where Listeria monocytogenes was diagnosed as the cause of abortion on 3 occasions, usually associated with the feeding of poor quality silage. In sheep and goats there were 132 incidents where listeriosis was diagnosed during 2008. Listeria monocytogenes was isolated from the spleen of a backyard

chicken (pet) that had been losing weight prior to death. Listeriosis was not disgnosed in pigs or wildlife during the year. The potential link, if any, between listeriosis infection in animals and infection in humans still remains unclear.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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.

Additional information

A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected , of which 3,249 were beef, 1,693 were pork and the remaining 1,056 were lamb. All samples were tested for a range of microorganisms including the presence of Listeria. The overall finding was that 619 of meat samples were contaminated with Listeria spp. of which 185 were Listeria monocytogenes. Listeria spp. was detected in 353 beef, 187 pork and 79 lamb samples. Listeria monocytogenes was detected in 105 beef, 47 pork and 33 lamb.

A 5 month (July to November 2006) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and Listeria monocytogenes in ready-to-eat smoked fish on retail sale in the UK. A total of 3,222 ready-to-eat smoked fish samples were purchased, of which 1,878 were hot smoked and 1,344 were the cold smoked variety. All samples were tested for the presence of Listeria spp. and a range of other microorganisms. 378 samples tested positive for Listeria spp. Listeria monocytogenes was the most

prevalent species with 302 positive samples , the remaining 76 were for other Listeria spp. Hot smoked fish accounted for 96 of the samples positive for Listeria spp. of which 66 were Listeria monocytogenes and 30 were other Listeria types. In cold smoked fish 282 were positive for Listeria spp with Listeria monocytogenes being the most predominant type with 236 positives, the remaining 46 were other Listeria types.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and Listeria monocytogenes in ready-to-eat cold sliced cooked meats on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were purchased , of which 134 were beef, 1,096 were pork, 402 were poultry and 54 were mixed variety. All samples were tested for the presence of Listeria spp. and a range of other microorganisms. The results indicate that Listeria spp. were present in 45 samples. Listeria monocytogenes was the most prevalent species accounting for 21 of the positive samples the remaining 24 were for other Listeria spp. Listeria spp. was detected in 5 beef, 36 pork, 3 poultry and 1 mixed meat samples. Listeria monocytogenes was detected in 2 beef, 16 pork, 2 poultry and 1 mixed meat samples.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and Listeria monocytogenes in ready-to-eat pâtés on retail sale in the UK. A total of 1,648 ready-to-eat pâtés were purchased , of which 1,535 were meat, 79 were seafood and 34 were vegetarian variety. All samples were tested for the presence of Listeria spp. and a range of other microorganisms. The results indicate that Listeria spp. were present in 12 samples. Listeria monocytogenes was detected in 4 pâté samples the remaining 8 were other Listeria spp. Listeria spp. was detected in 7 meat, and 5 seafood pâtés and was not detected in any vegetarian pâtés sampled. Listeria monocytogenes was detected in 1 meat and 3 seafood pâtés and was not detected in any vegetarian.

Welsh food Microbiology forum survey of Listeria in various ready-to-eat foods did not result in any samples positive for Listeria spp. from any of the dairy products tested. The survey of various other foodstuffs did yield positive results as shown in the table

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

England and Wales:
There is no data yet available for the number of recorded cases of listeriosis in 2008.

Scotland:
In 2008 there were 15 laboratory confirmed cases of listeriosis. This is a decrease of 35% on the 2007 total of 23 confirmed cases. In 2008 there were three deaths, but there were also underlying conditions which may have contributed to the fatal outcome.

Northern Ireland:
During 2008 there were 11 reported cases of listeriosis, with 3 recorded deaths.

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

The total number of reports for 2007 was 259, for 2006 was 210, for 2005 was 232 and 236 in 2004.

In England and Wales peak infection was seen in the late 1980's. There were a total of 231 cases in 2007, an increase on the 187 cases reported in 2006 and on the 198 cases in 2005, which was down from 217 cases the previous year (2004).

In Northern Ireland, there were 5 cases reported in 2007, all of which were L. monocytogenes. 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. In 2006 there were 17 laboratory confirmed cases of listeriosis, a 47% decrease on 2005 when there were 32 cases, but much closer to the 2004 total of 15 reports. There were 23 confirmed cases in 2007.

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	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at retail - Surveillance	NPHS	single	100g	449	0	449	0	449	0	0
Cheeses made from goats' milk - soft and semi-soft - made from pasteurised milk - at retail - Surveillance	NPHS	single	100g	23	0	23	0	23	0	0
Cheeses made from sheep's milk - soft and semi -soft - made from pasteurised milk - at retail - Surveillance	NPHS	single	100g	1	0	1	0	1	0	0
Dairy products (excluding cheeses) - butter - at retail - Surveillance	NPHS	single	100g	419	0	419	0	419	0	0

Footnote:

National Public Health Service for Wales (NPHS) data derived from the Welsh food Microbiology forum survey of Listeria in various RTE foods.

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Crustaceans - unspecified - cooked - at retail - Surveillance	NPHS	single	100g	147	6	147	6	147	0	0
Fish - smoked - at retail - Surveillance	NPHS	single	100g	178	12	178	12	178	0	0
Fish - smoked - cold-smoked - at retail - Survey - national survey	FSA	single	25g	1344	236	1344	236	1344	4	0
Fish - smoked - hot-smoked - at retail - Survey - national survey	FSA	single	25g	1878	66	1878	66	1878	3	3
Fishery products, unspecified - seafood pate - at retail - Survey - national survey	FSA	single	25g	79	3	79	3	79	0	0
Meat from bovine animals - fresh - at retail - Survey - national survey	FSA	single	Swab	3249	105	3249	105	3249	8	3
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Surveillance	NPHS	single	100g	227	4	227	3	227	2	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1)]	FSA	single	25g	134	2	134	2	134	0	0
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at retail - Surveillance	NPHS	single	100g	188	3	188	3	188	0	0
Meat from other animal species or not specified - meat products - cooked, ready-to-eat - chilled - at retail - Surveillance [2)]	NPHS	single	100g	143	0	143	0	143	0	0
Meat from other animal species or not specified - meat products - fermented sausages - at retail - Surveillance [3)]	NPHS	single	100g	316	6	316	6	316	0	0
Meat from other animal species or not specified - meat products - pâté - at retail - Surveillance	NPHS	single	100g	411	1	411	1	411	0	0
Meat from other animal species or not specified - meat products - pâté - at retail - Survey - national survey	FSA	single	25g	1535	1	1353	1	1353	0	0

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Meat from pig - fresh - at retail - Survey - national survey	FSA	single	Swab	1693	47	1693	47	1693	4	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - Surveillance	NPHS	single	100g	718	19	718	19	718	1	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - Survey - national survey [4]	FSA	single	25g	1096	16	1096	16	1096	0	0
Meat from poultry, unspecified - meat products - cooked, ready-to-eat - at retail - Survey - national survey [5]	FSA	single	25g	402	2	402	2	402	0	0
Meat from sheep - fresh - at retail - Survey - national survey	FSA	single	Swab	1056	33	1056	33	1056	2	1
Meat, mixed meat - meat products - cooked, ready-to-eat - at retail - Survey [6]	FSA	single	25g	54	1	54	1	54	0	0
Other processed food products and prepared dishes - pasta/rice salad - at retail - Survey - national survey	NPHS	single	100g	404	15	404	15	404	1	0
Other processed food products and prepared dishes - sandwiches - at retail - Surveillance	NPHS	single	100g	1643	86	1643	86	1643	4	3
Other processed food products and prepared dishes - sushi - at retail - Survey - national survey	NPHS	single	100g	50	1	50	1	50	0	0
Other processed food products and prepared dishes - vegetarian pate - at retail - Survey - national survey	FSA	single	25g	34	0	34	0	34	0	0
Ready-to-eat salads - at retail - Survey - national survey [7]	NPHS	single	100g	335	3	335	3	335	0	0

Comments:

[1] Cold sliced cooked meat
[2] Hotdogs/frankfurters
[3] Salami

Table Listeria monocytogenes in other foods

[4)] Cold sliced cooked meat
[5)] Cold sliced meat
[6)] Cold sliced cooked meat
[7)] Bagged green salads

Footnote:

National Public Health Service for Wales (NPHS) data derived from the Welsh food Microbiology forum survey of Listeria in various RTE foods

FSA data from Red Meat Survey and Cooked sliced meats and pate survey (unpublished)

The L. monocytogenes detection and enumeration results for fresh meat from bovine, pig and sheep categories (those reported from the FSA red meat survey) should be reported as presence per swab and cfu/swab resepectively

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) - at farm - Clinical investigations	VLA	animal		50	3	47
Gallus gallus (fowl) - at farm - Clinical investigations (Pet chicken)	VLA	animal		1	1	0
Goats - at farm - Clinical investigations	VLA	animal		8		8
Sheep - at farm - Clinical investigations	VLA	animal		132	33	99

Footnote:

Data for Great Britain - England, Wales and Scotland only.
Diagnoses made from clinical diagnostic material submitted to the VLA. Units tested are not known because the laboratory does not report negative results. The numbers above are numbers of incidents. There may be more than one 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:

There is no total data yet available for VTEC infection in humans in the UK for 2008. In total in 2007 there were 1113 laboratory confirmed cases of VTEC infection, a decrease on the 1234 recorded cases in 2006. There were 1129 cases reported in 2005 and 898 in 2004. During 2007, there were 31 cases of HUS, compared to the 60 cases reported in 2006, and 38 cases of HUS reported in 2005.

No data is yet available for laboratory confirmed cases of VTEC infection in England and Wales for 2008. In 2007, the HPA Laboratory of Enteric Pathogens confirmed 822 cases of VTEC O157 in England and Wales, a decrease on the annual total of 977 for 2006 and 938 in 2005.

In Northern Ireland there were 59 laboraotry confirmed reports of VTEC infectiion in humans in 2008, 50 of which were caused by VTEC O157. There were 54 reports in 2007 (38 of which were VT positive), 46 reports in 2006, 43 of which were VT positive, 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.

Enhanced surveillance for VTEC was initiated in Scotland in 1999 and for HUS in 2003. In 2007 there were a total of 222 cases of VTEC O157 and 20 reported cases of HUS. During 2006 there were a total of 230 cases of VTEC O157, 34 of which were from cases of HUS, and 18 cases of non-O157 VTEC. The 34 cases of HUS seen in 2006 is the highest number of cases in Scotland since enhanced surveillance began in 2003. In 2005 there were 167 VTEC O157, and 17 of those were from cases of HUS. 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.

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. The reports of VTEC O157 cases increased in 2007, and Scotland continued to have the highest incidence per 100,000 population in the UK with an incidence rate of 4.34 per 100,000 population.

Animals:
No formal national surveys were carried out in 2008. A survey of eligible cattle, sheep and pigs was carried out in 2003 - see report for 2003. In Great Britain, VTEC O157 outbreak investigations are undertaken by the Veterinary Laboratories Agency (VLA)at the request of public health colleagues on agricultural premises/ premises with animals thought to have a potential link with human disease cases. Six premises were visited and such investigations undertaken into potential human-animal contact links in 2008. In 2 of the 6 premises, isolates of VTEC with an indistinguishable PFGE profile from that found in the human cases were detected in goat, pig, horse, donkey and alpaca samples. VTEC O157 PT34, VT2 isolates from one of the dairy herds investigated (mainly from young stock) had 2 PFGE profiles similar to human isolates. VNTR profiles of human and animal strains differed at a single locus. Data suggested a probable link. On one of the premises (an open farm), VTEC O157 was not detected on the premises.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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 Great Britain have shown the importance of contact with animals and the animals' environment. In outbreak investigations carried out in 2007, where potential links to animal contacts were examined, several animal species in 2 out of the 3 premises investigated showed VTEC isolates with PFGE profiles inditinguishable from the human isolates from the human outbreak cases.

Additional information

Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as these were not available in time for inclusion in the 2007 report.

A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 red meat samples were collected, of which 3,249 were beef, 1,693 were pork and the remaining 1,056 were lamb. All samples were tested for a range of microorganisms including the presence of E. coli O157. The overall finding was that 1 beef sample was contaminated with VTEC O157, VTEC O157 was not detected in pork or lamb.

A 6 month (March to September 2007) survey was commissioned by the Food Standards Agency to measure the prevalence of Listeria spp. and Listeria monocytogenes in ready-to-eat cold sliced cooked meats on retail sale in the UK. A total of 1,686 ready-to-eat cold sliced cooked meats were purchased, of which 134 were beef, 1,096 were pork, 402 were poultry and 54 were mixed variety. All samples were tested for the presence of Listeria spp. and a range of other microorganisms including E. coli O157. The results indicated that E. coli O157 was not detected in any of the cold sliced cooked meats sampled.

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. Enhanced surveillance for VTEC was initiated in Scotland in 1999 and for HUS in 2003.

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

Northern Ireland:
In Northern Ireland there were 59 laboratory confirmed cases of VTEC infection in humans during 2008 (6 of these were imported). 50 cases were VT+ caused by VTEC O157 (5 of these were imported).

No data is yet available for England, Scotland and Wales for 2008.

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

In UK in total in 2007 there were 1113 laboratory confirmed cases of VTEC infection, a decrease on the 1234 recorded cases in 2006. There were 1129 cases reported in 2005 and 898 in 2004. Of the cases, 1108 were caused by VTEC O157, compared to 1216 in 2006. During 2007, there were 31 cases of HUS, compared to the 60 cases reported in 2006, and 38 cases of HUS reported in 2005.

In 2007, the HPA Laboratory of Enteric Pathogens confirmed 833 cases of VTEC O157 in England and Wales, including 11 cases of HUS, one an imported case. This was an decrease on the reported cases for 2006 (1003) and 2005 (932). The incidence per 100,000 population for laboratory confirmed E. coli O157 VT+ cases in 2007 was 1.6 and for laboratory confirmed HUS with VTEC O157 (VT+) cases it was 0.02.

In Northern Ireland, there were 54 reports of laboratory confirmed E. coli infections in 2007, 38 of these confirmed as VTEC O157 VT positive. These are provisional figures for 2007 and there are 16 isolates for which toxin information has not yet been received. There were 46 reports of E. coli O 157 in 2006, 43 of which were VT positive, 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. The incidence per 100,000 population for laboratory confirmed E. coli O157 VT+ cases was 2.18 for 2007.

Enhanced surveillance for VTEC was initiated in Scotland in 1999 and for HUS in 2003. In Scotland in 2007 there were a total of 237 cases of VTEC O157, 18 of which were from cases of HUS. Two additional cases of HUS were identified on clinical signs, but not confirmed in the laboratory. There was 1 laboratory confirmed case of HUS with non -O157 VTEC. 222 cases of non-HUS VTEC O175 infections were identified during the year and 15 cases of non - HUS other VTEC infections were also recorded. A further 5 laboratory confirmed cases have not been included in the data tables for the year as their isolates did not possess VT genes. Scotland continued to have the highest incidence per 100,000 population in the UK with an incidence rate of 4.34 per 100,000 population for laboratory confirmed E. coli O157 VT+ cases in 2007. The incidence for laboratory confirmed HUS with VTEC O157 (VT+) was 0.33 in 2007.

In Scotland in 2006 there were a total of 230 cases of VTEC O157, 34 of which were from cases of HUS, and 18 cases of non-O157 VTEC. An additional case of HUS was identified on clinical signs and serology. The 34 cases of HUS seen in 2006 is the highest number of cases in Scotland since enhanced surveillance began in 2003. In 2005 there were 167 VTEC O157, and 17 of those were from

cases of HUS. 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. 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. 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 Great Britain have shown the importance of contact with animals and the animals' environment.

In Great Britain, VTEC O157 outbreak investigations are undertaken by the Veterinary Laboratories Agency (VLA)at the request of public health colleagues on agricultural premises/ premises with animals thought to have a potential link with human disease cases. These investigations variously involve collaboration with other organisations, including the Environmental Health departments of Local Authorities and the Health and Safety Executive. Three premises were visited and such investigations undertaken into potential human-animal contact links in 2007. In 2 of the 3 premises, isolates of VTEC with an indistinguishable PFGE profile from that found in the human cases were detected in several animal species.

2.4.3 Escherichia coli, pathogenic in foodstuffs

Table VT E. coli in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC)-VTEC O157	Verotoxigenic E. coli (VTEC)-VTEC non-O157	Verotoxigenic E. coli (VTEC)-VTEC, unspecified
Meat from bovine animals - fresh - at retail - Survey - national survey	FSA	single	Swab	3249	1	1	0	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Survey - national survey [1)]	FSA	single	25g	134	0	0	0	0
Meat from pig - fresh - at retail - Survey - national survey	FSA	single	Swab	1693	0	0	0	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - Survey - national survey [2)]	FSA	single	25g	1096	0	0	0	0
Meat from sheep - fresh - at retail - Survey - national survey	FSA	single	Swab	1056	0	0	0	0

Comments:

[1)] Cold sliced cooked meat
[2)] Cold sliced cooked meat

Footnote:

FSA data derived from the red meat survey and cold sliced cooked meat and pate survey - unpublished data.

The detection method used in the red meat survey was ISO 16654.

A Patharix detection method was used in the cold sliced cooked meat and pate survey.

Confirmation testing for both the red meat survey and cold sliced cooked meat and pate surveys was carried by the HPA using a PCR method for VT genes (specifically VT1 and VT2).

2.4.4 Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

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

In Great Britain, VTEC O157 outbreak investigations are undertaken by the Veterinary Laboratories Agency (VLA)at the request of public health colleagues and variously involve collaboration with other organisations, including the Environmental Health departments of Local Authorities and the Health and Safety Executive. They are undertaken according to formal VLA guidelines. Determination of phage type (PT), Vero cytotoxin (VT) type and comparison of human and animal isolates by pulsed field gel electrophoresis (PFGE) are performed by the E. coli/ Shigella/ Yersinia/ Vibrio Reference Unit of the Laboratory of Enteric Pathogens, HPA Centre for Infections, Colindale. If isolates from animals circumstantially implicated in outbreaks have the same PT and indistinguishable PFGE profiles from human cases, this is taken as confirmatory evidence of a causal association. In practice, there can be minor PFGE profile variation amongst some isolates associated with an outbreak investigation. VNTR profiles of strains within an outbreak can also show variation at a single tandem repeat locus; application of this method is currently under development. Other VTEC O157 PTs may be detected incidentally during the investigation of animal premises.

Six premises were visited and such investigations undertaken in 2008.

Results of the investigation

Outbreak investigations in Great Britain - all livestock spp:
Six premises were identified as potentially linked to human disease outbreaks - 3 were premises open to the general public (2 open farms, one farm visitor centre and 2 dairy farms and a smallholding).

In August, the VLA investigated two dairy farms and a smallholding linked to five human cases of VTEC O157 PT34, VT2, including two babies attending a nursery. All human isolates had the same PFGE profile. In one of the dairy herds, VTEC O157 PT 34, VT2 was isolated from 11 of 12 faecal samples from young stock and one of 70 samples taken from the milking herd. Two PFGE profiles were observed among the cattle

strains; neither of these was identical to the human profile although they were clearly related to it. The VNTR profiles of 5 out of 6 cattle isolates differed from the human strain profile at one locus only and further VNTR work is in progress. In summary, results from the strain typing suggested a possible link between the cattle and human disease. VTEC O157 PT 4 (ie not the same as the outbreak strain) was isolated from one of 100 faecal samples from the other dairy herd; VTEC O157 was not detected from nine samples (from horses, dogs, a cat and rabbit) taken on the smallholding. Both these latter premises were excluded as possible sources.

Also in August 2008, the VLA undertook an investigation following reports of three human cases of VTEC O157 PT 21/28, VT2 infection linked to an open farm. VTEC O157 PT 21/28 was subsequently isolated from 20 (54%) of 37 faecal samples collected, with isolates obtained from goats, alpacas, ponies, donkeys and pigs. Strains from cases and from two goats, a horse and a pig had indistinguishable PFGE profiles and there were three variant but related profiles in goat, alpaca and donkey isolates. VNTR showed that isolates from human and animal
sources had either the same profile or differed at one locus only. In conclusion, the results of strain typing were consistent with the open farm being the source of the outbreak. The risks associated with potential contamination of an overflow car park used for overnight grazing, and from public access to the goat pens, were highlighted by investigators and appropriate precautions adopted.

In September, VLA assisted the HPA with the investigation of three cases of human VTEC O157 PT 21/28, VT2 infection which were circumstantially linked to an open farm. VTEC O157 was not isolated from any of 28 samples taken from pens containing goats, lambs, guinea pigs and rabbits and no link with the cases was detected.

Also in September 2008, the VLA assisted with the investigation of a VTEC O157 PT21/28, VT2 outbreak comprising four cases linked to a farm visitor centre. VTEC O157 PT21/28 was isolated from 8 (11%) of the 78 environmental and pooled faeces samples taken during the visit. Most of the positive samples were from goats, although VTEC O157 PT21/28 was also isolated from sheep, horse, donkey, pig, alpaca and bantam samples. Four human isolates and seven animal isolates from goat, horse, pig, sheep, donkey and bantam sources had
indistinguishable PFGE profiles; the remaining isolate from an alpaca had a variant of this profile. Four human and seven animal isolates had the same VNTR profile and one isolate from a goat showed variation at one locus only. These data therefore confirmed an epidemiological link between the livestock and cases. Appropriate
advice was given according to existing guidelines.

Relevance of the findings in animals to findings in foodstuffs and to human cases

An analysis of outbreak investigations associated with open farms in Great Britain 1997-2007 revealed that VTEC O157 was present on 61% of 31 premises sampled, with the highest proportion of positive samples on positive premises (29%) in cattle, followed by sheep (24%); infection was also detected in a range of other species (Pritchard and others, Veterinary Record, in press).

Additional information

VTEC O157 in farm dogs: farm dogs were thought to be the probable source of infection for one of the VTEC outbreaks in humans investigated during 2007 because of their close contact with the index case and with infected cattle. The dogs were individually resampled on two further occasions: VTEC O157 was not isolated again from either dog although sorbitol fermenting VT-negative E. coli O157 was coincidentally isolated from one dog on both occasions. VTEC O157 has previously been reported in dogs in association with human cases. However, it appears to be an uncommon occurrence and probably reflects temporary carriage and shedding following contact with cattle.

A scheme for enhancing surveillance of E. coli from diagnostic submissions to the VLA was carried out between 2005 and 2007 to detect new and emerging strains of potential zoonotic importance and those associated with disease in animals. It utilises standardised case definitions, colony selection criteria and extended serotyping plus Verocell assay, Multiplex PCR and Real Time PCRs to determine the following virulence factors: Vero cytotoxins (VT), eae (intimin), cytotoxic necrotising factor (CNF), cytolethal distending toxin (CLDT), heat-stable toxin (Sta), heat-labile toxin (LT), and fimbrial adhesions. Findings are entered onto a dedicated database (Ecotest) to facilitate surveillance and monitor trends over time. Antimicrobial sensitivity testing of the isolates to detect extended-spectrum beta-lactamase (ESBL) enzymes is included.

A total of 361 E. coli isolates were examined during 2007. Of the 347 isolates tested from animal endemic disease submissions, virulence factors with zoonotic potential were detected as follows: 5 (1.4%) were VT1+ and eae positive, 2 (0.6%) were VT1+, VT2+ and eae positive, 1 (0.3%) was VT1+ and VT2+, 2 (0.6%) were VT1+ only, 4 (1.2%) were VT2+ only and 24 (6.9%) were eae positive only. Overall, 14 (4.0%) of the 347 isolates from clinical disease cases in animals were VT+ compared with 20 (5.3%) of the 374 isolates examined in 2006 and 12 (5.7%) of the 210 isolates examined in 2005. The VTECs were isolated from cattle, sheep, goat and pigs. Twelve isolates (3.5%) contained the cytotoxic necrotizing factor (CNF) which was isolated from cattle, sheep/goats, pigs and other species. This compared with sixteen isolates (4.3%) in 2006.

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):
Bovine tuberculosis (TB) is the most serious endemic disease of cattle in GB. The sustained progress achieved in controlling bovine TB in GB throughout the 1950s, 1960s and 1970s by a test and slaughter regime stalled in the mid 1980s. The situation gradually regressed since then, and in the period between the 1986 and 2001 the total number of TB herd breakdowns ("incidents") in GB rose at an average annual rate of 14.5%. Since two years after the Food & Mouth Disease epidemic of 2001 (July 2003 onwards), this average annual rate of increase has slowed down although in 2008 there was an overall worsening in key epidemiological parameters relative to 2006 and 2007.

At the end of 2008, the United Kingdom was one of several 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. Nevertheless, just over 91% of all cattle herds in GB still retained their individual OTF status at the end of 2008 and the distribution of bovine TB incidents continues to be geographically clustered. 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 (cattle movements). Scientific evidence suggests that in the endemic TB areas of GB the Eurasian badger, Meles meles constitutes 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. Northern Ireland did not obtain Community co-financing for its TB

eradication programme in 2008.

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

Great Britain (England, Wales and Scotland): at the end of 2008 approximately 2.9 per cent of British herds were under movement restrictions due to a bovine TB incident.Other herds were restricted because of overdue testing. The balance 91.1% of British herds were OTF at the end of 2008.

Northern Ireland:
At the end of 2008 approximately 4.3% of herds in Northern Ireland were under bovine TB restriction due to a bovine TB incident (OTW status). This is a reduction on the 5.35% of herds under restriction at the end of 2007. There were 1,273 new reactor herds and 8,390 reactor animals detected since the start of 2008. 87.7% of Northern Irish herds were officially bovine TB-free at the end of 2008

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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. Bovine TB is a well recognised zoonosis and cases of human infection continue to be diagnosed in the UK. However, the advent of pasteurisation of virtually all the milk supply and a compulsory TB control programme in cattle has drastically reduced the incidence of human 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 Animal Health Agency (AH), 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, AH 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. classed as "imported" cases) or reactivation of long-standing latent TB infection contracted before the introduction of milk pasteurisation in the 1950s. The geographical distribution of human M bovis infections does not mirror that of bovine TB in the cattle population. However, in recent years GB has experienced some isolated incidents of clinical M.bovis infection in young and middle-aged people, suggestive of recent transmission form native animal reservoirs or infected humans, rather than reactivation of old latent infection or "imported" cases. There are no documented instances of infection associated with eating contaminated meat.

There is no data available for the total number of recorded cases of M. bovis in humans in 2008. In 2007 there were 21 (provisional) cases of M bovis in humans in the UK and none were known to be directly associated with contact with infected cattle. There was no information available for the year on possible cases of re-activation.

Recent actions taken to control the zoonoses

Once identified, reactor cattle (and, if necessary, any in-contacts) are valued and compulsorily removed. Compensation is paid to the herd owner according to the age, sex, production type and pedigree status of the slaughtered animal, by reference to a table of average market prices set monthly by the Department for 47 different categories 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 at the national TB reference laboratory in Weybridge in Great Britain. In herds with multiple reactors only a representative number of carcases may 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 herd test with negative results and the disclosure of reactors are forward - traced and tested (if still alive on another holding). Any cattle on holdings adjoining an infected herd are also tuberculin tested to check for lateral spread or exposure to a common environmental source of infection. Back-tracings of the herds of origin of reactors are also undertaken, where appropriate. Six months after the restoration of OTF status, affected herds undergo another tuberculin skin test. If this test is negative, a second skin test takes place 12 months later and, if the results are negative, the herd reverts to the normal testing frequency for the area.

Milk from dairy herds under TB restrictions destined for human consumption must undergo heat treatment (pasteurization). From 1 January 2006, the milk from tuberculin skin (and gamma-interferon) 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. In Great Britain it is a statutory requirement that all cattle over 42 days old moving out of a 1 or 2 yearly tested herd must undergo tuberculin skin testing with a negative result within 60 days prior to movement, unless the herd or movement meets an exemption. Cattle over 42 days of age moved to farms in Scotland from 1- and 2-yearly testing areas, must be subject to post-movement testing in addition to pre-movement TB testing.

Additional information

Under domestic TB legislation, the identification of suspect tuberculous lesions in the carcases of domestic mammals other than cattle is notifiable. Furthermore, the identification of M. bovis in clinical or pathological specimens taken from any mammal (except humans) must be reported to the Veterinary Laboratories Agency.

During 2008, Mycobacterium bovis infection was confirmed by culture of the organism from 1 sheep, 33 goats, 10 domestic pigs, 13 alpacas, 9 llamas, 18 domestic cats, 1 dog, 1 farmed deer, 5 park (or unknown type deer) and 31 wild deer. Some of these isolations (e.g. goats, pigs, camelids) represent incidents involving two or more infected animals from the same holding. Mycobacterium tuberculosis was detected in one of the 16 dogs tested for tuberculosis.

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.

In the UK in total in 2007 there were 22 (provisional) laboratory reports of tuberculosis due to M. bovis, compared to a total of 32 for the previous year.

In England and Wales in 2007 there were 21 (provisional) laboratory reports of tuberculosis due to M. bovis, compared to a total of 22 in 2006. In Scotland in 2007 there was one recorded case in 2007 and 6 in 2006. There were no reported infections of M. bovis in humans in Northern Ireland in 2007, compared with 3 in 2006 and 5 cases in 2005.

Results of the investigation

There was no data available for inclusion in the report for M. bovis cases recorded in humans England and Wales in 2008.

In Scotland in 2008 there were three reported cases of tuberculosis due to M.bovis. This compares with one case in 2007 and 6 in 2006. All three cases in 2008 were reported in males over the age of 65.

In Northern Ireland in 2008 there were 2 cases of M. bovis notified during the year. This compares with 3 in 2006 and 5 cases in 2005.

There was no information available on classification as reactivation of previous cases for the year due to the provisional nature of the data.

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.

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.

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 (OTF) from TB.

Additional information

The UK, 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 the UK enjoy OTF status.

Monitoring system

Sampling strategy

The TB testing programme applied in the UK follows the principles of Council Directive 64/432/EEC, as amended.

Frequency of the sampling

Compulsory tuberculin testing of cattle herds continued to take 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 2008, approximately 32.5% of all cattle herds in Great Britain were on an annual tuberculin testing frequency. The remainder were tested every two (12.5%), three (0.7%), or four (54.3%) 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 may be subject to routine annual testing if they present an increased public or animal health risk (e.g. producer-retailers of raw drinking cows' milk, herds owned by dealers, bull hirers, etc.).

Statutory pre-movement testing is carried out on all animals over 42 days of age moving out of 1 and 2-yearly testing parishes or herds.

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)

In the UK, all testing of cattle for TB is by the single intradermal comparative cervical tuberculin (SICCT) test, using avian and bovine purified protein derivative (PPD) tuberculins as per Annex B to Directive 64/432/EEC. The interpretation of test results is in line with this Directive, although a more severe interpretation is applied upon confirmation of TB in a herd. The SICCT test is the primary screening test and the only diagnostic method approved for certification of UK herds as officially TB free (OTF). 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 (IRs) are disclosed, they are required to be isolated and retested once (in Scotland and Wales) or up to two times (England) at 60 day intervals. IRs that do not resolve at retest are classed as reactors and 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).

Great Britain - England, Wales and Scotland:
The deployment of the ancillary gamma interferon (IFN) blood test (Bovigam) continued in 2008 to enhance the sensitivity of the cattle testing programme. Since October 2006, the use of the IFN test alongside the skin test has been mandatory in certain prescribed circumstances, primarily as an ancillary parallel test in new confirmed breakdowns outside of TB hotspot areas and also for rapid re-testing of animals with two successive IR results in annual or biennial testing areas of England. The blood test is also used occasionally in herds with persistent, confirmed breakdowns in high incidence areas. Overall, 22,344IFN tests were carried out in 2008 in GB and 4,181 positive animals identified for removal.

Northern Ireland:
Use of the IFN test continued during 2008. It is mainly used as a voluntary ancillary test to the SICCT in herds where infection is confirmed and its use allows earlier removal of diseased animals than the SICCT alone. Overall,

11,642 tests were carried out in 2008 and 272 IFN positive but SICTT negative animals were removed.

Case definition

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.

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 test reactors are detected, they are removed to slaughter. Lymph node samples or lesions of tuberculosis are submitted for laboratory examination. Where lesions of TB are suspected at routine slaughter, they are also submitted for laboratory examination.

Vaccination policy

Vaccination of cattle against TB is not carried out in the UK and is expressly forbidden by the domestic animal health legislation. In Great Britain, consideration is now being given to policy options for the deployment of a vaccine against TB in cattle and badgers, alongside the existing control measures.

Other preventive measures than vaccination in place

As described under control program mechanisms.

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 two consecutive herd tests if 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.

Control program/mechanisms

The control program/strategies in place

As stated above, routine tuberculin skin testing and slaughter of any reactors is the mainstay of the TB control programme in the UK. A revised Tuberculosis (England) Order 2007 came into force on 6 April 2007. Among other things, this extended pre-movement testing to all cattle over 42 days of age moving out of 1 and 2-yearly tested herds in the 60 days prior to movement, although some exemptions apply. Routine TB surveillance tests also qualify as pre-movement tests if the animals are moved within 60 days after that test. Other than these routine tests, pre-movement tests are arranged and paid for by the herd owner.

The Welsh Assembly Government introduced pre-movement testing in Wales on 2 May 2006, amended in 2007 in line with changes in the legislation applying to England. The Scottish Government introduced compulsory pre and post-movement testing requirements for Scotland in September 2005. This legislation also 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 Animal Health Agency/Veterinary Services Division of 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 Veterinary Laboratories Agency in Great Britain and the Department of Agriculture and Rural Development (DARD) in Northern Ireland.

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

United Kingdom - Great Britain: England, Wales and Scotland.
Provisional data for 2008 collated at the end of March 2009: At the end of 2008 approximately 2.9 per cent of British herds were under movement restrictions due to a bovine TB incident. Other herds were restricted because of overdue testing. The balance (91.1%) of British herds were OTF at the end of 2008. There was a provisional 18.9% increase in the total number of new TB incidents in Great Britain in 2008 (4,986) compared with 2007 (4,193). Of these new TB breakdowns, 85% occurred in the West of England and in Wales. Taking into account the overall number of tuberculin skin tests performed in unrestricted herds (56,583 in 2008, practically unchanged on 2007), this equates to a total herd TB incidence of 8.8%, compared to 7.4% for the previous year. The estimated herd incidence of bovine TB breakdowns confirmed by post-mortem examination and culture in 2008 was 4.7% (4.0% for 2007). Approximately 5.9 TB test reactors were identified for every 1,000 animals tested in 2008. A total of 1,153 cattle carcases with suspicious TB lesions (of which 828 yielded M. bovis on culture) were detected at commercial slaughter of cattle, thus supplementing active TB surveillance by skin testing.

United Kingdom - Northern Ireland:
At the end of 2008, 4.3% of herds in Northern Ireland were under bovine TB restriction due to a bovine TB incident (OTW status). This is a reduction on the 5.35% of herds under restriction at the end of 2007. There were 1,273 new reactor herds and 8,390 reactor animals detected since the start of 2008. 87.7% of Northern Irish herds were officially bovine TB free at the end of 2008. 1,523 reactor animals and animals detected with suspicious lesions at slaughter underwent histopathological and bacteriological examination with 980 of these culture positive for M. bovis.

Relevance of the findings in animals to findings in foodstuffs and to human cases

These are described in the General Evaluation above.

In 2007 there were 22 (provisional) cases of M bovis in humans in the UK and none were known to be directly associated with contact with 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.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

Deer (Farmed and Park)
United Kingdom - Great Britain(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 Animal health Agency (AH) 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 Â£1,200 (i.e. the maximum compensation payable is Â£600).

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

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 comparative 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 remain under permanent restrictions until destocked. Tuberculin testing is carried out on any 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

United Kingdom - Great Britain:
During 2008, M. bovis was cultured from 1 farmed deer, 5 park or unknown deer types and 31 wild tuberculous deer carcases detected at postmortem inspection (statutory notifications to Animal Health or Veterinary Laboratories Agency). 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.

United Kingdom - Northern Ireland
No data is available for 2008. in 2007, 93 deer carcasses were subject to investigation for tuberculosis and in 8 of these M. bovis was detected.

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

Great Britain:
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, mainly to prevent excessive population growth and damage to crops and woodland. 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 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.

A quantitative risk assessment carried out by the Central Science Laboratory (CSL) in 2005 concluded that some deer species (principally fallow deer – Dama dama) had the potential to act as maintenance hosts for M. bovis TB, although the prevalence of TB infection in deer is not high (less than 5%) and the ecology of wild deer made it unlikely that they would have any close direct contact with cattle. However, there was considerable uncertainty in the model's outputs and one of the data deficiencies identified as responsible for a considerable proportion of this uncertainty was the prevalence of M. bovis infection in deer, together with the abundance and distribution of the various deer species. As a result, Defra initiated in December 2006 a field survey of TB prevalence in wild deer in the South-west Peninsula and the Cotswolds (England) with the aim of providing indicative values for the prevalence M. bovis TB in all deer species found in areas of high TB prevalence in cattle. The results of the survey published in 2008, showed M. bovis infection is present at a very low prevalence (less than 1%, except in one area where it is present at 3.8% in fallow deer). In the Cotswolds high prevalences were found in two of the three areas sampled (15.9% and 8.1%), particularly in fallow deer (Dama dama). In all areas surveyed, fallow deer were the species most likely to have the highest prevalence of M. bovis infection.

Defra has concluded that, under current conditions of low to moderate density and TB prevalence, the majority of infected wild deer populations in SW England and Wales are most likely to act as spill-over hosts of M. bovis and, unlike badgers, do not pose a significant risk to cattle.
More detailed information about this research can be found on Defra's website: http://www.defra.gov.uk/animalh/tb/index.htm

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

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.

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
Alpacas - at farm - Surveillance [1)]	NRL	animal	30	16	13	0	3
Cats - pet animals - in total - Surveillance [2)]	NRL	animal	121	60	18	0	42
Deer - in total - Surveillance [3)]	NRL	animal	61	45	36	0	9
Dogs - pet animals - in total - Surveillance [4)]	NRL	animal	16	6	1	1	4
Goats - in total - Surveillance [5)]	NRL	animal	44	36	33	0	3
Lamas - at farm - Surveillance [6)]	NRL	animal	15	10	9	0	1
Pigs - at slaughterhouse - Monitoring (Routine meat inspection)	NRL	animal	68	19	10	0	9
Sheep - at slaughterhouse - Monitoring (Routine meat inspection)	NRL	animal	6	1	1	0	0

Comments:

[1)] Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination or from TB test reactors

[2)] Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination.

[3)] Wild and park deer. Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination or from TB test reactors

[4)] Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination.

[5)] Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination or from TB test reactors

[6)] Submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post mortem examination or from TB test reactors

Footnote:

Data for Great Britain (England, Scotland and Wales only).
NRL is the National Reference Laboratory

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	85585	8400000	77956	91.09	2463	2.88		6300000	468358	1153	828
NORTHERN IRELAND	26676	1647300	22920	85.92	769	2.88	1	1592213	0	1523	980
Total	112261	10047300	100876	89.86	3232	2.88	1	7892213	468358	2676	1808
Total - 1											

Footnote:

In the table "United Kingdom" refers to Great Britain - England, Wales and Scotland.
Number of herds: The balance (8.9%) represents all herds with OTF status suspended or withdrawn at the end of 2008 for any reason (e.g. test reactors, suspect cases at routine slaughter, overdue TB tests, etc.)
Routine tuberculin testing - interval between routine tuberculin tests: (1) 30.4% (2) 12.7% (3) 0.3% (4) 54.3% of all herds.
Routine tuberculin testing - number of animals tested: All tuberculin skin tests and interferon-gamma blood tests on individual animals (it is not possible to easily differentiate routine from non-routine animal tests).
Number of tests carried out before introduction to the herd: Pre-movement tuberculin tests of cattle not moving to slaughter became compulsory in England and Wales in March and May 2006, respectively. In Scotland both pre- and post-movement testing.
Number of animals with suspicious lesions: Cattle carcasses that presented with suspect tuberculous lesions at commercial slaughter (i.e. excludes cattle compulsorily slaughtered as skin or interferon gamma test reactors).
Number of animals detected positive: Cattle carcases with suspect TB lesions at routine slaughter from which Mycobacterium bovis was isolated. Excludes tuberculin and gamma-interferon test reactors.

Northern Ireland:
Total number of herds based on the number of cattle herds presenting cattle for a TB herd test during the last 4 years. Total number of animals based on the June agricultural census.
Number of animals submitterd for bacteriological/ histopathological examination includes samples from animals that were declared TB reactors. Most TB reactors are only examined by histopathological examination. Mycobacterium bovis confirmed in 980 animals (including TB test reactors)

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	0	0	0	0				2	1
Total	300	30000	0	0.0	0	0.0	0	0	0	2	1

Footnote:

In the table "United Kingdom" refers to Great Britian - England, Wales and Scotland. No data is available for Northern Ireland for 2008.
Value for number of animals and herds listed in Great Britain are approximate. No population data is available for Northern Ireland.
No routine tuberculin testing of deer is carried out in the UK 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 2 animals. Confirmation of TB was obtained in 1 animal.

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

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.

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 2007 there was a reduction in herd incidence. During 2008, there was a very slight increase in the herd incidence, however the overall number of positive animals showed a decline.

Other Brucella species UK:
Brucella melitensis, B. ovis, and B. suis have never been recorded in United Kingdom. Brucella canis was isolated from a dog in quarantine after travelling around Europe and North America in 2002.

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

Data on human cases in the UK is not yet available for 2008. There were 13 cases of brucellosis in humans in the UK in 2007, with 7 B. abortus infections, 5 B. mellitensis infections and 1 non specified Brucella spp infection reported

During the year 2008 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

Great Britain England, Wales, Scotland:
Cases of brucellosis in humans are usually recorded associated with infection acquired outside Great Britain. In England and Wales there were 6 cases of brucellosis recorded during 2007, 1 due to unspecified Brucella spp and 5 cases of B. mellitensis which were all impoted cases. In Scotland in 2008, there were no recorded cases of brucellosis, compared to 2 recorded cases in 2007 - both B. abortus infection.

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, during the peak of the brucellosis outbreak in Northern Irish cattle herds, 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 2007 there were 5 laboratory-confirmed cases of human brucella abortus infection, all with a history of occupational exposure.

Additional information

During 2008, 2671 dogs for export were tested. Serology of 209 alpacas, 15 llamas, 112 deer, 18 camels and microbiological testing of 18 bats, 1 water shrew, 3 American mink and 1 hedgehog was carried out as part of clinical investigations. All testing yielded negative results.

Two new species of Brucella have been isolated in marine mammals washed up on the coast around Great Britain. Microbiological examination for Brucella was carried out on 64 marine mammals - 8 were positive for Brucella species (5 Brucella ceti and 3 Brucella pinnipedialis)

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 the UK, unless believed acquired as a result of occupation. Diagnoses are made by serology or blood culture. 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 and Health Protection Agency Northern Ireland. 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 2007, 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

Data for brucellosis in humans in England and Wales in 2008 is currently not available. In England and Wales in 2007, 6 cases of brucellosis were recorded, 5 of which were Brucella mellitensis infections. This is an decrease on the total of 11 in the previous year (2006). All of the cases occurred in people believed to have acquired their infections overseas. None were believed to have been associated with occupation. No cases of Brucella abortus were recorded.

In 2008 in Scotland there were no recorded cases of brucellosis. There were 2 recorded cases in 2007

Data for brucellosis in humans in Northern Ireland in 2008 is currently not available. During 2007 there were 5 laboratory-confirmed cases of human Brucella abortus infection, an increase of 1 compared with the previous year's total of 4 for 2006. All 5 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.

2.6.3 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

Great Britain - England, Scotland and Wales

Great Britain is officially free of infection from Brucella abortus, Brucella melitensis, Brucella ovis and Brucella suis.

Northern Ireland does not have Officially Free status for Brucella abortus

Free regions

England, Wales and Scotland (Great Britain). The situation in Northern Ireland is described separately.

Monitoring system

Sampling strategy

Great Britain (England, Wales, Scoland)

Brucellosis is a notifiable disease and there is a statutory surveillance programme for the disease in Great Britain. As in previous years, the principle surveillance system in 2008 was monthly testing of bulk milk samples from dairy herds by the ELISA test, together with the requirement for notification and investigation of abortions or premature calvings. A key change was introduced to the surveillance programme in 2007:all routine blood testing of beef cattle, which has been carried out every other year since 1989, ceased. All other surveillance and risk management measures have been maintained

Farmers are legally required to notify the Animal Health Agency (State Veterinary Service) of any abortions or premature calvings that take place in their herd under Article 10 of the Brucellosis (England) Order 2000 and its equivalents in Wales and Scotland - this applies to both dairy and beef herds. If necessary, an abortion investigation is carried out and samples are taken from aborting animals and those calving prematurely (271 days or less from insemination) and tested both serologically and culturally. If a suspected Brucella organism has been cultured it must be identified at a Brucella reference centre; the reference centre for Great Britain is the Veterinary Laboratories Agency, Weybridge. Once infection is detected and confirmed, infected cattle and others at risk of infection must be slaughtered. Compensation is paid for cattle which have to be slaughtered to control brucellosis.

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. 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 2008:
During the year, approved laboratories tested 151850 bulk milk samples from 12570 herds as part of the national surveillance programme. Routine monitoring of cattle abortions and premature calvings was carried out with 6823 cases investigated during the year. There were no cases of brucellosis in cattle detected during 2008.

17789 animals were tested serologically with no animals detected as positive.

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. 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

England, Wales, Scotland.

As livestock in Great Britain 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 2008, 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.

Frequency of the sampling

Annual survey

Case definition

Isolation of the organism

Diagnostic/analytical methods used

Microbiological techniques to confirm. Serology to monitor.

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 2008, surveillance for brucellosis was provided by the National Sheep and Goat survey. In Great Britain, 23055 blood samples from 1348 flocks were tested, all with negative results. In Northern Ireland, 3602 animals in 206 flocks were tested, all with negative results.

In addition, in Great Britain, samples from 2906 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

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 in the Annual Sheep and Goat survey

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 2008, surveillance for brucellosis was provided by the National Sheep and Goat Survey. 522 blood samples from 145 goat herds in Great Britain and 156 samples from 29 goat herds in Northern Ireland were tested, all with negative results. In addition, in Great Britain, samples from 38 goat abortions were investigated. All were negative on test for brucellosis.

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

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

D. B. suis in animal - Pigs

Monitoring system

Sampling strategy

Boars intended for use as donors for artificial insemination are tested. Testing also carried out on pigs for export

Results of the investigation

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 2008, 1831 pigs (for AI and export) 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 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 monitoring system above.

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

For veterinary administrative purposes, the province is divided into 10 regions, each with a divisional veterinary office. The regions are sub-divided into "patches", each managed by a veterinary officer (VO) and team of technical officers. A centralised animal health database (Animal and Public Health Information System or APHIS), incorporating an animal movement and test

management system is used for all aspects of Brucellosis testing. The former is used to administer between-herd movement of cattle, captured in real-time using a permit system and terminals located in markets and abattoirs. The latter facilitates management of herd-level and animal-level tests, with results recorded at animal level.

Screening for Brucellosis comprises serological testing of eligible cattle, ELISA testing of bulk milk tank samples from dairy herds, premovement testing and sampling at slaughter of all cattle older than 30 months. Monthly bulk milk sampling commenced in 2001 and all dairy herds were included in the screening programme within the following year. The requirement for premovement testing was introduced in December 2004.

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 2008, 23396 herds were checked. In total 192 herds were positive, with 177 new herds positive during the period. Overall 908811 animals were tested individually and 384 animals were detected as positive.

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

There are just over 1.6 million cattle in Northern Ireland.

Results of tests carried out in 2008 are given in the tables.

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. There was a fall in brucellosis incidence in Northern Ireland from its peak (annual herd incidence of 1.43%) at the start of 2002 to its lowest point in October 2005 (0.34%). Subsequently, the rise in herd incidence since October 2005 peaked in October 2006 (0.6%) and then has stayed relatively level until autumn 2007 when there was another rise in incidence. The annual herd incidence as of December 2008 is now 0.87% while the annual animal incidence is 0.038%.

National statistics are based on a herd level Br test where number of cattle >= 0 (23,396 herds had a herd test where cattle were presented compared to 20,893 in same period of 2007). Prevalence and incidence figures were calculated using the herds which presented cattle at a herd test: Of the 26,780 herds eligible for testing (960,549 cattle) within Northern Ireland that were actively monitored for Brucellosis by blood or bulk milk sampling, there were 177 new breakdown herds over the last 12 month period and 384 Brucella reactor animals. The current annual herd incidence was 0.87% with an animal incidence of 0.038%. For the last 13-24 months, annual herd incidence was lower at 0.72% although animal incidence was higher at 0.041%. Peak herd incidence (1.43%) occurred in early 2003.

Two administrative regions in the country contributed the majority of the reactors during 2008. The vast majority of confirmed breakdowns occurred in a specific disease hotspot area.

Premovement testing was introduced in December 2004. In 2008, 24 Brucella reactors were detected from 178409 animal tests and a further has detected 26 BR reactors and a further 2006 inconclusive reactors from 471,100 animal tests.

Relevance of the findings in animals to findings in foodstuffs and to human cases

In Northern Ireland human cases of brucellosis occur which are associated with occupational contact with infected cattle.

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Alpacas - at farm - Clinical investigations (Serology)	NRL	animal	209	0	0	0	0	0
Bats - in total - Clinical investigations (Tissue samples)	NRL	animal	18	0	0	0	0	0
Camels - at farm - Clinical investigations (Serology)	NRL	animal	18	0	0	0	0	0
Deer - in total - Clinical investigations (Serology)	NRL	animal	112	0	0	0	0	0
Dogs - in total - Monitoring (Serology) [1)]	NRL	animal	2671	0	0	0	0	0
Hedgehogs - in total - Clinical investigations (Tissue samples)	NRL	animal	1	0	0	0	0	0
Lamas - at farm - Clinical investigations (Serology)	NRL	animal	15	0	0	0	0	0
Marine mammals - in total - Surveillance (Tissue samples)	NRL	animal	64	8	0	0	0	8
Minks - in total - Clinical investigations (Tissue samples)	NRL	animal	3	0	0	0	0	0
Pigs - at farm - Monitoring (Serology) [2)]	NRL	animal	1831	0	0	0	0	0
Shrews - in total - Clinical investigations (Tissue samples)	NTL	animal	1	0	0	0	0	0

Comments:

[1)] Dogs for export.
[2)] At AI and for export.

Footnote:

NRL is the National Reference Laboratory.
Marine mammals: 8 isolations of Brucella spp. - 5 Brucella ceti and 3 Brucella pinnipedialis

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	26780	26780	23396	192	177	44	22.92	87.36	.82	.76
Total	26780	26780	23396	192	177	44	22.92	87.36	0.82	0.76
Total - 1	26915	26915	24139	157	151	60	38.22	89.69	.65	.63

Footnote:

Total number of herds: number of cattle herds in which cattle were presented at a brucellosis herd test during the last 4 years.
Number of herds checked: herds with a herd-level brucellosis test where number of cattle >=0 (20,328 herds had a herd test where cattle were presented cf. 20,893 were presented in the same period of 2007).
Number of herds depopulated: 44 herds from 34 epidemiological units

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	Total number of animals slaughtered	% coverage at animal level	% positive animals - animal prevalence
NORTHERN IRELAND	1622541	960549	961894	908811	384	384	5372	100.14	.04
Total	1622541	960549	961894	908811	384	384	5372	100.14	0.04
Total - 1	1643458	945318	973529	911394	402	402	6585	102.98	.04

Footnote:

Total number of animals: obtained from the June Agricultural Census data.
Number of animals to be tested under the programme: based on the average number of cattle presented at brucellosis herd tests over the last 4 years.
% coverage at animal level: 94.6% animal coverage for individual tests (>100% because of repeat herd testing and births and deaths throughout the year. Denominator also an estimate based on average herd size over last 4 years).

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

	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 positive							
Region	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals
NORTHERN IRELAND	26780	960549	0	0	14	968	92	6520	808	32303			25866	920758
Total	26780	960549	0	0	14	968	92	6520	808	32303	0	0	25866	920758
Total - 1	26915	945318	0	0	33	4308	103	4147	1524	61824			25255	875039

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			Information about			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds	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 microbiologically	Number of animals positive microbiologically
																		Sero logically	BST		
UNITED KINGDOM	86281	8660490	86281	100	0	0	1350	17789	0	12570	151850	0	6823	0	0	6823	0	0	0	565	0
Total	86281	8660490	86281	100.0	0	0.0	1350	17789	0	12570	151850	0	6823	0	0	6823	0	0	0	565	0
Total - 1																					

Footnote:

United Kingdom includes Great Britain only (England, Wales and Scotland). Northern Ireland in community co-financed programme.
Clinical diagnostic samples submitted by private veterinarians for disease investigation into abortion cases in cattle = 565 (provisional data)

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

Region	Total number of existing		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	117000	35000000	117000	100	0	0	1493	23577	0	0	0	0	0	0
NORTHERN IRELAND	9164	2026511	9164	100	0	0	235	3758	0	0	0	0	0	0
Total	126164	37026511	126164	100.0	0	0.0	1728	27335	0	0	0	0	0	0
Total - 1														

Footnote:

Table gives results of the National Sheep and Goat survey, which is carried out annually and involves sampling over 2000 flocks in the UK to confirm disease freedom.
In the table "United Kingdom" refers to data from Great Britain - England, Wales and Scotland.

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

Data on total number of cases in the UK in 2008 is not yet available. There were a total of 73 cases of yersiniosis in humans in 2007, 72 of these designated as autochtone cases and 1 case of unknown origin.

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. However, in contrast, in 2007 there was a slight increase in the number of cases reported for the year.

Results of surveys carried out in 2008 are not yet available. Results for surveys carried out in 2007 are reported in 2008 as these were not available in time for inclusion in the 2007 report. A 15 month (March 2006 to June 2007) Food Standards Agency survey investigated the levels of microbiological contamination on the surface of fresh red meat on retail sale in the UK. A total of 5,998 samples were collected - 2,429 red meat samples (1,174 beef, 654 pork and 601 lamb) were tested for Yersinia enterocolitica. The overall finding was that 270 meat samples were contaminated with Yersinia enterocolitica - 142 in beef, 60 in pork and 68 in lamb.

No animal surveys were conducted in 2008. A survey of cattle, sheep and pigs in Great Britain eligible for slaughter was carried out in 2003 (see 2004 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

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 2007, there were 50 cases recorded, of which 49 were typed as Y. enterocolitica. In 2006 there were 32 reported cases of Yersinionsis, compared with 26 in 2005 and 68 in 2004. Reported cases varied between 32 and 68 between 1998 - 2003, with the highest number of reported cases during any one year being 88 cases reported in 1999.

In Scotland laboratory reports of Yersinia enterocolitica have varied between 28 and 109 since 1986. In 2007, 22 cases of yersiniosis were recorded; 19 of these infections were due to Y. enterocolitica

In Northern Ireland reports have fluctuated between 3 and 17 per annum from 1992-2006. There was 1 case of Y. enterocolitica reported in 2007.

Results of the investigation

There were 23 cases of yersiniosis recorded in humans in Scotland in 2008. Of these, 18 were typed as Yersinia enterocolitica.

There were no cases of yersiniosis recorded in humans in Northern Ireland in 2008

Data on human cases in England and Wales is not yet available for 2008.

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.

2.7.3 Yersinia in foodstuffs

Table Yersinia in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Yersinia spp.	Y. enterocolitica	Yersinia spp., unspecified	Y. kristensenii	Y. molaretti	Y. frederiksenii	Y. intermedia
Meat from bovine animals - fresh - at retail - Survey - national survey	FSA	single	Swab	1174	182	0		6	1	16	14
Meat from pig - fresh - at retail - Survey - national survey	FSA	single	Swab	654	75	60		2	0	6	6
Meat from sheep - fresh - at retail - Survey - national survey	FSA	single	Swab	601	96	68		4	1	3	17

	Y. enterocolitica-O:3	Y. enterocolitica-O:5,27	Y. enterocolitica-O:9	Y. enterocolitica-Not typeable	Y. enterocolitica-O:5	Y. enterocolitica-unspecified	Y. enterocolitica-biotype 1A	Y. enterocolitica-biotype 3
Meat from bovine animals - fresh - at retail - Survey - national survey	0	0	0	104	4	0	142	0
Meat from pig - fresh - at retail - Survey - national survey	0	2	1	44	6		58	2
Meat from sheep - fresh - at retail - Survey - national survey	0	0	0	45	6		67	1

Footnote:

Data is from the unpublished Red Meat Survey A number of the samples in this survey exhibited more than one Yersinia species/serotype hence individual totals by serotype may total more than the total units positive for Yersinia spp.
Y.bercoveiri was also isolated (1 pork and 1 beef sample).
Y. rohdei was also isolated (2 beef and 2 lamb samples)

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 2004. It consisted of a statistically based survey and examination of faeces of pigs arriving for slaughter in abattoirs in Great Britain.

Results of the investigation

There were no cases of pigs detected infected with Yersinia spp. from clinical diagnostic samples submitted to the Veterinary Laboratories Agency in Great Britain in 2008.

The animal table shows number of incidents of yersiniosis detected from examination of clinical diagnostic samples in other animals. The number of diagnoses was small and it is therefore difficult to comment on trends

Table Yersinia in animals

	Source of information	Sampling unit	Units tested	Total units positive for Yersinia spp.	Y. enterocolitica	Y. pseudotuberculosis	Yersinia spp., unspecified	Y. enterocolitica-O:3	Y. enterocolitica-O:9
All animals - in total - Clinical investigations (Unspecified animals)	VLA	animal		3			3		
Birds - in total - Clinical investigations (Wild and domestic birds)	VLA	animal		11		2	9		
Goats - at farm - Clinical investigations	VLA	animal		4		1	3		
Sheep - at farm - Clinical investigations	VLA	animal		12	1	6	5		
Wild animals - in total - Clinical investigations (Wild mammals)	VLA	animal		2	1	1			

Footnote:

Diagnoses made from clinical diagnostic material submitted to government veterinary laboratories. Units tested are not known because the laboratory does not report negative results. The numbers above are numbers of incidents. There may be more than one diagnosis in the same incident.

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 1999. 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 - 2007 or in 2008.

Animals:
There was no evidence to indicate that trichinellosis exists in the UK domesticated pig population or in horses in 2008. The last positive diagnosis in pigs in Great Britain was in 1978. In Northern Ireland, the last confirmed case of Trichinellosis was in 1979 in pig meat. This case was linked to suspected illegally imported meat. An on-going survey of foxes identified 1 case of Trichinella in Northern Ireland in 2007.

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

Trichinosis is a zoonotic disease caused by ingestion of raw meat containing larvae of the nematode of the Trichinella spp. Four species of Trichinella are found in Europe. Symptoms are associated first with the gastrointestinal tract and later with the muscles as the worm penetrates and develops there. The main source of human infection is raw or undercooked meat products from pigs or wild boar, but meat products from other animals may also be a source (e.g. horse, bear and walrus).

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

There were no human cases reported in England and Wales, Northern Ireland or Scotland in 2008. The last recorded outbreak in the UK, albeit involving imported food, was of eight cases reported in 2000.

There is no evidence to indicate that Trichinella exists in pigs, wild boar or horses in the UK, as shown by the negative results from the pig, wild boar and horse carcasses that are tested annually. This view is supported by an ongoing survey of wildlife that from 2002 to October 2008, has examined 3400 foxes in Great Britain and 450 foxes in Northern Ireland, with only one fox from Northern Ireland testing positive for T. spiralis in 2007. From 2006 to 2008 other wildlife have been tested including in Great Britian 37 cetaceans, 8 seals, 1 sealion, 17 birds and 138 mink and in Northern Ireland 44 badgers . All samples were negative.

Pigs horses and wild boar are routinely monitored for the presence of Trichinella. In 2008, 232,404 breeding sows and boars, 524,722 fattening pigs (including a proportion of outdoor reared pigs estimated as 80,000), 4,008 horses, 1567 wild boar and 32 feral wild boar muscle samples were examined for Trichinella in Great Britain. In Northern Ireland, 3858 breeding sows and boars, 531 outdoor reared pigs and 912,260 fattening pig muscle samples were examined. All samples were negative.

An ongoing survey of Trichinella in foxes is carried out by the Food Standards Agency (FSA) in the United Kingdom. 450 samples from Great Britain and 150 samples from Northern Ireland were examined from November 2007 to October 2008.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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

Additional information

From January 2006, enhanced testing for Trichinella , by the EU pepsin digest method, was extended to the domestic slaughter of all boars, sows and farmed wild boar that are processed in a slaughterhouse and feral wild boar processed in an Approved Game Handling Establishment. In 2008 a voluntary programme for testing feral wild boar hunted for own consumption or direct supply was also introduced. Testing of samples are undertaken by laboratories in the slaughterhouse or at the regional Veterinary Laboratories Agency (VLA) laboratories,. A laboratory quality assurance programme is organised by the National Reference Laboratory.

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, Health Protection Scotland and Health Protection Agency, Communicable Disease Surveillance Centre Northern Ireland).

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 1999. 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 from 2002 to 2008.

Results of the investigation

No human cases of Trichinellosis were recorded in 2008.

2.8.3 Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

General

Surveillance system:

Regulation (EC) 2075/2005 lays down specific rules on official controls for Trichinella in meat. It also lays down the methods of detection to be used and requires carcases of domestic swine to be sampled in slaughterhouses and tested for the presence of Trichinella as part of the post mortem inspection. Carcases of domestic swine kept solely for fattening and slaughter can be exempt from testing if they come from a holding or category of holding that has been officially recognised by the competent authority as free from Trichinella in accordance with the procedure set down in the Regulation. Carcases of horses, wild boar and other farmed and wild animal species susceptible to Trichinella infection are also required to be sampled in slaughterhouses or game handling establishments.

Diagnostic/analytical methods used

General

From January 2006, testing for Trichinella spiralis, by the EU muscle digest method, was extended to the domestic slaughter of all boars, sows, farmed wild boar processed in a slaughterhouse and ferral wild boar processed through an Approved Game Handling Establishment.

Results of the investigation including description of the positive cases and the

Fattening pigs raised under controlled housing conditions in integrated production system

Overall for the UK: 1,356,982 tested with 0 positive (Northern Ireland: 912,260 tested, 0 positive and Great Britain: 444,722 tested, 0 positive)

Fattening pigs not raised under controlled housing conditions in integrated production system

Overall for the UK: 80,531 tested, 0 positive (Northern Ireland: 531 tested, 0 positive and Great Britain: 80,000 tested, 0 positive).

For wild boar - farmed and feral:
Farmed wild boars - UK: 1567 tested, 0 positive
Ferral wild boars - UK: 31 tested, 0 positive

Breeding sows and boars

Overall for the UK: 236,262 tested, 0 positive (Northern Ireland: 3,858 tested, 0 positive and Great Britain: 232,404 tested, 0 positive)

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

There is no evidence to indicate that Trichinella exists in pigs in the UK, as shown by the negative results from the large proportion of carcasses that are tested annually.

Pigs and horses are routinely monitored for the presence of Trichinella at the slaughterhouse. In 2008, 232,408 breeding sows and boars and 1567 farmed wild boar and 28 feral wild boar muscle samples were examined for Trichinella in Great Britain, together with 524,722 fattening pigs (including an estimated 80,000 outdoor reared pigs the actual number of which is not recorded centrally). In Northern Ireland 3,328 breeding sows and boars, 912,260 fattening pigs and 531 outdoor reared pigs were tested during 2008. All samples examined were negative

In 2007, 205,393 breeding sows and boars and 2,023 farmed wild boar and 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 was not recorded centrally). In Northern Ireland 3,328 breeding sow and boars and 767 outdoor reared pigs and were tested during 2007. All samples examined were negative.

B. Trichinella in horses

Monitoring system

Sampling strategy

Surveillance system:
Regulation (EC) 2075/2005 lays down specific rules on official controls for Trichinella in meat. It requires carcases of horses to be sampled in slaughterhouses.

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 4008 samples were tested in 2008, all in Great Britain and none in Northern Ireland. There were no positive findings during the year.

Notification system in place

Notified to the Meat Hygiene Service, Veterinary Services and the Food Standards Agency.

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

No Trichinella was reported in any samples examined in 2008.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella spp.	T. spiralis	Trichinella spp., unspecified
Badgers - at farm - Surveillance	MHS/FSA	animal	44	0	0	0
Foxes - in total - Survey [1)]	MHS/FSA	animal	600	0	0	0
Pigs - breeding animals - unspecified - sows and boars - at slaughterhouse - Monitoring	MHS/FSA	animal	236262	0	0	0
Pigs - fattening pigs - not raised under controlled housing conditions in integrated production system - at slaughterhouse - Monitoring	MHS/FSA	animal	80531	0	0	0
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - at slaughterhouse - Monitoring	MHS/FSA	animal	1356982	0	0	0
Solipeds, domestic - horses - at slaughterhouse - Monitoring	MHS/FSA	animal	4008	0	0	0
Wild animals - in total - Monitoring [2)]	FSA	animal	201	0	0	0
Wild boars - farmed - at slaughterhouse - Monitoring	MHS/FSA	animal	1567	0	0	0
Wild boars - wild - from hunting - Monitoring [3)]	MHS/FSA	animal	31	0	0	0

Comments:

[1)] November 2007 - October 2008

[2)] 2006 - 2008

[3)] Voluntary programme introduced in 2008 for testing feral wild boar hunted for own consumption or direct supply

Footnote:

In the table "wild animals" includes 37 cetaceans, 8 seals, 1 sealion, 17 birds and 138 mink tested between 2006 and 2008.
Meat Hygiene Service (MHS) reports from self-testing establishments in Great Britain. The National Reference Laboratory reports from other approved establishments and provides testing to the MHS. The data from both sources are combined in the table. The Food Standards Agency (FSA) collates the data for the UK.

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. E. multilocularis is not known to be present in the UK .

Humans:
The incidence in humans is highest in mid-Wales. 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. Recently, there have been on average 10 - 15 cases reported annually. In Scotland reports of cases are infrequent, averaging less than 1 per year.

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 Veterinarian.

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.

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

Humans:
In 2008, there were no recorded cases of Echinococcus in humans in Scotland or Northern Ireland. Data is not yet available for the number of cases in England and Wales in 2008. There were 8 cases of Echinococcus granulosus in the UK in 2007 - all in England and Wales. This is a decrease on the 12 recorded cases in 2006 and the 9 cases recorded in 2005.

Animals:
In Great Britain, hydatid disease is present in the sheep and cattle population. Findings at post mortem are recorded centrally by region in England, Wales and

Scotland.

No cases of hydatidosis (echinococcosis) were detected in Northern Ireland in 2008. The last cases recorded were from imported Alpacas over 10 years ago.

E. multilocularis is not known to be present in the UK.

Recent actions taken to control the zoonoses

The Welsh Assembly Government has agreed to fund a 10 year disease eradication programme to control hydatid disease in Wales, to be implemented in the near future. This programme will be based on an education programme and dog deworming campaign.

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.

Results of the investigation

In 2008, there were no recorded cases of Echinococcus in humans in Scotland or Northern Ireland. Data is not yet available for the number of cases in England and Wales in 2008

In the UK, 8 cases of Echinococcus granulosus were recorded in 2007, compared to 12 cases in 2006 and 9 in 2005. The recorded cases in 2007 were all in England and Wales, with no reports from Scotland or Northern Ireland for the year or for previous years 2006 and 2005. 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 2008.

E. multilocularis is believed to be absent from animals in UK.

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) - at slaughterhouse - Monitoring (Meat inspection)	MHS/FSA	animal	2262297	3067	0	0	3067
Sheep - at slaughterhouse - Monitoring (Meat inspection)	MHS/FSA	animal	16043345	84326	0	0	84326

Footnote:

Meat Hygiene Service (MHS) is an executive agency of the Food Standards Agency (MHS).
E. multilocularis has not ever been recordrd 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. Isolates from private laboratories are not reported. Toxoplasmosis is endemic in the UK sheep population.

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

Complete data for reports of Toxoplasmosis in humans is not yet available for 2008. The number of laboratory reports recorded in humans in the UK in 2007 was 152, and there is no obvious trend. There were 127 reports in 2006.

Toxoplasmosis remained the second most common cause of abortions in sheep in Great Britain during the year and accounted for 22.9% of all incidents of foetopathy in sheep and goats diagnosed in 2008, compared to 29.3% diagnosed in 2007. Toxoplasmosis was confirmed in 201 incidents recorded in 2008 in diagnotic samples from sheep and none in goats, compared to 376 incidents recorded in 2007 in diagnostic samples from sheep in Great Britain and in 5 samples from goats.

In sheep 110 (49%) of 223 sera tested (from 64 separate submissions) were positive for T. gondii compared with 228 (44%) of 649 sera (149 submissions) in 2007. In goats, none of 4 sera (2 submissions) were positive in 2008 compared with 18 (47%) of 38 sera (10 submissions) in 2007. In alpacas, 1 of 6 sera were positive in 2008 (3 submissions). These results do not constitute a structured survey.
No pig sera were tested in 2008 or 2007.

In sheep in 2007, 228 (44%) of 649 sera tested (from 149 separate submissions) were positive for T. gondii compared with 197 (46%) of 428 sera (113 submissions) in 2006. In goats, 18 (47%) of 38 sera (10 submissions) were positive in 2007 compared with 3 (16%) of 19 sera (5 submissions) in 2006. No

pig sera were examined in 2006 but in 2007, 3 (6%) of 54 sera (7 submissions) were positive. There was also serological evidence of infection in an alpaca in 2007.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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.

Additional information

In animals, serological examinations for Toxoplasma gondii using the latex agglutination test (LAT) are undertaken by the VLA on sera submitted to regional laboratories by veterinary practitioners for clinical diagnostic purposes. The figures recorded in the table for 2008 provide an overview of the serological status of samples submitted for diagnosis, monitoring and screening purposes but do not constitute a structured survey. Positive samples, as defined here, have LAT titres of 1/64 or greater and indicate a history of exposure to this protozoan parasite.

The figures recorded in the table are the number of incidents recorded in 2008. An incident is defined as the first diagnosis of a disease from a clinical diagnostic submission from an animal or group of animals on a single premises within a defined period of time.

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.

In Northern Ireland the surveillance system is based on laboratory reports.

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. There were 106 cases of toxoplasmosis were reported under the surveillance system in 2007. It is known that voluntary reporting underestimates 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 and 44 in 2007. In Northern Ireland there were no cases reported in 2006, compared to 2 cases in 2005.

In Northern Ireland there were 2 cases reported during 2007, compared to none in 2006 and 2 in 2005.

Results of the investigation

Data on reports of toxoplasmosis is not yet available for England and Wales for 2008.

There were 48 cases recorded in Scotland during 2008.

No cases were reported in Northern Ireland in 2008.

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. A total of 667 cases were diagnosed by TRU over the 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).

2.10.3 Toxoplasma in animals

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii
Alpacas - at farm - Clinical investigations	VLA	animal		1	1
Sheep - at farm - Clinical investigations [1)]	VLA	animal		201	201

Comments:

[1)] Abortion investigations

Footnote:

Data for Great Britain - England, Wales and Scotland
Clinical diagnostic samples submitted by private veterinary surgeons to the Veterinary Laboratories Agency (VLA) in 2008. Total units tested are not known because the laboratory does not report negative results.
Table shows the number of incidents of Toxoplasma foetopathy diagnosed in sheep in Great Britain. There was also one case in an alpaca.

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. The last indigenous human death from classical rabies occurred in 1902. Since 1902, there have been 26 reported cases of human rabies in the UK. Of these, 25 resulted from infection whilest abroad. There was one report of rabies caused by infection with European bat lyssavirus type 2 in 2002, which was caused by a bite from an indigenous bat.

The last case of indigenous terrestial rabies in an animal was in 1922. In total, six bats have tested positive for live European Bat Lyssavirus during the passive surveillance programme in Great Britain since 1987.

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

If rabies is suspected on the basis of clinical appearance and/or behaviour in humans or animals, it is compulsory to notify the relevant government departments and further investigations are carried out.
Humans:
During 2008, there was one human fatality caused by classical rabies in Northern Ireland - an imported case with infection acquired overseas.

Animals:
In 2008, 18 cats, 19 dogs and five foxes, were submitted for laboratory testing. There was one positive finding in 2008 - in a puppy which died in quarantine after being imported from Sri Lanka.

The VLA has a longstanding programme of passive scanning surveillance for EBLV in bats in Great Britain (GB). 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. In 2007, 1204 bats were submitted for testing under the passive surveillance programme and 2 were suspect cases, making a total of 1206 bats tested during the year. One bat tested positive for live European Bat Lyssavirus (EBLV-2) during 2007.

General passive surveillance in bats continued during 2008 and 1,308 bats were

tested under the passive surveillance programme in GB. There were 2 reports of infection with live European Bat Lyssavirus 2 (EBLV 2) in bats in England during 2008 detected as part of this programme.

A three year active surveillance programme for testing bats for EBLV in England and Scotland took place between 2003-2006. Target species were Daubenton's bats in Northern England and Scotland, and serotines in Southern England. Natterer's and Pipistrelle's bats were also tested in small numbers as non-target species. This survey identified one (of 273 examined) serotine bat (Eptesicus serotinus) from southern England to be antibody positive for EBLV1 in 2004. Results indicated a low seroprevalence estimate of EBLV-2 in Britain's Daubenton's bats of about 2%. All oral swabs tested were negative

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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.

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. Defra follows its generic contingency plan should classical rabies be identified in animals in Great Britain. Defra's revised Contingency Plan for Exotic Animal Diseases was laid before Parliament in December 2008.

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

Indigenous human rabies is extremely rare in the UK. Since 1902 there have been 26 reported cases of human rabies in the UK. Of these, twenty-five resulted from infection whilst abroad. The sole exception was a rare case of rabies aquired in the UK, caused by infection with European Bat Lyssavirus type 2 in 2002 , which was caused by a bite from an indigenous bat. One case of classical rabies 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.

Results of the investigation

There was one human case of classical rabies reported in 2008 - aquired overseas by a patient who spent time working at an animal sanctuary in South Africa. This was a fatal case.

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 26 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.

2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

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

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

In 2008, 18 cats, 19 dogs and five foxes, were submitted for laboratory testing. There was one positive finding in 2008 - in a puppy which died in quarantine after being imported from Sri Lanka.

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

One case of classical rabies in a puppy which died in quarantine after being imported from Sri Lanka was confirmed in the United Kingdom during 2008.

The UK is recognised as having rabies free status by the O.I.E.

Additional information

The Pet Travel Scheme (PETS) is a system that allows pet dogs, cats and ferrets from certain countries to enter the UK without quarantine as long as they meet the rules of the scheme. It also means that people in the UK can take their dogs, cats and ferrets to other European Union countries, and return with them to the UK. They can also, having taken their dogs, cats and ferrets to certain listed non-EU countries, bring them back to the UK without the need for

quarantine. The purpose of these rules is to keep the UK free from rabies and certain other exotic diseases which could be introduced via the movement of pet animals.

During 2008, 10,287 cats, 93,719 dogs and 52 ferrets successfully entered the UK under the Scheme. In total, 565,940 pet animals have entered the UK under PETS since 2000 (ferrets have only been able to enter under the Scheme since July 2004). There have been no cases of imported rabies in the UK in animals that have used PETS. Workers of animal rescue charities and workers at quarantine centers are advised to be immunized against rabies as a precaution

Table Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	European Bat Lyssavirus 1 (EBL 1)	European Bat Lyssavirus 2 (EBL 2)	Unspecified Lyssavirus	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Bats - wild - in total - Surveillance [1)]		animal	1308	2	0	2	0	0	0
Cats - in total - Monitoring (At quarantine)	NRL	animal	18	0	0	0	0	0	0
Dogs - in total - Monitoring (At quarantine) [2)]	NRL	animal	19	1	0	0	0	1	0
Foxes - wild - in total - Monitoring	NRL	animal	5	0	0	0	0	0	0

Comments:

[1)] Passive surveillance programme
[2)] Imported dog in quarantine

Footnote:

NRL is National Reference Laboratory

2.12 Q-FEVER

2.12.1 General evaluation of the national situation

2.12.2 Coxiella (Q-fever) in animals

A. C. burnetii in animal

Monitoring system

Frequency of the sampling

Clinical diagnostic samples submitted by private veterinarians during disease investigations. Usually submissions received in abortion investigations.

Results of the investigation

There were 2 incidents of Q fever infection reported in cattle, 2 in sheep and 1 incident in goats detected during the year from clinical diagnostic samples submitted to the Veterinary Laboratories Agency.

Q fever was diagnosed as the cause of 0.4% (3 cases in total) of all incidents of foetopathy diagnosed in sheep and goat abortion cases during the year in Great Britain.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Increased interest in Q fever continued in 2008, in the wake of a large outbreak affecting workers in a meat processing plant in Stirlingshire in 2006. VLA assisted the HPA with the retrospective investigation of a human outbreak (about 30 cases) of Q fever (Coxiella burnetii) in the Cheltenham area in 2007. The source of the infection was not apparent but one possibility was windborne transmission from local livestock premises and this was investigated by a telephone survey of local farms identified by HPA from prevailing wind direction (data obtained from the Met Office). The survey assessed whether any husbandry risk practices (particularly relating to parturition and handling of potentially contaminated bedding material) may have been adopted during the period (late April/early May 2007) when cases appeared to have acquired infection. The findings are still being evaluated. A veterinary surveillance project is currently underway in an infected goat herd and a PCR for Q fever and other initiatives are under development.

Table Coxiella burnetii (Q fever) in animals

	Source of information	Sampling unit	Units tested	Total units positive for Coxiella (Q-fever)	C. burnetii
Cattle (bovine animals) - at farm - Clinical investigations	VLA	animal		2	2
Goats - at farm - Clinical investigations	VLA	animal		1	1
Sheep - at farm - Clinical investigations	VLA	animal		2	2

Footnote:

Data for Great Britain - England, Wales and Scotland
Clinical diagnostic samples submitted by private veterinary surgeons to the Veterinary Laboratories Agency (VLA) in 2008. Total units tested are not known because the laboratory does not report negative results.
Table shows the number of incidents of Q fever diagnosed in cattle, sheep and goats in Great Britain.

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ENTEROCOCCUS, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.2 ESCHERICHIA COLI, NON-PATHOGENIC

3.2.1 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.

Surveys of E. Coli recovered from broilers and turkeys are currently in progress. A number of isolates resulting from submission of diagnostic samples have been tested for antimicrobial resistance in 2008 and the results are presented in the tables.

3.2.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

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 (ie isolates are tested for resistance to either cefpodoxime or both 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.

The testing regime is based on that commonly used in medical surveillance. 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.

Monitoring of veterinary E. coli isolates through the enhanced surveillance system instituted in 2006 continued in 2008

Results of the investigation

Resistance to the indicator cephalosporins was detected in very low numbers of E.coli isolates from pigs and chickens in 2008. A higher prevalence of resistance to cefotaxime was observed in E. coli from cattle than in the other farmed species in 2008 and most of the resistant isolates originated from calves. Isolates resistant to the indicator cephalosporins (cefotaxime, ceftazidime or cefpodoxime) are subjected to further investigation, initially to determine whether they have a phenotype consistent with ESBL or AmpC beta-lactamase

production. E. coli isolates with an AmpC phenotype are not characterised further. The final confirmed figures for ESBL producing E. coli from animals in 2008 are not available at this stage, but preliminary provisional results suggest that CTX-M-14 and its variants was the ESBL occurring most frequently in cattle E. coli in 2008, with CTX-M-15 occurring less commonly and with CTX-M-1 at a still lower prevalence. Visits to some affected farms on which ESBLs have been detected in E. coli in cattle have in some cases demonstrated links to potential human sources of infection for cattle.

The prevalence of resistance to enrofloxacin in E. coli isolates from cattle was 10% in 2008, compared to 6.5% in 2007. Resistance to enrofloxacin was detected at a low prevalence in E. coli isolates from pigs, chickens and turkeys in 2008. This mirrors the situation in 2007 and 2006, when similar findings occurred, but differs from the situation in 2005, when resistance was only detected in isolates from pigs.

Table Antimicrobial susceptibility testing of E. coli in animals

E. coli		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys	
Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes	
Number of isolates available in the laboratory		2205		218		101		30	
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Neomycin	2193	899	218	17	100	6	24	5
	Streptomycin	1945	1264	82	39				
Cephalosporins	Cefotaxim	1942	175						
	Cefpodoxime			215	2	96	1	29	0
Fluoroquinolones	Enrofloxacin	2181	218	218	15	101	3	30	5
Penicillins	Ampicillin	2205	1632	218	102	101	49	30	15
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	2205	1410	218	46	101	6	30	4
Tetracyclines	Tetracyclin	2205	1632	218	150	101	45	30	20
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	2205	882	218	107	101	16	30	4

Footnote:

Cattle, pig, chicken and turkey isolates monitoring programme - isolates mostly derived from clinical diagnostic samples. Data for Great Britain (England, Wales and Scotland)

Table Breakpoints used for antimicrobial susceptibility testing

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

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	VLA						10	13		13
	Neomycin	VLA						10	13		13
	Streptomycin	VLA						10	13		13
Amphenicols	**Chloramphenicol**	VLA						30	13		13
	Florfenicol	VLA						30	13		13
Cephalosporins	**Cefotaxim**	BSAC						30	29		29
	Ceftazidim	BSAC						30	21		21
Fluoroquinolones	**Enrofloxacin**	VLA						5	13		13
Penicillins	**Ampicillin**	VLA						10	13		13
Tetracyclines	**Tetracyclin**	VLA						10	13		13
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**	VLA						25	13		13

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

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

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.

The full analysis of outbreak data are often not completed until some time after the outbreak has finished. 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.

Description of the types of outbreaks covered by the reporting:

The definitions used in this report are those given in the Specific Guidelines for 2008 Foodborne Outbreaks Reporting.

The UK submitted all the foodborne outbreak data as possible outbreaks in 2007 and 2008. The reporting of only "possible" outbreaks is specifically a legal issue -

publication of this information in these defined categories makes it difficult for the UK authorities to prosecute in instances where the foodborne outbreak has been reported as a "possible" outbreak as opposed to a "verified" outbreak. In addition, the legal aspects are not consistent with the criteria provided in the Guidance Document.

The UK only reports data for general outbreaks of foodborne infections. Data on household outbreaks are not included. This is because it is considered that household outbreaks will be under-ascertained by comparison with general outbreaks, not all household outbreaks involve aquiring infection in the home and it is considered unlikely in most cases that household outbreaks are verifiable according to the definitions for the purposes of reporting in the Trends and Sources Report.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

All UK outbreaks reported in 2008 have been classified as "possible" outbreaks so as not to legally compromise any prosecutions that might be undertaken by regulatory authorities. There were a total of 50 possible foodbourne outbreaks reported in 2008 in the UK. The most common causative agent identified in the outbreaks was Salmonella species(4). There were in total 99 people affected by foodborne outbreak infections during the year (all showing symptoms but not necessarily positive microbiological isolations made) in Scotland and Northern Ireland. There were 14 hospitalisations and 3 deaths in total. There is no information on number of cases affeted in England and Wales for 2008.

There were 25 foodborne outbreaks in 2007 in the UK, all designated as possible foodborne outbreaks. During the year, the most common causative agent identified in the outbreaks was Salmonella species (8). There were in total 387 people affected by foodborne outbreak infections during the year (all showing symtoms but not necessarily positive microbiological isolations made). There were 30 hospitalisations and 5 deaths in total

England and Wales:
There were 42 possible foodborne outbreaks in 2008 in England and Wales. There is no futher detail on these recorded outbreaks currently available. There were 16 possible foodborne outbreaks in England and Wales during 2007. The most common causative agents identified during the outbreaks was Salmonella species and foodborne viruses. In total during the year, 143 human cases were recorded, 17 people were hospitalised due to food-borne outbreaks and there were 5 deaths.

Scotland:
There were 6 possible foodborne outbreaks in Scotland during 2008. Salmonella

was the most common causative agent identified in outbreaks during the year, affecting 64 people in total and resulting in 6 hospitalisations but no deaths. The largest outbreak was S. Agona, (setting: caterers) and the implicated foodstuff was beef strips. The other outbreaks involved S. Poona (community setting), S. Enteritidis (restaurant setting) and S. Typhimurium (shop setting) and involved cooked meats, Chinese meals and egg sandwiches, bagged salad and minced beef as the implicated foodstuffs. There was a possible general outbreak of Clostridium perfringens, involving an unknown number of people, but with stovies the implicated foodstuff. Scrombotoxin was the causative agent in an outbreak affecting 12 people, with one hospitalisation, with tuna as the implicated foodstuff.

There were 9 possible foodborne outbreaks in Scotland during 2007. The most common causative agents identified during the outbreaks was Salmonella. In total during the year, 145 people were affected, 13 people were hospitalised due to food-borne outbreaks and there was one death.

Northern Ireland:
There were 2 recorded foodborne outbreaks in Northern Ireland during 2008. An outbreak of listeriosis involved 7 cases in hospital settings, with microbiological links to pre-packed sandwiches. The second outbreak involved 16 people in a residential home, the implicated foodstuff was not identified, but the causative agent was Norovirus, which was identified in 4 residents. In this latter case there was possible foodborne and possible person to person spread of infection. There were no foodborne outbreaks recorded in Northern Ireland during 2007.

Additional information

There were 16 possible foodborne outbreaks in England and Wales during 2007. The most common causative agents identified during the outbreaks was Salmonella species and foodborne viruses. S. Enteritidis PT5c, possibly transmitted by cooked ham and beef, egg fried rice and duck resulted in a restaurant outbreak affecting 6 people. S. Muenchen (suspect food vehicle houmous) and S. Senftenberg (suspect food vehicle basil) was reported in 6 people and 30 people respectively. 3 Norovirus outbreaks (hotel/club associated) affected a total of 30 people, with the suspect food vehicle in 2 of the outbreaks being oysters. In the 3rd case a suspect food vehicle could not be determined. Beef in a hotel was the suspect food vehicle in a case of a Cl. perfingens possible food borne outbreak that affected 25 people. E. coli O157 (suspect food vehicle cooked meats) caused an outbreak affecting 46 people, the largest number of cases in a single foodborne outbreak in England and Wales during the year. Evidence for the source of the outbreak was descriptive only. In total

during the year, 17 people were hospitalised due to food-borne outbreaks and there were 5 deaths.

Scotland:
There were 6 possible foodborne outbreaks in Scotland during 2008. There were 9 possible foodborne outbreaks in Scotland during 2007. The most common causative agents identified during the outbreaks was Salmonella. S. Schwartzengrund caused 14 cases, but the source foodstuff remained unknown. S. Senftenburg was also detected in basil in Scotland and was linked to 9 possible cases. S. Enteritidis and S. Typhimurium were implicated in 5 and 32 human cases respectively, with source foodstuff unknown. E. coli O157 (suspect food vehicle cooked meats) caused an outbreak in 33 people. Campylobacter caused an outbreak affecting 52 people, the largest number of cases in a single foodborne outbreak during the year. The suspect food vehicle in this case was chicken liver pate in a restaurant. In total during the year, 13 people were hospitalised due to food-borne outbreaks and there was one death.

Northern Ireland:
There were no recorded foodborne outbreaks in Northern Ireland in 2007.

Foodborne Outbreaks: summarized data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	0	0	unknown	unknown	unknown	0
Campylobacter	6	6	unknown	unknown	unknown	0
Clostridium	3	3	unknown	unknown	0	0
Escherichia coli, pathogenic	4	4	unknown	unknown	unknown	0
Foodborne viruses	2	2	16	0	0	0
Listeria	3	3	7	7	3	0
Other agents	2	2	12	1	0	0
Parasites	1	1	unknown	unknown	unknown	0
Salmonella	25	25	64	7	0	0
Staphylococcus	0	0	unknown	unknown	unknown	0
Unknown	4	4	unknown	unknown	unknown	0
Yersinia	0	0	unknown	unknown	unknown	0

Footnote:

Data for Scotland and Northern Ireland only. Data for foodborne outbreaks recorded in 2008 is currently not available for England and Wales