

UNITED KINGDOM

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

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

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

IN 2010

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 protects 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
Animal Health and Veterinary Laboratories Agency (VLA)	AHVLA is an Executive Agency of Defra. It has a regional network of veterinary laboratories and provides animal disease surveillance, diagnostic services, research and implementation of animal and zoonotic disease control policy in Great Britain	Data on zoonotic agents in animals and feed, collation of data from Scottish Agricultural College, antimicrobial resistance data on isolates from animals in Great Britain and population data and monitoring of implementation of the zoonotic disease control programmes in Great Britain.
Department of Health	Government department . The aim of DH is to improve the health and well being of people in England	Overview

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
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
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 2010 .

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.

* 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

List of Contents

1	ANIMAL POPULATIONS	1
2	INFORMATION ON SPECIFIC ZOOSES AND ZONOTIC AGENTS	7
2.1	SALMONELLOSIS	8
2.1.1	General evaluation of the national situation	8
2.1.2	Salmonellosis in humans	9
2.1.3	Salmonella in foodstuffs	10
2.1.4	Salmonella in animals	16
2.1.5	Salmonella in feedingstuffs	54
2.1.6	Salmonella serovars and phagetype distribution	62
2.1.7	Antimicrobial resistance in Salmonella isolates	114
2.2	CAMPYLOBACTERIOSIS	269
2.2.1	General evaluation of the national situation	269
2.2.2	Campylobacteriosis in humans	272
2.2.3	Campylobacter in foodstuffs	273
2.2.4	Campylobacter in animals	274
2.2.5	Antimicrobial resistance in Campylobacter isolates	277
2.3	LISTERIOSIS	283
2.3.1	General evaluation of the national situation	283
2.3.2	Listeria in foodstuffs	285
2.3.3	Listeria in animals	286
2.4	E. COLI INFECTIONS	287
2.4.1	General evaluation of the national situation	287
2.4.2	E. coli infections in humans	289
2.4.3	Escherichia coli, pathogenic in animals	290
2.5	TUBERCULOSIS, MYCOBACTERIAL DISEASES	295
2.5.1	General evaluation of the national situation	295
2.5.2	Tuberculosis, mycobacterial diseases in humans	297
2.5.3	Mycobacterium in animals	298
2.6	BRUCELLOSIS	312
2.6.1	General evaluation of the national situation	312
2.6.2	Brucellosis in humans	313
2.6.3	Brucella in animals	314
2.7	YERSINIOSIS	329
2.7.1	General evaluation of the national situation	329
2.7.2	Yersiniosis in humans	330
2.7.3	Yersinia in animals	331
2.8	TRICHINELLOSIS	333
2.8.1	General evaluation of the national situation	333
2.8.2	Trichinellosis in humans	335
2.8.3	Trichinella in animals	336

2.9	ECHINOCOCCOSIS	341
2.9.1	General evaluation of the national situation	341
2.9.2	Echinococcosis in humans	343
2.9.3	Echinococcus in animals	344
2.10	TOXOPLASMOSIS	345
2.10.1	General evaluation of the national situation	345
2.10.2	Toxoplasmosis in humans	347
2.10.3	Toxoplasma in animals	348
2.11	RABIES	350
2.11.1	General evaluation of the national situation	350
2.11.2	Rabies in humans	352
2.11.3	Lyssavirus (rabies) in animals	353
2.12	STAPHYLOCOCCUS INFECTION	355
2.12.1	General evaluation of the national situation	355
2.13	Q-FEVER	355
2.13.1	General evaluation of the national situation	355
2.13.2	Coxiella (Q-fever) in animals	357
3	INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL	360
3.1	ESCHERICHIA COLI, NON-PATHOGENIC	361
3.1.1	General evaluation of the national situation	361
3.1.2	Antimicrobial resistance in Escherichia coli, non-pathogenic	362
3.2	ENTEROCOCCUS, NON-PATHOGENIC	369
3.2.1	General evaluation of the national situation	369
4	INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS	370
4.1	ENTEROBACTER SAKAZAKII	371
4.1.1	General evaluation of the national situation	371
4.2	HISTAMINE	371
4.2.1	General evaluation of the national situation	371
4.3	STAPHYLOCOCCAL ENTEROTOXINS	371
4.3.1	General evaluation of the national situation	371
5	FOODBORNE OUTBREAKS	372

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.

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

Population figures (other than number of flocks of chickens and turkeys subject to the Salmonella NCP) are derived on the 1st June or the 1st December.

The total number of cattle and calves in the UK increased by 0.9% from 10.0 million in 2009 to 10.1 million in 2010. The total number of pigs fell by 1.8% to just under 4.5 million. On 1st June 2010, there were 31.1 million sheep in the UK, a reduction of 1% on the June 2009 figure. The total number of all poultry increased by 7.3% between 2009 and 2010.

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

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 2009. 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.

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

Table Susceptible animal populations

* Only if different than current reporting year

Animal species	Category of animals	Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
		Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	calves (under 1 year)			61846		2860378		80950	
	- in total			2699946		10111687		94709	
Deer	farmed - in total					30913	2009	502	
Ducks	- in total ¹⁾			13173532		2469866	2009	6095	
Gallus gallus (fowl)	grandparent breeding flocks for egg production line ²⁾	10						3	
	parent breeding flocks for egg production line ³⁾	121						35	
	breeding flocks for egg production line - in total ⁴⁾	131						38	
	broilers	33611		862550741		105309284		2524	
	elite breeding flocks for meat production line ⁵⁾	49						13	
	laying hens ⁶⁾	4368		41147397		47106637		1481	
	breeding flocks for meat production line - in total ⁷⁾	1419						439	
	parent breeding flocks for meat production line ⁸⁾	1216						359	
grandparent breeding flocks for meat production line ⁹⁾	154						67		

Table Susceptible animal populations

Animal species	Category of animals	Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
		Data	Year*	Data	Year*	Data	Year*	Data	Year*
Gallus gallus (fowl)	elite breeding flocks for egg production line ¹⁰⁾	0						0	
Geese	- in total ¹¹⁾			411177		123013		5781	2009
Goats	- in total			11226		92951		8037	2009
Pigs	- in total			9665736		4460317		10737	
Sheep	- in total			14294653		31084338		67634	2009
Solipeds, domestic	horses - in total					311314		44792	2009
Turkeys	breeding flocks, unspecified - in total	249							
	meat production flocks	3078							
	- in total	3327		15574988		3891888			

Comments:

- 1) Data for England and Northern Ireland only
- 2) Number of flocks subject to at least one official test during 2010
- 3) Number of flocks subject to at least one official test during 2010
- 4) Number of flocks subject to at least one official test during 2010
- 5) Number of flocks subject to at least one official test during 2010

Table Susceptible animal populations

Comments:

- 6) Number of flocks eligible for testing under the requirements of the Salmonella NCP and subject to at least one test during 2010
- 7) Number of flocks subject to at least one official test during 2010
- 8) Number of flocks subject to at least one official test during 2010
- 9) Number of flocks subject to at least one official test during 2010
- 10) Number of flocks subject to at least one official test during 2010
- 11) Data for England and Northern Ireland only

Footnote:

Population data above derived from Agricultural Census and RADAR. For some poultry population figures, only data available from England and Northern Ireland.

Breeding chicken flocks, laying hen flocks and breeding turkey flocks are adult flocks subject to monitoring and control procedures for Salmonella under Reg. 2160/2003/EC. Broiler and fattening turkey flocks are birds reared for meat and monitored 3 weeks before slaughter. Only flocks on holdings eligible for inclusion in the NCP are included in the total flock count. Other population data above derived from Agricultural Census and Great Britain Poultry Register - includes all premises of 50 or more poultry.

2. INFORMATION ON SPECIFIC ZONOSSES AND ZOOBOTIC 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

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

Humans:

There has been an overall trend of reduction in reports of Salmonella infection in humans in the UK over recent years.

Food:

A survey of ready-to-eat foods sold at mobile vendors was carried out during the year - of the 88 samples tested, none were positive for Salmonella.

Animals:

Reports of Salmonella in cattle, sheep and horses increased in 2010 compared to 2009, while reports in pigs, bird species not subject to a Salmonella National Control Programme and other non-statutory species decreased. Reports of Salmonella 4,[5],12:i:- increased.

Salmonella National Control Programmes: a new National Control Programme (NCP) for turkey flocks, came into force on 1st January 2010. For the turkey and the other chicken sector programmes, all Salmonella reduction targets (as designated in the EU legislation) were met for 2010.

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

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

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 882/2004 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

Ascertainment of cases is via mandatory notification of food poisoning and reporting of isolations by publicly funded human diagnostic microbiology laboratories.

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

An increase in the reports of human salmonellosis in the UK was seen in the mid 1980s and between 1989 and 1997, about 30,000 cases were reported each year. Since 1997 numbers reported have declined. Generally during this period over 60% of reports were *Salmonella* Enteritidis. 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.

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

There has been a significant decreasing trend in laboratory confirmed reports of *Salmonella* infection in humans in the UK since the late 1990s. Specifically recently, *S. Enteritidis*, has reduced from 39.98% of all *Salmonella* reports in 2009 to 26.83% in 2010.

Relevance as zoonotic disease

Salmonella Enteritidis and *Salmonella* Typhimurium still account for the majority of cases of human Salmonellosis in the UK.

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in pig meat and products thereof

Results of the investigation

No surveys were carried out in 2010.

B. Salmonella spp. in bovine meat and products thereof

Results of the investigation

No surveys were carried out in 2010.

C. Salmonella spp. in broiler meat and products thereof

Results of the investigation

No surveys were carried out in 2010.

D. Salmonella spp. in eggs and egg products

Results of the investigation

No national surveys were carried out in 2010.

E. Salmonella spp. in turkey meat and products thereof

Results of the investigation

No surveys were carried out in 2010.

Table Salmonella in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Other processed food products and prepared dishes - unspecified - ready-to-eat foods - at catering - Survey (Products sold at mobile vendors)	FSA	Single	25g	88	0	0	0	0

Footnote:

FSA = the Food Standards Agency

2.1.4 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Monitoring system

Sampling strategy

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

Sampling is carried out as specified in EU legislation Regulation (EC) No. 2160/2003, Regulation (EC) No. 200/2010 and the UK Salmonella National Control Programme (NCP) for breeding hens (*Gallus gallus*).

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

When birds are four weeks old and two weeks before moving to laying phase/laying unit

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

Every two to three weeks during the production period.

In addition to the sampling above, Official Control Samples are collected from each breeding flock on two occasions which are sufficiently distant in time from each other during the production cycle (usually within 4 weeks of moving to the laying accommodation and again within the last 8 weeks of production).

Type of specimen taken

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

Sampling at the holding: hatcher tray liners or chick box liners and chicks dead on arrival/culls

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

Sampling at the holding: Boot swabs or composite faeces samples

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

Sampling at the holding: Boot swabs or composite faeces samples

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:

- Hatcher tray liners or 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, meconium samples etc.

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 of 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 rodent droppings, dust samples, swabs taken from empty houses, transport vehicles etc.

Breeding flocks: Production period

According to the requirements of the NCP, mandatory sampling is required every 2 to 3 weeks during the laying/production period as follows:

- A minimum of 5 pairs of boot swabs or

- A composite faeces sample made up of 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 hatcher debris, fluff, additional boot swabs/faeces samples, dust samples, rodent droppings, swabs taken from empty houses, transport vehicles etc. Additional voluntary operator samples are usually taken as part of hatchery hygiene monitoring programmes.

Case definition

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

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

Reports of *Salmonella* isolates under the relevant legislation are classed as positive. A flock is counted as positive once only during the year, regardless of the number of tests carried out/isolates obtained.

'Flock' is defined as poultry of the same health status kept on the same holding and 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

ISO 6579:2002/Amd1:2007

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

ISO 6579:2002/Amd1:2007 (Annex D)

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

ISO 6579:2002/Amd1:2007 (Annex D)

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 not used in the layer breeder sector but is sometimes used in the broiler breeder sector (parent level).

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

Control program/mechanisms

The control program/strategies in place

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

Regulation (EC) No. 2160/2003 lays down harmonised rules for the monitoring and control of Salmonella in breeding flocks of domestic fowl. The legislation sets out enhanced monitoring and controls for Salmonella which have been implemented in the UK through the Control of Salmonella in Poultry Order (England) 2007, the Control of Salmonella in Poultry (Scotland) Order 2008, the Control of Salmonella in Poultry (Wales) Order 2008 and the Control of Salmonella in Poultry Scheme Order (Northern Ireland) 2008. This legislation implements the Salmonella National Control Programme (NCP) for breeding flocks (of chickens – *Gallus gallus*) to meet the target for reduction in Salmonella prevalence set out in EU legislation.

Regulation (EC) No. 200/2010 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 the regulated Salmonella serovars annually. The EU target for breeding flocks is based on the 5 serovars considered of greatest public health significance at the time of drafting of the legislation (the 5 most frequent serovars in human cases): *S. Enteritidis*, *S. Typhimurium*, *S. Virchow*, *S. Hadar* and *S. Infantis*. Any breeding flock found to be infected with a regulated Salmonella serovar according to the protocol outlined above is placed under official control and the requirements of Regulation (EC) No. 2160/2003 are implemented.

Regulation (EC) No 200/2010 allowed for an extension in the frequency of operator sampling at the holding from every two weeks to every three weeks, at the discretion of the Competent Authority. A reduction in the number of routine official samples required in each flock from three to two per year was also allowed. This revised testing protocol is applicable to Member States who have met the Salmonella reduction target as specified in the legislation for two consecutive years. This extended testing interval and reduced official sampling frequency have been applied in the UK, although some UK breeding companies have chosen to still sample at a two weekly frequency.

Recent actions taken to control the zoonoses

One UK breeding chicken flock was confirmed positive with a monophasic *Salmonella Typhimurium* variant *S. 4,5,12:i:-* by PCR testing and phage typing from NCP sampling during 2010. At the time of detection, according to the legislation, monophasic strains of *S. Typhimurium* (*S. 4,5,12:i:-* and *S. 4,12:i:-*) were not specified as regulated/target serovars, however official action was taken and the flock was slaughtered. The “Scientific Opinion on monitoring and assessment of the public health risk of “*Salmonella Typhimurium*-like” strains”, published in autumn 2010 by EFSA (<http://www.efsa.europa.eu/en/efsajournal/pub/1826.htm>) concluded that “The public health risk posed by these emerging monophasic *S. Typhimurium* strains is therefore considered comparable to that of other *S. Typhimurium* strains which have caused widespread epidemics of infection over the past four decades”. Monophasic strains of *S. Typhimurium* have now been included in the legislation as regulated serovars within the breeding chicken Salmonella National Control Programme as of 1st January 2010 (Regulation (EC) No. 517/2011).

Measures in case of the positive findings or single cases

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

Any breeding flock found to be infected with *S. Typhimurium* or *S. Enteritidis* 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.

Following compulsory slaughter of the positive flock(s), 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. Eggs from the positive flock are removed from the hatchery and destroyed.

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 collaboration with government experts on *Salmonella* control and the operator's private veterinary surgeon.

Public health authorities are advised of the isolation of *Salmonella*. Visits are made to the farm by Government officials to carry out an epidemiological investigation and provide advice to the food business operator on the control of *Salmonella* if the *Salmonella* isolated is considered to be of public health significance.

Notification system in place

All isolations of *Salmonella* must be reported and a culture must be supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain. In Northern Ireland, all isolations of *Salmonella* must be reported to a veterinary inspector of the Department of Agriculture, [Zoonoses Order (Northern Ireland) 1991]. Approved private laboratories testing under the *Salmonella* legislation are required to provide monthly returns on tests conducted under this legislation to the Competent Authority.

The main provisions of the Zoonoses Order 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 carcass 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 Orders relevant to the breeding chicken control programme are:

- 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 Great Britain 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.
- Flock owners are required to 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

In the UK, a total of 1550 adult breeding flocks were subject to at least one Official Control Sample during the year (1349 in Great Britain and 201 in Northern Ireland). No UK breeding flocks tested positive for *Salmonella* Enteritidis or *Salmonella* Typhimurium during the year. One breeding flock tested positive for *Salmonella* Typhimurium DT120 (a monophasic *Salmonella* 4,5,12:i:-) from NCP sampling during 2010.

A further 18 adult breeding flocks tested positive for other *Salmonella* serovars during the year. These included ten adult flocks on nine holdings in Great Britain: four flocks with *S. Mbandaka*, four flocks with *S. Senftenberg* and single flocks with *S. Indiana* and *S. Kottbus*. In Northern Ireland, eight flocks tested positive: five flocks for *S. Senftenburg*, two flocks for *S. Mbandaka* and one flock for *S. Montevideo*. None of the flocks detected positive in 2010 also tested positive in 2009.

Using the number of flocks in production in the UK that were subject to at least one official test during 2010 as the denominator figure, this gives an estimated prevalence of 0.06% (1/1550) for the target *Salmonella* serovars and a prevalence of 1.23% for all *Salmonella* serotypes (19/1550). These results indicate a reduction in prevalence compared to previous years (0.122% for the regulated serovars and 1.4% for all *Salmonella* serovars in 2009 and 0.49% for the regulated serovars and 1.28% for all serovars in 2008). Since the introduction of the current *Salmonella* National Control Programme in 2007, the UK *Salmonella* prevalence results for chicken breeding flocks have been very encouraging and the reduction target of 1% or less flocks remaining positive for *Salmonella* Enteritidis, Typhimurium, Hadar, Infantis and Virchow has been achieved each year since the start of the programme.

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

Sampling is carried out as specified in EU legislation Regulation 2160/2003/EC and Regulation 646/2007/EC and the UK Salmonella National Control Programme (NCP) for chickens producing meat for human consumption (broilers).

Frequency of the sampling

Broiler flocks: Before slaughter at farm

According to the requirements of the Salmonella National Control Programme, mandatory sampling is required within 3 weeks of the birds being sent to slaughter. Routine Official Control Samples are collected once annually from 10% of holdings with more than 5000 birds.

Type of specimen taken

Broiler flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

The NCP sample must consist of a minimum of 2 pairs of boot swabs taken so as to be representative of the whole area in the house to which the birds have access. In flocks of less than 100 broilers, where it is not possible to take boot swabs, hand drag swabs may be used.

Other operator voluntary monitoring can include additional boot swabs, litter samples, dust samples, rodent droppings, swabs taken from empty houses, transport vehicles etc.

Case definition

Broiler flocks: Before slaughter at farm

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

Reports of Salmonella isolates under the relevant legislation are classed as positive. A flock is counted as positive once only during the year, regardless of the number of tests carried out/isolates obtained.

“Flock” is defined as poultry of the same health status kept on the same holding and 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

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002/Amd1:2007 (Annex D)

Vaccination policy

Broiler flocks

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

However, vaccination is not used in broiler flocks

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

Regulation 2160/2003/EC lays down harmonised rules for the monitoring and control of Salmonella in broiler flocks. The legislation sets out enhanced monitoring and controls for Salmonella which have been implemented by the UK National Control Programme (NCP) for broilers. The Regulation was implemented in the UK through the Control of Salmonella in Broiler Flocks Order (England) 2009, the Control of Salmonella in Poultry (Breeding, Laying and Broiler Flocks) (Scotland) Order 2009, the Control of Salmonella in Broiler Flocks (Wales) Order 2009 and the Control of Salmonella in Broiler Flocks Scheme Order (Northern Ireland) 2009. This national legislation implements the Salmonella NCP for broilers required by Regulation (EC) No. 2160/2003, to meet the target for reduction in Salmonella prevalence set out in EU legislation. The NCP applies to all operators, except where the operator produces small quantities of product provided direct to the consumer or via local retailers which only supply the final consumer or where all production is for private domestic use only.

Regulation 646/2007/EC sets a target for the UK broiler sector to ensure that no more than 1% of broiler flocks remain positive for Salmonella of greatest human health significance by the end of 2011. The EU target is based on the 2 most common serovars in human cases which are *S. Enteritidis* and *S. Typhimurium*.

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

Broiler flocks: Before slaughter at farm

If *S. Enteritidis* or *S. Typhimurium* is detected in an operator sample, official samples are collected by the Competent Authority from the next crop in the affected house as well as from all other flocks on the holding. If any of these samples are positive, a restriction notice is served on the holding under the Zoonoses Order, requiring supervised cleansing and disinfection and further sampling. If any of the post cleansing and disinfection samples return a positive result for *S. Enteritidis* or *S. Typhimurium*, subsequent flocks may only be moved off the site under license to the slaughterhouse and further official sampling of all flocks in the next crop is carried out.

It is the responsibility 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 possibility of cross-contamination and to minimise the risk to public health. The Salmonella monitoring results for all eligible broiler flocks must be included as part of the Food Chain Information documentation, accompanying each batch to the slaughterhouse (Annex II of Regulation (EC) No. 853/2004)

Public health authorities are advised of the isolation of Salmonella in broiler flocks. Visits are made to the farm by Government officials to carry out an epidemiological investigation and provide advice to the food business operator on the control of Salmonella if the Salmonella isolated is considered to be of public health significance.

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

Approved private laboratories testing under the Salmonella legislation are required to provide monthly returns on tests conducted under this legislation to the Competent Authority.

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

In total, 160 routine annual official sampling visits were carried out to broiler premises in the UK by the Competent Authority during the year to fulfill the requirements of the legislation. In addition, risk based sampling visits were carried out to all premises where a flock was detected positive for a regulated serovar during the year. There were approximately 33611 flocks tested according to the requirements of the Salmonella NCP during 2010 - this number was derived from the monthly returns from private and Government testing laboratories for all broiler flocks tested 3 weeks before moving to slaughter.

Five hundred and twenty five (525) broiler flocks of Gallus gallus, originating from 207 unique holdings, were positive for any Salmonella serovar. All positive flocks detected during 2010 originated on holdings in Great Britain – there were no positive flocks detected on Northern Ireland.

Seven broiler flocks were detected positive for Salmonella Typhimurium. In addition, three flocks were positive for monophasic Salmonella 1,4,[5],12:i:-. No (0) broiler flocks were positive for S. Enteritidis. One flock was positive for S. Virchow PT4 but none were positive for S. Hadar or S. Infantis.

In total, 514 broiler flocks were positive for other Salmonella serovars. Five flocks tested positive for both S. Kedougou and S. Ohio, three flocks tested positive for both S. Livingstone and S. Ohio and one flock tested positive for both S. Mbandaka and S. Thompson. These flocks have only been recorded as positive once in the total number of units positive. Including all of these incidents, 135 flocks were found infected with S. Kedougou, 95 with S. Ohio, 79 with S. Livingstone, 73 with S. Montevideo, 64 with S. Mbandaka, 26 with S. Senftenberg, 10 with S. Orion, 4 with S. Thompson, 3 with S. Kentucky, 3 with S. Lexington, 2 with S. Anatum, 2 with S. Havana, 2 with S. Kottbus, 1 with S. Derby, 1 with S. Litchfield, 1 with S. Newport, 1 with S. Ouakam, 1 with S. Reading, and 20 with Salmonella strains with structures only (6 with S. 6,7:Z10:-, 4 with S. 6,7:ROUGH:-, 2 with S. 6,7:-:-, 1 with S. 3,19:-:-, 1 with S. 3,19:ROUGH:-, 1 with S. 4,12:D:-, 1 with S. 4,12:E,H:-, 1 with S. 42:Z4,Z23:-, 1 with S. 6,7:-:-NM, 1 with S. 6,7:L,W:-, and 1 with S. O_ROUGH:G,S,T:-).

Using the number of flocks in production in the UK during 2010 as the denominator figure, this gives an estimated prevalence of 7/33611 or 0.02% for the target Salmonella serovars, S. Enteritidis and S. Typhimurium, for the UK in 2010. These results indicate a reduction on the 2009 prevalence of 0.043%

(12/27780) for the target Salmonella serovars. The prevalence of all Salmonella serovars for the UK for 2010 was 525/33611 or 1.56% (compared to 1.31% or 364/27780 in 2009)

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

In 2009, ten broiler flocks were positive for *S. Enteritidis* and two broiler flocks were positive for *S. Typhimurium* (ST). Two flocks were positive for *S. Virchow* but none were positive for *S. Hadar* or *S. Infantis*. 350 broiler flocks were positive for other non-regulated Salmonella serovars.

There was no official statutory Salmonella Control Programme in broilers in the UK in 2008. Monitoring for Salmonella in broilers was carried out on a voluntary basis by the food business operator. This was also performed by operators who are members of some farm assurance schemes. For 2008 and preceding years, the Salmonella monitoring results for broilers were based on the total number of incidents (and therefore are not comparable with the monitoring results derived from implementation of the Salmonella National Control Programme, which are flock based results). 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.

Additional information

During 2010, three broiler flocks were detected positive with a monophasic Salmonella Typhimurium variant (4,5,12:i:-). At the time of detection, according to the legislation, monophasic strains of *S. Typhimurium* (*S. 4,5,12:i:-* and *S. 4,12:i:-*) were not specified as regulated/target serovars. However, where relevant, expert advisory visits to provide disease control advice, were carried out to premises where this strain had been detected.

The “Scientific Opinion on monitoring and assessment of the public health risk of “Salmonella Typhimurium-like” strains”, published in autumn 2010 by EFSA (<http://www.efsa.europa.eu/en/efsajournal/pub/1826.htm>) concluded that “The public health risk posed by these emerging monophasic *S. Typhimurium* strains is therefore considered comparable to that of other *S. Typhimurium* strains which have caused widespread epidemics of infection over the past four decades”. Monophasic strains of *S. Typhimurium* have now been included in the legislation as regulated serovars.

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

Monitoring system

Sampling strategy

Laying hens flocks

Sampling is carried out as specified in EU legislation Regulation No. 2160/2003, Regulation No 1168/2006 and the UK Salmonella National Control Programme (NCP) for laying hens (*Gallus gallus*).

Frequency of the sampling

Laying hens: Day-old chicks

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

At least every 15 weeks during the production period. One routine Official Control Sample is collected annually from one laying flock on all premises with more than 1000 birds.

Eggs at packing centre (flock based approach)

Voluntary industry sampling as part of industry assurance scheme. Sampling by Government officials if suspicion of presence of *Salmonella* that could pose public health risk.

Type of specimen taken

Laying hens: Day-old chicks

Hatcher tray liners or chick box liners and chicks dead on arrival or cull chicks

Laying hens: Rearing period

Boot swabs or composite faeces sample

Laying hens: Production period

Boot swabs or composite faeces (plus dust sample at official test)

Eggs at packing centre (flock based approach)

Eggs for human consumption

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:

- Hatcher tray liners or 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

house/space available to the birds.

Other operator voluntary monitoring can include rodent droppings, dust samples, swabs taken from empty houses, transport vehicles etc.

Laying hens: Production period

According to the requirements of the NCP, mandatory sampling is required at least 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 routine Official Control Sample is collected annually from one laying flock on all premises with more than 1000 birds and consists of two pairs of boot swabs/two composite faeces samples and a dust sample.

Operator voluntary monitoring can include rodent faeces and other environmental samples, dust samples, swabs taken from empty houses, transport vehicles, egg samples taken at the packing centre 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.

Reports of Salmonella isolates under the relevant legislation are classed as positive. A flock is counted as positive once only during the year, regardless of the number of tests carried out/isolates obtained.

“Flock” is defined as poultry of the same health status kept on the same holding and 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: Rearing period

ISO 6579:2002/Amd1:2007 (Annex D)

Laying hens: Production period

ISO 6579:2002/Amd1:2007 (Annex D)

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 collaboration with the industry.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

Regulation (EC) No. 2160/2003 lays 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 have 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, the Control of Salmonella in Poultry (Scotland) Order 2008, the Control of Salmonella in Poultry (Wales) Order 2008 and the Control of Salmonella in Poultry Scheme Order (Northern Ireland) 2008. This legislation implements the Salmonella NCP for laying flocks (of chickens – *Gallus gallus*) to meet the target for reduction in Salmonella prevalence set out in EU legislation. The NCP applies to all operators 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 UK 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 to a final prevalence of 2% or less. The EU target for laying flocks is based on the 2 most common serovars in human cases which are *S. Enteritidis* and *S. Typhimurium*. Any laying flock found to be infected with the regulated Salmonella serovars according to the protocol outlined above is placed under official control and the requirements of the Regulation 2160/2003/EC are implemented.

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

If a flock is confirmed infected with *S. Enteritidis* or *S. Typhimurium*, the flock is placed under restriction and all the eggs from the flock must be designated as Class B eggs (i.e. can no longer be marketed as Class A table eggs). The eggs cannot be used for human consumption unless they are heat treated to eliminate the risk of Salmonella contamination. All other flocks on the holding are sampled officially. Following depopulation of a *S. Enteritidis*/*S. Typhimurium* positive flock, another official sample is required in the follow-on flock at 22-26 weeks of age.

If the operator wishes to challenge sampling results, he/she can request additional optional confirmatory testing to be carried out according to the sampling protocol laid out in Regulation (EC) No. 1237/2007 (testing either 4000 eggs or the internal organs of 300 birds or 5 faecal & 2 dust samples per flock). Restrictions remain in place until results of this further testing are known.

Public health authorities are advised of the isolation of Salmonella in laying chicken flocks. Visits are made to the farm by Government officials to carry out an epidemiological investigation and provide advice to the food business operator on the control of Salmonella if the Salmonella isolated is considered to be of public health significance.

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

The Salmonella NCP is implemented in the UK through the Control of Salmonella in Poultry Orders (England, Scotland, Wales and Northern Ireland). The main provisions of this legislation relevant to the

laying chicken Salmonella National Control Programme are:

- Owners of chicken laying flocks of more than 350 birds must be registered unless officials have access to flock information from another source (e.g. the Great Britain Poultry Register). Information supplied should include the name and address of the holding, the number of laying hens on the holding.
- flock owners are required to 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.

Approved private laboratories testing under the Salmonella legislation are required to provide monthly returns on tests conducted under this legislation to the Competent Authority.

Results of the investigation

There were a total of 4368 flocks in production in the UK in 2010. This includes all premises where there were more than 350 hens in production during the year. In total, 1566 routine annual official sampling visits were carried out during the year.

In Great Britain, 41 adult chicken flocks of laying hens, originating from 39 unique holdings, were positive for any Salmonella serovar. In Northern Ireland, 7 flocks were positive for any serovar

Six adult laying chicken flocks were confirmed positive with Salmonella Enteritidis during 2010. Three flocks tested positive for S. Enteritidis PT4, one flock tested positive for both S. Enteritidis PT4 and PT35, one flock tested positive for both S. Enteritidis PT4 and PT9b, and one flock tested positive for S. Enteritidis PT6a. There were no flocks positive for S. Enteritidis in Northern Ireland during the year.

Three adult chicken flocks of laying hens, originating from 3 separate holdings were confirmed positive for S. Typhimurium. One flock tested positive for both S. Typhimurium DT56 variant and DT193, one flock tested positive for S. Typhimurium DT30, and one flock tested positive for S. Typhimurium DT8. There were no flocks detected positive for S. Typhimurium in Northern Ireland in 2010.

Two flocks were detected positive for monophasic Salmonella Typhimurium strains in Great Britain during 2010 - both with S. 4,12:i:- DT193. Two flocks were detected positive with S. Infantis - both in Northern Ireland.

A further 35 adult laying flocks tested positive for other Salmonella serovars during the year: 30 flocks originating from 28 separate holdings in Great Britain and 5 flocks in Northern Ireland. These included four flocks with S. Derby, four with S. Agona, four with S. Livingstone, three with S. Mbandaka, two with S. Africana, two with S. Anatum, two with S. Dublin, one with S. Agama, one with S. Tennessee, one with S. Bardo, one with S. Bovismorbificans, one with S. Durham, one with S. Kedougou, one with S. Kottbus, one with S. London, one with S. Montevideo, one with S. Ohio, one with S. Senftenberg, one with S. Thompson, one with S. 13,23:-:- and one with an unspecified Salmonella.

Using the number of flocks in production in the UK during 2010 as the denominator figure, this gives an estimated prevalence of 0.21% (9/4368) for Salmonella Enteritidis and Salmonella Typhimurium for the UK in 2010 (a reduction on the 2009 prevalence of 0.36% (16/4466)). The estimated prevalence of Salmonella positive adult laying flocks, under the requirements of the NCP, for all Salmonella serovars is 1.10% (48/4368).

These results indicate a reduction in prevalence compared to previous years (0.36% for the regulated serovars and 1.7% for all Salmonella serovars in 2009 and approximately 1% for the regulated serovars and 1.2% for all serovars in 2008).

In Great Britain, 30 immature (in-rear) chicken flocks of laying hens, on a total of 23 unique holdings, were positive for any Salmonella serovar. One flock was positive for S. Enteritidis PT4, no flocks were positive for S. Typhimurium. 24 flocks were infected with S. Senftenberg, one with S. Montevideo, one with S. Paratyphi B var. Java, one with S. Regent, and two with untypable Salmonella strains (two with S. 3,19:ROUGH:-). There were no in-rear laying flocks detected positive for any Salmonella serovar in 2010.

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

There was no official statutory UK Salmonella Control Programme in the laying chicken sector in the few years leading up to implementation of the current programme. However, the majority of egg producers in the UK have 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. For 2007 and preceding years, the Salmonella monitoring results were based on the total number of incidents reported (and therefore are not comparable with the monitoring results derived from implementation of the Salmonella National Control Programme, which are flock based results).

There were a total of 4466 flocks in production in the UK in 2009 and in total, 1504 routine annual official sampling visits were carried out during the year. In total, 12 flocks were positive for S. Enteritidis and four were positive for S. Typhimurium. Sixty adult chicken laying flocks, originating from 54 unique holdings, were positive for Salmonella serovars other than the regulated Salmonellas. The most commonly isolated serovar was S. Senftenburg (10.5%) followed by S. Agona (9.2%).

2008 was the first year of implementation of the Salmonella NCP in laying flocks in the UK. In total during the year, 47 flocks were positive for S. Enteritidis and 4 flocks were positive for S. Typhimurium. Overall, fifteen adult flocks were positive for Salmonella serovars other than the regulated Salmonella serovars designated in the legislation.

The considerable reduction in Salmonella prevalence since the EU baseline survey of 2004/05, while not directly comparable to the NCP monitoring results due to different sampling methods and denominator data, does indicate that substantial progress continues to be made in controlling Salmonella in the layer sector. Results for 2008, 2009 and 2010 were all well below the EC definitive target of 2%.

Additional information

D. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

Government funded scanning surveillance programmes are delivered by the Veterinary Laboratories Agency (VLA) (now the Animal Health Veterinary Laboratories Agency), the Scottish Agricultural College (SAC) and the Agri-food and Biosciences Institute (AFBI). These programmes are built upon the subsidised diagnosis and disease investigation service offered to livestock farmers through their private veterinary surgeons. Over 90% of the Salmonella isolates derived from cattle annually are from samples taken for diagnostic purposes and submitted for testing under this programme.

Type of specimen taken

Animals at farm

Usually faeces or from organs at post mortem

Methods of sampling (description of sampling techniques)

Animals at farm

Voluntary samples usually sent by a private veterinarian for diagnostic purposes

Case definition

Animals at farm

Culture and isolation of Salmonella from samples taken from the animal. Reports of Salmonella isolates under the Zoonoses Order are classed as positive.

All figures for Northern Ireland are based on the total number of isolations of Salmonella. Figures from Great Britain are based on the total number of incidents recorded. 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

Various

Vaccination policy

Vaccination against Salmonella Dublin and Salmonella Typhimurium 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 programme for Salmonella in cattle. All Salmonellae isolated must be reported to the Competent Authority under the requirements of national legislation. Advice on disease control measures is given and visits to the farm by Government officials may be made, particularly if the Salmonella is considered to be 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 outbreak of salmonellosis in humans associated with the farm.

Measures in case of the positive findings or single cases

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

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

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 the UK, 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 veterinary laboratories. As in previous years, the majority (> 90%) of Salmonella reports in cattle were from samples taken for clinical diagnostic purposes and came from cattle on farms.

Great Britain:

Reports of Salmonella in cattle were 16% higher than during 2009. S. Dublin remained the most common serovar and rose from 523 reports during 2009 to 589 reports during 2010. There was also a 65% increase in reports of S. Mbandaka. There were 57 reports of S. Typhimurium (of which over half were DT104 or DT193), which represents a 9.5% reduction compared with 2009. There were also 32 reports of Salmonella 4,5,12:i:- (30 reports of DT193, and single reports of U323 and NOPT) compared with 15 reports in 2009. There were five reports of 4,12:i:-, compared to three in 2009. In addition, there were four reports of S. Enteritidis (two of PT13a, one PT14B and one PT8) compared with three in the preceding year. There was one reported incident of S. Infantis, but no reports of S. Hadar or S. Virchow.

Northern Ireland:

There were a total of 186 reports of isolation of Salmonella from cattle in Northern Ireland in 2010. The majority of these were S. Dublin (178), but there were also two S. Typhimurium reports, one S. Infantis and one monophasic Salmonella 4,5,12:i:- report.

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

In 2009, the number of reports of Salmonella from cattle increased compared to 2008 (895 compared to 865), mostly reflecting in a 30% rise of S. Dublin reports (524 recorded incidents) and also a more than doubling in the number of reports of S. Mbandaka (62 incidents) in Great Britain. There were 857 reports of Salmonellosis in cattle in the UK in 2007, 750 in 2006, 989 in 2005 and 1218 reports in 2004. Overall, Salmonella Dublin has been the most common serovar isolated from cattle in the UK since the late 1990s.

The majority of incidents reported are from samples taken for diagnostic purposes, and not from samples from healthy animals or taken during a structured survey. Therefore the sample submission rate and the number of Salmonella incidents recorded on an annual basis is subject to external influencing factors which can impact on observed trends (such as clinical presentation of disease, economic influences, awareness of a disease etc). In Great Britain, there was a 4% increase in submissions from cattle in 2010 compared to 2009 and an overall increase in total VLA/SAC submissions in 2010 (101,768 submissions during January – December 2010) which is 3% higher than during 2009 (99,032 submissions) and 6% higher than during 2008 (95,894 submissions).

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

Salmonella Dublin is the most common serovar associated with abortion in cattle. Salmonella Dublin is seldom isolated in samples from man.

E. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

Government funded scanning surveillance programmes are delivered by the Veterinary Laboratories Agency (VLA) (now the Animal Health Veterinary Laboratories Agency), the Scottish Agricultural College (SAC) and the Agri-food and Biosciences Institute (AFBI). These programmes are built upon the subsidised diagnosis and disease investigation service offered to livestock farmers through their private veterinary surgeons. On average, approximately 90% of incidents are from the isolation of Salmonella in samples taken for diagnostic purposes (clinical samples) and submitted for testing under this programme.

Multiplying herds

As for breeding herds

Fattening herds

As for breeding herds.

The Zoonoses National Control Programme for Salmonella (ZNCP) in pigs is a voluntary industry operated Salmonella monitoring programme carried out by means of meat juice ELISA testing at slaughter. Results from this programme are not reported in this report.

Frequency of the sampling

Fattening herds at slaughterhouse (herd based approach)

Voluntary sampling - industry Zoonoses National Control Programme for Salmonella (ZNCP)

Type of specimen taken

Breeding herds

Usually faeces or organs at post mortem. Voluntary samples usually sent by a private veterinarian for diagnostic purposes

Multiplying herds

Usually faeces or organs at post mortem. Voluntary samples usually sent by a private veterinarian for diagnostic purposes

Fattening herds at farm

Usually faeces or organs at post mortem. Voluntary samples usually sent by a private veterinarian for diagnostic purposes

Fattening herds at slaughterhouse (herd based approach)

Meat juice

Methods of sampling (description of sampling techniques)

Fattening herds at farm

Fattening herds at slaughterhouse (herd based approach)

Case definition

Breeding herds

Reports of Salmonella isolates under the Zoonoses Order are classed as positive.

All figures for Northern Ireland are based on the total number of isolations of Salmonella. Figures from Great Britain are based on the total number of incidents recorded. 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

Fattening herds at slaughterhouse (herd based approach)

Not included in this report

Diagnostic/analytical methods used

Breeding herds

various

Multiplying herds

various

Fattening herds at farm

various

Fattening herds at slaughterhouse (herd based approach)

meat juice ELISA

Vaccination policy

Breeding herds

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

Multiplying herds

As for breeding herds

Fattening herds

As for breeding herds

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

The control program/strategies in place

Breeding herds

There is no statutory national control programme for Salmonella in pigs. All Salmonellae isolated must be reported to the Competent Authority under the requirements of national legislation. Advice on disease control measures is given and visits to the farm by Government officials may be made, particularly if the Salmonella is considered to be 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 pigs. Assistance is given to the public health authorities with on-farm investigations and epidemiological studies if there is an outbreak of salmonellosis in humans associated with the farm.

Multiplying herds

As for breeding herds

Fattening herds

As for breeding herds. In addition, there is a voluntary industry control scheme in place in the UK: in April 2008, the British Pig Executive (BPEX) launched a revised action plan for combating Salmonella in pigs - the Zoonoses National Control Programme for pigs (ZNCP). 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 Salmonellae), 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 monitoring is initially through the industry with government support.

Currently, approximately 90% of pigs in the UK are produced under an assurance scheme that includes the Zoonosis National Control Programme for Salmonella in pigs (ZNCP).

Measures in case of the positive findings or single cases

Public health authorities are advised of the isolation of Salmonella. Advice is given on control of Salmonella and farm visits may be made by the veterinary and public health authorities.

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

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

Results of the investigation

There is no statutory routine Salmonella monitoring of pigs in the UK, therefore the majority of isolates come from pigs with clinical disease. The number of reports is dependent on the total pig population and the number of diagnostic submissions to veterinary laboratories. As in previous years, the majority (> 90%) of Salmonella reports in pigs were from samples taken for clinical diagnostic purposes and came from pigs on farms. The results of the voluntary industry ZNCP scheme are not reported in this report

Great Britain:

There were a total of 172 reported incidents recorded in pigs in 2010. Reports of Salmonella in pigs were 5.5% lower compared with 2009, which is reflected in a 25% decrease of porcine S. Typhimurium incidents (from 130 during 2009 to 98 during 2010). Over two thirds of the S. Typhimurium reports were either U288 or DT193. By contrast, reports of both Salmonella 4,5,12:i:- and Salmonella 4,12:i:- increased. There were 30 reports of S. 4,5,12:i:- (24 reports of DT193, five reports of DT120 and one NOPT) compared with eleven during 2009, and there were 13 reports of S. 4,12:i:- (11 reports of DT193 and two reports of DT120) compared with just one in 2009. This reflects the pan-European rise in monophasic S. Typhimurium strains, especially in pigs. There were no reports of S. Enteritidis.

Northern Ireland:

There were a total of 62 reports of isolation of Salmonella from pigs in Northern Ireland in 2010. The most common serovars were S. Typhimurium and the monophasic strains 4,[5],12:i:- (24 and 8 respectively). There were also no reports of S. Enteritidis.

The majority of incidents reported are from samples taken for diagnostic purposes, and not from samples from healthy animals or taken during a structured survey. Therefore the sample submission rate and the number of Salmonella incidents recorded on an annual basis is subject to external influencing factors which can impact on observed trends (such as clinical presentation of disease, economic influences, awareness of a disease etc). In Great Britain, there was a 3% decrease in submissions from pigs in 2010 compared to 2009 despite an overall increase in total VLA/SAC submissions in 2010 (101,768 submissions during January – December 2010) which is 3% higher than during 2009 (99,032 submissions) and 6% higher than during 2008 (95,894 submissions).

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

In total in the UK, there were 207 reports of Salmonella in pigs in 2009. The most commonly isolated serovar was Salmonella Typhimurium (150 reports - 72.5%). For the first time, S. 4,5,12:i:- was the second most commonly isolated serovar (12 incidents reported accounting for 5.8%, compared to 8 recorded incidents in 2008) and S. Derby was only the third most common serovar (8 reported incidents accounting for 3.9%). No S. Enteritidis was reported in pigs in the UK in 2009. There was one report of S. Anatum. Overall, the number of pig Salmonella incidents and isolations dropped slightly in 2009 compared to 2008 (when there were 219 reports). However specifically in Great Britain, there was again an increase in the number of incidents recorded, with 182 compared to 174 in 2008 and 163 in 2007. 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.

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

Salmonella Typhimurium is the second most common serovar isolated from humans in the UK. Salmonella Derby is not commonly isolated from human disease cases.

From 2007, reports of the monophasic Salmonella 4,[5],12:i:- serovar have increased substantially, mainly in pigs and cattle in the UK, but also in other animals (mice, sheep, cats, dogs, horses). Molecular studies are underway to compare strains to those isolated from humans in the UK and in other European countries.

F. 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)

Sampling is carried out as specified in EU legislation Regulation (EC) No. 2160/2003/EC and Regulation (EC) No. 584/2008 and the UK Salmonella National Control Programme (NCP) for breeding turkey flocks.

Meat production flocks

Sampling is carried out as specified in EU legislation Regulation (EC) No. 2160/2003/EC and Regulation (EC) No. 584/2008 and the UK Salmonella National Control Programme (NCP) for fattening turkey flocks producing meat for human consumption.

Frequency of the sampling

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

All consignments sampled on arrival

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

At 4 weeks of age and 2 weeks prior to moving to the laying unit/ start of lay

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

At least every 3 weeks during the production period. Sampling can be carried out at the holding or at the hatchery. One routine Official Control Sample is collected annually from all flocks on 10% of holdings with at least 250 adult breeding turkeys between 30 and 45 weeks of age and on all holdings with elite, great grandparent and grandparent breeding turkeys.

Meat production flocks: Before slaughter at farm

According to the requirements of the Salmonella National Control Programme, mandatory sampling is required within 3 weeks of the birds being sent to slaughter. The results remain valid for up to 6 weeks after sampling. Routine Official Control Samples are collected once annually from 10% of holdings with more than 500 birds.

Type of specimen taken

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

Poult box liners and poults dead on arrival or culled poults.

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

Bootswabs and/or 900 square cm dust swabs.

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

Sampling at the holding: bootswabs and/or 900 square cm dust swabs.

Sampling at the hatchery: poult box liners or 900 square cm swabs or broken eggshells

Meat production flocks: Before slaughter at farm

Bootswabs and/or 900 square cm dust swabs.

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, comprising of at least the following from each hatchery delivery:

- Ten poult box liners for every batch of poults delivered.
- All poults dead on arrival or culled on arrival from each hatchery delivery.

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 four weeks of age and two weeks before moving to the laying phase or laying unit as follows:

- A minimum of five pairs of boot swabs to be representative of the whole area in the house to which the birds have access or
- One pair of bootswabs and one 900 square cm dust swab or
- Four hand-held 900 square cm dust swabs if less than 100 turkeys present.

Other operator voluntary monitoring can include rodent droppings, dust samples, swabs from transport vehicles etc.

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

According to the requirements of the NCP, mandatory sampling is required at least every three weeks during the laying/production period of the flock and within three weeks before the birds are moved to the slaughterhouse. Sampling can be carried out at the holding or at the hatchery.

Holding sampling:

- A minimum of five pairs of boot swabs to be representative of the whole area in the house to which the birds have access or
- One pair of bootswabs and one 900cm dust swab or
- Four hand-held 900 square cm dust swabs if less than 100 turkeys present.

Hatchery sampling:

- Visibly soiled liners from five hatcher baskets covering one square metre area or
- 900 square cm swabs from five places in hatcher or hatcher baskets or
- 10 grams broken eggshells from each of 25 hatcher baskets.

Operator voluntary monitoring can include rodent faeces and other environmental samples, dust samples, swabs taken from empty houses, transport vehicles, meconium samples etc.

Meat production flocks: Before slaughter at farm

The NCP sample must consist of a minimum of two pairs of boot swabs or one pair of bootswabs and one 900 square cm dust swab taken so as to be representative of the whole area in the house to which the birds have access. In flocks of less than 100 turkeys, where it is not possible to take boot swabs, four hand-held 900 square cm dust swabs may be used.

Other operator voluntary monitoring can include additional boot swabs, litter samples, dust samples, rodent droppings, swabs taken from empty houses, transport vehicles etc.

Case definition

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

Reports of *Salmonella* isolates under the relevant legislation are classed as positive. A flock is counted as positive once only during the year, regardless of the number of tests carried out/isolates obtained.

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

Monitoring system

Diagnostic/analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period
ISO 6579:2002/Amd1:2007 (Annex D)

Meat production flocks: Before slaughter at farm
ISO 6579:2002/Amd1:2007 (Annex D)

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.

Other preventive measures than vaccination in place

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

Codes of Good Practice in the control of Salmonella on turkey 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.

Meat production flocks

As above

Control program/mechanisms

The control program/strategies in place

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

Regulation (EC) No. 2160/2003 lays down harmonised rules for the monitoring and control of Salmonella in turkey flocks. The legislation sets out enhanced monitoring and controls for Salmonella which has been implemented by the UK National Control Programme (NCP) for turkeys. The Regulation was implemented in the UK through the Control of Salmonella in Turkey Flocks Order (England) 2009, the Control of Salmonella in Turkey Flocks (Scotland) Order 2009, the Control of Salmonella in Turkey Flocks (Wales) Order 2010 and the Control of Salmonella in Turkey Flocks Scheme Order (Northern Ireland) 2010. This legislation implements the Salmonella NCP for turkeys required by Regulation (EC) No. 2160/2003, to meet the target for reduction in Salmonella prevalence set out in EU legislation.

Regulation (EC) No. 584/2008 sets a target for the UK turkey sector to ensure that no more than 1% of breeding turkey flocks and no more than 1% of fattening turkey flocks remain positive for Salmonella of human health significance by the end of 2012. The EU target is based on the 2 most common serovars in human cases which are S. Enteritidis and S. Typhimurium.

According to the Control of Salmonella in Turkey Flocks Orders, no person may administer any antimicrobial to turkeys as a specific method to control Salmonella.

Meat production flocks

As above for breeding turkeys. The NCP applies to all operators, except where the operator produces small quantities of product provided direct to the consumer or via local retailers which only supply the final consumer or where all production is for private domestic use only.

Measures in case of the positive findings or single cases

Any breeding turkey flock found to be infected with S. Typhimurium or S. Enteritidis is compulsorily slaughtered with compensation. When S. Enteritidis or S. 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.

Following compulsory slaughter of positive flock(s), 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. Eggs from the positive flock must be removed from the hatchery and destroyed.

In fattening turkey flocks, if *S. Enteritidis* or *S. Typhimurium* is detected in an operator sample, official samples are collected by the Competent Authority from the next crop in the affected house as well as from all other flocks on the holding. If any of these samples are positive, a restriction notice is served on the holding under the Zoonoses Order, requiring supervised cleansing and disinfection and further sampling. If any of the post cleansing and disinfection samples return a positive result for *S. Enteritidis* or *S. Typhimurium*, subsequent flocks may only be moved off the site under license to the slaughterhouse and further official sampling of all flocks in the next crop is carried out.

It is the responsibility 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 possibility of cross - contamination and to minimise the risk to public health. The *Salmonella* monitoring results for all eligible turkey flocks must be included as part of the Food Chain Information documentation, accompanying each batch to the slaughterhouse (Annex II of Regulation (EC) No. 853/2004)

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

Notification system in place

All isolations of *Salmonella* must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

Approved private laboratories testing under the *Salmonella* legislation are required to provide monthly returns on tests conducted under this legislation to the Competent Authority.

Results of the investigation

A total of 36 routine annual official sampling visits were carried out to breeding turkey premises and a total of 66 routine official sampling visits were carried out to fattening turkey premises in the UK during the year to fulfill the requirements of the legislation. In addition, risk based sampling visits were carried out to all fattening turkey premises where a flock was detected positive for a regulated serovar during the year.

There were an estimated 249 breeding turkey flocks and an estimated 3078 eligible fattening turkey flocks tested according to the requirements of the UK *Salmonella* National Control Programme for Turkeys in 2010. Seven breeding flocks, originating from three separate holdings and 475 fattening turkey flocks, originating from 92 separate holdings respectively, were positive for any *Salmonella* serovar.

Breeding flocks: No breeding flocks were detected positive for *S. Enteritidis*, *S. Typhimurium*, *S. Hadar*, *S. Infantis* or *S. Virchow* during the year. Seven flocks were positive for other *Salmonella* serovars - four flocks were positive for *S. Derby*, two flocks for *S. Bovismorbificans* and one flock was positive for *S. Montevideo*. Using the number of flocks in production in the UK during 2010 as the denominator figure, the estimated prevalence of the target serovars *S. Enteritidis* and/or *S. Typhimurium* in turkey breeding flocks was 0.0% (0/249) which is well below the definitive target of 1%, to be achieved by 31st December 2012. The prevalence for all *Salmonella* serovars was 2.8% (7/249). All positive flocks were from Great

Britain - there were no positive breeding turkey flocks in Northern Ireland in 2010.

Fattening turkey flocks: Four fattening turkey flocks were detected positive for *Salmonella* Typhimurium during 2010. No fattening flocks were detected positive for *S. Enteritidis*, *S. Hadar*, *S. Infantis* or *S. Virchow*. Using the number of flocks in production in the UK during 2010 as the denominator figure, the estimated prevalence of the target serovars *S. Enteritidis* and/or *S. Typhimurium* in fattening turkey flocks 0.13% (4/3,078) which is well below the definitive target of 1%, to be achieved by 31st December 2012. The prevalence for all *Salmonella* serovars was 15.4% (475/3,078). In total, the 471 fattening flocks positive for other *Salmonella* serovars included: 330 flocks positive for *S. Derby*, 64 for *S. Kedougou*, 35 for *S. Kottbus*, 27 for *S. Newport*, two for *S. Kentucky*, one for *S. Agona*, one for *S. Indiana*, one for *S. Montevideo* and ten flocks were positive for untypable *Salmonella* strains (three with *S. 6,8:E,H:-*, two with *S. 13,23:i:-*, two with *S. O Rough:F,G:-*, two with *O Rough:E,H:1,2* and one with *O Rough:i:L,W*). There were no monophasic strains of *S. Typhimurium* (*S. 4,5,12:i:-* and *S. 4,12:i:-*) isolated from turkey flocks during 2010. Of the total 475 positive flocks, 473 of these were flocks in Great Britain and two were flocks in Northern Ireland.

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

There was no official statutory *Salmonella* Control Programme in turkeys in the UK before 2010. Monitoring for *Salmonella* in turkeys was carried out on a voluntary basis by the food business operator, especially by those operators who are members of some farm assurance schemes. For 2009 and preceding years, the *Salmonella* monitoring results for turkeys were based on the total number of incidents (and therefore are not comparable with the monitoring results derived from implementation of the *Salmonella* National Control Programme, which are flock based results). There were 73 reports of *Salmonella* in turkeys in Great Britain in 2009 (in Northern Ireland, there were no reports of isolations of *Salmonella* from turkeys in 2009). This was an increase of 28% compared to 2008, where 57 reports of *Salmonella* incidents/isolations were received. There was only one report of *S. Typhimurium* and no reports of *S. Enteritidis* during 2009. The most commonly isolated serovars were *S. Kedougou* (39.4%) and *S. Derby* (23.9%). There were 113 reported incidents of *Salmonella* in turkeys in 2007, 183 in 2006, 279 in 2005 and 243 in 2004.

During the EU baseline survey for the prevalence of *Salmonella* in commercial turkey holdings in 2006/2007 (Decision 2006/666/EC and 2007/208/EC), 0.5% of UK turkey breeding flocks and 4.6% of UK fattening turkey holdings were positive for *S. Typhimurium*. No *S. Enteritidis* was found. The reduction in reports of *Salmonella* detected in turkeys over the last few years is considered to be mainly due to the voluntary application and improvement of *Salmonella* control measures on turkey farms following the baseline survey and in preparation for the start of the turkey *Salmonella* NCP in 2010.

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

Apart from *S. Typhimurium*, the other most common serovars reported in turkeys in the UK are not commonly reported in human disease laboratory confirmed cases.

G. Salmonella in Animals Ducks - unspecified

Monitoring system

Sampling strategy

Monitoring for Salmonella in duck breeding, fattening and commercial egg laying flocks is carried out on a voluntary basis by the food business operator.

Frequency of the sampling

Animals at farm

Other: No statutory sampling carried out. Voluntary operator sampling according to food business operator's own protocol

Type of specimen taken

Animals at farm

Other: faeces samples, bootswabs, hatchery debris, cull birds, hatcher tray liners, organs at post mortem etc

Methods of sampling (description of sampling techniques)

Animals at farm

Voluntary samples usually sent by the operator to a private testing laboratory/ government testing laboratory to monitor Salmonella status of the flock or post mortem samples sent by private veterinarian for diagnostic purposes

Case definition

Animals at farm

Culture and isolation of Salmonella from samples taken from the animal/flock or associated with its environment. Reports of Salmonella isolates under the Zoonoses Order 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.

Diagnostic/analytical methods used

Animals at farm

various

Vaccination policy

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

Control program/mechanisms

The control program/strategies in place

Operators are encouraged to monitor in the same way as Gallus gallus under Regulation 2160/2003/EC, but there is no statutory national Salmonella control programme in the duck industry sector in the UK. All Salmonellae isolated must be reported to the Competent Authority under the requirements of national legislation. Advice on disease control measures is given and visits to the farm by Government officials may be made, particularly if the Salmonella is considered to be 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 ducks. Assistance is given to the public health authorities with on-farm investigations and

epidemiological studies if there is a outbreak of salmonellosis in humans associated with the farm.

An Industry Assurance Scheme, similar to those already in place for the broiler and layer chicken sector has been developed by representatives of the UK duck industry and will be published in 2011.

Measures in case of the positive findings or single cases

Advice is given on control of Salmonella and farm visits may be made by the veterinary and public health authorities. Restrictions may be placed on the premises under the Zoonoses Order.

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

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

Results of the investigation

Voluntary monitoring for Salmonella is carried out by a significant proportion of the duck industry, but because this is done on a voluntary basis, the number of submissions for Salmonella testing from UK duck flocks can vary from year to year.

Great Britain:

In total there were 81 recorded incidents of Salmonella in ducks in 2010 - a reduction of 73% compared with 2009. This is possibly due to a decrease in monitoring on commercial holdings. There were marked reductions in the frequency of most serovars, particularly the four most frequently identified in 2009: S. Indiana (78% decrease), S. Orion and variants (including S. Binza) (84% decrease), S. Hadar (92% decrease) and S. Give (80% decrease). In contrast, reports of S. Typhimurium more than doubled from eight during 2009 to 17 during 2010, two thirds of which occurred during the final quarter of the year. Ten of the reports were of DT8, four were DT30, two were U302 and one was UNTY. This increase in reports of S. Typhimurium in part reflects trace-back investigations following an outbreak of human illness due to S. Typhimurium DT8 associated with the consumption of duck eggs, and also increased monitoring and investigations within the duck industry. There was also a single incident of Salmonella 4,5,12:i:-, but no reports of S. Enteritidis, compared with one incident in 2009.

Northern Ireland:

There were two reports of Salmonella isolation from ducks during 2010 - one S. Typhimurium and one Salmonella spp. unspecified.

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

There were 301 reports of Salmonella recorded in ducks during 2009. These were all incidents recorded in Great Britain. Reports were 7% higher than in 2008 (277), which may reflect the 25% increase of S. Indiana incidents in this species. The number of reports of S. Orion increased by 22% in 2009 (61 reports, 20% of total duck reports) compared with 2008 (50 reports, 18% of total duck reports). This was probably due to the changes in reporting of S. Binza and S. Thomasville which are now reported using the Kaufmann-White scheme nomenclature. There was one incident of S. Enteritidis and 8 incidents of S. Typhimurium recorded in ducks during the year.

The number of reports of Salmonella in ducks fell by 22.4% in 2008 compared with 2007 (277 incidents in 2008; 357 in 2007). The most commonly reported serotype was 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 in 2007 (50 reports in 2008; 32 reports in 2007). The number of reports of *S. Kedougou* (24 reports) had also increased in 2008 compared with 2007 in which there were only five reported. There was a big decrease seen in the number of reports of *S. Indiana* (95 reports compared with 149 in 2007) and *S. Binza* (19 reports compared with 42 in 2007). Smaller decreases were noted in the number of reports of *S. Mbandaka* (28 reports compared with 36 in 2007) and *S. Give* (10 reports compared with 17 in 2007). There was one incident of *S. Enteritidis* in ducks (PT9b) compared with ten during 2007. There were 4 incidents of *S. Typhimurium* reported in ducks during the year. 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 (as a source of infection)

Salmonella Indiana is reported rarely in humans. *S. Typhimurium* DT8 has been associated with farmed ducks in the UK for many years, accounting for around 50% of all *S. Typhimurium* incidents in ducks.

In 2010, an outbreak of *Salmonella Typhimurium* DT 8 in humans occurred in England and Northern Ireland, with 81 recorded cases and 5 patients were hospitalised. Descriptive epidemiological investigation found a strong association with infection and consumption of duck eggs. Duck eggs contaminated with *S. Typhimurium* DT8 were collected from a patient's home and also at farms in the duck-egg supply chain. Targeted disease control measures were taken on duck premises linked to the outbreak including inspection and provision of advice on effective disease control measures, voluntary movement restrictions and enhanced cleansing and disinfection. The Food Standards Agency issued advice to consumers and caterers on the importance of good hygiene practice when cooking with and consuming duck eggs in order to reduce the risk of infection. Although duck eggs form a small part of total UK eggs sales, there has been significant growth in sales in recent years. This is the first known outbreak of salmonellosis linked to duck eggs in the UK since 1949 and highlighted the impact of a changing food source and market on the re-emergence of salmonellosis linked to duck eggs. (Noble, D.J, Lane, C., Little, C.L., Davies, R., de Pinna, E., Larkin, L., Morgan, D. (2011). Revival of an old problem: An increase of *Salmonella enterica* serovar *Typhimurium* Definitive Phage Type 8 Infections in 2010 in England and Northern Ireland linked to duck eggs. *Epidemiology and Infection* (in press))

H. Salmonella in Animals Geese - unspecified

Monitoring system

Sampling strategy

Monitoring for Salmonella in geese is carried out on a voluntary basis by the food business operator. Reports of Salmonella in geese usually arise from samples sent by a private veterinarian for diagnostic purposes. There is no official national control plan for the control of Salmonella in the geese industry sectors. Government funded scanning surveillance programmes are delivered by the Veterinary Laboratories Agency (VLA) (now the Animal Health Veterinary Laboratories Agency), the Scottish Agricultural College (SAC) and the Agri-food and Biosciences Institute (AFBI). These programmes are built upon the subsidised diagnosis and disease investigation service offered to livestock farmers through their private veterinary surgeons.

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 sent by a private veterinarian for diagnostic purposes

Case definition

Animals at farm

Culture and isolation of Salmonella from samples taken from the animal/flock or associated with its environment. Reports of Salmonella isolates under the Zoonoses Order 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.

Diagnostic/analytical methods used

Animals at farm

Various

Vaccination policy

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

Control program/mechanisms

The control program/strategies in place

Operators are encouraged to monitor in the same way as Gallus gallus under Regulation 2160/2003/EC, but there is no statutory national Salmonella control programme in the goose industry sector in the UK. All Salmonellae isolated must be reported to the Competent Authority under the requirements of national legislation. Advice on disease control measures is given and visits to the farm by Government officials may be made, particularly if the Salmonella is considered to be 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 geese. Assistance is given to the public health authorities with on-farm investigations and epidemiological studies if there is a outbreak of salmonellosis in humans associated with the farm.

Measures in case of the positive findings or single cases

Advice is given on control of Salmonella and farm visits may be made by the veterinary and public health authorities. Restrictions may be placed on the premises under the Zoonoses Order.

Notification system in place

All isolations of Salmonella must be reported to the Competent Authority and a culture supplied to the National Reference Laboratory under the Zoonoses Order 1989 in Great Britain and the Zoonoses Order (Northern Ireland) 1991 in Northern Ireland.

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

Results of the investigation

Submission of samples from geese is most likely to be for diagnostic purposes. There were four reports of Salmonella from geese in 2010, compared with two reports during 2009. Two of the reports were S. Typhimurium (DT30 and UNTY) and the other two were S. Indiana.

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes - official and industry sampling ¹⁾	1419	NRL	Flock	1419	17	0	0	0	0	0	0
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes - official and industry sampling ²⁾	131	NRL	Flock	131	2	0	0	0	0	0	1
Gallus gallus (fowl) - breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes - industry sampling ³⁾		NRL	Flock	unknown	0	0	0	0	0	0	0

	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes - official and industry sampling ¹⁾	17
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes - official and industry sampling ²⁾	1
Gallus gallus (fowl) - breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes - industry sampling ³⁾	0

Table Salmonella in breeding flocks of Gallus gallus

Comments:

- 1) Elite, Grandparent and Parent flocks
- 2) Elite, Grandparent and Parent flocks
- 3) Elite, Grandparent and Parent flocks. Total number of existing flocks and number of flocks tested not known.

Footnote:

The table records the results of the testing of breeding flocks across the broiler and layer breeder lines in fulfillment of the requirements of the Salmonella National Control Programme and monitoring of the achievement of the designated EU target for reduction of Salmonella in breeding flocks according to Regulation (EC) No. 200/2010.

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

The number of flocks in the broiler- and layer- breeder line categories that were registered and subject to at least one official test during 2010 is used as the denominator population. In total 1547 flocks were registered during the year, but not all were eligible for operator/official testing as adult flocks.

A flock is counted as positive once only during the period 1st January to 31st December 2010, regardless of the number of tests carried out/isolates obtained.

For in-rear flocks, the number of existing flocks and number of flocks tested is not known, but there is a statutory requirement under national legislation to report all isolations of Salmonella. No flocks were reported positive for any Salmonella serovar during 2010

Table Salmonella in other birds

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Other serovars
Guinea fowl	NRL	Flock	unknown	1	0	1		0
Partridges	NRL	Flock	unknown	1	0	0		1
Pheasants	NRL	Flock	unknown	10	0	4		6
Pigeons	NRL	Animal	unknown	21	0	20		1
Birds - wild	NRL	Animal	unknown	1	0	1		0

Footnote:

NRL = Salmonella National Reference Laboratory.

All figures from Great Britain are total number of incidents. An "incident" comprises the first isolation and all subsequent isolations of the same serovar or serovar and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single premise within a 30 day period. Figures recorded for Northern Ireland are total number of isolations, but in most cases would constitute an incident as per the definition as well.

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

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	Other serovars
Cattle (bovine animals) - at farm - Clinical investigations	NRL	Animal	unknown	1073	4	59	38	14	958
Other animals - unspecified	NRL	Animal	unknown	27	0	6	1	0	20
Pigs - at farm - Clinical investigations	NRL	Animal	unknown	234	0	122	51	0	61
Sheep - at farm - Clinical investigations	NRL	Animal	unknown	179	0	7	0	2	170
Solipeds, domestic - at farm - Clinical investigations	NRL	Animal	unknown	37	3	16	3	0	15

Footnote:

NRL = Salmonella National Reference Laboratory.

In the table "other animals unspecified" refers to isolates from Northern Ireland from non-defined miscellaneous animal species.

All figures from Northern Ireland for cattle, sheep, horses, pigs and other animals are total number of isolations of Salmonella. All figures from Great Britain (England, Scotland and Wales) are 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 premise within a 30 day period.

Number of units tested are not known because the laboratories do not report negative results unless as part of an official control programme or survey. Therefore for purposes of completing the table, number of units tested is recorded as the same as number of positive units

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	Other serovars	S. Hadar
Gallus gallus (fowl) - laying hens - during rearing period ¹⁾		NRL	Flock	unknown	30	1	0	0	0	29	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	4368	NRL	Flock	4368	48	6	3	2	1	34	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	4368	NRL	Flock	4368	23	1	0	0	0	22	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	4368	NRL	Flock	1566	20	2	2	2	1	12	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling ²⁾	4368	NRL	Flock	unknown	5	3	1	0	0	0	0
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling ³⁾	33611	NRL	Flock	33611	525	0	7	3	0	514	0
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes - official and industry sampling	249	NRL	Flock	249	7	0	0	0	0	7	0
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling	3078	NRL	Flock	3078	475	0	4	0	0	471	0
Ducks - at farm - Monitoring - industry sampling ⁴⁾		NRL	Flock	unknown	83	0	18	1	1	59	4
Geese - at farm - Monitoring - industry sampling ⁵⁾		NRL	Flock	unknown	4	0	2	0	0	2	0

Table Salmonella in other poultry

	S. Infantis	S. Virchow
Gallus gallus (fowl) - laying hens - during rearing period ¹⁾	0	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	2	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	0	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	1	0
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling ²⁾	1	0
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling ³⁾	0	1
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes - official and industry sampling	0	0
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling	0	0
Ducks - at farm - Monitoring - industry sampling ⁴⁾	0	0
Geese - at farm - Monitoring - industry sampling ⁵⁾	0	0

Comments:

Table Salmonella in other poultry

Comments:

- 1) Total number of existing flocks and number of flocks tested not known.
- 2) In total, 20 UK premises were visited for official suspect sampling to be carried out during the year. Total number of flocks tested unknown.
- 3) The number of existing flocks and number of flocks tested is derived from the number of Salmonella Control Programme samples submitted to private and Government veterinary laboratories for testing of all eligible broiler flocks 3 weeks prior to slaughter.
- 4) Total number of existing flocks and number of flocks tested not known
- 5) Total number of existing flocks and number of flocks tested not known

Footnote:

NRL = Salmonella National Reference Laboratory.

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

The table records the results of the testing of adult and immature laying flocks in fulfilment of the requirements of the Salmonella National Control Programme and monitoring of the achievement of the designated EU target for reduction of Salmonella in adult laying flocks according to Regulation (EC) No. 1168/2006.

The table records the results of the testing of broiler flocks before slaughter in fulfilment of the requirements of the Salmonella National Control Programme and monitoring of the achievement of the designated EU target for reduction of Salmonella in broiler flocks according to Regulation (EC) No. 646/2007. The number of existing flocks and number of flocks tested is derived from the samples submitted to private and Government veterinary laboratories to fulfil the requirements of the NCP for testing of all eligible broiler flocks 3 weeks prior to slaughter. Five flocks tested positive for both S. Kedougou and S. Ohio, three flocks tested positive for both S. Livingstone and S. Ohio and one flock tested positive for both S. Mbandaka and S. Thompson. These flocks have been recorded as positive once only in the total number of units positive.

The table records the results of the testing of adult turkey breeding and fattening flocks in fulfilment of the requirements of the Salmonella National Control Programme and monitoring of the achievement of the designated EU target for reduction of Salmonella in turkey flocks according to Regulation (EC) No. 584/2008.

Most isolates from poultry species not currently subject to a Salmonella National Control Programme are derived from voluntary industry monitoring for Salmonella. All figures for these species recorded in Great Britain are total number of incidents. An "incident" comprises the first isolation and all subsequent isolations of the same serovar or serovar and phage/ definitive type combination of a particular Salmonella from an animal, group of animals or their environment on a single premise within a 30 day period. Figures recorded for these species in Northern Ireland are total number of isolations, but in most cases would constitute an incident as per the definition as well. For voluntary industry monitoring, the number of units tested are not known because testing 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. Home produced feed materials of animal origin are subjected to official testing under the Animal Byproducts Regulations 2005. (Imported animal protein destined for feed production in Great Britain is tested under the Importation of Processed Animal Protein Order 1981 according to a risk assessment of the import. The results of imported feed testing are not reported in this report).

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. The results of testing carried out on feed materials by feed business operators under HACCP/own checks are included in the tables on *Salmonella* in other feed matter, compound feed materials and in the total *Salmonella* isolations in all feed types included in the *Salmonella* serovars table.

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

There were 262 isolations of *Salmonella* from feedingstuffs and other products associated with the Animal By-Products Regulations (ABPR) reported during January - December 2010 compared with 199 during the same period in 2009 and 232 during the same period in 2008, increases of 32% and 13% respectively. Compared with January - December 2009 there were increases in the number of reports of *S. Tennessee* (from 18 to 40), *S. Senftenberg* (from 18 to 39), *S. Agona* (from 14 to 25), *S. Anatum* (from 3 to 14) and *S. Kedougou* (from 7 to 18). There were also small increases in several other serovars including *S. Havana*, *S. Ohio* and *Salmonella* 4,5,12:i:-.

In addition, there were a large number of other serovars reported during January - December 2010 that were not reported at all during 2009, these were: *S. Alachua* (from rape), *S. subspecies arizonae* (from compound horse feed), *S. Banana* (from rape), *S. Bareilly* (from blood products intended for pet food), *S. Bovismorbificans* (from unspecified rendering plant material), *S. Braenderup* (from compost), *S. Brandenburg* (from spare ribs intended for pet food), *S. Chennai* (from soya), *S. Cotham* (from blood products intended for pet food), *S. Gaminara* (from maize), *S. Give* (from compound chicken feed and compound dog feed), *S. Goldcoast* (from unspecified rendering plant material), *S. Indiana* (from compost), *S. Isangi* (from sunflower), *S. Jerusalem* (from a mix of cereals and oil seed), *S. London* (from unspecified rendering plant material), *S. Muenchen* (from compound chicken feed), *S. Odozi* (from mill environment),

S. Oranienburg (from compound fish feed and fishmeal), S. Ordonez (from compound cattle feed and compound pig/poultry meal), S. Oslo (from blood products intended for pet food), S. Poona (from soya), S. Uppsala (from meat and bone meal), Salmonella 3,19:z27:- (from compound pig feed), Salmonella 4:12:- (from sunflower seed meal), Salmonella 4,12:b (from compound cattle feed), Salmonella 4,12:i:- (from unspecified rendering plant material), Salmonella 4,5,12:i:- (from blood products intended for pet food, a mixture of tripe and heart, and compost), Salmonella 9,46:-:- (from palm kernel), Salmonella 13,23:rough:- (from soya), Salmonella 13,23:-:rough (from compound chicken feed) and Salmonella 38:b:1,2 (from rape). Compared with January - December 2009, during January - December 2010 there were falls in the number of reports of S. Mbandaka (from 29 to 14), S. Lexington (from 5 to 1), S. Agama (from 4 to 1) and S. Kentucky (from 4 to 1). Other serovars for which the number of reports fell were S. Livingstone, S. Rissen and S. Schwarzengrund.

There were no reports of S. Enteritidis and ten reports of S. Typhimurium during January - December 2010; compared with one report and eight reports respectively during the same period in 2009. The reports of S. Typhimurium were: DT2 and DT120 from mill environment, DT8 from compound chicken feed, DT99 from soya and from compound sheep feed, DT104 from meat and bone meal, DT193 from rendering plant material, U310 from compound cat feed, and UNTY from raw tripe and from rendering plant material. The two isolates of Salmonella 4,12:i:- (DT120 and DT193, both from blood products intended for pet food) and the five isolates of Salmonella 4,5,12:i:- (single reports of DT120 from compost and blood products intended for pet food, and DT193 from a minced tripe/heart mix (1 report) and blood products intended for pet food (2 reports)) are likely to be monophasic S. Typhimurium.

There were four reports of S. Infantis (from poultry meat meal, rendering plant material, compound chicken feed and compound pig feed) during January - December 2010 and no reports of either S. Hadar or S. Virchow, the same as during January - December 2009.

Neither of the two reports of S. Paratyphi B var Java (single reports from meat and bone meal and blood products intended for pet food) were multi drug resistant (MDR) or cephalosporin-resistant strains.

There were 100 reports of Salmonella from compound animal feeds during January - December 2010 compared with 54 during the same period in 2009 (an increase of 85%); this increase is likely to be associated with a general increase in contamination of soya. Forty-nine of the reports (49%) were from compound chicken feed, 16 reports (16%) were from compound cattle feed, 13 (13%) were from compound pig feed, nine (9%) were from compound fish feed, five (5%) were from compound pig/poultry feed, three (3%) were from compound sheep feed, two (2%) were from compound cat feed, and there was a single reports (1%) from compound dog feed, compound horse feed and compound mixed poultry feed.

S. Tennessee (40 reports, 15% of total reports) was the most commonly reported serovar during January - December 2010; the second and third most commonly reported serovars were S. Senftenberg (39 reports, 15% of total reports) and S. Agona (25 reports, 10% of total reports). S. Tennessee was reported from fishmeal, rape, soya, sunflower, municipal solid waste (MSW), an oil seed/vegetable mix, mill environment, compound fish feed, compound pig feed and compound pig/poultry feed. S. Senftenberg was reported from feather meal, fishmeal, rape, soya, sunflower, sopralin (high vegetable protein concentrate premix), an oil seed/vegetable mix, blood products intended for pet feed, compound cattle feed, compound chicken feed and compound pig feed, and S. Agona was reported from maize, soya, sunflower, mill environment, herbs, compound cattle feed, compound chicken feed, compound pig feed, compound pig/poultry feed, compound sheep feed and compound mixed poultry feed.

There were 408 batches of home produced protein tested (including one private test) under ABPR during January - December 2010 of which two (0.49%) tested positive for Salmonella. This is a reduction

compared with the same period in 2009 when 18 batches (4.97%) out of 362 were positive.

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

Although Salmonellas are found in feed materials, the processes involved in animal feed production should normally eliminate them. Animal feed may become contaminated on farm if poorly stored and not kept vermin free. 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

Only four batches of imported protein were tested under IPAPO during January - December 2010 and none were positive for Salmonella; this compares to the same period in 2009 when there were 16 batches tested and one positive (6.25%).

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Other serovars	S. Infantis
Compound feedingstuffs for cattle	NRL	Batch	25g	unknown	16	0	0		16	0
Compound feedingstuffs for fish	NRL	Batch	25g	unknown	9	0	0		9	0
Compound feedingstuffs for horses	NRL	Batch	25g	unknown	1	0	0		1	0
Compound feedingstuffs for pigs	NRL	Batch	25g	unknown	13	0	0		12	1
Compound feedingstuffs for poultry (non specified)	NRL	Batch	25g	unknown	1	0	0		1	0
Compound feedingstuffs for sheep	NRL	Batch	25g	unknown	3	0	1		2	0
Compound feedingstuffs, not specified (Mixed species - pig and poultry compound feedingstuffs)	NRL	Batch	25g	unknown	5	0	0		5	0
Compound feedingstuffs, not specified (compound feedingstuffs for chickens)	NRL	Batch	25g	unknown	49	0	1		47	1
Compound feedingstuffs, not specified (compound feedstuffs for cats)	NRL	Batch	25g	unknown	2	0	1		1	0
Compound feedingstuffs, not specified (compound feedstuffs for dogs)	NRL	Batch	25g	unknown	1	0	0		1	0

Footnote:

Table contains data for Great Britain - England, Scotland and Wales only. Sampling is carried out under operator HACCP procedures/own checks according to the recommendations of the Defra Codes of Practice. Includes Salmonella isolations from imported compound feedstuffs

Number of units tested are not known. Salmonella isolates are serotyped at the Salmonella National Reference Laboratory (NRL).

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

Table Salmonella in compound feedingstuffs

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Feed material of land animal origin - blood meal - Monitoring - official sampling	NRL	Batch	25g	6	0	0	0	0
Feed material of land animal origin - feather meal - Monitoring - official sampling	NRL	Batch	25g	6	0	0	0	0
Feed material of land animal origin - greaves - Monitoring - official sampling	NRL	Batch	25g	11	0	0	0	0
Feed material of land animal origin - meat and bone meal - Monitoring - official sampling	NRL	Batch	25g	15	0	0	0	0
Feed material of land animal origin - meat meal - Monitoring - official sampling	NRL	Batch	25g	1	0	0	0	0
Feed material of land animal origin - poultry offal meal - Monitoring - official sampling	NRL	Batch	25g	7	0	0	0	0
Feed material of marine animal origin - fish meal - Monitoring - official sampling	NRL	Batch	25g	5	0	0	0	0
Feed material of marine animal origin - fish meal - Surveillance - HACCP and own checks	NRL	Batch	25g	unknown	7	0	0	7
Other feed material (Domestic and imported processed animal protein arriving for feedstuffs use) ¹⁾	NRL	Batch	25g	5321	20	0	0	20
Other feed material - Monitoring - official sampling	NRL	Batch	25g	356	2	1	0	1
Other feed material - at processing plant (Protein concentrate) ²⁾	NRL	Batch	25g	670	10	0	0	10

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Other feed material - at processing plant - domestic production (Processed animal protein at GB premises) ³⁾	NRL	Batch	25g	17863	198	0	0	198

Comments:

- 1) Tests performed under the Animal By-Products Regulations 2005 and Defra Codes of Practice
- 2) Tests performed under the Animal By-Products Regulations 2005 and Defra Codes of Practice
- 3) Tests performed under the Animal By-Products Regulations 2005 and Defra Codes of Practice

Footnote:

Salmonella isolates are sent to the National Reference Laboratory (NRL) for serotyping.

Data for Great Britain (England, Scotland and Wales): Home produced feed materials of animal origin are subjected to official testing under the Animal Byproducts Regulations 2005. The table above details the results of this official testing. In total, 407 batches were tested and 2 batches were positive for Salmonella.

The table also includes the results of samples taken from feed materials of animal origin by feed business operators as part of HACCP/own checks.

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Other serovars
Feed material of cereal grain origin - maize	NRL	Batch	25g	unknown	2	0	0	0	2
Feed material of oil seed or fruit origin - palm kernel derived	NRL	Batch	25g	unknown	1	0	0	0	1
Feed material of oil seed or fruit origin - rape seed derived	NRL	Batch	25g	unknown	12	0	0	0	12
Feed material of oil seed or fruit origin - soya (bean) derived	NRL	Batch	25g	unknown	50	0	0	0	50
Feed material of oil seed or fruit origin - sunflower seed derived	NRL	Batch	25g	unknown	12	0	0	0	12
Other feed material (miscellaneous)	NRL	Batch	25g	unknown	141	0	5	0	136

Footnote:

Isolates derived from non-official sampling are from samples taken by feed business operators as part of HACCP. 500g sample recommended but may vary (operators may take more or less).

Salmonella isolates are sent to the National Reference Laboratory (NRL) for serotyping. Number of units tested are not known.

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

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
Not typeable			0				1		0				
S. 13,23:-:-			0				0		1				
S. 13,23:i:-			0				0		0				
S. 3,19:-:-			0				0		1				
S. 4,12:d:-			0				0		1				
S. 4,12:e,h:-			0				0		1				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. 4,12:i:-			5				13		2				
S. 4,5,12:i:-			33				38		5				
S. 6,7:-:-			0				1		2				
S. 6,7:-:l,w			0				0		1				
S. 6,7:z10:-			0				0		6				
S. 6,8:e,h:-			0				0		0				
S. Africana			0				0		2				
S. Agama			6				0		1				
S. Agona			0				0		4				
S. Altona			1				0		1				
S. Anatum			13				1		4				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. Bardo			0				1		1				
S. Bareilly			0				0		0				
S. Berta			1				0		0				
S. Bovismorbificans			1				3		1				
S. Brandenburg			0				0		0				
S. Bredeney			1				2		0				
S. Choleraesuis			0				2		0				
S. Derby			0				19		5				
S. Dublin			767				0		6				
S. Durham			1				0		1				
S. Enteritidis			4				0		7				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. Gallinarum biovar Pullorum			0				0		0				
S. Give			0				2		0				
S. Give var. 15+			0				0		0				
S. Goldcoast			0				1		15				
S. Hadar			0				0		0				
S. Havana			0				0		2				
S. IIIb 61:::1,5,7			0				0		0				
S. IIIb61:k:1,5,7			0				0		0				
S. Indiana			0				0		1				
S. Infantis			2				3		3				
S. Kedougou			0				4		136				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. Kentucky			0				1		5				
S. Kottbus			4				3		5				
S. Lexington			0				0		3				
S. Litchfield			0				0		1				
S. Livingstone			0				1		83				
S. London			1				6		1				
S. Mbandaka			102				0		93				
S. Montevideo			39				0		78				
S. Nagoya			0				0		0				
S. Newport			10				2		1				
S. Niarembe			0				0		0				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. Ohio			2				0		96				
S. Orion			0				0		10				
S. Orion var. 15			0				0		0				
S. Oslo			1				0		0				
S. Ouakam			0				0		1				
S. Panama			0				1		0				
S. Paratyphi B var. Java			0				0		1				
S. Reading			1				3		1				
S. Regent			0				0		1				
S. Rissen			1				3		0				
S. Senftenberg			0				0		62				

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	1073	0	0	0	234	0	675	0	0	0	0
Number of isolates per serovar													
S. Tennessee			0				0		5				
S. Thompson			0				0		5				
S. Typhimurium			59				122		11				
S. Virchow			0				0		1				
S. enterica subsp. arizonae			0				0		0				
S. enterica subsp. diarizonae			0				0		0				
S. enterica subsp. enterica, rough			4				1		1				
Salmonella spp., unspecified			14				0		0				

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
Not typeable						0				0			0
S. 13,23:-:-						0				0			0
S. 13,23:i:-						0				0			0
S. 3,19:-:-						0				0			0
S. 4,12:d:-						0				0			0
S. 4,12:e,h:-						0				0			0
S. 4,12:i:-						0				0			0
S. 4,5,12:i:-						0				0			1
S. 6,7:-:-						0				0			0
S. 6,7:-:l,w						0				0			0
S. 6,7:z10:-						0				0			0

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
S. 6,8:e,h:-						0				0			0
S. Africana						0				0			0
S. Agama						0				0			0
S. Agona						0				0			0
S. Altona						0				0			0
S. Anatum						0				0			0
S. Bardo						0				0			0
S. Bareilly						0				0			0
S. Berta						0				0			0
S. Bovismorbificans						0				0			0
S. Brandenburg						0				0			0

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
S. Bredeney						0				0			0
S. Choleraesuis						0				0			0
S. Derby						0				0			0
S. Dublin						0				0			0
S. Durham						0				0			0
S. Enteritidis						0				0			0
S. Gallinarum biovar Pullorum						0				2			0
S. Give						0				0			5
S. Give var. 15+						0				0			1
S. Goldcoast						0				0			0
S. Hadar						0				0			4

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
S. Havana						0				0			3
S. IIIb 61:-:1,5,7						0				0			0
S. IIIb61:k:1,5,7						0				0			0
S. Indiana						0				0			26
S. Infantis						0				0			0
S. Kedougou						1				0			2
S. Kentucky						0				0			0
S. Kottbus						0				0			2
S. Lexington						0				0			0
S. Litchfield						0				0			0
S. Livingstone						0				0			0

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
S. London						0				0			0
S. Mbandaka						0				0			2
S. Montevideo						0				0			0
S. Nagoya						0				0			0
S. Newport						0				0			0
S. Niarembé						0				0			0
S. Ohio						0				0			0
S. Orion						0				1			7
S. Orion var. 15						0				3			3
S. Oslo						0				0			0
S. Ouakam						0				0			0

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
S. Panama						0				0			0
S. Paratyphi B var. Java						0				0			0
S. Reading						0				0			0
S. Regent						0				0			0
S. Rissen						0				0			0
S. Senftenberg						0				0			2
S. Tennessee						0				0			0
S. Thompson						0				0			0
S. Typhimurium						21				5			18
S. Virchow						0				0			0
S. enterica subsp. arizonae						0				0			0

Table Salmonella serovars in animals

Serovar	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	0	22	0	0	0	12	0	0	83
Number of isolates per serovar													
<i>S. enterica</i> subsp. <i>diarizonae</i>						0				0			0
<i>S. enterica</i> subsp. <i>enterica</i> , rough						0				0			0
<i>Salmonella</i> spp., unspecified						0				1			7

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
Not typeable					0				0				0
<i>S. 13,23:-:-</i>					0				0				0
<i>S. 13,23:i:-</i>					0				0				0

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. 3,19:-:-					0				0				0
S. 4,12:d:-					0				0				0
S. 4,12:e,h:-					0				0				0
S. 4,12:i:-					0				0				0
S. 4,5,12:i:-					0				1				0
S. 6,7:-:-					0				0				0
S. 6,7:-:l,w					0				0				0
S. 6,7:z10:-					0				0				0
S. 6,8:e,h:-					0				0				0
S. Africana					0				0				0
S. Agama					0				1				4

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. Agona					0				0				0
S. Altona					0				0				0
S. Anatum					0				0				1
S. Bardo					0				0				0
S. Bareilly					0				0				0
S. Berta					0				0				0
S. Bovismorbificans					0				0				0
S. Brandenburg					0				0				1
S. Bredeney					0				0				0
S. Choleraesuis					0				0				0
S. Derby					0				0				3

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. Dublin					0				6				24
S. Durham					0				0				0
S. Enteritidis					0				0				0
S. Gallinarum biovar Pullorum					0				0				0
S. Give					0				0				0
S. Give var. 15+					0				0				0
S. Goldcoast					0				0				0
S. Hadar					0				0				0
S. Havana					0				0				0
S. IIIb 61:-:1,5,7					0				0				22
S. IIIb61:k:1,5,7					0				0				78

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. Indiana					2				0				0
S. Infantis					0				0				1
S. Kedougou					0				0				0
S. Kentucky					0				1				0
S. Kottbus					0				0				0
S. Lexington					0				0				0
S. Litchfield					0				0				0
S. Livingstone					0				0				0
S. London					0				0				0
S. Mbandaka					0				0				1
S. Montevideo					0				0				23

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. Nagoya					0				0				1
S. Newport					0				0				1
S. Niarembé					0				0				0
S. Ohio					0				0				0
S. Orion					0				0				0
S. Orion var. 15					0				0				0
S. Oslo					0				0				0
S. Ouakam					0				0				0
S. Panama					0				0				0
S. Paratyphi B var. Java					0				0				0
S. Reading					0				0				0

Table Salmonella serovars in animals

Serovar	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	0	0	4	0	0	0	27	0	0	0	179
Number of isolates per serovar													
S. Regent					0				0				0
S. Rissen					0				0				0
S. Senftenberg					0				2				0
S. Tennessee					0				0				0
S. Thompson					0				0				0
S. Typhimurium					2				6				7
S. Virchow					0				0				0
S. enterica subsp. arizonae					0				0				6
S. enterica subsp. diarizonae					0				10				4
S. enterica subsp. enterica, rough					0				0				0
Salmonella spp., unspecified					0				0				2

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
Not typeable				0		0			
S. 13,23:-:-				0		0			
S. 13,23:i:-				0		2			
S. 3,19:-:-				0		0			
S. 4,12:d:-				0		0			
S. 4,12:e,h:-				0		0			
S. 4,12:i:-				1		0			
S. 4,5,12:i:-				2		0			
S. 6,7:-:-				0		0			
S. 6,7:-:l,w				0		0			
S. 6,7:z10:-				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
S. 6,8:e,h:-				0		3			
S. Africana				0		0			
S. Agama				1		0			
S. Agona				0		1			
S. Altona				0		0			
S. Anatum				1		0			
S. Bardo				0		0			
S. Bareilly				0		0			
S. Berta				1		0			
S. Bovismorbificans				0		2			
S. Brandenburg				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
S. Bredeney				0		0			
S. Choleraesuis				0		0			
S. Derby				1		334			
S. Dublin				0		0			
S. Durham				0		0			
S. Enteritidis				3		0			
S. Gallinarum biovar Pullorum				0		0			
S. Give				0		0			
S. Give var. 15+				0		0			
S. Goldcoast				0		0			
S. Hadar				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
S. Havana				0		0			
S. IIIb 61:-:1,5,7				0		0			
S. IIIb61:k:1,5,7				0		0			
S. Indiana				0		1			
S. Infantis				0		0			
S. Kedougou				0		64			
S. Kentucky				0		2			
S. Kottbus				0		35			
S. Lexington				0		0			
S. Litchfield				0		0			
S. Livingstone				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
S. London				0		0			
S. Mbandaka				0		0			
S. Montevideo				0		2			
S. Nagoya				2		0			
S. Newport				5		27			
S. Niarembe				0		0			
S. Ohio				1		0			
S. Orion				0		0			
S. Orion var. 15				0		0			
S. Oslo				3		0			
S. Ouakam				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
S. Panama				0		0			
S. Paratyphi B var. Java				0		0			
S. Reading				0		0			
S. Regent				0		0			
S. Rissen				0		0			
S. Senftenberg				0		0			
S. Tennessee				0		0			
S. Thompson				0		0			
S. Typhimurium				16		4			
S. Virchow				0		0			
S. enterica subsp. arizonae				0		0			

Table Salmonella serovars in animals

Serovar	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates serotyped	0	0	0	37	0	482	0	0	0
Number of isolates per serovar									
<i>S. enterica</i> subsp. <i>diarizonae</i>				0		0			
<i>S. enterica</i> subsp. <i>enterica</i> , rough				0		5			
<i>Salmonella</i> spp., unspecified				0		0			

Footnote:

NRL = Salmonella National Reference Laboratory.

In the table "Salmonella spp unspecified" refers to isolates where structure only was determined or where the Salmonella serovar was not specified.

In the table "Birds - wild - game birds" includes pheasants, partridges and guinea fowl. "Birds - other" refers to pigeons and wild birds.

"Other animals unspecified" refers to isolates from Northern Ireland from non-defined miscellaneous animal species.

In cattle, sheep, pigs, horses and other animals and birds, diagnoses are made from clinical diagnostic material submitted to government veterinary laboratories VLA/SAC/AFBI. All data from Great Britain (England, Scotland and Wales) are 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 or their environment on a single premises within a 30 day period. There may be more than one diagnosis in the same incident. All data from Northern Ireland for cattle, sheep, horses, pigs and other animals are based on total number of isolations of Salmonella.

Data on serovars detected in chickens (*Gallus gallus*) and turkeys are derived from Salmonella testing carried out under the requirements of the Salmonella National Control Programmes in breeding chickens, layers, broilers and turkeys. There can be multiple serovars isolated from individual positive flocks.

Because the reporting system in Great Britain is based on incidents or flocks, the number of isolates in the laboratory is not specifically recorded and therefore not included in the table.

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of cereal grain origin - maize		Feed material of marine animal origin - fish meal		Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	2	0	7	0	1	0	12	0	50	0	12
Number of isolates per serovar													
Salmonella spp., unspecified			0		0		0		1		0		0
S. 3,19:-:-			0		0		0		0		1		0
S. 4,12:-:-			0		0		0		0		0		1
S. 4,5,12:i:-			0		0		0		0		0		0
S. 6,7:-:-			0		0		0		0		0		0
S. 9,46:-:-			0		0		1		0		0		0
S. Agona			1		0		0		0		8		2
S. Alachua			0		0		0		0		0		0
S. Anatum			0		1		0		1		0		0

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of cereal grain origin - maize		Feed material of marine animal origin - fish meal		Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	2	0	7	0	1	0	12	0	50	0	12
Number of isolates per serovar													
S. Banana			0		0		0		0		0		0
S. Bareilly			0		0		0		0		0		0
S. Braenderup			0		0		0		0		0		0
S. Chennai			0		0		0		0		1		0
S. Cotham			0		0		0		0		0		0
S. Cubana			0		0		0		0		1		0
S. Derby			0		1		0		0		1		0
S. Gaminara			1		0		0		0		0		0
S. Havana			0		0		0		1		0		0
S. Indiana			0		0		0		0		0		0

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of cereal grain origin - maize		Feed material of marine animal origin - fish meal		Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	2	0	7	0	1	0	12	0	50	0	12
Number of isolates per serovar													
S. Infantis			0		0		0		0		0		0
S. Isangi			0		0		0		0		0		1
S. Jerusalem			0		0		0		0		0		0
S. Kedougou			0		0		0		0		0		0
S. Livingstone			0		0		0		0		0		0
S. Mbandaka			0		0		0		0		1		0
S. Minnesota			0		0		0		0		0		0
S. Montevideo			0		0		0		2		1		0
S. Muenster			0		0		0		0		0		0
S. Nottingham			0		0		0		0		1		0

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of cereal grain origin - maize		Feed material of marine animal origin - fish meal		Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	2	0	7	0	1	0	12	0	50	0	12
Number of isolates per serovar													
S. Odozi			0		0		0		0		0		0
S. Oranienburg			0		1		0		0		0		0
S. Oslo			0		0		0		0		0		0
S. Ouakam			0		1		0		0		0		0
S. Paratyphi B var. Java			0		0		0		0		0		0
S. Poona			0		0		0		0		1		0
S. Rissen			0		0		0		0		2		0
S. Schwarzengrund			0		0		0		0		0		0
S. Senftenberg			0		1		0		1		14		6
S. Taksony			0		0		0		0		0		1

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of cereal grain origin - maize		Feed material of marine animal origin - fish meal		Feed material of oil seed or fruit origin - palm kernel derived		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived		Feed material of oil seed or fruit origin - sunflower seed derived
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates serotyped	0	0	2	0	7	0	1	0	12	0	50	0	12
Number of isolates per serovar													
S. Tennessee			0		2		0		6		18		1
S. Typhimurium			0		0		0		0		0		0
S. Uppsala			0		0		0		0		0		0
S. enterica subsp. enterica, rough			0		0		0		0		0		0

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - sunflower seed derived	Other feed material - miscellaneous	
	Clinical	Monitoring	Clinical
Sources of isolates			
Number of isolates in the laboratory			
Number of isolates serotyped	0	141	0
Number of isolates per serovar			
Salmonella spp., unspecified		18	
S. 3,19:-:-		0	
S. 4,12:-:-		1	
S. 4,5,12:i:-		4	
S. 6,7:-:-		0	
S. 9,46:-:-		0	
S. Agona		5	
S. Alachua		1	
S. Anatum		2	
S. Banana		1	

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - sunflower seed derived	Other feed material - miscellaneous	
		Clinical	Clinical
Sources of isolates		Monitoring	Clinical
Number of isolates in the laboratory			
Number of isolates serotyped	0	141	0
Number of isolates per serovar			
S. Bareilly		1	
S. Braenderup		1	
S. Chennai		0	
S. Cotham		1	
S. Cubana		0	
S. Derby		3	
S. Gaminara		0	
S. Havana		4	
S. Indiana		1	
S. Infantis		2	

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - sunflower seed derived	Other feed material - miscellaneous	
	Clinical	Monitoring	Clinical
Sources of isolates			
Number of isolates in the laboratory			
Number of isolates serotyped	0	141	0
Number of isolates per serovar			
S. Isangi		0	
S. Jerusalem		1	
S. Kedougou		0	
S. Livingstone		1	
S. Mbandaka		54	
S. Minnesota		1	
S. Montevideo		0	
S. Muenster		2	
S. Nottingham		0	
S. Odozi		0	

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - sunflower seed derived	Other feed material - miscellaneous	
		Clinical	Clinical
Sources of isolates		Monitoring	Clinical
Number of isolates in the laboratory			
Number of isolates serotyped	0	141	0
Number of isolates per serovar			
S. Oranienburg		0	
S. Oslo		1	
S. Ouakam		0	
S. Paratyphi B var. Java		2	
S. Poona		0	
S. Rissen		0	
S. Schwarzengrund		2	
S. Senftenberg		22	
S. Taksony		0	
S. Tennessee		2	

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - sunflower seed derived	Other feed material - miscellaneous	
		Clinical	Clinical
Sources of isolates		Monitoring	Clinical
Number of isolates in the laboratory			
Number of isolates serotyped	0	141	0
Number of isolates per serovar			
S. Typhimurium		5	
S. Uppsala		1	
S. enterica subsp. enterica, rough		2	

Footnote:

Because the reporting system in Great Britain is based on incidents, the number of isolates in the laboratory is not specifically recorded and therefore not included in the table.

Table Salmonella Enteritidis phage types in animals

Phage type	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	4	0	0	0	0	0	9	0	0	0	0
Number of isolates per phage type													
PT 11			0						0				
PT 13a			2						0				
PT 14b			1						0				
PT 35			0						1				
PT 4			0						6				
PT 6a			0						1				
PT 8			1						0				
PT 9b			0						1				

Table Salmonella Enteritidis phage types in animals

Phagetype	Other poultry			Solipeds, domestic			
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates							
Number of isolates in the laboratory							
Number of isolates phagetyped	0	0	0	0	0	3	0
Number of isolates per phagetype							
PT 11						2	
PT 13a						0	
PT 14b						0	
PT 35						0	
PT 4						1	
PT 6a						0	
PT 8						0	
PT 9b						0	

Footnote:

For Salmonella Enteritidis isolates derived from the Salmonella National Control Programme sampling, there may be more than one phage type detected in a positive flock.

The reporting system in Great Britain for animal species not subject to a Salmonella National Control Programme is based on incidents and not isolations. For species subject to a control programme, the reporting system is based on flocks. Therefore, the number of isolates in the laboratory is not specifically recorded. (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 premise within a 30 day period).

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	59	0	0	0	119	0	16	0	0	0	0
Number of isolates per phagetype													
DT 1			0				0		0				
DT 104			17				7		1				
DT 104b			1				6		0				
DT 12			7				1		0				
DT 120			2				14		0				
DT 132			0				0		1				
DT 135			0				0		0				
DT 193			16				33		2				
DT 193a			2				0		0				
DT 2			0				0		1				
DT 30			0				0		1				

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	59	0	0	0	119	0	16	0	0	0	0
Number of isolates per phagetype													
DT 32			0				2		0				
DT 40			1				0		0				
DT 41			1				0		0				
DT 41b			1				0		0				
DT 56			0				0		3				
DT 8			2				0		3				
DT 80			1				0		0				
DT 85			0				0		1				
DT 99			0				0		1				
Not typeable			5				12		2				
U 288			1				38		0				

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	59	0	0	0	119	0	16	0	0	0	0
Number of isolates per phagetype													
U 302			1				3		0				
U 308			0				2		0				
U 310			1				0		0				
U 311			0				1		0				

Phagetype	Other poultry			Birds (Pigeons and wild birds)				Birds - wild - game birds				Ducks	
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	0	20	0	0	0	5	0	0	17
Number of isolates per phagetype													
DT 1						0				0			0
DT 104						0				0			0

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	0	20	0	0	0	5	0	0	17
Number of isolates per phagetype													
DT 104b						0				0			0
DT 12						0				0			0
DT 120						0				0			0
DT 132						0				0			0
DT 135						0				0			0
DT 193						2				0			0
DT 193a						0				0			0
DT 2						16				1			0
DT 30						0				0			4
DT 32						0				0			0
DT 40						0				0			0

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	0	20	0	0	0	5	0	0	17
Number of isolates per phagetype													
DT 41						0				0			0
DT 41b						0				0			0
DT 56						0				0			0
DT 8						0				3			10
DT 80						0				1			0
DT 85						0				0			0
DT 99						2				0			0
Not typeable						0				0			1
U 288						0				0			0
U 302						0				0			2
U 308						0				0			0

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry			Birds (Pigeons and wild birds)			Birds - wild - game birds				Ducks		
	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	0	20	0	0	0	5	0	0	17
Number of isolates per phagetype													
U 310						0				0			0
U 311						0				0			0

Phagetype	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	2	0	0	0	5	0	0	0	6
Number of isolates per phagetype													
DT 1					0				0				0
DT 104					0				0				2
DT 104b					0				0				0
DT 12					0				0				1

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	2	0	0	0	5	0	0	0	6
Number of isolates per phagetype													
DT 120					0				0				1
DT 132					0				0				0
DT 135					0				0				0
DT 193					0				0				2
DT 193a					0				1				0
DT 2					0				0				0
DT 30					1				2				0
DT 32					0				0				0
DT 40					0				0				0
DT 41					0				0				0
DT 41b					0				0				0

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Ducks		Geese				Other animals - unspecified				Sheep		
	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	0	0	0	2	0	0	0	5	0	0	0	6
Number of isolates per phagetype													
DT 56					0				1				0
DT 8					0				1				0
DT 80					0				0				0
DT 85					0				0				0
DT 99					0				0				0
Not typeable					1				0				0
U 288					0				0				0
U 302					0				0				0
U 308					0				0				0
U 310					0				0				0
U 311					0				0				0

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates phagetyped	0	0	0	15	0	4	0	0	0
Number of isolates per phagetype									
DT 1				1		0			
DT 104				0		1			
DT 104b				0		0			
DT 12				3		0			
DT 120				1		0			
DT 132				0		0			
DT 135				1		0			
DT 193				1		0			
DT 193a				1		0			
DT 2				1		0			
DT 30				0		0			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates phagetyped	0	0	0	15	0	4	0	0	0
Number of isolates per phagetype									
DT 32				0		0			
DT 40				0		0			
DT 41				0		0			
DT 41b				1		0			
DT 56				0		0			
DT 8				3		0			
DT 80				1		0			
DT 85				0		0			
DT 99				0		0			
Not typeable				0		3			
U 288				0		0			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Sheep	Solipeds, domestic				Turkeys			
	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates									
Number of isolates in the laboratory									
Number of isolates phagetyped	0	0	0	15	0	4	0	0	0
Number of isolates per phagetype									
U 302				0		0			
U 308				0		0			
U 310				1		0			
U 311				0		0			

Footnote:

The reporting system in Great Britain for animal species not subject to a Salmonella National Control Programme is based on incidents and not isolations. For species subject to a control programme, the reporting system is based on flocks. Therefore, the number of isolates in the laboratory is not specifically recorded. (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 premise within a 30 day period).

Table S. 1,4,[5],12:i:- phage types in Animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Monitoring	Clinical	Control program	Surveillance	Monitoring	Clinical	Control program	Surveillance	Monitoring	Clinical	Control program	Surveillance	Monitoring
Sources of isolates													
Number of isolates in the laboratory													
Number of isolates phagetyped	0	37	0	0	0	43	0	0	0	0	7	0	0
Number of isolates per phagetype													
DT 120		0				7					2		
DT 193		35				35					5		
Not typeable		1				1					0		
U 323		1											

Phagetype	Other poultry			Solipeds, domestic			
	Clinical	Control program	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates							
Number of isolates in the laboratory							
Number of isolates phagetyped	0	0	0	0	0	3	0
Number of isolates per phagetype							
DT 120						0	
DT 193						3	

Table S. 1,4,[5],12:i:- phagetypes in Animals

Phagetype	Other poultry			Solipeds, domestic			
	Clinical	Control program	Surveillance	Control program	Monitoring	Clinical	Surveillance
Sources of isolates							
Number of isolates in the laboratory							
Number of isolates phagetyped	0	0	0	0	0	3	0
Number of isolates per phagetype							
Not typeable						0	
U 323							

Footnote:

For Salmonella isolates derived from the Salmonella National Control Programme sampling, there may be more than one phage type detected in a positive flock.

The reporting system in Great Britain for animal species not subject to a Salmonella National Control Programme is based on incidents and not isolations. For species subject to a control programme, the reporting system is based on flocks. Therefore, the number of isolates in the laboratory is not specifically recorded. (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 premise within a 30 day period).

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 from cattle tested during 2010 for antimicrobial resistance were mainly selected from isolates tested under the Zoonoses Order from Great Britain and these were derived mainly 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 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

All Salmonella isolates from cattle are tested to determine their antimicrobial susceptibility at either AHVLA Weybridge or AHVLA Lasswade. Isolates in Northern Ireland are tested by AFBI.

The British Society for Antimicrobial Chemotherapy (BSAC) standardised disc diffusion method was used to test Salmonella isolates from cattle obtained under the Zoonoses Order from England and Wales, mainly using BSAC breakpoints, though where these were unavailable (for example for some veterinary antimicrobials) and in some other situations, then AHVLA breakpoints were used. In Northern Ireland CLSI is used. Antimicrobials included were: Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin (Kanamycin in Northern Ireland).

Cut-off values used in testing

Testing was performed using the BSAC standardised disc diffusion method with disc concentrations as recommended by BSAC (apart from sulphonamides where a 300µg disc was used and nalidixic acid

where there is no BSAC recommendation). For ceftazidime, cefotaxime, ciprofloxacin, gentamicin, chloramphenicol and trimethoprim/ sulphonamides BSAC breakpoints were used (zone of inhibition for resistant isolates < 29, 29, 19, 19, 20 and 15mm respectively). For other antimicrobials the AHVLA veterinary breakpoint was used (tetracyclines, ampicillin, nalidixic acid, sulphonamides, resistant < or equal to 13mm).

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 public and animal health and the serotype, phage type and characteristics of the organism involved. In Great Britain, visits are conducted by Animal Health and Veterinary Laboratories Agency staff and on farms where follow-up sampling and epidemiological investigation are carried out, control measures deemed appropriate may be put in place and relevant advice given to the farmer.

Notification system in place

All Salmonellas isolated in a veterinary or other laboratory from food-producing animals must be reported to the competent authority under the requirements of the Zoonoses Order. Isolates are sent to the NRL and serotyping and antimicrobial sensitivity testing is carried out at the NRL.

Results of the investigation

In England and Wales in 2010, 975 Salmonella isolates were tested for antimicrobial susceptibility from cattle and 81% were fully sensitive. Five *S. Enteritidis* isolates were recovered from cattle in England and Wales and these isolates were fully susceptible to the antimicrobials tested. For *S. Typhimurium* in cattle from England and Wales, 63 isolates were available for testing and 19% were fully sensitive, a decrease on the figure of 36% recorded for 2009. These fully susceptible *S. Typhimurium* isolates in cattle belonged to a range of different phage types. 52% of *S. Typhimurium* isolates were resistant to more than 4 antimicrobials. There were 20 *S. Typhimurium* DT104 or DT104B isolates tested from cattle and 19 had the typical ACSSuT pattern of penta-resistance frequently associated with DT104; a single isolate of DT104 was detected from cattle without chloramphenicol, but with ASSuT resistance. Considering all *Typhimurium* isolates, resistance to nalidixic acid was detected in 13% of *S. Typhimurium* isolates from cattle. Resistance to cefotaxime or ceftazidime was not detected in Salmonella isolates from cattle. Monophasic Salmonella, with the antigenic structure 4,5,12:i:- was detected in cattle and isolates were typically resistant to ampicillin, streptomycin, sulphonamides and tetracyclines.

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. However, in 2009 and 2010 an increase in the proportion of fully-susceptible *S. Typhimurium* isolates was noted. In previous years over much of the past decade, a proportion of *S. Typhimurium* DT104 isolates from cattle have usually shown resistance to trimethoprim/ sulphonamides; resistance to trimethoprim/ sulphonamides was not detected over the period 2007 - 2010 in *S. Typhimurium* DT104 isolates from cattle. In England and Wales in 2010, 975 Salmonella isolates were tested for antimicrobial susceptibility from cattle and 81% were fully sensitive; this can be compared to figures of 799 Salmonella isolates with 85% fully sensitive in 2009 and 625 Salmonella isolates with 82% fully sensitive in 2008. The relatively high number of susceptible isolates reflects the large numbers of

Salmonella Dublin tested. Monophasic Salmonella isolates with the ASSuT pattern of resistance are increasing in prominence in cattle in the UK; similar isolates have been noted in several European countries.

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

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

B. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

Results of the investigation

No surveys were carried out in 2010.

C. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Results of the investigation

No surveys were carried out in 2010.

D. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Results of the investigation

No surveys were carried out in 2010.

E. 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]. Almost 90% of incidents are recorded as the result of examining clinical samples.

Type of specimen taken

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

Methods of sampling (description of sampling techniques)

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 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

All Salmonella isolates from pigs in Great Britain are tested to determine their antimicrobial susceptibility at either AHVLA Weybridge or AHVLA Lasswade. Testing in Northern Ireland is carried out by AFBI.

The British Society for Antimicrobial Chemotherapy (BSAC) standardised disc diffusion method was used to test Salmonella isolates obtained under the Zoonoses Order from England and Wales, mainly using BSAC breakpoints, though where these were unavailable (for example for some veterinary antimicrobials) and in some other situations, then VLA breakpoints were used. In Northern Ireland CLSI is used. Antimicrobials included were: Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin (Kanamycin in Northern Ireland).

Cut-off values used in testing

Testing was performed using the BSAC standardised disc diffusion method with disc concentrations as recommended by BSAC (apart from sulphonamides where a 300µg disc was used and nalidixic acid where there is no BSAC recommendation). For ceftazidime, cefotaxime, ciprofloxacin, gentamicin, chloramphenicol and trimethoprim/ sulphonamides BSAC breakpoints were used (zone of inhibition for resistant isolates < 29, 29, 19, 19, 20 and 15mm respectively). For other antimicrobials the VLA veterinary breakpoint was used (tetracyclines, ampicillin, nalidixic acid, sulphonamides, resistant < 13mm).

Results of the investigation

In England and Wales in 2010, 274 Salmonella isolates were tested from pigs. 18% of these isolates were fully sensitive, an increase compared to 2009 when 8% were fully sensitive. The contribution of S. Typhimurium to the total number of Salmonella isolates tested influences the fully susceptible figure

because this serotype commonly shows antimicrobial resistance.

In 2010, the next most prevalent serotype in pigs after Typhimurium was the monophasic Salmonella 4,5,12:i:- which commonly showed resistance to ampicillin, streptomycin, sulphonamides and tetracyclines. Monophasic Salmonellas with the antigenic structure 4,5,12:i:- and an ASSuT pattern of resistance appear to be increasing in prevalence and importance in several parts of Europe.

There were no isolates of *S. Enteritidis* recovered from pigs.

Considering *S. Typhimurium* in pigs, 108 isolates were available for testing in 2010 and 3% were fully sensitive, similar to the figures observed in 2009 when 2% were fully sensitive. 70% of *S. Typhimurium* isolates showed resistance to more than 4 antimicrobials in 2010, compared to 66% in 2009. Three *S. Typhimurium* DT 104 isolates were examined from pigs and all of these were penta-resistant, with the ACSSuT pattern of resistance. Resistance to ciprofloxacin was observed in two isolates of *S. Typhimurium*; these isolates were phage type U288 and U308.

Ciprofloxacin resistance was not observed in Salmonella isolates of other serotypes from pigs in 2009 or 2010. 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. In 2009, 2% of Salmonella isolates were resistant to cefotaxime; these isolates belonged to the monophasic Salmonella serotypes 4,12:i:-, 4,5,12:i:- and to Bovismorbificans and all isolates recovered were epidemiologically linked to a single index case premises. No resistance to third generation cephalosporins was detected in Salmonella isolates from pigs in 2010.

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

It is evident that in general terms, Salmonella isolates from pigs tend to be more resistant than those from cattle or sheep. A low number of Salmonella isolates resistant to cefotaxime were detected in pigs in 2009 and these were found to possess the ESBL CTX-M-1. The isolates originated from epidemiologically-linked groups of pigs and farm visits have been performed to evaluate the situation and advise on control procedures. Further cephalosporin resistant isolates were not detected in 2010 at follow-up visits. A very low prevalence of resistance to ciprofloxacin was detected in Salmonella Typhimurium isolates from pigs. The proportion of isolates of *S. Typhimurium* which were fully-susceptible to the panel of antimicrobials tested was similar to the figure observed in 2009.

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

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

F. 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 and broilers (*Gallus gallus*) and in turkeys were selected from isolates derived from testing carried out under the National Control Programmes in accordance with the EFSA recommendations, SANCO/431/2007 and Decision 2007/407/EC.

Type of specimen taken

As per requirements of the Salmonella National Control Programmes.

Methods of sampling (description of sampling techniques)

In accordance with the Salmonella National Control Programmes.

Procedures for the selection of isolates for antimicrobial testing

One isolate from each positive flock.

Methods used for collecting data

Isolates from England, Wales, Scotland and Northern Ireland 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

Isolates from England and Wales were tested at the AHVLA National Reference Laboratory for Antimicrobial Resistance in Veterinary Bacteria. Isolates from Northern Ireland are tested by AFBI.

Salmonella isolates recovered from laying hens, broilers and turkeys under the National Control Plan in England and Wales were tested by the broth microdilution (MIC) method, in accordance with EFSA's recommendations and using EUCAST epidemiological cut-off values as described in SANCO/431/2007. In Northern Ireland CLSI was used. Antimicrobials included were: Tetracycline, Chloramphenicol, Ampicillin, Ceftazidime, Cefotaxime, Ciprofloxacin, Nalidixic acid, Trimethoprim / Sulfonamide, Sulfonamide, Streptomycin, Gentamicin (Kanamycin in Northern Ireland).

Cut-off values used in testing

Salmonella isolates recovered from laying hens, broilers and turkeys 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 Decision 2007/407/EC.

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 public and animal health and the serotype, phage type and characteristics of the organism involved. In Great Britain, visits are conducted by Animal Health and Veterinary Laboratories 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 provided to the farmer.

Results of the investigation

Considering monitoring performed under the National Control Plans for laying hens and broilers in England and Wales in 2010, 168 Salmonella isolates were tested from broilers, 115 from layers and 168 from turkeys.

In broilers, 21% of the Salmonella isolates were fully sensitive. There were no isolates of *S. Enteritidis* recovered from broilers and eligible for inclusion under the EFSA protocol and only four isolates of *S. Typhimurium*. Considering all Salmonella serotypes the most prevalent serotype was *S. Kedougou*, similar to the previous year. There were no Salmonella isolates recovered from broilers which were resistant to cefotaxime; however, 8 isolates (5%) were resistant to ciprofloxacin and these isolates belonged to the serotypes *Kedougou* (3) and *Senftenberg* (2), with single isolates of *Lexington*, *Montevideo* and a rough strain. A single isolate of monophasic Salmonella 4,5,12:i:- was tested from broilers and did not show typical ASSuT resistance, being susceptible to streptomycin and ampicillin.

In layers, 42% of the Salmonella isolates were fully sensitive. For *S. Enteritidis* 23 isolates were tested and 10 of these (43%) were fully sensitive. There were 9 isolates of *S. Typhimurium* tested from layers and of these, 2 were fully sensitive. Two of the *S. Typhimurium* isolates were resistant to more than 4 antimicrobials. No Salmonella isolates from layers were resistant to cefotaxime; six Salmonella isolates were resistant to ciprofloxacin and these belonged to serotypes *Senftenberg* (2), *Regent*, *Kedougou*, *Java* and a rough strain. Six isolates of monophasic Salmonella 4,5,12:i:- were examined from layers and these all showed the typical ASSuT pattern of resistance except one, which was SSuT.

In turkeys, 4% of isolates (n=168) were fully sensitive. There were no *S. Enteritidis* isolates recovered from this species. For *S. Typhimurium* in turkeys, three isolates were reported and two were resistant to ciprofloxacin. No resistance was detected to the third generation cephalosporin cefotaxime in Salmonella isolates from turkeys. Resistance to ciprofloxacin was detected in 16 isolates (10%), belonging to serotypes *Derby* (5), *Kedougou* (3), *Kottbus* (3), *Senftenberg* (2), *Typhimurium* (2) and *Indiana* (1). All of these isolates were also resistant to nalidixic acid, except single isolates of *Kottbus* and *Typhimurium*, suggesting that transferable fluoroquinolone resistance may have been present in these single isolates.

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

During 2010, no resistance to cefotaxime was detected in Salmonella isolates from chickens (*Gallus gallus*) or turkeys. Resistance to ciprofloxacin was detected in 2010 in Salmonella isolates from turkeys, layers and broilers, including isolates of *S. Senftenberg* from all three types of poultry. This represents a change from the situation in 2008, when ciprofloxacin resistance was not detected in Salmonella isolates from chickens.

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

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

Table Antimicrobial susceptibility testing of Salmonella in Cattle (bovine animals)

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. 4,5,12:i:-		S. Anatum		S. Dublin		S. Mbandaka		S. Montevideo	
	no		no		no		no		no		no		no		no	
	5		63		975		91		14		589		116		41	
Isolates out of a monitoring program (yes/no)																
Number of isolates available in the laboratory																
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol	5	0	63	29	975	35	91	4	14	0	589	1	116	0	41	0
Fluoroquinolones - Ciprofloxacin	5	0	63	7	975	7	91	0	14	0	589	0	116	0	41	0
Quinolones - Nalidixic acid	5	0	63	8	975	16	91	0	14	0	589	8	116	0	41	0
Sulphonamides - Sulfonamide	5	0	63	47	975	131	91	75	14	1	589	2	116	1	41	0
Aminoglycosides - Streptomycin	5	0	63	48	975	150	91	76	14	1	589	15	116	5	41	0
Aminoglycosides - Gentamicin	5	0	63	0	975	2	91	1	14	0	589	1	116	0	41	0
Trimethoprim + Sulphonamides	5	0	63	3	975	5	91	1	14	0	589	0	116	0	41	0
Penicillins - Ampicillin	5	0	63	39	975	122	91	75	14	1	589	1	116	3	41	0
Tetracyclines - Tetracycline	5	0	63	49	975	144	91	85	14	1	589	0	116	1	41	0
Fully sensitive	5	5	63	12	975	793	91	2	14	13	589	565	116	109	41	41
Cephalosporins - Cefotaxim	5	0	63	0	975	0	91	0	14	0	589	0	116	0	41	0
Cephalosporins - Ceftazidim	5	0	63	0	975	0	91	0	14	0	589	0	116	0	41	0

Footnote:

Isolates derived mostly from clinical diagnostic samples submitted by private veterinary practitioners for disease diagnosis. Disc diffusion method.

More than one isolate per reported incident is included in the analysis.

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. 4,12:i:-		S. 4,5,12:i:-		S. Derby		S. London		S. Newport	
	Isolates out of a monitoring program (yes/no)		no		no		no		no		no		no		no	
	Number of isolates available in the laboratory		108		274		17		84		13		8		11	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			108	86	274	77	17	3	84	6	13	0	8	0	11	0
Fluoroquinolones - Ciprofloxacin			108	2	274	2	17	0	84	0	13	0	8	0	11	0
Quinolones - Nalidixic acid			108	7	274	7	17	0	84	0	13	0	8	0	11	0
Sulphonamides - Sulfonamide			108	96	274	207	17	15	84	81	13	8	8	0	11	2
Aminoglycosides - Streptomycin			108	87	274	192	17	15	84	80	13	7	8	0	11	1
Aminoglycosides - Gentamicin			108	13	274	20	17	2	84	5	13	0	8	0	11	0
Trimethoprim + Sulphonamides			108	72	274	96	17	5	84	12	13	2	8	0	11	1
Penicillins - Ampicillin			108	87	274	185	17	15	84	81	13	0	8	0	11	1
Tetracyclines - Tetracycline			108	97	274	197	17	17	84	63	13	11	8	0	11	2
Fully sensitive			108	3	274	49	17	0	84	2	13	2	8	8	11	9
Cephalosporins - Cefotaxim			108	0	274	0	17	0	84	0	13	0	8	0	11	0
Cephalosporins - Ceftazidim			108	0	274	0	17	0	84	0	13	0	8	0	11	0

Footnote:

Isolates derived mostly from clinical diagnostic samples submitted by private veterinary practitioners for disease diagnosis. Disc diffusion method.

More than one isolate per reported incident may be included in the analysis

Table Antimicrobial susceptibility testing of Salmonella in Turkeys

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Derby		S. Kedougou		S. Kottbus		S. Newport		S. Senftenberg	
	Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes		yes		yes	
	Number of isolates available in the laboratory		3		168		78		37		19		9		3	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			3	1	168	13	78	4	37	3	19	3	9	2	3	0
Fluoroquinolones - Ciprofloxacin			3	2	168	16	78	5	37	3	19	3	9	0	3	2
Quinolones - Nalidixic acid			3	1	168	15	78	6	37	3	19	2	9	0	3	2
Trimethoprim			3	0	168	24	78	7	37	3	19	2	9	9	3	1
Sulphonamides - Sulfonamide			3	3	168	158	78	77	37	36	19	16	9	9	3	3
Aminoglycosides - Streptomycin			3	1	168	146	78	76	37	31	19	14	9	9	3	3
Aminoglycosides - Gentamicin			3	0	168	3	78	0	37	0	19	3	9	0	3	0
Penicillins - Ampicillin			3	1	168	30	78	8	37	3	19	5	9	9	3	1
Tetracyclines - Tetracycline			3	2	168	144	78	77	37	37	19	11	9	3	3	3
Fully sensitive			3	0	168	7	78	0	37	0	19	3	9	0	3	0
Resistant to 1 antimicrobial			3	1	168	1	78	0	37	0	19	0	9	0	3	0
Resistant to 2 antimicrobials			3	0	168	18	78	4	37	6	19	3	9	0	3	0
Resistant to 3 antimicrobials			3	0	168	99	78	59	37	26	19	5	9	0	3	1
Resistant to 4 antimicrobials			3	1	168	17	78	4	37	1	19	5	9	5	3	0
Resistant to >4 antimicrobials			3	1	168	26	78	11	37	4	19	3	9	4	3	2
Cephalosporins - Cefotaxim			3	0	168	0	78	0	37	0	19	0	9	0	3	0

Footnote:

Salmonella isolates reported according to Decision 2007/407/EC for turkeys for 2010. All isolates collected through industry and official sampling under the requirements of the the Salmonella National Control Programme for breeding and fattening turkey flocks. More than one isolate per positive flock included in the analysis.

Table Antimicrobial susceptibility testing of Salmonella in Turkey

Broth microdilution method

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - laying hens

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. 4,5,12:i:-		S. Derby		S. Kedougou		S. Mbandaka		S. Senftenberg		
	Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes		yes		yes		
	Number of isolates available in the laboratory		23		9		115		6		5		4		9		30
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	
Amphenicols - Chloramphenicol	23	1	9	2	115	11	6	0	5	0	4	1	9	0	30	3	
Fluoroquinolones - Ciprofloxacin	23	0	9	0	115	6	6	0	5	0	4	1	9	0	30	2	
Quinolones - Nalidixic acid	23	1	9	0	115	7	6	0	5	0	4	1	9	0	30	2	
Trimethoprim	23	3	9	3	115	17	6	0	5	0	4	3	9	0	30	4	
Sulphonamides - Sulfonamide	23	13	9	7	115	60	6	6	5	4	4	4	9	1	30	10	
Aminoglycosides - Streptomycin	23	11	9	6	115	50	6	6	5	2	4	3	9	1	30	6	
Aminoglycosides - Gentamicin	23	0	9	0	115	0	6	0	5	0	4	0	9	0	30	0	
Penicillins - Ampicillin	23	4	9	5	115	32	6	5	5	1	4	2	9	0	30	6	
Tetracyclines - Tetracycline	23	11	9	6	115	54	6	6	5	3	4	4	9	1	30	8	
Fully sensitive	23	10	9	2	115	48	6	0	5	0	4	0	9	8	30	17	
Resistant to 1 antimicrobial	23	1	9	0	9	1	6	0	5	3	4	0	9	0	30	5	
Resistant to 2 antimicrobials	23	2	9	1	115	6	6	0	5	0	4	0	9	0	30	1	
Resistant to 3 antimicrobials	23	5	9	1	115	18	6	1	5	1	4	2	9	1	30	2	
Resistant to 4 antimicrobials	23	2	9	3	115	16	6	5	5	1	4	0	9	0	30	1	
Cephalosporins - Cefotaxim	23	0	9	0	115	0	6	0	5	0	4	0	9	0	30	0	

Footnote:

Salmonella isolates reported according to Decision 2007/407/EC for laying hens for 2010. All isolates collected through industry and official sampling under the requirements of the the Salmonella National Control Programme for laying hens. More than one isolate per positive flock included in the analysis.

Broth microdilution method

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - laying hens

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - broilers

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Kedougou		S. Livingstone		S. Mbandaka		S. Montevideo		S. Ohio	
	Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes		yes		yes	
Number of isolates available in the laboratory		4		168		34		28		23		18		23		
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			4	0	168	11	34	0	28	0	23	2	18	3	23	0
Fluoroquinolones - Ciprofloxacin			4	0	168	8	34	3	28	0	23	0	18	1	23	0
Quinolones - Nalidixic acid			4	0	168	7	34	1	28	1	23	0	18	1	23	0
Trimethoprim			4	2	168	93	34	29	28	15	23	10	18	4	23	20
Sulphonamides - Sulfonamide			4	2	168	112	34	32	28	15	23	14	18	6	23	21
Aminoglycosides - Streptomycin			4	1	168	57	34	18	28	11	23	9	18	3	23	3
Aminoglycosides - Gentamicin			4	1	168	17	34	3	28	2	23	6	18	0	23	0
Penicillins - Ampicillin			4	1	168	20	34	2	28	4	23	2	18	3	23	1
Tetracyclines - Tetracycline			4	3	168	87	34	24	28	15	23	7	18	2	23	19
Fully sensitive			4	0	168	35	34	1	28	8	23	5	18	9	23	2
Resistant to 1 antimicrobial			4	1	168	16	34	0	28	4	23	3	18	2	23	0
Resistant to 2 antimicrobials			4	2	168	25	34	3	28	1	23	9	18	2	23	3
Resistant to 3 antimicrobials			4	0	168	51	34	18	28	8	23	0	18	4	23	14
Resistant to 4 antimicrobials			4	0	168	24	34	10	28	3	23	2	18	0	23	4
Resistant to >4 antimicrobials			4	1	168	17	34	2	28	4	23	4	18	1	23	0
Cephalosporins - Cefotaxim			4	0	168	0	34	0	28	0	23	0	18	0	23	0

Footnote:

Salmonella isolates reported according to Decision 2007/407/EC for broilers for 2010. All isolates collected through industry and official sampling under the requirements of the the Salmonella National Control Programme for broiler chickens. One isolate per positive flock selected for testing by the dilution method.

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - broilers

Table Antimicrobial susceptibility testing of *S. Anatum* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Anatum	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2	
Tetracyclines - Tetracycline	8	2	2																							
Fluoroquinolones - Ciprofloxacin	0.06	2	0			1		1																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	2																							
Aminoglycosides - Gentamicin	2	2	0											1		1										
Penicillins - Ampicillin	4	2	1															1								
Cephalosporins - Cefotaxim	0.5	2	0							1		1														
Sulphonamides - Sulfamethoxazol	256	2	2																							

S. Anatum	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline		1			1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Anatum in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Anatum Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin						1	1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol											1	1						8	1024

Table Antimicrobial susceptibility testing of *S. Enteritidis* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	23	1																			6		15		1
Tetracyclines - Tetracycline	8	23	11															6		4		2				
Fluoroquinolones - Ciprofloxacin	0.06	23	0			2		20		1																
Quinolones - Nalidixic acid	16	23	1																			20		2		
Trimethoprim	2	23	3													20										
Aminoglycosides - Streptomycin	32	23	11																	3		1		6		1
Aminoglycosides - Gentamicin	2	23	0											14		9										
Penicillins - Ampicillin	4	23	4															5		13		1				
Cephalosporins - Cefotaxim	0.5	23	0							5		17		1												
Sulphonamides - Sulfamethoxazol	256	23	13																							

S. Enteritidis	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		1																2	64	
Tetracyclines - Tetracycline		1		2	8													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Enteritidis Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid					1													4	64
Trimethoprim			3															0.5	32
Aminoglycosides - Streptomycin		1		1		3	7											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			4															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				6		4				1			12					8	1024

Table Antimicrobial susceptibility testing of *S. Litchfield* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Litchfield	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0															1								
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																							1
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Litchfield	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Litchfield* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Litchfield Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						1												8	1024

Table Antimicrobial susceptibility testing of *S. Paratyphi B* var. Java in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Paratyphi B var. Java	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0															1								
Penicillins - Ampicillin	4	1	0																			1				
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Paratyphi B var. Java	Gallus gallus (fowl) - laying hens																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline																		1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Paratyphi B var. Java in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Paratyphi B var. Java	Gallus gallus (fowl) - laying hens																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						1												8	1024

Table Antimicrobial susceptibility testing of *S. Senftenberg* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Senftenberg	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	14	4																					1		9
Tetracyclines - Tetracycline	8	14	4															2		3		1		4		
Fluoroquinolones - Ciprofloxacin	0.06	14	2					10		2						1		1								
Quinolones - Nalidixic acid	16	14	3																			5		5		1
Trimethoprim	2	14	2													11				1						
Aminoglycosides - Streptomycin	32	14	6																					6		2
Aminoglycosides - Gentamicin	2	14	2											6		4		1		1		2				
Penicillins - Ampicillin	4	14	5															1				8		1		
Cephalosporins - Cefotaxim	0.5	14	0									1		5		8										
Sulphonamides - Sulfamethoxazol	256	14	7																							

S. Senftenberg	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		3			1													2	64	
Tetracyclines - Tetracycline		1		1	2													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Senftenberg in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Senftenberg Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid				1	2													4	64
Trimethoprim			2															0.5	32
Aminoglycosides - Streptomycin				3		1	2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			4															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1		1		5				1			6					8	1024

Table Antimicrobial susceptibility testing of *S. Kedougou* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kedougou	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	4	1																					1		2
Tetracyclines - Tetracycline	8	4	4																							
Fluoroquinolones - Ciprofloxacin	0.06	4	1					3				1														
Quinolones - Nalidixic acid	16	4	1																			3				
Trimethoprim	2	4	3													1										
Aminoglycosides - Streptomycin	32	4	3																					1		
Aminoglycosides - Gentamicin	2	4	0											2		2										
Penicillins - Ampicillin	4	4	2															1		1						
Cephalosporins - Cefotaxim	0.5	4	0							1		2				1										
Sulphonamides - Sulfamethoxazol	256	4	4																							

S. Kedougou	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol				1														2	64	
Tetracyclines - Tetracycline					4													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Kedougou in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Kedougou Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					1													4	64
Trimethoprim			3															0.5	32
Aminoglycosides - Streptomycin						1	2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			2															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													4					8	1024

Table Antimicrobial susceptibility testing of *S. Ohio* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Ohio	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Ohio	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Ohio in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Ohio Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	6	0																						2		4
Tetracyclines - Tetracycline	8	6	6																								
Fluoroquinolones - Ciprofloxacin	0.06	6	0					6																			
Quinolones - Nalidixic acid	16	6	0																				3		3		
Trimethoprim	2	6	0														6										
Aminoglycosides - Streptomycin	32	6	6																								
Aminoglycosides - Gentamicin	2	6	0											1		4		1									
Penicillins - Ampicillin	4	6	5																	1							
Cephalosporins - Cefotaxim	0.5	6	0							2		3		1													
Sulphonamides - Sulfamethoxazol	256	6	6																								

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					6														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							6											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			5															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													6					8	1024

Table Antimicrobial susceptibility testing of *S. Anatum* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Anatum	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																			1				
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0													1										
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Anatum	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Anatum* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Anatum Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1														8	1024

Table Antimicrobial susceptibility testing of S. 1,3,19:-:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	1																								
Tetracyclines - Tetracycline	8	1	1																								
Fluoroquinolones - Ciprofloxacin	0.06	1	0							1																	
Quinolones - Nalidixic acid	16	1	0																					1			
Trimethoprim	2	1	1																								
Aminoglycosides - Streptomycin	32	1	1																								
Aminoglycosides - Gentamicin	2	1	0											1													
Penicillins - Ampicillin	4	1	1																					1			
Cephalosporins - Cefotaxim	0.5	1	0														1										
Sulphonamides - Sulfamethoxazol	256	1	0																								

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol		1																	2	64
Tetracyclines - Tetracycline				1															1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 1,3,19:-:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1														8	1024

Table Antimicrobial susceptibility testing of S. Derby in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Derby	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	78	4																			6		57		11
Tetracyclines - Tetracycline	8	78	77															1								
Fluoroquinolones - Ciprofloxacin	0.06	78	5	1		14		56		2				5												
Quinolones - Nalidixic acid	16	78	6																			68		4		
Trimethoprim	2	78	7													68		3								
Aminoglycosides - Streptomycin	32	78	76																					1		1
Aminoglycosides - Gentamicin	2	78	0											41		31		6								
Penicillins - Ampicillin	4	78	8															56		12		2				
Cephalosporins - Cefotaxim	0.5	78	0							7		65		5		1										
Sulphonamides - Sulfamethoxazol	256	78	77																							

S. Derby	Turkeys																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		3			1													2	64	
Tetracyclines - Tetracycline				1	76													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Derby in Turkeys - quantitative data [Dilution method]

S. Derby Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					6													4	64
Trimethoprim			7															0.5	32
Aminoglycosides - Streptomycin							76											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin		1	7															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1								1		2	74					8	1024

Table Antimicrobial susceptibility testing of *S. Montevideo* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Montevideo	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	18	3																					4		11
Tetracyclines - Tetracycline	8	18	2															2		2		11		1		
Fluoroquinolones - Ciprofloxacin	0.06	18	1			3		8		6		1														
Quinolones - Nalidixic acid	16	18	1																			7		9		1
Trimethoprim	2	18	4													12		1		1						1
Aminoglycosides - Streptomycin	32	18	3																			2		12		
Aminoglycosides - Gentamicin	2	18	0											10		7		1								
Penicillins - Ampicillin	4	18	3															4		1		10		1		1
Cephalosporins - Cefotaxim	0.5	18	0							3		2		12		1										
Sulphonamides - Sulfamethoxazol	256	18	6																							

S. Montevideo	Gallus gallus (fowl) - broilers																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol		2			1													2	64
Tetracyclines - Tetracycline					2													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Montevideo in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Montevideo Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid		1																4	64
Trimethoprim			3															0.5	32
Aminoglycosides - Streptomycin		1		1		1	1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin		1																0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		3		6		1		2					6					8	1024

Table Antimicrobial susceptibility testing of *S. Kentucky* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kentucky	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	0															1								
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	1																							
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Kentucky	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Kentucky* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Kentucky Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Ouakam* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Ouakam	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Ouakam	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Ouakam* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Ouakam Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Senftenberg* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Senftenberg	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	0																			1		2		
Tetracyclines - Tetracycline	8	3	3																							
Fluoroquinolones - Ciprofloxacin	0.06	3	2					1						2												
Quinolones - Nalidixic acid	16	3	2																			1				
Trimethoprim	2	3	1													1		1								
Aminoglycosides - Streptomycin	32	3	3																							
Aminoglycosides - Gentamicin	2	3	0											3												
Penicillins - Ampicillin	4	3	1															1		1						
Cephalosporins - Cefotaxim	0.5	3	0									2		1												
Sulphonamides - Sulfamethoxazol	256	3	3																							

S. Senftenberg	Turkey																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline		2			1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Senftenberg* in Turkeys - quantitative data [Dilution method]

S. Senftenberg Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					2													4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin				1			2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													3					8	1024

Table Antimicrobial susceptibility testing of *S. Kottbus* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kottbus	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2	
Tetracyclines - Tetracycline	8	2	0															1		1						
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	0																					1		1
Aminoglycosides - Gentamicin	2	2	0											2												
Penicillins - Ampicillin	4	2	0																	1		1				
Cephalosporins - Cefotaxim	0.5	2	0									1				1										
Sulphonamides - Sulfamethoxazol	256	2	0																							

S. Kottbus	Gallus gallus (fowl) - laying hens																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline																		1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Kottbus in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Kottbus Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						2												8	1024

Table Antimicrobial susceptibility testing of S. 6,7:-:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	0																						2		1
Tetracyclines - Tetracycline	8	3	3																								
Fluoroquinolones - Ciprofloxacin	0.06	3	0					3																			
Quinolones - Nalidixic acid	16	3	0																			2			1		
Trimethoprim	2	3	2																1								
Aminoglycosides - Streptomycin	32	3	2																			1					
Aminoglycosides - Gentamicin	2	3	0											1		1			1								
Penicillins - Ampicillin	4	3	0																2		1						
Cephalosporins - Cefotaxim	0.5	3	0									3															
Sulphonamides - Sulfamethoxazol	256	3	3																								

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					3														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 6,7:-:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			2															0.5	32
Aminoglycosides - Streptomycin							2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													3					8	1024

Table Antimicrobial susceptibility testing of *S. Senftenberg* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Senftenberg	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	30	3																			5		17		5
Tetracyclines - Tetracycline	8	30	8															11		8		3				
Fluoroquinolones - Ciprofloxacin	0.06	30	2	1		6		20		1		2														
Quinolones - Nalidixic acid	16	30	2																			20		8		
Trimethoprim	2	30	4													24		1		1						
Aminoglycosides - Streptomycin	32	30	6																			1		12		7
Aminoglycosides - Gentamicin	2	30	0											12		12		6								
Penicillins - Ampicillin	4	30	6															7		12		5		1		
Cephalosporins - Cefotaxim	0.5	30	0									7		12		11										
Sulphonamides - Sulfamethoxazol	256	30	10																							1

S. Senftenberg	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		2			1													2	64	
Tetracyclines - Tetracycline		1		2	5													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Senftenberg in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Senftenberg Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid					2													4	64
Trimethoprim			4															0.5	32
Aminoglycosides - Streptomycin		4				3	3											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			5															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		6		7		6						2	8					8	1024

Table Antimicrobial susceptibility testing of *S. Agona* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Agona	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	0																					2		1
Tetracyclines - Tetracycline	8	3	0															1		1		1				
Fluoroquinolones - Ciprofloxacin	0.06	3	0			1		2																		
Quinolones - Nalidixic acid	16	3	0																			2		1		
Trimethoprim	2	3	0													3										
Aminoglycosides - Streptomycin	32	3	0																					1		2
Aminoglycosides - Gentamicin	2	3	0											2		1										
Penicillins - Ampicillin	4	3	0															2				1				
Cephalosporins - Cefotaxim	0.5	3	0							1		1				1										
Sulphonamides - Sulfamethoxazol	256	3	0																							

S. Agona	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Agona in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Agona Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		2		1														8	1024

Table Antimicrobial susceptibility testing of *S. Dublin* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Dublin	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Dublin	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Dublin in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Dublin Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. 6,7:z10:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 6,7:z10:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	0																						3		
Tetracyclines - Tetracycline	8	3	1																		2						
Fluoroquinolones - Ciprofloxacin	0.06	3	0			3																					
Quinolones - Nalidixic acid	16	3	0																				3				
Trimethoprim	2	3	0													1		2									
Aminoglycosides - Streptomycin	32	3	0																						3		
Aminoglycosides - Gentamicin	2	3	0											3													
Penicillins - Ampicillin	4	3	0															1		2							
Cephalosporins - Cefotaxim	0.5	3	0									2		1													
Sulphonamides - Sulfamethoxazol	256	3	1																								

S. 6,7:z10:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					1														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 6,7:z10:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. 6,7:z10:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1				1					1					8	1024

Table Antimicrobial susceptibility testing of S. 6,7:-:- in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																									
	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																			
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. 6,7:-:- in Turkeys - quantitative data [Dilution method]

S. 6,7:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol												1						8	1024

Table Antimicrobial susceptibility testing of *S. Mbandaka* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Mbandaka	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	9	0																					7		2
Tetracyclines - Tetracycline	8	9	1															1		7						
Fluoroquinolones - Ciprofloxacin	0.06	9	0			6		3																		
Quinolones - Nalidixic acid	16	9	0																			7		2		
Trimethoprim	2	9	0													9										
Aminoglycosides - Streptomycin	32	9	1																					8		
Aminoglycosides - Gentamicin	2	9	0											3		6										
Penicillins - Ampicillin	4	9	0															5		3		1				
Cephalosporins - Cefotaxim	0.5	9	0							1		5		2		1										
Sulphonamides - Sulfamethoxazol	256	9	1																							

S. Mbandaka	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline		1																1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Mbandaka in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Mbandaka Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		2		5				1					1					8	1024

Table Antimicrobial susceptibility testing of *S. Reading* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Reading	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																		1					
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Reading	Gallus gallus (fowl) - broilers																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline				1														1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Reading in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Reading Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1																8	1024

Table Antimicrobial susceptibility testing of S. 6,8:e,h:- in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 6,8:e,h:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																									
	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	0																			2		1		
Tetracyclines - Tetracycline	8	3	1															2								
Fluoroquinolones - Ciprofloxacin	0.06	3	0			2		1																		
Quinolones - Nalidixic acid	16	3	0																			3				
Trimethoprim	2	3	1													2										
Aminoglycosides - Streptomycin	32	3	2																					1		
Aminoglycosides - Gentamicin	2	3	0											1		2										
Penicillins - Ampicillin	4	3	0															2				1				
Cephalosporins - Cefotaxim	0.5	3	0							1		2														
Sulphonamides - Sulfamethoxazol	256	3	2																							

S. 6,8:e,h:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																			
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. 6,8:e,h:- in Turkeys - quantitative data [Dilution method]

S. 6,8:e,h:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1	1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1											2					8	1024

Table Antimicrobial susceptibility testing of S. Mbandaka in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Mbandaka	Turkeys																										
	Isolates out of a monitoring program (yes/no)																										
	Number of isolates available in the laboratory																										
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16	
Amphenicols - Chloramphenicol	16	1	0																							1	
Tetracyclines - Tetracycline	8	1	1																								
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																					
Quinolones - Nalidixic acid	16	1	0																			1					
Trimethoprim	2	1	0													1											
Aminoglycosides - Streptomycin	32	1	1																								
Aminoglycosides - Gentamicin	2	1	0													1											
Penicillins - Ampicillin	4	1	0															1									
Cephalosporins - Cefotaxim	0.5	1	0									1															
Sulphonamides - Sulfamethoxazol	256	1	1																								

S. Mbandaka	Turkeys																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1														1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Mbandaka* in Turkeys - quantitative data [Dilution method]

S. Mbandaka Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. Kedougou in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kedougou	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	37	3																			9		20		5
Tetracyclines - Tetracycline	8	37	37																							
Fluoroquinolones - Ciprofloxacin	0.06	37	3			20		13		1				3												
Quinolones - Nalidixic acid	16	37	3																			31		3		
Trimethoprim	2	37	3													34										
Aminoglycosides - Streptomycin	32	37	31																					4		
Aminoglycosides - Gentamicin	2	37	0											24		9		1		3						
Penicillins - Ampicillin	4	37	3															24		10						
Cephalosporins - Cefotaxim	0.5	37	0							13		19		5												
Sulphonamides - Sulfamethoxazol	256	37	36																							

S. Kedougou	Turkeys																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		1		2														2	64	
Tetracyclines - Tetracycline				5	32													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Kedougou in Turkeys - quantitative data [Dilution method]

S. Kedougou Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					3													4	64
Trimethoprim			3															0.5	32
Aminoglycosides - Streptomycin		2		2		10	19											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			3															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						1				1			35					8	1024

Table Antimicrobial susceptibility testing of *S. Ohio* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Ohio	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	23	0																			1		22		
Tetracyclines - Tetracycline	8	23	19																	4						1
Fluoroquinolones - Ciprofloxacin	0.06	23	0			6		17																		
Quinolones - Nalidixic acid	16	23	0																			23				
Trimethoprim	2	23	20													3										
Aminoglycosides - Streptomycin	32	23	3																			2		11		4
Aminoglycosides - Gentamicin	2	23	0											8		13		2								
Penicillins - Ampicillin	4	23	1															17		4		1				
Cephalosporins - Cefotaxim	0.5	23	0							2		18		1		2										
Sulphonamides - Sulfamethoxazol	256	23	21																							

S. Ohio	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1	17													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Ohio in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Ohio Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			20															0.5	32
Aminoglycosides - Streptomycin		3		2			1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1		1									21					8	1024

Table Antimicrobial susceptibility testing of *S. Virchow* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Virchow	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Virchow	Gallus gallus (fowl) - broilers																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline		1																1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of *S. Virchow* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Virchow Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin				1														2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Virchow* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Virchow	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0															1								
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																						1	
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Virchow	Turkey																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Virchow* in Turkeys - quantitative data [Dilution method]

S. Virchow Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1																8	1024

Table Antimicrobial susceptibility testing of S. Montevideo in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Montevideo	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2	
Tetracyclines - Tetracycline	8	2	1															1								
Fluoroquinolones - Ciprofloxacin	0.06	2	0					1		1																
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	0													1				1						
Aminoglycosides - Streptomycin	32	2	1																					1		
Aminoglycosides - Gentamicin	2	2	0													2										
Penicillins - Ampicillin	4	2	0															2								
Cephalosporins - Cefotaxim	0.5	2	0									1		1												
Sulphonamides - Sulfamethoxazol	256	2	1																							

S. Montevideo	Turkeys																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Montevideo* in Turkeys - quantitative data [Dilution method]

S. Montevideo Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1									1					8	1024

Table Antimicrobial susceptibility testing of *S. Bovismorbificans* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Bovismorbificans	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2	
Tetracyclines - Tetracycline	8	2	1															1								
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	1																					1		
Aminoglycosides - Gentamicin	2	2	0											2												
Penicillins - Ampicillin	4	2	0															2								
Cephalosporins - Cefotaxim	0.5	2	0							1		1														
Sulphonamides - Sulfamethoxazol	256	2	1																							

S. Bovismorbificans	Turkey																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline					1													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of *S. Bovismorbificans* in Turkey - quantitative data [Dilution method]

S. Bovismorbificans Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkey																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1									1					8	1024

Table Antimicrobial susceptibility testing of *S. Bovismorbificans* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Bovismorbificans Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1		
Tetracyclines - Tetracycline	8	1	0																1								
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																			
Quinolones - Nalidixic acid	16	1	0																				1				
Trimethoprim	2	1	0														1										
Aminoglycosides - Streptomycin	32	1	0																								1
Aminoglycosides - Gentamicin	2	1	0												1												
Penicillins - Ampicillin	4	1	0																		1						
Cephalosporins - Cefotaxim	0.5	1	0							1																	
Sulphonamides - Sulfamethoxazol	256	1	1																								

S. Bovismorbificans Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline																			1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. Bovismorbificans in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Bovismorbificans Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

Salmonella spp., unspecified Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	1																								
Tetracyclines - Tetracycline	8	1	0																						1		
Fluoroquinolones - Ciprofloxacin	0.06	1	1															1									
Quinolones - Nalidixic acid	16	1	1																								
Trimethoprim	2	1	0													1											
Aminoglycosides - Streptomycin	32	1	0																						1		
Aminoglycosides - Gentamicin	2	1	0											1													
Penicillins - Ampicillin	4	1	0																		1						
Cephalosporins - Cefotaxim	0.5	1	0													1											
Sulphonamides - Sulfamethoxazol	256	1	1																								

Salmonella spp., unspecified Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest
Amphenicols - Chloramphenicol		1																2	64
Tetracyclines - Tetracycline																		1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Salmonella spp., unspecified	Gallus gallus (fowl) - broilers																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid					1													4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol										1								8	1024

Table Antimicrobial susceptibility testing of *S. Mbandaka* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Mbandaka	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	23	2																					9		12
Tetracyclines - Tetracycline	8	23	7															3		10		3				
Fluoroquinolones - Ciprofloxacin	0.06	23	0	1		3		15		4																
Quinolones - Nalidixic acid	16	23	0																			18		5		
Trimethoprim	2	23	10													12		1								
Aminoglycosides - Streptomycin	32	23	9																			1		10		3
Aminoglycosides - Gentamicin	2	23	6											6		9				2		1				2
Penicillins - Ampicillin	4	23	2															4		12		5				
Cephalosporins - Cefotaxim	0.5	23	0							1		18		4												
Sulphonamides - Sulfamethoxazol	256	23	14																							

S. Mbandaka	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		2																2	64	
Tetracyclines - Tetracycline					7													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Mbandaka* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Mbandaka Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			10															0.5	32
Aminoglycosides - Streptomycin				3		4	2											2	128
Aminoglycosides - Gentamicin		3																0.25	32
Penicillins - Ampicillin			2															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1		4		4						1	13					8	1024

Table Antimicrobial susceptibility testing of *S. Typhimurium* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	9	2																			3		1		3
Tetracyclines - Tetracycline	8	9	6																	2					1	
Fluoroquinolones - Ciprofloxacin	0.06	9	0			1		6		2																
Quinolones - Nalidixic acid	16	9	0																			5		4		
Trimethoprim	2	9	3													5		1								
Aminoglycosides - Streptomycin	32	9	6																					3		
Aminoglycosides - Gentamicin	2	9	0											8						1						
Penicillins - Ampicillin	4	9	5																	4						
Cephalosporins - Cefotaxim	0.5	9	0							4		5														
Sulphonamides - Sulfamethoxazol	256	9	7																							

S. Typhimurium	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol				1	1													2	64	
Tetracyclines - Tetracycline				1	5													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Typhimurium* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

S. Typhimurium Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			3															0.5	32
Aminoglycosides - Streptomycin						1	5											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			5															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						2							7					8	1024

Table Antimicrobial susceptibility testing of *S. Agona* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Agona	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																					1		1
Tetracyclines - Tetracycline	8	2	1																	1						
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	1																							1
Aminoglycosides - Gentamicin	2	2	0											1		1										
Penicillins - Ampicillin	4	2	1															1								
Cephalosporins - Cefotaxim	0.5	2	0									1		1												
Sulphonamides - Sulfamethoxazol	256	2	2																							

S. Agona	Turkey																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Agona* in Turkey - quantitative data [Dilution method]

S. Agona Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkey																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													2					8	1024

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1		
Tetracyclines - Tetracycline	8	1	1																								
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																			
Quinolones - Nalidixic acid	16	1	0																						1		
Trimethoprim	2	1	1																								
Aminoglycosides - Streptomycin	32	1	0																								1
Aminoglycosides - Gentamicin	2	1	0											1													
Penicillins - Ampicillin	4	1	0																		1						
Cephalosporins - Cefotaxim	0.5	1	0									1															
Sulphonamides - Sulfamethoxazol	256	1	1																								

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					1														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. 4,5,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Agama* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Agama	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	0															1								
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Agama	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Agama* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

S. Agama Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1																8	1024

Table Antimicrobial susceptibility testing of *S. Indiana* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Indiana	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																			1		1		
Tetracyclines - Tetracycline	8	2	0															1		1						
Fluoroquinolones - Ciprofloxacin	0.06	2	1					1						1												
Quinolones - Nalidixic acid	16	2	1																					1		
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	1																							1
Aminoglycosides - Gentamicin	2	2	0											1		1										
Penicillins - Ampicillin	4	2	1																		1					
Cephalosporins - Cefotaxim	0.5	2	0							1		1														
Sulphonamides - Sulfamethoxazol	256	2	2																							

S. Indiana	Turkey																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Indiana* in Turkeys - quantitative data [Dilution method]

S. Indiana Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					1													4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													2					8	1024

Table Antimicrobial susceptibility testing of *S. Bareilly* in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Bareilly	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Bareilly	Turkeys																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1														1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Bareilly in Turkeys - quantitative data [Dilution method]

S. Bareilly Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin				1														2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol								1										8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	3	1																						2	
Tetracyclines - Tetracycline	8	3	2															1								
Fluoroquinolones - Ciprofloxacin	0.06	3	2			1								1				1								
Quinolones - Nalidixic acid	16	3	1																			2				
Trimethoprim	2	3	0													2		1								
Aminoglycosides - Streptomycin	32	3	2																							
Aminoglycosides - Gentamicin	2	3	0											1		2										
Penicillins - Ampicillin	4	3	1															2								
Cephalosporins - Cefotaxim	0.5	3	0							1		1		1												
Sulphonamides - Sulfamethoxazol	256	3	3																							

S. Typhimurium	Turkeys																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol					1													2	64
Tetracyclines - Tetracycline					2													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of *S. Typhimurium* in Turkeys - quantitative data [Dilution method]

S. Typhimurium Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					1													4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin		1					2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													3					8	1024

Table Antimicrobial susceptibility testing of *S. Typhimurium* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	4	0																			1		2		1
Tetracyclines - Tetracycline	8	4	3																	1						
Fluoroquinolones - Ciprofloxacin	0.06	4	0			1		3																		
Quinolones - Nalidixic acid	16	4	0																			4				
Trimethoprim	2	4	2													2										
Aminoglycosides - Streptomycin	32	4	1																					1		2
Aminoglycosides - Gentamicin	2	4	1											2		1								1		
Penicillins - Ampicillin	4	4	1																	3						
Cephalosporins - Cefotaxim	0.5	4	0									3		1												
Sulphonamides - Sulfamethoxazol	256	4	2																							

S. Typhimurium	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					3													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Typhimurium Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			2															0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1		1							2					8	1024

Table Antimicrobial susceptibility testing of S. Orion in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Orion	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																			1				
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	1																							
Aminoglycosides - Streptomycin	32	1	0																							1
Aminoglycosides - Gentamicin	2	1	0															1								
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0													1										
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Orion	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1														1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Orion in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Orion Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Montevideo* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Montevideo	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																					1		1
Tetracyclines - Tetracycline	8	2	0															1				1				
Fluoroquinolones - Ciprofloxacin	0.06	2	0					1		1																
Quinolones - Nalidixic acid	16	2	0																			1		1		
Trimethoprim	2	2	0													2										
Aminoglycosides - Streptomycin	32	2	0																							2
Aminoglycosides - Gentamicin	2	2	0											1		1										
Penicillins - Ampicillin	4	2	0															1				1				
Cephalosporins - Cefotaxim	0.5	2	0									1		1												
Sulphonamides - Sulfamethoxazol	256	2	0																							

S. Montevideo	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Montevideo* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

S. Montevideo Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1				1												8	1024

Table Antimicrobial susceptibility testing of S. 4,12:d:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 4,12:d:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																										
	Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1		
Tetracyclines - Tetracycline	8	1	0																		1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																			
Quinolones - Nalidixic acid	16	1	0																			1					
Trimethoprim	2	1	0														1										
Aminoglycosides - Streptomycin	32	1	0																						1		
Aminoglycosides - Gentamicin	2	1	0																1								
Penicillins - Ampicillin	4	1	0																		1						
Cephalosporins - Cefotaxim	0.5	1	0									1															
Sulphonamides - Sulfamethoxazol	256	1	0																								

S. 4,12:d:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline																			1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 4,12:d:- in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. 4,12:d:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	Antimicrobials:																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1																8	1024

Table Antimicrobial susceptibility testing of *S. Regent* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Regent	Gallus gallus (fowl) - laying hens																										
	Isolates out of a monitoring program (yes/no)																										
	Number of isolates available in the laboratory																										
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16	
Amphenicols - Chloramphenicol	16	1	0																							1	
Tetracyclines - Tetracycline	8	1	1																								
Fluoroquinolones - Ciprofloxacin	0.06	1	1											1													
Quinolones - Nalidixic acid	16	1	1																								
Trimethoprim	2	1	0													1											
Aminoglycosides - Streptomycin	32	1	1																								
Aminoglycosides - Gentamicin	2	1	0											1													
Penicillins - Ampicillin	4	1	1																								
Cephalosporins - Cefotaxim	0.5	1	0									1															
Sulphonamides - Sulfamethoxazol	256	1	1																								

S. Regent	Gallus gallus (fowl) - laying hens																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																		2	64
Tetracyclines - Tetracycline					1													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Regent in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Regent Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					1													4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							1											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. 1,3,19:-:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	1																								
Tetracyclines - Tetracycline	8	1	1																								
Fluoroquinolones - Ciprofloxacin	0.06	1	1									1															
Quinolones - Nalidixic acid	16	1	1																								
Trimethoprim	2	1	1																								
Aminoglycosides - Streptomycin	32	1	1																								
Aminoglycosides - Gentamicin	2	1	0																1								
Penicillins - Ampicillin	4	1	1																								
Cephalosporins - Cefotaxim	0.5	1	0											1													
Sulphonamides - Sulfamethoxazol	256	1	1																								

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol					1														2	64
Tetracyclines - Tetracycline				1															1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 1,3,19:-:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. 1,3,19:-:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					1													4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of *S. Africana* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Africana	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Quinolones - Nalidixic acid	16	1	0																			1				
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Africana	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Africana in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Africana Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1														8	1024

Table Antimicrobial susceptibility testing of *S. Livingstone* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Livingstone	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	29	0																			6		17		6
Tetracyclines - Tetracycline	8	29	15															3		7		3		1		
Fluoroquinolones - Ciprofloxacin	0.06	29	0			11		18																		
Quinolones - Nalidixic acid	16	29	1																			24		4		
Trimethoprim	2	29	15													12		2				1				
Aminoglycosides - Streptomycin	32	29	11																					12		2
Aminoglycosides - Gentamicin	2	29	2											13		12				2		1				1
Penicillins - Ampicillin	4	29	4															10		12		3				1
Cephalosporins - Cefotaxim	0.5	29	0							4		13		11		1										
Sulphonamides - Sulfamethoxazol	256	29	15																							

S. Livingstone	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline		3		2	10													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Livingstone in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Livingstone Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid					1													4	64
Trimethoprim		1	13															0.5	32
Aminoglycosides - Streptomycin		4		4		5	2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			3															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		3		8		3						1	14					8	1024

Table Antimicrobial susceptibility testing of S. Newport in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Newport	Turkeys																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	9	2																					1		6
Tetracyclines - Tetracycline	8	9	3																	4		2				
Fluoroquinolones - Ciprofloxacin	0.06	9	0			1		7		1																
Quinolones - Nalidixic acid	16	9	0																			5		4		
Trimethoprim	2	9	9																							
Aminoglycosides - Streptomycin	32	9	9																							
Aminoglycosides - Gentamicin	2	9	0											9												
Penicillins - Ampicillin	4	9	9																							
Cephalosporins - Cefotaxim	0.5	9	0											2		7										
Sulphonamides - Sulfamethoxazol	256	9	9																							

S. Newport	Turkeys																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol		1		1														2	64
Tetracyclines - Tetracycline				1	2													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of *S. Newport* in Turkeys - quantitative data [Dilution method]

S. Newport Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			9															0.5	32
Aminoglycosides - Streptomycin						4	5											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			9															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													9					8	1024

Table Antimicrobial susceptibility testing of *S. Indiana* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Indiana	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																			1		1		
Tetracyclines - Tetracycline	8	2	2																							
Fluoroquinolones - Ciprofloxacin	0.06	2	0			1		1																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	2																					1		
Aminoglycosides - Streptomycin	32	2	1																					1		
Aminoglycosides - Gentamicin	2	2	0											1		1										
Penicillins - Ampicillin	4	2	0															1				1				
Cephalosporins - Cefotaxim	0.5	2	0							1		1														
Sulphonamides - Sulfamethoxazol	256	2	2																							

S. Indiana	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					2													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Indiana* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Indiana Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													2					8	1024

Table Antimicrobial susceptibility testing of *S. Thompson* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Thompson	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2	
Tetracyclines - Tetracycline	8	2	1																	1						
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																		
Quinolones - Nalidixic acid	16	2	0																			2				
Trimethoprim	2	2	2																							
Aminoglycosides - Streptomycin	32	2	0																			1		1		
Aminoglycosides - Gentamicin	2	2	0											2												
Penicillins - Ampicillin	4	2	0															1				1				
Cephalosporins - Cefotaxim	0.5	2	0							1				1												
Sulphonamides - Sulfamethoxazol	256	2	2																							

S. Thompson	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1														1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Thompson in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Thompson Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim			2															0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													2					8	1024

Table Antimicrobial susceptibility testing of *S. Livingstone* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Livingstone	Gallus gallus (fowl) - laying hens																										
	Isolates out of a monitoring program (yes/no)																										
	Number of isolates available in the laboratory																										
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16	
Amphenicols - Chloramphenicol	16	3	1																							2	
Tetracyclines - Tetracycline	8	3	3																								
Fluoroquinolones - Ciprofloxacin	0.06	3	0					2		1																	
Quinolones - Nalidixic acid	16	3	0																			2			1		
Trimethoprim	2	3	0													3											
Aminoglycosides - Streptomycin	32	3	2																						1		
Aminoglycosides - Gentamicin	2	3	0											3													
Penicillins - Ampicillin	4	3	0															2				1					
Cephalosporins - Cefotaxim	0.5	3	0									2				1											
Sulphonamides - Sulfamethoxazol	256	3	2																								

S. Livingstone	Gallus gallus (fowl) - laying hens																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol		1																2	64
Tetracyclines - Tetracycline				1	2													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of S. Livingstone in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Livingstone Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin							2											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1									2					8	1024

Table Antimicrobial susceptibility testing of *S. Newport* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Newport	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																					1		
Trimethoprim	2	1	1																							
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	1																							
Cephalosporins - Cefotaxim	0.5	1	0											1												
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Newport	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Newport in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Newport Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. 13,23:i:- in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 13,23:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																										
	Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2		
Tetracyclines - Tetracycline	8	2	2																								
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																			
Quinolones - Nalidixic acid	16	2	0																			2					
Trimethoprim	2	2	1													1											
Aminoglycosides - Streptomycin	32	2	1																						1		
Aminoglycosides - Gentamicin	2	2	0											2													
Penicillins - Ampicillin	4	2	1															1									
Cephalosporins - Cefotaxim	0.5	2	0									1		1													
Sulphonamides - Sulfamethoxazol	256	2	2																								

S. 13,23:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					2														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 13,23:i:- in Turkeys - quantitative data [Dilution method]

S. 13,23:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol												2						8	1024

Table Antimicrobial susceptibility testing of *S. Indiana* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Indiana	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																						1	
Trimethoprim	2	1	1																						1	
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0																							
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Indiana	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Indiana* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

S. Indiana Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin				1														2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1																8	1024

Table Antimicrobial susceptibility testing of *S. Lexington* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Lexington	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	0																			1				
Fluoroquinolones - Ciprofloxacin	0.06	1	1									1														
Quinolones - Nalidixic acid	16	1	0																					1		
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																			1				
Aminoglycosides - Gentamicin	2	1	0											1												
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Lexington	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Lexington in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

S. Lexington Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
	Quinolones - Nalidixic acid																		4
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1														8	1024

Table Antimicrobial susceptibility testing of *S. Kottbus* in Turkey - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kottbus	Turkey																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	19	3																			7		9		
Tetracyclines - Tetracycline	8	19	11															3		4					1	
Fluoroquinolones - Ciprofloxacin	0.06	19	3			12		4				2		1												
Quinolones - Nalidixic acid	16	19	2																			16		1		
Trimethoprim	2	19	2													12		5								
Aminoglycosides - Streptomycin	32	19	14																					1		1
Aminoglycosides - Gentamicin	2	19	3											9		7										1
Penicillins - Ampicillin	4	19	5															12		2						
Cephalosporins - Cefotaxim	0.5	19	0							11		6		2												
Sulphonamides - Sulfamethoxazol	256	19	16																							

S. Kottbus	Turkey																		
	Isolates out of a monitoring program (yes/no)																		
	Number of isolates available in the laboratory																		
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol		2			1													2	64
Tetracyclines - Tetracycline		1			10													1	64
Fluoroquinolones - Ciprofloxacin																		0.015	8

Table Antimicrobial susceptibility testing of *S. Kottbus* in Turkeys - quantitative data [Dilution method]

S. Kottbus Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid					2													4	64
Trimethoprim			2															0.5	32
Aminoglycosides - Streptomycin		3		4		2	8											2	128
Aminoglycosides - Gentamicin		1	1															0.25	32
Penicillins - Ampicillin		1	4															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol		1		1		1						1	15					8	1024

Table Antimicrobial susceptibility testing of *S. Kedougou* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Kedougou	Gallus gallus (fowl) - broilers																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	34	0																					16		18
Tetracyclines - Tetracycline	8	34	24																	8		1		1		
Fluoroquinolones - Ciprofloxacin	0.06	34	3			2		28		1		1		1		1										
Quinolones - Nalidixic acid	16	34	1																			30		1		2
Trimethoprim	2	34	29													4		1								
Aminoglycosides - Streptomycin	32	34	18																			3		10		1
Aminoglycosides - Gentamicin	2	34	3											24		7						2		1		
Penicillins - Ampicillin	4	34	2															13		17		2				
Cephalosporins - Cefotaxim	0.5	34	0							10		18		5		1										
Sulphonamides - Sulfamethoxazol	256	34	32																							

S. Kedougou	Gallus gallus (fowl) - broilers																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1	23													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of *S. Kedougou* in *Gallus gallus* (fowl) - broilers - quantitative data [Dilution method]

S. Kedougou Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Gallus gallus (fowl) - broilers																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid					1													4	64
Trimethoprim			29															0.5	32
Aminoglycosides - Streptomycin		2		2		11	5											2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			2															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol						1		1					32					8	1024

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Turkeys - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

Salmonella spp., unspecified Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																										
	Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						2		
Tetracyclines - Tetracycline	8	2	2																								
Fluoroquinolones - Ciprofloxacin	0.06	2	0			1		1																			
Quinolones - Nalidixic acid	16	2	0																				2				
Trimethoprim	2	2	0													2											
Aminoglycosides - Streptomycin	32	2	1																								1
Aminoglycosides - Gentamicin	2	2	0											2													
Penicillins - Ampicillin	4	2	0															1		1							
Cephalosporins - Cefotaxim	0.5	2	0							1		1															
Sulphonamides - Sulfamethoxazol	256	2	2																								

Salmonella spp., unspecified Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Turkeys																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					2														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Turkeys - quantitative data [Dilution method]

Salmonella spp., unspecified Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory Antimicrobials:	Turkeys																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													2					8	1024

Table Antimicrobial susceptibility testing of *S. Thompson* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Thompson	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																						1	
Tetracyclines - Tetracycline	8	1	1																							
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																				1			
Trimethoprim	2	1	1																							
Aminoglycosides - Streptomycin	32	1	1																							
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	1																							
Cephalosporins - Cefotaxim	0.5	1	0									1														
Sulphonamides - Sulfamethoxazol	256	1	1																							

S. Thompson	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
																				Number of isolates available in the laboratory
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline					1													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Thompson in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Thompson Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Quinolones - Nalidixic acid																		4	64
Trimethoprim			1															0.5	32
Aminoglycosides - Streptomycin						1												2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin			1															0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol													1					8	1024

Table Antimicrobial susceptibility testing of S. London in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. London	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	<=0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																							1
Tetracyclines - Tetracycline	8	1	0																			1				
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																					1		
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																							1
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0																	1						
Cephalosporins - Cefotaxim	0.5	1	0											1												
Sulphonamides - Sulfamethoxazol	256	1	0																							1

S. London	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. London in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. London Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol																		8	1024

Table Antimicrobial susceptibility testing of S. 4,12:i:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. 4,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																										
	Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	2	0																						1		1
Tetracyclines - Tetracycline	8	2	2																								
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																			
Quinolones - Nalidixic acid	16	2	0																				2				
Trimethoprim	2	2	0														2										
Aminoglycosides - Streptomycin	32	2	2																								
Aminoglycosides - Gentamicin	2	2	0											1		1											
Penicillins - Ampicillin	4	2	2																								
Cephalosporins - Cefotaxim	0.5	2	0									2															
Sulphonamides - Sulfamethoxazol	256	2	2																								

S. 4,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Amphenicols - Chloramphenicol																			2	64
Tetracyclines - Tetracycline					2														1	64
Fluoroquinolones - Ciprofloxacin																			0.015	8

Table Antimicrobial susceptibility testing of S. 4,12:i:- in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. 4,12:i:- Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Quinolones - Nalidixic acid																		4	64	
Trimethoprim																		0.5	32	
Aminoglycosides - Streptomycin							2											2	128	
Aminoglycosides - Gentamicin																		0.25	32	
Penicillins - Ampicillin			2															0.5	32	
Cephalosporins - Cefotaxim																		0.06	4	
Sulphonamides - Sulfamethoxazol													2					8	1024	

Table Antimicrobial susceptibility testing of S. Derby in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Derby	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	5	0																					3		2
Tetracyclines - Tetracycline	8	5	3																	2						
Fluoroquinolones - Ciprofloxacin	0.06	5	0					5																		
Quinolones - Nalidixic acid	16	5	0																			5				
Trimethoprim	2	5	0													4		1								
Aminoglycosides - Streptomycin	32	5	2																					3		
Aminoglycosides - Gentamicin	2	5	0											2		3										
Penicillins - Ampicillin	4	5	1															1		3						
Cephalosporins - Cefotaxim	0.5	5	0									2				3										
Sulphonamides - Sulfamethoxazol	256	5	4																							

S. Derby	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline				1	2													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Derby in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Derby Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Antimicrobials:																				
Quinolones - Nalidixic acid																			4	64
Trimethoprim																			0.5	32
Aminoglycosides - Streptomycin						1	1												2	128
Aminoglycosides - Gentamicin																			0.25	32
Penicillins - Ampicillin			1																0.5	32
Cephalosporins - Cefotaxim																			0.06	4
Sulphonamides - Sulfamethoxazol						1							4						8	1024

Table Antimicrobial susceptibility testing of *S. Durham* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Durham	Gallus gallus (fowl) - laying hens																										
	Isolates out of a monitoring program (yes/no)																										
	Number of isolates available in the laboratory																										
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16	
Amphenicols - Chloramphenicol	16	2	1																							1	
Tetracyclines - Tetracycline	8	2	2																								
Fluoroquinolones - Ciprofloxacin	0.06	2	0					2																			
Quinolones - Nalidixic acid	16	2	0																			2					
Trimethoprim	2	2	0													2											
Aminoglycosides - Streptomycin	32	2	2																								
Aminoglycosides - Gentamicin	2	2	0											2													
Penicillins - Ampicillin	4	2	2																								
Cephalosporins - Cefotaxim	0.5	2	0									2															
Sulphonamides - Sulfamethoxazol	256	2	2																								

S. Durham	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol		1																2	64	
Tetracyclines - Tetracycline					2													1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Durham in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Durham Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																			
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Quinolones - Nalidixic acid																		4	64	
Trimethoprim																		0.5	32	
Aminoglycosides - Streptomycin							2											2	128	
Aminoglycosides - Gentamicin																		0.25	32	
Penicillins - Ampicillin			2															0.5	32	
Cephalosporins - Cefotaxim																		0.06	4	
Sulphonamides - Sulfamethoxazol													2					8	1024	

Table Antimicrobial susceptibility testing of *S. Bardo* in *Gallus gallus* (fowl) - laying hens - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Bardo	Gallus gallus (fowl) - laying hens																									
	Isolates out of a monitoring program (yes/no)																									
	Number of isolates available in the laboratory																									
Antimicrobials:	Cut-off value	N	n	≤0.008	>0.008	0.015	>0.016	0.03	>0.03	0.06	>0.06	0.12	>0.12	0.25	>0.25	0.5	>0.5	1	>1	2	>2	4	>4	8	>8	16
Amphenicols - Chloramphenicol	16	1	0																					1		
Tetracyclines - Tetracycline	8	1	0																	1						
Fluoroquinolones - Ciprofloxacin	0.06	1	0					1																		
Quinolones - Nalidixic acid	16	1	0																					1		
Trimethoprim	2	1	0													1										
Aminoglycosides - Streptomycin	32	1	0																					1		
Aminoglycosides - Gentamicin	2	1	0													1										
Penicillins - Ampicillin	4	1	0															1								
Cephalosporins - Cefotaxim	0.5	1	0							1																
Sulphonamides - Sulfamethoxazol	256	1	0																							

S. Bardo	Gallus gallus (fowl) - laying hens																			
	Isolates out of a monitoring program (yes/no)																			
	Number of isolates available in the laboratory																			
Antimicrobials:	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest	
Amphenicols - Chloramphenicol																		2	64	
Tetracyclines - Tetracycline																		1	64	
Fluoroquinolones - Ciprofloxacin																		0.015	8	

Table Antimicrobial susceptibility testing of S. Bardo in Gallus gallus (fowl) - laying hens - quantitative data [Dilution method]

S. Bardo Isolates out of a monitoring program (yes/no) Number of isolates available in the laboratory	Gallus gallus (fowl) - laying hens																		
	>16	32	>32	64	>64	128	>128	256	>256	512	>512	1024	>1024	2048	>2048	4096	>4096	lowest	highest
Antimicrobials:																			
Quinolones - Nalidixic acid																		4	64
Trimethoprim																		0.5	32
Aminoglycosides - Streptomycin																		2	128
Aminoglycosides - Gentamicin																		0.25	32
Penicillins - Ampicillin																		0.5	32
Cephalosporins - Cefotaxim																		0.06	4
Sulphonamides - Sulfamethoxazol				1														8	1024

Table Cut-off values for antibiotic resistance testing of Salmonella in Animals

Test Method Used
Disc diffusion Broth dilution

Standard methods used for testing
EFSA recommendations BSAC/VLA

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol	EFSA/BSAC	16	20
Tetracyclines	Tetracycline	EFSA/VLA	8	13
Fluoroquinolones	Ciprofloxacin	EFSA/BSAC	0.06	19
Quinolones	Nalidixic acid	EFSA/VLA	16	13
Trimethoprim	Trimethoprim	EFSA	2	
Sulphonamides	Sulfonamide	EFSA/VLA	256	13
Aminoglycosides	Streptomycin	EFSA/VLA	32	13
	Gentamicin	EFSA/BSAC	2	19
	Neomycin	VLA		13
Trimethoprim + Sulphonamides	Trimethoprim + Sulphonamides	BSAC		15
Cephalosporins	Cefotaxim	EFSA/BSAC	0.5	29
	Ceftazidim	BSAC		29
Penicillins	Ampicillin	EFSA/VLA	4	13

Table Cut-off values for antibiotic resistance testing of Salmonella in Animals

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

Campylobacter is the most commonly isolated bacterial gastrointestinal pathogen in the UK. In 2000 there were 65,165 reports of cases in the UK (including cases acquired in the UK and abroad) which steadily decreased to 49,508 in 2004. Since 2004 the UK has recorded an almost year on year increase in Campylobacter cases, with 65,114 cases reported in 2009.

However, the number of cases identified through laboratory reports is known to be an underestimate of the actual number of cases that occur in the community. A large study of infectious intestinal disease (IID) carried out in England in the mid-1990s found that only 1 in 136 cases of IID were picked up through the laboratory reporting system (Wheeler, J.G. et al (1999). Study of infectious intestinal disease in England: rates in the community, presenting to general practice, and reported to national surveillance. The Infectious Intestinal Disease Study Executive, *BMJ*. 318:1046-50). A second study to identify any changes since then is expected to be published in 2011.

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), Campylobacter fetus most commonly diagnosed. Ruminant abortion material is not considered a major source for human infection.

A three-year (2007 - 2009) UK national survey, aimed at determining the prevalence, within batch prevalence and load of Campylobacter in broiler flocks at slaughter, showed that Campylobacter contaminated broiler batches commonly enter the slaughterhouses introducing high levels of Campylobacter into the food chain. The overall Campylobacter prevalence for the three-year survey was 79.2%. The prevalence decreased year on year with 82.1%, 78.3% and 77.5% in 2007, 2008 and 2009, respectively. Prevalence was lowest in February (68.3%) and highest in August (97.1%). *C. jejuni* was the most common species (74.8%) followed by *C. coli* (25.1%) and one batch was contaminated with *C. lari* (0.1%). In total, 8923 Campylobacter isolates were recovered from caecal samples over the three-year survey.

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

Food:

No national surveys were carried out in 2010. Despite the high number of laboratory reports of Campylobacter in the UK, foodborne outbreaks of infection remain relatively rare. An increasing trend in outbreaks linked to poultry liver parfait or pâté consumption has however been reported for both 2009 and 2010.

Animals:

No surveys were carried out in 2010. Clinical diagnostic samples from animals in the UK, submitted to the

Veterinary Laboratories Agency (now the Animal Health Veterinary Laboratories Agency), the Scottish Agricultural College and the Agri-food and Biosciences Institute in 2010, were predominantly *Campylobacter* foetopathy cases. The total units tested are not known because the laboratories do not report negative results, unless part of an official control programme or survey.

In Great Britain, a total of 273 *Campylobacter* isolates (mainly from ruminant abortion cases) were identified by the VLA during 2010 and subject to further examination/typing: 202 were from sheep, 60 bovine, 8 avian, 1 red deer, 1 equine and 1 kangaroo. One hundred and fifty three (76%) of the ovine isolates were *C. fetus fetus*, compared to 63% in 2009, with the remaining 49 (24%) a mixture of enteric strains (37% in 2009). Of the 34 (57%) venereal bovine isolates, 27 (45%) were *C. fetus venerealis intermedius* compared to 33% in 2009, 5 (8%) were *C. fetus fetus* (15% in 2009) and 2 (3%) *C. fetus venerealis* (9% in 2009). The remaining 26 (43%) (same % as in 2009) were a mixture of enteric (thermophilic) strains. Isolates from avian species comprised 5 (63%) *C. jejuni* and 3 (37%) *C. coli*. Isolates from miscellaneous species were all *C. jejuni*. In Northern Ireland, a total of 53 *Campylobacter* isolates were recorded in 2010 - 15 were *C. jejuni*, 2 were *C. coli*, 2 were *C. lari* and 34 were recorded as unspecified *Campylobacter* species.

Analysis of all incidents of foetopathy in sheep and goats in Great Britain during the year indicated *Campylobacter* spp. (both thermophilic and non-thermophilic) accounted for 21.3% (of a total 959 investigated incidents) of all diagnoses of foetopathy in 2010. This is a greater proportion than seen in 2009, where *Campylobacter* accounted for 12.6% (out of a total 904 investigated incidents) of all diagnoses of foetopathy investigated during the year.

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

Human campylobacteriosis due to thermophilic *Campylobacter* is a major cause of food poisoning, although non-thermophilic strains (such as *C. fetus*) can also (rarely) cause severe zoonotic illness. 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 studies using Multi-locus Sequence Typing (MLST) have supported this view, identifying poultry meat as an important source of *Campylobacter* infections in humans.

(<http://cid.oxfordjournals.org/content/48/8/1072.full.pdf+html> – Sheppard et al., 2009;

<http://www.plosgenetics.org/article/fetchArticle.action?articleURI=info:doi/10.1371/journal.pgen.1000203>)

Recent actions taken to control the zoonoses

The Food Standards Agency's Foodborne Disease Strategy 2010-2015 has the desired outcome that "food produced or sold in the UK is safe to eat". Tackling *Campylobacter* in UK-produced chicken is the main priority of the strategy. A *Campylobacter* Risk Management Programme has been developed, encompassing a range of projects targeted at different points across the food chain, from farm to fork. The Programme aims to reduce *Campylobacter* to a specified target: a reduction in the percentage of chickens that have the highest level of contamination (ie those with more than 1000cfu per gram) from a baseline of 27% to a target of 10% by April 2015. A joint cross-government and industry stakeholder working group has been set up to work towards achieving this target. The reduction is planned to be achieved through stakeholder engagement and partnership working to set in place interventions at primary production, slaughterhouse/processing, retail and at the consumer level.

This work is being supported by a joint *Campylobacter* research strategy to feed in to the evidence-based approach to the Programme. The research programme will also build on consumers' acceptability of

interventions, including issues relating to cost, which will inform decisions on what is appropriate for the UK consumer and how best to communicate the *Campylobacter* control programme to the public. The findings of the first wave of research, Citizens' Forums on *Campylobacter*, were published in 2010 (<http://www.food.gov.uk/science/socsci/ssres/foodsafetyss/citforumcampy>).

Additional information

Surveillance system:

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

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

2.2.2 Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Reporting system in place for the human cases

Ascertainment of cases is via mandatory notification of food poisoning and reporting of isolation 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. rose to a peak in the late 1990s, followed by a general downward trend until around 2004. Since then, there has been a year on year increase in laboratory confirmed reports of campylobacteriosis in the UK. *Campylobacter* is the most commonly isolated bacterial gastrointestinal pathogen in the UK. A proportion of *Campylobacter* isolates are speciated and indicate that *Campylobacter jejuni* accounts for the majority, followed by *Campylobacter coli*.

Relevance as zoonotic disease

Campylobacter remains the most commonly isolated bacterial gastrointestinal pathogen in the UK. 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

Results of the investigation

No surveys were carried out in 2010

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Results of the investigation

No surveys were carried out in 2010

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified	C. fetus	C. hyointestinalis
Birds - at farm - Clinical investigations (Unspecified species)	VLA/AFBI	Animal	unknown	9	3	5	1	0	0	0	0
Cattle (bovine animals) - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	64	0	10	0	0	0	34	9
Dogs - pet animals - Clinical investigations	VLA/AFBI	Animal	unknown	3	0	2	0	0	0	0	0
Other animals - unspecified - Clinical investigations ¹⁾	VLA/AFBI	Animal	unknown	3	0	3	0	0	0	0	0
Pigs - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	15	2	0	0	0	0	0	0
Sheep - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	232	17	33	1	0	0	153	1

	C. mucosalis	C. sputorum	Campylobacter spp., unspecified
Birds - at farm - Clinical investigations (Unspecified species)	0	0	0
Cattle (bovine animals) - at farm - Clinical investigations	1	10	0
Dogs - pet animals - Clinical investigations	0	0	1
Other animals - unspecified - Clinical investigations ¹⁾	0	0	0
Pigs - at farm - Clinical investigations	0	0	13
Sheep - at farm - Clinical investigations	2	5	20

Table Campylobacter in animals

Comments:

¹⁾ Red deer (1), equine (1), kangaroo (1)

Footnote:

VLA = Veterinary Laboratories Agency in Great Britain. AFBI = Agri-food and Biosciences Institute in Northern Ireland.

The Scottish Agricultural College (SAC) supplies data on recorded incidents in Scotland to the VLA for inclusion in the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Diagnoses made from clinical diagnostic material submitted to government veterinary laboratories VLA/SAC/AFBI. The total units tested are not known because the laboratory does not report negative results, unless part of an official control programme or survey. The numbers recorded are numbers of incidents. There may be more than one diagnosis in the same incident.

2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Sampling strategy used in monitoring

Methods used for collecting data

Results of the investigation

No surveys were carried out in 2010.

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

Results of the investigation

No surveys were carried out in 2010

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

Results of the investigation

No surveys were carried out in 2010.

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

Results of the investigation

No surveys were carried out in 2010.

E. Antimicrobial resistance in *Campylobacter jejuni* and *coli* in pigs

Results of the investigation

There were no surveys carried out in 2010.

F. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Laboratory used for detection for resistance

Cut-off values used in testing

Results of the investigation

No surveys were carried out in 2010.

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 of listeriosis in humans in the UK have fallen from a peak in the late 1980's following target provision of advice to pregnant women to avoid ripened soft cheeses and pâtés. Listeriosis is a rare disease in the UK and numbers remained low, at around 100-150 UK cases per year up to 2003 when an increase in the number of cases was noted, mainly attributable to an increase in England and Wales. The rise in the number of cases has occurred particularly in people over 60 years of age and the reason for this increase is unknown. The number of 'pregnancy-associated' cases has remained relatively low. In an attempt to try and understand this increase, several surveys focused on ready-to-eat foods that have been linked to the recent rise and/or from case food histories have been carried out over recent years with the aim to investigate the microbiological quality of these products (results reported in previous annual reports).

The potential link, if any, between listeriosis infection in animals and infection in humans still remains unclear.

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

Human Data

In 2010 there was a drop in the number of cases in England and Wales from an average of 199 cases per year between 2005 and 2009 to 156 cases in 2010. While still above the levels observed during the 1990s, this is a noticeable decrease and the lowest numbers reported since 2002. In Scotland, there were 16 cases of *L. monocytogenes* and one of *Listeria* species reported in 2010, the same overall number as reported in 2009 when there were 17 cases of *L. monocytogenes*.

Food:

Results of surveys carried out in 2010 are given in the tables. No *Listeria* spp were detected in any of the samples tested during the year.

Animals:

During 2010, listeriosis was diagnosed in 237 incidents in animals in the UK, in all cases from clinical diagnostic samples submitted by private veterinarians to the Veterinary Laboratories Agency (now the Animal Health Veterinary Laboratories Agency), the Scottish Agricultural College and the Agri-food and Biosciences Institute. Of the total, 221 incidents were recorded in Great Britain and 16 in Northern Ireland. This included 58 incidents in cattle, where *Listeria* spp was diagnosed as the cause of abortion, mastitis, iritis or encephalitis, usually associated with the feeding of poor quality silage. In sheep and goats there were 174 incidents where listeriosis was diagnosed during 2010, including meningitis, septicaemia or abortions caused by *Listeria monocytogenes* and *Listeria ivanovii*. Analysis of all incidents of foetopathy in sheep and goats in Great Britain, indicated *Listeria* spp. accounted for 2.5% (25 out of a total 959 investigated incidents in GB) of all diagnoses of foetopathy investigated during the year. Listeriosis was not diagnosed in pigs during the year.

During 2009, listeriosis was diagnosed in 196 incidents in animals in the UK. There were more recorded

incidents in cattle in 2009 compared to 2010 (63 in 2009) but there were fewer in sheep (128 incidents in 2009 compared to 174 in 2010). However, for the data from Great Britain, the percentage of foetopathy cases where *Listeria* spp were implicated/ detected as a cause of foetopathy, remained approximately the same in 2009 at 2.6% (23 out of a total 904 investigated incidents in GB).

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

Listeria monocytogenes bacteria are widely distributed in the environment, and especially in sites with decaying vegetable material. It is believed that consumption of contaminated foods is the main transmission route for both people and animals. Human infection acquired directly from animals is possible, but apart from a few cases it is not clear what, if any, connection there is between human listeriosis and animal listeriosis.

The data reported in the table for prevalence in animals summarises confirmed clinical diagnoses of listeriosis from specimens submitted to VLA, SAC and AFBI laboratories during 2010. For Great Britain data, diagnoses use strict criteria and are recorded (once only per incident) using the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Additional information

Surveillance system:

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

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

2.3.2 Listeria in foodstuffs

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 other animal species or not specified - meat products - cooked, ready-to-eat - at retail - Survey	FSA	Single	25g	47	0	47	0	47	0	0
Meat, mixed meat - meat products - pâté - at retail - Survey (Shopping basket survey)	FSA	Single	25g	42	0	42	0	42	0	0
Other processed food products and prepared dishes - unspecified - ready-to-eat foods - at catering - Survey (Products sold at mobile vendors)	FSA	Single	25g	88	0	88	0	0	0	0
Ready-to-eat salads - at retail - Survey (Shopping basket survey)	FSA	Single	25g	22	0	22	0	22	0	0
Vegetables - products - at retail - Survey (Shopping basket survey)	FSA	Single	25g	43	0	43	0	43	0	0

Footnote:

FSA = the Food Standards Agency

2.3.3 Listeria in animals

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria	L. monocytogenes	Listeria spp., unspecified
Birds - Clinical investigations (Domestic and wild birds)	VLA/AFBI	Animal	unknown	2	0	2
Cattle (bovine animals) - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	58	0	58
Goats - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	10	0	10
Other animals - at farm - Clinical investigations (Miscellaneous exotic farmed species)	VLA/AFBI	Animal	unknown	2	0	2
Sheep - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	164	0	164
Wild animals (Mammals) ¹⁾	VLA/AFBI	Animal	unknown	1	0	1

Comments:

¹⁾ Red Squirrel

Footnote:

VLA = Veterinary Laboratories Agency in Great Britain.

AFBI = Agri-food and Biosciences Institute in Northern Ireland.

The Scottish Agricultural College (SAC) supplies data on recorded incidents in Scotland to the VLA for inclusion in the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Diagnoses made from clinical diagnostic material submitted to the VLA/SAC/AFBI. The total units tested are not known because the laboratory does not report negative results, unless part of an official control programme or survey. The total 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

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

Food:

No national surveys were carried out in 2010.

Animals:

During the year, there were nine investigations carried out where animal-associated sources of human infection were suspected - with isolates of VTEC indistinguishable on PFGE from the human cases of disease detected on three of the premises. The largest recorded animal-associated outbreak of VTEC infection in humans in Great Britain linked to an open farm premises occurred in September 2009, involving 93 human cases. Eleven of the 33 E. coli isolates obtained from animals present on the premise were found to be indistinguishable from those causing infection in the human cases (VTEC O157 PT 21/28 found in sheep, pigs, goats, cattle, ponies and rabbits). In addition, a survey of camelids (camels, alpacas and llamas) was carried out with 3 out of 188 animals on 96 premises testing positive for VTEC O157 - all from the same premise (- Featherstone, C.A., Foster, A.P., Chappell, S.A., Carson, T. & Pritchard, G.C. (2011) VTEC O157: Verocytotoxigenic Escherichia coli O157 in camelids. *Veterinary Record* 168:194-195)

In 2008, there were six investigations carried out where animal-associated sources of human infection were suspected - with isolates of VTEC indistinguishable on PFGE from the human cases of disease detected on two of the premises. In 2007, two of the three premises investigated also yielded isolates with the same phage type and PFGE profiles as the human disease cases.

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

Foodborne outbreaks have been well documented, but many cases of VTEC O157 are sporadic 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.

Additional information

Surveillance system:

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

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

2.4.2 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 - 1500 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

Relevance as zoonotic disease

While foodborne outbreaks have been well documented, many cases of VTEC O157 are sporadic 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.

2.4.3 Escherichia coli, pathogenic in animals

A. Verotoxigenic E. coli (VTEC) in Animals All animals

Monitoring system

Sampling strategy

Verocytotoxigenic-producing E.coli (VTEC) O157 outbreak investigations are undertaken according to agreed guidelines at the request of Consultants in Communicable Disease Control of the Health Protection Agency (HPA)/National Public Health Service (NPHS)/Health Protection Scotland (HPS)/ Public Health Agency Northern Ireland (HSCNI) where an animal-associated source is suspected, and variously involve collaboration with other organisations, including the Environmental Health departments of Local Authorities and the Health and Safety Executive. Determination of phage type (PT), Verocytotoxin (VT) type and comparison of human and animal isolates by pulsed field gel electrophoresis (PFGE) and variable number of tandem repeat (VNTR) analysis are performed by the E. coli / Shigella / Yersinia / Vibrio Reference Unit of the Laboratory of Gastrointestinal Pathogens, HPA Centre for Infections, Colindale. If isolates from animals circumstantially implicated in outbreaks have the same PT and indistinguishable PFGE or VNTR profiles from human cases, this is taken as confirmatory evidence of a causal association. In practice, there can be minor 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 under development. Other VTEC O157 PTs may be detected incidentally during the investigation of animal premises.

Nine investigations into VTEC O157 outbreaks in humans with potential links to animals were carried out in 2010, involving visits by Government veterinarians and animal sampling on five premises.

No surveys were carried out for VTEC in cattle, sheep or pigs in the UK in 2010 - the last national survey in these species was conducted in 2003 in Great Britain, and results are in the report for 2004. A survey was carried out for VTEC in camelids (alpacas and llamas) during the year.

Frequency of the sampling

Animals at farm

where considered relevant/ necessary in the event of human disease cases linked to an agricultural premises

Type of specimen taken

Animals at farm

Faeces

Control program/mechanisms

Recent actions taken to control the zoonoses

Information via leaflets and articles aimed at farmers, veterinarians and policy makers is available from the Animal Health Veterinary Laboratories Agency (AHVLA), the Health and Safety Executive and other Government departments' websites. The AHVLA also visits farmer and veterinary meetings on request to talk about VTEC O157 and control of other zoonoses in farmed livestock. Prevention of the spread of E.coli in animals relies on good hygiene, such as keeping any bedding clean and dry. A leaflet has been published on the prevention of E.coli O157 in cattle:
http://www.defra.gov.uk/vla/science/docs/sci_vtec_leaflet.pdf.

The Health and Safety Executive website contains further information for visitors to farms which can be found at: www.hse.gov.uk/campaigns/farmsafe/ecoli.htm. Advice for farmers, but which could also in part be applied to those responsible for other types of establishments where the public have access to animals, on practical steps to reduce the risk of ill health to visitors is published on the HSE website at: <http://www.hse.gov.uk/pubns/ais23.pdf>.

Results of the investigation

Nine premises in England were identified as potentially linked to human disease outbreaks during 2010 (there were no investigations reported in Scotland, Wales or Northern Ireland during the year). Five of these were premises open to the general public ("open farms"), one was a commercial farm with links to human cases, one case comprised of possible exposures on an agricultural field where cattle and sheep grazed, one was on a country estate where deer were the implicated animal species and one involved a nursery/agricultural college.

Animal sampling was undertaken on five of the premises investigated and in three of the five premises, *E. coli* O157 was detected in samples taken from animals present on the premises (multiple species). In these investigations, molecular profiling indicated matches between human isolates and some or all of the isolates from animal species sampled during the investigation, including from cattle, sheep, goats, pigs, equines and camelids. Phage types detected included predominantly PT 21/28, but PT1 was also detected. Animal sampling was not carried out on four premises where there were either reported family outbreaks or no clear links to livestock could be established. In these cases, advisory support was provided by AHVLA.

In the survey carried out on VTEC in camelids, in total 188 animals were sampled on 96 separate premises with 3 samples, all from the one premises, testing positive for VTEC O157 (VT2 and eae).

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

Cattle are the main reservoir of VTEC O157 in the UK, but the organism is also commonly found in other ruminants, especially sheep, and has been isolated from a wide range of other livestock and wildlife species. While VTEC causes illness in humans, it does not normally cause disease in other animal species.

In England and Wales about 15% of general VTEC outbreaks have been linked to direct or indirect animal contact. Prior to the large outbreak at an open farm in 2009, involving 93 human cases, human disease outbreaks with animal contact links have generally each comprised fewer than ten cases. Most large outbreaks have been related to food rather than direct contact with animals. About 80% of human cases appear to be sporadic and unattributed to an identifiable source, although case-control studies suggest that contact with farm animals and the rural environment may be a major contributing factor.

An analysis of outbreak investigations associated with open farms in Great Britain over a 10 year period revealed that VTEC O157 was confirmed in 19 (60%) of 31 farm premises sampled, with the highest proportion of positive samples on positive premises (29%) in cattle, followed by sheep (24%), donkeys (15%), pigs (14%), horses (12%) and goats (10%). These premises were sampled because of perceived links with human case and not as part of a survey so the results may not be representative of all open farms.

Additional information

Available controls for VTEC, including VTEC O157 in animals, rely on the application of good husbandry and hygiene measures particularly at the point of provision of food production. These principally require

the hygienic production and pasteurisation of milk, the provision of clean animals to slaughter, and the application of hygiene practices in the processing of these animals and the meat produced from them. In addition, controls to minimise the risk of zoonotic spread on farms require the application of appropriate risk management procedures based upon those suggested for open farms. Visitors to livestock farms, including those open to the general public, ramblers and workers on commercial livestock farms are all at risk of exposure, and should ensure good hand hygiene is observed. Risk of foodborne human illness can be reduced by thoroughly cooking meat and meat products, and by avoiding cross-contamination of work surfaces and ready-to-eat foods. At abattoirs, Food Business Operators are required to check the hide or skins of livestock presented for slaughter for faecal contamination, and take the necessary steps to avoid contamination of the meat during slaughter.

Table VT E. coli in animals

	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
Alpacas - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	1	1	1	0	0
Birds - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	2	0	0	0	0
Cattle (bovine animals) - at farm - animal sample - faeces (outbreak investigations) ¹⁾	VLA	Animal	1g	36	3	3	0	0
Cattle (bovine animals) - calves (under 1 year) - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	31	4	4	0	0
Goats - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	16	2	2	0	0
Guinea pigs - pet animals (outbreak investigations)	VLA	Animal	1g	2	0	0	0	0
Lamas - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	2	1	1	0	0
Other animals - at farm - animal sample - faeces - Survey - national survey (Camelids) ²⁾	VLA	Holding	1g	96	1	1	0	0
Pigs - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	16	4	4	0	0
Poultry, unspecified - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	14	0	0	0	0
Rabbits - pet animals - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	4	0	0	0	0
Sheep - at farm - animal sample - faeces (Outbreak investigations)	VLA	Animal	1g	142	18	18	0	0

Table VT E. coli in animals

	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
Solipeds, domestic - at farm - animal sample - faeces (outbreak investigations)	VLA	Animal	1g	6	3	3	0	0

Comments:

- 1) Animals over 1 year age
- 2) Camels, alpacas and llamas

Footnote:

The table includes data derived from VTEC O157 outbreak investigations undertaken where an animal-associated source is suspected. Outbreak settings include premises open to the general public ("open farms"), commercial farms with links to human cases and other agricultural settings.

During 2010, a survey was carried out on VTEC in camelids.

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, Scotland and Wales):

Bovine tuberculosis (TB) is a serious endemic infectious 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 has gradually regressed since then and in the period between 1986 and 2001, the total number of TB herd breakdowns ('incidents') in Great Britain doubled every five years. From July 2003 onwards, this doubling rate has slowed down to every 10 years. In 2010 there was a slight reduction in the herd incidence of new breakdowns relative to 2009, which had, in turn represented a reduction in the herd incidence relative to 2008.

The United Kingdom as a whole, is 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. However, Scotland was designated an OTF region in October 2009.

Just over 92% of all cattle herds in Great Britain retained their individual OTF status at the end of 2010 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. TB incidents with evidence of infection (herds with OTF status withdrawn due to detection of typical TB lesions and/or isolation of *Mycobacterium bovis* in laboratory culture) 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 Great Britain, the Eurasian badger, *Meles meles* constitutes a significant reservoir of infection for cattle.

Northern Ireland:

The control of bovine TB in cattle in NI commenced in the 1920s. 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. From 1996, there was evidence of an increase in disease until 2003 (peak incidence occurred during the spring of 2003: herd incidence = 10.2%; animal incidence = 0.99%). Since then disease levels have reduced. 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.

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

The risk of humans contracting TB in the UK from animals is very low due to the pasteurisation of milk, the cattle testing programme and meat inspection at slaughterhouses. Bovine TB is a recognised zoonosis and can cause human infection. However, less than 1% of all culture-confirmed cases of TB in humans are due to infection with *M. bovis* and the majority of cases are due to infection contracted abroad or reactivation of latent infection in elderly people contracted before pasteurisation became a widespread practice.

Milk hygiene regulations require that raw milk sold for drinking must be from OTF herds. When the OTF status of a dairy herd is suspended, the Animal Health and Veterinary Laboratories Agency (AHVLA) 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 pasteurisation. The medical authorities are also informed once infection with *M. bovis* is confirmed in tuberculin reactors or in cattle carcasses undergoing routine meat inspection.

Recent actions taken to control the zoonoses

Additional information

Under domestic TB legislation, the identification of suspect tuberculous lesions in the carcasses of domestic mammals other than cattle is notifiable to the Animal Health and Veterinary Laboratories Agency/Veterinary Services Northern Ireland. Furthermore, the identification of *M. bovis* in clinical or pathological specimens taken from any mammal (except humans) must be reported to AHVLA/DARDNI.

During 2010, *M. bovis* infection was confirmed by culture of the organism from 13 sheep, 29 domestic pigs, 42 alpacas, 23 domestic cats, 2 dogs, one goat, 25 wild deer, one wild boar and one wildebeest. Some of these isolations (e.g. pigs, camelids) represent incidents involving two or more infected animals from the same holding. In Northern Ireland, 103 badgers (found dead, including road traffic accidents) were tested and 14 were found positive for *M. bovis*. *Mycobacterium tuberculosis* was found in one of the pet dogs tested during the year.

2.5.2 Tuberculosis, mycobacterial diseases in humans

A. Tuberculosis due to *Mycobacterium bovis* in humans

Reporting system in place for the human cases

Access to reference laboratories able to differentiate *M. bovis* and *M. tuberculosis* exists for all publicly funded human diagnostic microbiology laboratories in the UK. 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: notification of clinical cases of pulmonary and non-pulmonary tuberculosis, reporting of mycobacterial isolates from confirmed cases and death certification.

History of the disease and/or infection in the country

The distribution of human cases of *M. bovis* in the UK has remained similar over the last 15 years and, on average, there are approximately 20 - 50 (typically 40) reported cases per annum. The majority have occurred in older age groups and reflects reactivation of pre-existing infection.

Results of the investigation

Relevance as zoonotic disease

Bovine TB is a recognised zoonosis and can cause human infection. However, less than 1% of all culture-confirmed cases of TB in humans are due to infection with *M. bovis* and the majority of those cases are due to infection picked up abroad or reactivation in elderly people of latent infection contracted before milk pasteurisation became widespread. 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.

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, however the prevalence of the disease is regionalised and the majority of cattle herds in the UK are OTF. In acknowledgement of the low and stable incidence of tuberculosis in Scottish herds, Scotland became an OTF region of the UK in October 2009 (Commission Decision 2009/761/EC). In order to maintain this status, a number of additional control measures for movements into Scotland were agreed by the UK administrations. New legislation has been put in place to support these arrangements which took effect from 28 February 2010 with the introduction of The Tuberculosis (Scotland) amendment Order 2009.

Free regions

Scotland (Commission Decision 2009/761/EC).

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

Great Britain:

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 two, four or six years. At the end of 2010, there was an increase in the percentage of cattle herds being tested every three years or less. Approximately 47% of all cattle herds in Great Britain were annually tested. The remainder were tested every two (6%), three (1%), or four (46%) years. In Wales, all herds are tested every year, whereas in Scotland, with OTF status, the testing interval is every four years. TB testing intervals for England 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 two, three and four 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 one- and two-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.

Methods of sampling (description of sampling techniques)

In the UK, the primary screening test for TB in cattle is 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 infection in a herd (OTF status withdrawn). Where inconclusive test reactors (IRs) are disclosed, they are required to be isolated and retested once after 60 days. Any IRs that do not resolve at this retest are classed as reactors and removed to slaughter.

The programme of regular tuberculin herd testing is supplemented by veterinary inspection of cattle carcasses 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 carcass (or the whole carcass if more than one organ is affected) are removed and do not enter the food chain.

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 interferon-gamma (IFN- γ) blood test (Bovigam) continued in 2010, to enhance the sensitivity of the cattle testing programme. Since October 2006, the use of the IFN- γ test, in conjunction with the skin test, has been mandatory in certain prescribed circumstances, primarily as an ancillary parallel test in new Officially TB Free status withdrawn 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, 26,346 IFN- γ tests were carried out in 2010 in Great Britain and 1,129 positive animals identified for removal.

Northern Ireland:

Use of the γ IFN test continued during 2010. 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, 13,484 tests were carried out in 2010 and 495 γ IFN positive but SICCT negative animals were removed.

Case definition

Evidence of *M. bovis* infection is confirmed in test reactors and direct 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 (OTF status withdrawn breakdown) is one in which at least one animal has been found with post mortem evidence of *M. bovis* infection.

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 line with Directive 78/52/EEC.

Nevertheless, the development of cattle vaccines and oral badger vaccines continues and is a high research priority in Great Britain. The earliest projected date for the use of a BCG cattle vaccine with a

differential diagnostic test to Differentiate Infected from Vaccinated Animals (a so-called 'DIVA test') is 2015 and the earliest projected date for a licensed BCG oral badger vaccine is late 2015.

Other preventive measures than vaccination in place

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 one- and two-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 one or two 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. Following Scotland attaining OFT status in October 2009, there has been a new requirement for cattle of 42 days of age or more from low incidence areas of England (three and four yearly tested herds) to be tested prior to movement to Scotland unless they have spent their whole lives in low incidence areas or they are being sent direct to slaughter in Scotland.

These new Orders retained the obligation to notify the regional veterinary leads of the Animal Health Veterinary Laboratories Agency of any suspicion of TB in live cattle and deer and cattle/deer carcasses. They also introduced a new duty to notify of the suspicion of TB in the carcass 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 in Great Britain.

Recent actions taken to control the zoonoses

Measures in case of the positive findings or single cases

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 in 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 herds with multiple reactors only a representative number of carcasses 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 a series of tuberculin tests at 60-day minimum 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.

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.

Removal of movement restrictions on herds with OTF status suspended or withdrawn depends on the successful completion of tuberculin skin herd tests with negative results (one herd test if disease in OTF suspended status herd or two consecutive herd tests if infection confirmed - OTF status withdrawn herds). Cleansing and disinfection of the premises with OTF status withdrawn herds is also required. Public health advice is given to the herd keeper and health authorities are informed. Purchasers of bulk milk are advised of application of restrictions to their suppliers.

Movements of animals into and out of a OTF status withdrawn herd prior to the detection of infection are traced using a computerised database. Forward-traced animals and back-traced herds may be placed under movement restriction (OTF status suspended) until appropriate tests have been carried out.

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 health authorities are notified when *M. bovis* infection is confirmed in tuberculin reactors or in cattle during routine slaughter.

Results of the investigation

Great Britain (England, Wales and Scotland):

At the end of 2010, approximately 1.4% of British herds were under movement restrictions due to a bovine TB incident. Other herds were restricted because of overdue testing. The balance (92.7%) of British herds were OTF at the end of 2010. There was a provisional 2.2% increase in the total number of new TB incidents in Great Britain in 2010 (4,703) compared with 2009 (4,602). Of these new TB breakdowns, 76.6% occurred in the West of England and in Wales. Taking into account the overall number of tuberculin skin tests performed in unrestricted herds (63,536 in 2010, an increase from 59,980 in 2009), this equates to a total herd TB incidence of 7.4%, compared to 7.6% for the previous year. The estimated herd incidence of bovine TB breakdowns confirmed by post-mortem examination and culture in 2010 was 3.9% (4.1% for 2009). Approximately 4.2 TB test reactors were identified for every 1,000 animals tested in 2010. A total of 1,136 cattle carcasses with suspicious TB lesions (of which 602 yielded *M. bovis* on culture) were detected at commercial slaughter of cattle, thus supplementing active TB surveillance by skin testing.

Northern Ireland:

Approximately 22,600 herds were tuberculin tested during 2010 (approx 1.6 million cattle). The herd and animal incidence of TB has reduced over the last year with the current levels running at 5.15% and 0.404%, respectively (previous 13-24 months, herd incidence = 5.61%, animal incidence = 0.512%). At the end of 2010, the 12-month moving average for TB reactors was 533 per month (compared to 683 in

December 2009). The 12-month moving average for new TB herd breakdowns was 98 herds per month (cf. 108 in December 2009). At the end of December 2010, 3.8% of herds in Northern Ireland had OTF status withdrawn due to a bovine TB incident. This is a reduction on the 4.1% of herds of OTF status withdrawn at the end of 2009.

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

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

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 - AHVLA. Under the same order, an AHVLA inspector may require a deer owner or keeper to arrange for TB testing to be undertaken at the owners/keepers expense. 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. It requires owners/keepers to detain deer suspected of having TB pending their slaughter. Following mandatory slaughter, the owner/keeper receives compensation.

There is no compulsory routine tuberculin testing for the approximately 30,000 farmed and 25,000 park deer kept in Great Britain. Any tuberculin testing is limited to deer placed under TB restrictions, mainly following reports of TB in carcasses. 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 carcasses. 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.

United Kingdom - Northern Ireland

Similar legislation exists and similar procedures and testing protocols are followed.

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 carcasses 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 fulfill, the premises may remain under permanent restrictions until destocked. Test reactors are compulsorily slaughtered and compensation paid at 50% of their market value up to a ceiling of £1,200 (i.e. the maximum compensation payable is £600). Tuberculin testing is also 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 carcass 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). It is also notifiable in Northern Ireland under similar legislation.

Results of the investigation

United Kingdom - Great Britain:

During 2010, *M. bovis* was cultured from 1 farmed, 6 park and 15 wild (or other) tuberculous deer carcasses detected at postmortem inspection (statutory notifications to AHVLA). Virtually all of the infected wild deer carcasses were found in counties of southwest England and southeast Wales where there is a high incidence of bovine TB.

United Kingdom - Northern Ireland

In 2010, *M. bovis* was isolated from 13 out of 85 animal carcass lesions submitted for histopathological and bacteriological examination. In addition, two wild fallow deer were tested for TB in 2010, with negative results.

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 carcasses 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. Stalkers and deer managers may receive training in carcass inspection and have a statutory obligation to report suspicion of disease to the local AHVLA office.

A field survey of TB prevalence in wild deer in the South-west Peninsula and the Cotswolds (England) in 2006 indicated *M. bovis* infection was present at a very low prevalence (less than 1%, except in one area where it was 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. It was 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 (<http://www.defra.gov.uk/animalh/tb/index.htm>)

Northern Ireland

There are 3 species of wild or feral deer in Northern Ireland: *Dama dama* (fallow deer), *Cervus nippon* (sika deer) and *Cervus elaphus* (red deer). A proportion of the red deer are enclosed. A survey carried out in 1995, in which deer of the three species were sampled, demonstrated a prevalence of 5.8% (397 deer sampled). A later surveillance exercise carried out in 2009, in which fallow and sika deer were sampled, revealed a prevalence of 2% (146 deer sampled). However, the low number of deer in NI (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role is likely to be limited if not entirely insignificant.

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

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

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Badgers ¹⁾	NRL	Animal	103	16	14	0	2
Goats ²⁾	NRL	Animal	14	1	1	0	0
Pigs ³⁾	NRL	Animal	341	145	29	0	116
Sheep ⁴⁾	NRL	Animal	39	14	13	0	1
Alpacas ⁵⁾	NRL	Animal	151	53	42	0	11
Cats - pet animals ⁶⁾	NRL	Animal	86	47	23	0	24
Deer (wild and park deer) ⁷⁾	NRL	Animal	48	28	25	0	3
Dogs - pet animals ⁸⁾	NRL	Animal	9	3	2	1	0
Fish - aquarium fish ⁹⁾	NRL	Animal	1	0	0	0	0
Lamas ¹⁰⁾	NRL	Animal	7	0	0	0	0
Wild animals ¹¹⁾	NRL	Animal	5	2	1	0	1

Comments:

- 1) Northern Ireland - survey
- 2) Routine meat inspection at slaughterhouse or submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination
- 3) Routine meat inspection at slaughterhouse
- 4) Routine meat inspection at slaughterhouse
- 5) Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem

Table Tuberculosis in other animals

Comments:

- examination or submission by state veterinarians from TB reactors, contacts and suspect clinical cases
- 6) Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination
 - 7) Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination
 - 8) Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination
 - 9) Koi Carp (1). Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination
 - 10) Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination or submission by state veterinarians from TB reactors, contacts and suspect clinical cases
 - 11) Wildebeest (3), otters (2). Clinical investigations - submission of tissue specimens by state and private veterinarians from suspect tuberculous animals disclosed at post-mortem examination

Footnote:

NRL = National Reference Laboratory

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

If present, the row "Total -1" refers to analogous data of the previous year.

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	25933	25933	23595	1484	1150	16	1.08	90.98	6.29	4.87
United Kingdom ¹⁾	83636	83636	60523	7971	4703	4	.05	72.36	13.17	7.77
Total : ²⁾	109569	109569	84118	9455	5853	20	.21	76.77	11.24	6.96
Total - 1	110802	110802	81876	9987	5867			73.89	12.2	7.17

Comments:

¹⁾ Great Britain - England, Scotland and Wales. Scotland has Officially Tuberculosis Free Status

²⁾ N.A.

Footnote:

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.

In the table "United Kingdom" refers to Great Britain - England, Scotland and Wales. Under the current reporting methods it is not possible to distinguish between the total number of herd tests carried out and the number of individual herds that have been tested (possibly more than once) during the year so the figure for the number of herds checked includes herds that will have been tested more than once during the year, so the herd coverage figure could exceed 100% in certain regions of Great Britain. The figure for the number of positive herds includes all herds that had their Official TB Free (OTF) status withdrawn or suspended at some time during 2010 due to a TB breakdown. Therefore this figure includes new and ongoing TB breakdowns. The figure for the number of new positive herds indicates the total new TB breakdowns that were identified/began in 2010. The figure for the number of herds depopulated includes total depopulations of entire cattle holdings and any partial slaughter of discrete epidemiological groups within an infected holding that were carried out for the purposes of controlling outbreaks where the herd's Official TB Free status had been withdrawn.

Table Tuberculosis in farmed deer

If present, the row "Total -1" refers to analogous data of the previous year.

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					no routine test			95	14
Total : ¹⁾	300	30000	0	0	0	0	N.A.	0	0	95	14

Comments:

¹⁾ N.A.

Footnote:

The total numbers of animals and herds listed are figures for Great Britain, obtained from the UK Agricultural census (June 2009) and are approximate. No population data is available for Northern Ireland. The total number of animals with suspicious lesions detected and the total number of animals confirmed positive on bacteriological examination is UK data from Great Britain and from 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 10 animals in Great Britain in 2010. Confirmation of TB was obtained in one animal. In Northern Ireland, lesions suspicious of TB were detected in 85 animals and confirmation of TB was obtained in 13 animals.

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of animals	Number of animals to be tested under the programme	Number of animals tested	Number of animals tested individually	Number of positive animals	Slaughtering		Indicators	
						Number of animals with positive result slaughtered or culled	Total number of animals slaughtered	% coverage at animal level	% positive animals - animal prevalence
Northern Ireland	1604356	1583229	1582878	1582878	6404	6404	7144	99.98	.4
United Kingdom ¹⁾	8645964	8645964	7562694	7562694	31679	31679	32737	87.47	.42
Total : ²⁾	10250320	10229193	9145572	9145572	38083	38083	39881	89.41	.42
Total - 1	10007218	9993430	8543110	8543110	42963	42963	45227	85.49	.5

Comments:

¹⁾ Great Britain - England, Scotland and Wales. Scotland has Officially Tuberculosis Free Status

²⁾ N.A.

Footnote:

Northern Ireland: Total number of animals based on the June agricultural census. Number of animals to be tested under the programme based on the average number of cattle presented at TB herd tests during the last 4 years. The number of animals tested is the actual number tested during the year.

In the table "United Kingdom" refers to Great Britain - England, Scotland and Wales. Under the current reporting methods it is not possible to distinguish the number of individual animals tested for TB during the year, so the figure for total number of animals tested includes animals which may have been tested and counted more than once so the animal coverage percentage may exceed 100% in certain regions of Great Britain. The figures for the number of animals tested individually and the number of positive animals include animals that were skin test reactors, inconclusive reactors on two occasions and gamma interferon blood test reactors, regardless of their post mortem and culture findings. The figure for the total number of animals slaughtered includes, in addition to the animals that were detected positive through skin testing or the gamma interferon test, also non-reactor cattle taken as direct contacts to known infected animals in herds where the Official TB Free status was withdrawn.

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Status of herds and animals under the programme													
	Total number of herds and animals under the programme		Unknown		Not free or not officially free				Free or officially free suspended		Free		Officially free	
	Herds	Animals	Herds	Animals	Last check positive		Last check negative		Herds	Animals	Herds	Animals	Herds	Animals
Northern Ireland	25933	1583229	0	0	245	59274	741	90811	1872	148740			23075	1284404
United Kingdom ¹⁾	83636	8645964	0	0					6090				77546	
Total : ²⁾	109569	10229193	0	0	245	59274	741	90811	7962	148740	0	0	100621	1284404
Total - 1 ³⁾	26287	1599025	0	0	412	78238	673	76759	1985	174685			23201	1269343

Comments:

¹⁾ Great Britain - England, Scotland and Wales. Scotland has Officially Tuberculosis Free Status

²⁾ N.A.

³⁾ Data for Northern Ireland only

Footnote:

Northern Ireland: Total number of herds and animals under the programme based on the average number of cattle herds in which cattle were presented at a TB test and the average number of cattle presented during the last 4 years.

In the table "United Kingdom" refers to Great Britain - England, Scotland and Wales. The figure for number of herds that had officially free TB status suspended includes the total number of herds under TB-related movement restrictions (ie herds where Officially TB Free status was withdrawn or suspended due to detection of test reactors or for other reasons such as overdue TB tests). Because TB tests are not linked to official animal identifiers, it is not possible to report the number of animals with free or officially free status suspended or confirmed during 2010. For this reason, it is also not possible to provide figures for the other columns on last check results.

The 2009 results are reported for Northern Ireland only.

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

Humans:

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.

Animals:

Great Britain - England, Wales, Scotland: all livestock in Great Britain are officially free of infection from *Brucella abortus*, *Brucella melitensis*, *Brucella ovis* and *Brucella suis*. All cattle herds within Great Britain achieved Officially Brucellosis Free (OBF) status for *Brucella abortus* on 1 October 1985 and Great Britain achieved regional freedom in 1996.

Northern Ireland: Northern Ireland does not have Officially Free status for *Brucella abortus*, but is officially free of *Brucella melitensis*, *Brucella ovis* and *Brucella suis*.

Brucella melitensis, *B. canis*, *B. ovis* and *B. suis* have never been recorded in United Kingdom.

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

During the year 2010, 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. No sheep or goat herds were detected positive for *Brucella mellitensis* during the annual sheep and goat survey in 2010.

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

Cases of brucellosis in humans are usually recorded associated with infection acquired outside Great Britain. In Northern Ireland cases of brucellosis are associated with infection in cattle.

Additional information

During 2010, 2331 dogs for export were tested. Serology of 291 alpacas, 4 llamas, 63 deer, 8 antelopes and one giraffe, all for import/export requirements, yielded negative results.

2.6.2 Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

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, National Public Health Service for Wales, 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

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 the UK sheep/goat population. Most cases occur in people who are believed to have acquired their infections overseas, mainly in Middle Eastern and Mediterranean countries. 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. In Northern Ireland, cases of brucellosis are associated with infection in cattle and an increase in the number of human cases has been seen since 1998.

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

Free regions

Great Britain is officially free of infection from *Brucella abortus*. Northern Ireland does not have Officially Free status for *Brucella abortus*.

Monitoring system

Sampling strategy

Great Britain - England, Wales, Scotland:

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 2010 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 and post import testing. (Since April 2007, beef cattle in England and Wales are no longer routinely blood sampled every 2 years as part of the surveillance programme).

Farmers are legally required to notify the Animal Health and Veterinary Laboratories Agency (AHVLA) 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. Abortions and premature calvings 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 by culture. If a suspected *Brucella* organism has been cultured it must be reported to the Competent Authority and sent for identification to the *Brucella* National Reference Laboratory.

Type of specimen taken

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

Great Britain - 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 movement license, are imposed once a reactor is identified (on suspicion). The animal is required to be kept in isolation and slaughtered within 21 days. Other animals on the farm can be sent, under license, 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 Officially Brucellosis Free (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

In Great Britain, notification is required under the Brucellosis (England) Order 2000 and its equivalents in Wales and Scotland. The Zoonoses Order 1989 requires the isolation of *Brucella* species in any laboratory to be reported to the Competent Authority.

Results of the investigation

Great Britain - England, Wales, Scotland:

During 2010, approved laboratories tested 110796 bulk milk samples from 9233 herds as part of the national surveillance programme. Routine monitoring of cattle abortions and premature calvings was carried out with 7010 cases investigated during the year. 18028 animals were tested serologically with 2 animals detected as positive. Both were slaughtered but neither was confirmed on post mortem analysis. Overall, there were no cases of brucellosis in cattle confirmed during 2010.

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

Great Britain - England, Wales, Scotland:

All herds within Great Britain achieved Officially Brucellosis Free (OBF) status on 1 October 1985.

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

Great Britain - 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.

B. 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 herds is checked each year in the Annual Sheep and Goat survey

Frequency of the sampling

Annual sampling.

Type of specimen taken

Blood, organ/tissues as appropriate

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 2010, surveillance for brucellosis was provided by the National Sheep and Goat Survey. 567 blood samples from 141 goat herds in Great Britain and 193 samples from 17 goat herds in Northern Ireland were tested, all with negative results. In addition, in Great Britain, samples from 29 goat abortions were investigated. All were negative on test for brucellosis.

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

The UK remains free of *Brucella melitensis*.

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

There is no evidence of humans being infected with brucellosis associated with goats in the UK. *Brucella melitensis* infection in man is acquired from outside the UK.

C. 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 2010, 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. During the year 2010, surveillance for brucellosis was provided by the National Sheep and Goat survey. In Great Britain, 22386 blood samples from 1365 flocks were tested, all with negative results. In Northern Ireland, 3877 animals in 204 flocks were tested, all with negative results. In addition, in the UK, samples from 1152 for England and Wales (old number 2204) sheep abortions were investigated. All were negative on tests for brucellosis

Frequency of the sampling

Annual survey

Type of specimen taken

Blood, organ/tissues as appropriate.

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 under the Zoonoses Order 1989 and Zoonoses Order (Northern Ireland) 1991.

Results of the investigation

During the year 2010, surveillance for brucellosis was provided by the National Sheep and Goat survey. In Great Britain, 22386 blood samples from 1365 flocks were tested, all with negative results. In Northern Ireland, 4615 animals in 256 flocks were tested, all with negative results. In addition, in the UK, samples from 1189 sheep abortions were investigated. All were negative on tests for brucellosis

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

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

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

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

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 according to the importer's requirements

Results of the investigation

During 2010, 2548 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 animals in the UK.

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

Monitoring system

Sampling strategy

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 serological results recorded at animal level. Screening for Brucellosis comprises serological testing of eligible cattle, ELISA testing of bulk milk tank samples from dairy herds, pre-movement testing and sampling at slaughter of cattle older than 48 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 pre-movement testing was introduced in December 2004.

The Department of Agriculture and Rural Development for Northern Ireland (DARD) carries out a programme of blood testing of all herds containing breeding stock (and milk testing of all dairy herds). Routine brucellosis blood sampling is carried out on cattle herds in Northern Ireland on an annual basis, with the exception of some dairy herds, which are routinely blood sampled on a biennial basis (with associated monthly bulk milk ELISA testing). The blood samples are tested by means of a serum agglutination test (SAT) in accordance with the techniques described in Annex C of Directive 64/432/EC. 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 iu of agglutination per ml or any CFT reading of < 20 iu is classified as an inconclusive reactor and is required to be isolated and retested. A risk analysis is carried out and if significant risk factors exist, then an ELISA test is requested on subsequent tests. Derestriction of the animal's movements within the country may occur if the iELISA and CFT results are negative and SAT remains less than 102 iu. Animals with SAT readings of ≥ 102 iu may be taken as reactors, as may animals with CFT readings of ≥ 20 iu. Those with iELISA positive results may be removed, again depending on significant risk factors. In addition, monthly bulk milk samples, which are collected by the dairies, are tested at the Veterinary Sciences Division (Stormont) laboratory using an ELISA kit.

Abortions are required to be notified and 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 SAT, CFT and ELISA tests 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

blood, milk, tissues/organ as appropriate

Case definition

Culture and isolation of the organism.

Diagnostic/analytical methods used

Serology and culture.

Vaccination policy

Vaccination policy: Vaccination of animals is not allowed.

Measures in case of the positive findings or single cases

Herd restrictions 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. When an animal is intended to be slaughtered, the amount of compensation is based on the market value of the animal. The market value is an amount agreed between the competent authority and the owner of the animal. Where agreement cannot be reached the owner has the option to nominate an independent valuer to value the animal. Where either the competent authority or the owner is dissatisfied with the determination of market value they may submit an appeal to an independent panel. If the amount of salvage received by DARD for the carcase exceeds the compensation payable under the above rules then the difference is paid to the herd keeper.

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.

Notification system in place

Statutory notification of abortions under the Brucellosis Control Order (Northern Ireland) 2004. The isolation of *Brucella* species in a laboratory is reportable under the Zoonoses Order (Northern Ireland) 1991.

Results of the investigation

In 2010, herds were checked. In total 77 herds were positive, with 74 new herds positive during the period. Overall 867,402 animals were tested individually and 184 animals were detected as positive. The annual herd incidence was 0.38% in December 2010 and the annual animal incidence was 0.020% in the same month compared to an annual herd incidence of 0.35% and an annual animal incidence of 0.012% for the same period in 2009. Two administrative regions in the country contributed the majority of the reactors during the period 2008 to 2010. The vast majority of confirmed breakdowns occurred in specific disease hotspot areas. Pre- movement testing was introduced in December 2004 and in 2010, six *Brucella* reactors were detected from 167,240 animal tests.

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

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 stayed relatively level until autumn 2007 when there was another rise in incidence. The annual herd incidence at December 2009 was 0.35% while the annual animal incidence was 0.012%. The annual herd incidence was 0.38% in December 2010 and the annual animal incidence was 0.020% in the same month.

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

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

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Pigs ¹⁾	NRL	Animal	165	0	0	0	0	0
Alpacas ²⁾	NRL	Animal	291	0	0	0	0	0
Deer ³⁾	NRL	Animal	63	0	0	0	0	0
Dogs ⁴⁾	NRL	Animal	2331	0	0	0	0	0
Lamas ⁵⁾	NRL	Animal	4	0	0	0	0	0
Marine mammals ⁶⁾	NRL	Animal	30	0	0	0	0	0
Zoo animals, all ⁷⁾	NRL	Animal	9	0	0	0	0	0

Comments:

- ¹⁾ Import/export testing
- ²⁾ Import/export testing
- ³⁾ Import/export testing
- ⁴⁾ Import/export testing
- ⁵⁾ Import/export testing
- ⁶⁾ Clinical investigations
- ⁷⁾ Antelope (8), Giraffe (1). Import/export testing

Footnote:

NRL = National Reference Laboratory

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

If present, the row "Total -1" refers to analogous data of the previous year.

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	25933	25933	22531	77	74	30	38.96	86.88	.34	.33
Total : ¹⁾	25933	25933	22531	77	74	30	38.96	86.88	.34	.33
Total - 1	26287	26287	23135	76	71	20	26.32	88.01	.33	.31

Comments:

¹⁾ N.A.

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 exceeds 0 (19,598 herds had a herd test where cattle were presented compared to 20,181 in the same period of 2009)

Number of herds depopulated = 30 herds from 20 epidemiological units

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of animals	Number of animals to be tested under the programme	Number of animals tested	Number of animals tested individually	Number of positive animals	Slaughtering		Indicators	
						Number of animals with positive result slaughtered or culled	Total number of animals slaughtered	% coverage at animal level	% positive animals - animal prevalence
Northern Ireland	1604356	928756	925361	867402	184	184	2304	99.63	.02
Total :	1604356 ¹⁾	928756	925361	867402	184	184	2304	99.63	.02
Total - 1	1612813	946438	936672	888898	116	116	2227	98.97	.01

Comments:

¹⁾ N.A.

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.

Percentage coverage at animal level: not equal to 100% because of repeat herd testing and births and deaths throughout the year. Denominator also an estimate based on the average herd size over the last 4 years.

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Status of herds and animals under the programme													
	Total number of herds and animals under the programme		Unknown		Not free or not officially free				Free or officially free suspended		Free		Officially free	
	Herds	Animals	Herds	Animals	Last check positive		Last check negative		Herds	Animals	Herds	Animals	Herds	Animals
Northern Ireland	25933	928756	57	0	14	1377	43	3010	725	43169			25094	881200
Total : ¹⁾	25933	928756	57	0	14	1377	43	3010	725	43169	0	0	25094	881200
Total - 1	26287	946438	0	0	10	1196	63	3218	841	36358			25373	905666

Comments:

¹⁾ N.A.

Footnote:

Total number of herds under the programme: number of cattle herds in which cattle were presented at a brucellosis herd test during the last 4 years.

Total number of animals under the programme: based on the average number of cattle presented at brucellosis herd tests over the last 4 years.

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

If present, the row "Total -1" refers to analogous data of the previous year.

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 microbiologically	Number of animals positive microbiologically	Number of suspended herds
United Kingdom	99001	32778336	99001	100	0	0	1779	27761	0	2	2	1531	0	0
Total : ¹⁾	99001	32778336	99001	100	0	0	1779	27761	0	2	2	1531	0	0

Comments:

¹⁾ N.A.

Footnote:

The table gives results of the National Sheep and Goat Survey which is carried out annually and involves sampling nearly 2000 flocks in the UK to confirm disease freedom.

In the table "United Kingdom" refers to data from all four countries - England, Scotland, Wales and Northern Ireland.

"Number of animals examined microbiologically" refers to aborted sheep or goat fetuses examined microbiologically for Brucella.

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
	Herds	Animals	Number of herds	%	Number of herds	%	Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
							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 ¹⁾	74705	8367980	74705	100	0	0	2571	18028	0	9233	110796	0	7010	0	0	108	0	2	0	0	0
Total : ²⁾	74705	8367980	74705	100	0	0	2571	18028	0	9233	110796	0	7010	0	0	108	0	2	0	0	0

Comments:

¹⁾ Great Britain - England, Scotland and Wales

²⁾ N.A.

Footnote:

In the table "United Kingdom" refers to data from Great Britain - England, Scotland and Wales. Northern Ireland had a community co-financed programme in 2010.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

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

Infection with yersiniosis is not notifiable in humans or animals in the UK.

Human data:

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

Food:

There were no food surveys carried out in 2010.

Animals:

No surveys were conducted in animals in 2010. During the year, yersiniosis was diagnosed in 18 incidents in animals in the UK, in all cases from clinical diagnostic samples submitted by private veterinarians to the Veterinary Laboratories Agency, the Scottish Agricultural College and the Agri-food and Biosciences Institute. The number of diagnoses is generally small and it is therefore difficult to comment on trends.

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

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

Y. enterocolitica has been isolated from many domestic and wild mammals, birds and some cold-blooded animals. More than 50 serotypes have been identified, not all of which cause disease in animals and man. *Y. pseudotuberculosis* has been isolated from various species of wild and domestic mammals, birds and reptiles.

The data reported in the table for prevalence in animals summarizes confirmed clinical diagnoses of yersiniosis from specimens submitted to VLA, SAC and AFBI laboratories during 2010. For Great Britain data, diagnoses use strict criteria and are recorded (once only per incident) using the Veterinary Investigation Diagnostic Analysis (VIDA) system.

2.7.2 Yersiniosis in humans

A. Yersiniosis 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

In the UK, the annual number of reported cases varied between 32 and 68 from 1998 - 2010, with the highest number of reported cases during any one year being 88 cases reported in 1999.

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.

Relevance as zoonotic disease

Yersiniosis in humans is mostly caused by *Yersinia enterocolitica*, and humans usually acquire infection through food contaminated with the faeces of infected animals.

2.7.3 Yersinia in animals

A. Yersinia enterocolitica in pigs

Monitoring system

Sampling strategy

Animals at farm

No national survey was carried out in 2010. The last survey of pigs was conducted in 2003 and reported in 2004.

Diagnostic/analytical methods used

Animals at farm

Culture

Animals at slaughter (herd based approach)

Culture

Results of the investigation

During 2010, *Yersinia enterocolitica* was diagnosed only once, as an incidental finding in pigs with porcine intestinal adenopathy (PIA). This diagnosis however was not recorded in the table for prevalence in animals as the data in the table includes only confirmed clinical diagnoses, extracted via specific disease codes which are allocated using strict criteria on the Veterinary Investigation Diagnostic Analysis (VIDA) system. If yersiniosis is not recorded as a primary or secondary diagnosis on this system, it is not allocated diagnostic code and does not appear in the overall summary figures for the year.

Table Yersinia in animals

	Source of information	Sampling unit	Units tested	Total units positive for Yersinia	Y. enterocolitica	Y. pseudotuberculosis	Yersinia spp., unspecified	Y. enterocolitica - O:3	Y. enterocolitica - O:9	Y. enterocolitica - Y. enterocolitica, unspecified
Birds - Clinical investigations (Domestic and wild birds) ¹⁾	VLA/AFBI	Animal	unknown	5	0	5	0			
Other animals - at farm - Clinical investigations (Miscellaneous exotic farmed species)	VLA/AFBI	Animal	unknown	3	0	0	3			
Sheep - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	8	0	8	0			
Wild animals - Clinical investigations ²⁾	VLA/AFBI	Animal	unknown	2	0	2	0			

Comments:

¹⁾ Ducks unspecified (1), Barbary ducks (1), buzzard (1), Von Der Dercken Hornbill (2)

²⁾ Red Forest buffalo (1) and red squirrel (1)

Footnote:

VLA = Veterinary Laboratories Agency in Great Britain.

AFBI = Agri-food and Biosciences Institute in Northern Ireland.

The Scottish Agricultural College (SAC) supplies data on recorded incidents in Scotland to the VLA for inclusion in the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Diagnoses made from clinical diagnostic material submitted to government veterinary laboratories VLA/SAC/AFBI. The total units tested are not known because the laboratory does not report negative results, unless part of an official control programme or survey. The numbers recorded are numbers of incidents. There may be more than one diagnosis in the same incident.

Diagnosis is by culture.

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:

There have been no known cases of human trichinosis acquired from infected meat from animals reared in the United Kingdom either in the UK or in other countries that have received meat and meat products from the UK since 1975. Overall, there were no laboratory-confirmed cases of Trichinellosis between 1987 and 1999 in the UK. 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 - 2010.

Animals:

The last positive diagnosis in pigs in Great Britain was in 1978. In Northern Ireland, the last confirmed case of Trichinellosis in pig meat was in 1979. This case was linked to suspected illegally imported meat. An on-going survey of foxes has recently identified 2 cases of *Trichinella* in Northern Ireland, one in 2007 and one in 2009.

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

There were no human cases of trichinosis reported in England, Wales, Scotland or Northern Ireland in 2010.

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 carcasses that are tested annually. This view is supported by an ongoing annual survey of wildlife.

Pigs, horses and wild boar are routinely monitored for the presence of *Trichinella*. In Great Britain in 2010, muscle samples from 211,601 breeding sows and boars, 542,505 finishing pigs raised in contained housing and 111,116 raised with outdoor access at some period were examined for *Trichinella*. In addition, 8,083 horses, 952 farmed wild boar and 202 feral wild boar muscle samples were examined. In Northern Ireland, muscle samples from 9073 breeding sows and boars, 455 outdoor reared pigs, 1,085,862 finishing pigs raised in contained housing and 935 horses were examined. All samples yielded negative results.

An ongoing survey of *Trichinella* in foxes is carried out by the Food Standards Agency (FSA) in the United Kingdom. In total, 502 samples from Great Britain and 146 samples from Northern Ireland were examined from January 2010 to December 2010. In addition, 33 badgers from Northern Ireland were tested. All samples were negative for *Trichinella*.

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

Trichinosis is a zoonotic disease caused by ingestion of raw meat containing larvae of the nematode of the *Trichinella* spp. There are eight zoonotic species of trichinella, of which *T. spiralis* is the most common species 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).

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 government 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 2009.

Results of the investigation

No human cases of Trichinellosis were recorded in 2010.

2.8.3 Trichinella in animals

A. 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 carcasses 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.

Diagnostic/analytical methods used

As per legislation

Results of the investigation including the origin of the positive animals

A total of 9018 samples were tested in 2010 (8083 in Great Britain and 935 in Northern Ireland). There were no positive findings during the year.

Notification system in place

Notified to the Food Standards Agency and Department of Environment, Food and Rural Affairs (Defra) in Great Britain / Department of Agriculture and Rural Development in Northern Ireland.

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

No Trichinella was reported in any samples examined in 2010.

B. 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 carcasses of domestic swine to be sampled in slaughterhouses and tested for the presence of *Trichinella* as part of the post mortem inspection. Carcasses 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.

Carcasses 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. Systematic testing of all finishing pigs may also be reduced if the country or region can demonstrate that it is an area of negligible risk for *Trichinella* according to the Regulation.

Frequency of the sampling

General

As per the legislation

Case definition

General

Isolation of the parasite

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 feral wild boar processed through an Approved Game Handling Establishment.

Results of the investigation including description of the positive cases and the verification of the *Trichinella* species

Fattening pigs raised under controlled housing conditions in integrated production system

Overall for the UK: 1,628,367 tested with 0 positive results (Northern Ireland: 1,085,862 tested with 0 positive and Great Britain: 542,505 tested with 0 positive)

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

Overall for the UK: 111,571 tested with 0 positive (Northern Ireland: 455 tested with 0 positive and Great Britain: 111,116 tested with 0 positive).

For wild boar - farmed and feral:

Farmed wild boars - UK: 952 tested, 0 positive

Feral wild boars - UK: 202 tested, 0 positive.

Breeding sows and boars

Overall for the UK: 220,674 tested with 0 positive (Northern Ireland: 9,073 tested with 0 positive and Great Britain: 211,601 tested with 0 positive)

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

Pigs and horses are routinely monitored for the presence of *Trichinella* at the slaughterhouse. There was no evidence to indicate that trichinellosis existed in the UK domesticated pig population in 2010. The last positive diagnosis in pigs in Great Britain was in 1978. In Northern Ireland, the last confirmed case of Trichinellosis in pig meat was in 1979. This case was linked to suspected illegally imported meat. An on-going survey of foxes has identified 2 cases of *Trichinella* in Northern Ireland, one in 2007 and one in 2009. There were no positive findings from foxes in 2010.

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

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, Wales, Northern Ireland or Scotland in 2010. The last recorded outbreak in the UK, albeit involving imported food, was of eight cases reported in 2000.

Table *Trichinella* in animals

	Source of information	Sampling unit	Units tested	Total units positive for <i>Trichinella</i>	<i>T. spiralis</i>	<i>Trichinella</i> spp., unspecified
Foxes ¹⁾	FSA	Animal	648	0	0	0
Wild boars - farmed ²⁾	FSA	Animal	952	0	0	0
Wild boars - wild ³⁾	FSA	Animal	202	0	0	0
Badgers - wild - Monitoring ⁴⁾	FSA	Animal	33	0	0	0
Pigs - breeding animals - unspecified - sows and boars - at slaughterhouse ⁵⁾	FSA	Animal	220674	0	0	0
Pigs - fattening pigs - not raised under controlled housing conditions - at slaughterhouse ⁶⁾	FSA	Animal	111571	0	0	0
Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse ⁷⁾	FSA	Animal	1628367	0	0	0
Solipeds, domestic - horses - at slaughterhouse ⁸⁾	FSA	Animal	9018	0	0	0

Comments:

- 1) Wild. Sampling context: monitoring. Sample size 5 grams.
- 2) Meat inspection. Sampling stage: abattoir or approved game handling establishment. Sample size 5 grams
- 3) Meat inspection. Sampling stage: approved game handling establishment/ hunted. Sample size 5 grams
- 4) Wild. Tested at collection for post mortem examination for TB surveillance. Sample size 5 grams.
- 5) Meat inspection. Sample size 1 gram
- 6) Meat inspection. Sample size 1 gram

Table Trichinella in animals

Comments:

⁷⁾ Meat inspection. Sample size 1 gram

⁸⁾ Meat inspection. Sample size 5 grams

Footnote:

Food Standards Agency (FSA) Official Veterinarians carrying out meat inspection, report from self-testing establishments in Great Britain. The National Reference Laboratory reports from other approved establishments and provides testing services to the FSA. The Department of Agriculture and Rural Development reports for Northern Ireland. The Food Standards Agency collates the data for the UK and data from both sources are combined in the table.

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 areas in Scotland, England and Wales. *E. multilocularis* is not known to be present in the UK animal population.

Humans:

There are, on average, 8 - 15 cases reported annually in the UK. The number of indigenously acquired human cases is very low, with one new indigenously contracted case identified approximately every five years.

Animals:

In Great Britain, Echinococcosis (hydatid disease) is present in the sheep and cattle population. Hydatid disease in animals is not notifiable in the UK 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 carcass and/or the offal as may be judged appropriate to the circumstances of the case by an inspector or Official Veterinarian. Meat inspection in all licensed slaughterhouses is carried out by Official Veterinarians in the Food Standards Agency in Great Britain and the post mortem findings are recorded centrally.

In Northern Ireland, Veterinary Service staff are situated in all meat plants and carry out post mortem inspection of all carcasses, including inspection for evidence of hydatid cysts. The last recorded detection of hydatid disease in livestock in Northern Ireland was in 2006.

E. multilocularis is not known to be present in animals in the UK, other than a single case in an imported beaver kept in captivity that was diagnosed in May 2010.

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

Echinococcus granulosus:

The following figures are reported findings of hydatid disease at post mortem inspection of sheep and cattle for human consumption at licensed abattoirs in the UK: during 2010, 1,042,785 cattle were subject to meat inspection and 1368 were affected with hydatid cysts (0.13%). There were 10,453,233 sheep subject to meat inspection during the year of which 56,817 (0.54%) were affected with hydatid cysts. All positive findings were in slaughterhouses in Great Britain - there were no post mortem detections of hydatidosis in any species in Northern Ireland in 2010.

The figures for 2010 are higher than in 2009, with 0.06% (1422/2,293,283) and 0.48% (74,491/15,436,023) in cattle and sheep respectively. However, 2010 figures are more consistent with the findings in 2008, when 0.14% of cattle and 0.53% of sheep were recorded as affected.

The impact of the disease on the health of the individual animal is negligible, with only marginal economic losses to the individual farmer from condemnation of affected organs, principally the liver.

Echinococcus ortleppi (also known as the G5 strain of *Echinococcus granulosus*) was diagnosed in a

Philippine Spotted Deer submitted for clinical disease investigation in June 2010. The deer belonged to a zoological collection (imported from Europe in 2006). At post mortem examination, multiple spherical nodules were diffusely distributed throughout the lung parenchyma.

Echinococcus multilocularis

E. multilocularis was diagnosed in a clinical diagnostic submission from a beaver in 2010. The affected beaver had been held in a two-acre enclosure. She had been wild caught in Bavaria, Germany in late 2006 and was imported as a juvenile, so would have been born in the spring of 2006. This beaver was initially quarantined in Great Britain in early 2007 for six months and had then been kept in captivity since, until being found dead in May 2010. Liver lesions were identified at post mortem that were found to be positive for *E. multilocularis* at subsequent PCR testing.

At least 49 beavers have been imported into Great Britain from Northern Bavaria. These beavers have been moved, after rabies quarantine, to private and public collections in Scotland and England. There would appear to be a small risk that imported Bavarian beavers could be infected with *E. multilocularis*. As these imported beavers are all in captivity in the UK, there is negligible risk of predation by foxes or dogs of any of these potential intermediate hosts. Therefore, the UK's disease free status for *E. multilocularis* will not have been compromised outside these captive collections.

A study was concluded in 2010 by the Food and Environment Research Agency (FERA) to investigate the presence of *Echinococcus granulosus* and *Echinococcus multilocularis* in faecal samples collected from red foxes (*Vulpes vulpes*) in England. Faecal samples from 384 wild foxes were tested: of these samples, 218 were collected during 2005, 103 during 2006, 51 during 2007, 11 during 2008 and one in 2010. The male:female ratio for the fox samples was approximately 1:1. Two hundred and fifty seven of the foxes were young adults, 24 juveniles and 103 older adults. Nearly all of the carcasses were in good condition when reaching the post mortem facility at York. Fox faecal samples were examined for both *E. multilocularis* and *E. granulosus* using an egg isolation followed by PCR method, based on published primer sets. All samples tested negative for both *E. multilocularis* and *E. granulosus*. Approximately 35% of the samples were positive for *Taenia* spp and other cestodes.

Recent actions taken to control the zoonoses

The Welsh Assembly Government is running a 10 year disease awareness programme in Wales. This programme is based on an education 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

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 and reports of cases are infrequent, averaging less than 1 per year. Overall, recently, there have been on average 8 - 15 cases reported annually in the UK.

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Beavers - Clinical investigations (Imported)	VLA	Animal		1	1	0	1	
Cattle (bovine animals) - at slaughterhouse - Monitoring (meat inspection)	FSA	Animal		1042785	1368	1368	0	
Foxes - wild ¹⁾	FERA	Animal		1	0	0	0	
Sheep - at slaughterhouse - Monitoring (meat inspection)	FSA	Animal		10453233	56817	56817	0	

Comments:

¹⁾ Part of a survey carried out in England for *E. granulosus* and *E. multilocularis*. In total, 384 foxes tested between 2005 - 2010, all with negative results.

Footnote:

FSA = Food Standards Agency.

FERA = Food and Environment Research Agency.

Routine visual meat inspection for hydatidosis (*Echinococcus granulosus*).

E. multilocularis was detected in a captive imported beaver in 2010

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

Northern Ireland:

Toxoplasmosis was diagnosed in 51 incidents in sheep during 2010. There were no confirmed diagnoses in goats, but one recorded case of *Toxoplasma gondii* in pigs.

Great Britain (England, Scotland and Wales):

Toxoplasmosis remained the second most common cause of abortions in sheep in Great Britain during the year and accounted for 22.5% of all incidents of foetopathy in sheep and goats diagnosed in 2010 (out of 959 cases investigated), compared to 23.1% in 2009, 22.9% in 2008 and 29.3% diagnosed in 2007.

Toxoplasmosis was confirmed in 204 incidents recorded in 2010 in clinical diagnostic samples from sheep. There were no recorded cases in goats during the year. The 2010 figures are similar to previous years: 204 recorded diagnoses of toxoplasmosis causing foetopathy in sheep in 2009 and in one case in goats, 201 in 2008 in sheep with none in goats and 376 incidents from sheep and 5 in goats in 2007. These figures arising from clinical investigations are the number of incidents recorded in 2010. 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.

Serological examinations for *Toxoplasma gondii* using the latex agglutination test (LAT) are undertaken by the Veterinary Laboratories Agency (VLA) on sera submitted to regional diagnostic laboratories. In sheep in 2010, 340 (44%) of 781 sera tested (from 171 separate submissions) were positive for *T.gondii* compared with 321 (44%) of 732 sera (from 174 submissions) in 2009. In pigs, 26 (27%) of 97 sera (two submissions) were positive in 2010, compared to 1 (10%) of 10 sera positive in 2009. These findings provide a summary of the serological status of samples submitted for diagnosis, monitoring and screening purposes during 2010 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.

In a separately funded project, the seroprevalence of *T. gondii* in adult breeding sheep in Great Britain was measured using sera taken during the *Brucella melitensis* survey. A random sample of 227 flocks (3544 animals), stratified by Animal Health Office region, was selected in order to estimate the seroprevalence of positive flocks, with a precision of +/- 5 per cent and 95 per cent confidence, assuming

a true prevalence of 50 per cent. All available samples were tested from each flock, thereby providing 95 per cent confidence in detecting at least one true positive animal at a minimum within flock seroprevalence of 45 per cent. Serum samples were tested by Latex Agglutination Test (LAT); the standard ISO 17025 (UKAS) accredited test used by the VLA to detect *T. gondii* specific IgG and IgM in animal serum samples. Samples exhibiting significant agglutination at a serum dilution factor (antibody titre) of 1:64 were defined as positive. As relevant data relating to the use of LAT on sheep sera is lacking, results from human studies described by Barker and Holliman (1992) were used and a test sensitivity of 99 per cent and specificity of 81 per cent was assumed.

Of the 3539 sera collected from 227 flocks, 2619 (74.0%) were found to be positive for *T. gondii* specific antibody when tested using latex agglutination. Details of vaccination status were returned for 3049 (86.1 %) of animals sampled. The results show that 6.2% of the animals included in the survey were vaccinated, 57.2% were unvaccinated and the remaining 36.5% were of unknown vaccination status. Animal seroprevalence was estimated at 68.6%, flock seroprevalence at 100% and within flock seroprevalence at 68.6%. Multilevel logistic modelling suggested that the likelihood of an animal testing positive for toxoplasma antibody increased with age and this effect appeared to be amplified in animals vaccinated against *T. gondii*. The model did not reveal an association between vaccination status and risk of testing positive. There was no evidence of regional variation in the distribution of seropositive flocks. These results indicate that levels of toxoplasma infection in breeding sheep in GB are high and provide further evidence to suggest that postnatal infection is more common than congenital infection in sheep.

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

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

Recent actions taken to control the zoonoses

The Control of Substances Hazardous to Health (COSHH) Regulations 2002 require employers and the self employed to assess risks to health from harmful substances, including micro-organisms, and to take steps to prevent or control those risks, and The Management of Health and Safety at Work Regulations 1999 require employers and the self employed to further assess any risks which affect pregnant women.

Updated information on zoonoses and appropriate control measures can be found in HSE Agriculture Information sheet 2 - Common Zoonoses in Agriculture (available at www.HSE.gov.uk/pubns/ais2.pdf). There is also the 1997 publication Infection risks to new and expectant mothers in the workplace - a guide for employers, by the Advisory Committee on Dangerous Pathogens (ref: ISBN 0-7176-1360-7)

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.

History of the disease and/or infection in the country

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.

2.10.3 Toxoplasma in animals

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii
Goats - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	1	1
Other animals - at farm - Clinical investigations (Miscellaneous exotic farmed species)	VLA/AFBI	Animal	unknown	1	1
Pigs - Surveillance (Unstructured survey) ¹⁾	VLA	Animal	97	26	26
Pigs - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	1	1
Sheep - Surveillance (Unstructured survey) ²⁾	VLA	Animal	781	340	340
Sheep - animals over 1 year - at farm - Survey - national survey ³⁾	VLA	Flock	3539	2619	2619
Sheep - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	266	266
Wild animals - Clinical investigations (Mammals)	VLA/AFBI	Animal	unknown	1	1

Comments:

- ¹⁾ Serum samples submitted to Regional Laboratories. Does not constitute a structured survey. Great Britain only.
- ²⁾ Serum samples submitted to Regional Laboratories. Does not constitute a structured survey. Great Britain only.
- ³⁾ Structured survey carried out in breeding ewes. Samples exhibiting significant agglutination at a serum dilution factor of 1:64 were defined as positive. 6.2% of the 3539 animals included in the survey were vaccinated, 36.5% were of unknown vaccination status and 57.2% were unvaccinated. Animal prevalence was estimated at 68.6% and flock prevalence at 100%

Table Toxoplasma in animals

Footnote:

VLA = Veterinary Laboratories Agency in Great Britain. AFBI = Agri-food and Biosciences Institute in Northern Ireland. The Scottish Agricultural College (SAC) supplies data on recorded incidents in Scotland to the VLA for inclusion in the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Diagnoses made from clinical diagnostic material submitted to government veterinary laboratories VLA/SAC/AFBI. Total units tested is unknown because the laboratory does not report negative results, unless part of an official control programme/survey. The numbers recorded are numbers of incidents. There may be more than one diagnosis in the same incident. Serological investigations for *Toxoplasma gondii* using the latex agglutination test (LAT) are undertaken by the VLA in Great Britain on serum samples submitted to Regional Laboratories. The findings provide a summary of the serological status of samples submitted for diagnosis, monitoring and screening purposes during the year but do not constitute a structured survey. Positive samples recorded in the table have LAT titres of 1/64 or greater and indicate a history of exposure to the parasite.

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 whilst 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 terrestrial rabies in an animal in the UK was in 1922. In total, nine bats have tested positive for live European Bat Lyssavirus during the passive surveillance programme in Great Britain that has been carried out since 1987.

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

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

Humans:

There were no human cases of classical rabies reported in the 2010 in the UK.

Animals:

In 2010, 16 cats, 18 dogs and two foxes, were submitted for laboratory testing. All these samples tested negative for rabies. In addition, 3 zoo animals (various species) and 83 zoo bats were tested during the year, all with negative results.

The Animal Health and Veterinary Laboratories Agency (VLA) has a longstanding programme of passive scanning surveillance for European Bat Lyssavirus (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. During 2006, 859 bats were tested with one testing positive. In 2007, 1204 bats were submitted for testing under the passive surveillance programme and 2 were submitted as suspect cases, making a total of 1206 bats tested during the year, with one positive EBLV2 detected. During 2008, 1308 bats were tested with 2 positive EBLV2 bats detected. In 2009, 1095 bats were tested and a single bat submitted from West Lothian, Scotland tested positive for European Bat Lyssavirus 2. This passive surveillance continued in 2010, with 609 bats tested during the year, none of which were positive

A three year active surveillance programme for testing bats for EBLV in England and Scotland took place between 2003-2006. The species targeted 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 (as a source of infection)

European Bat Lyssavirus (EBLVs) are related to the classical rabies virus. These viruses 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. Only EBLV 2 has been detected 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, mainly pets. 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. A Rabies Disease Control Strategy is currently being drafted.

Additional information

Workers at animal rescue charities, workers at quarantine centers and bat handlers are advised to be immunized against rabies as a precaution.

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 signs, 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) on 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 the patient.

History of the disease and/or infection in the country

Indigenous human rabies is extremely rare in the UK. The last case of human terrestrial rabies acquired in the UK was in 1902, however occasional travel-related cases do occur. In the last 10 years there have been four cases of human rabies in the UK, all acquired abroad (from Nigeria, Philippines, India and South Africa). The sole exception was a rare case of rabies acquired in the UK, caused by infection with European Bat Lyssavirus type 2 in 2002, which was caused by a bite from an indigenous bat.

Results of the investigation

There were no human cases of classical rabies reported in the 2010 in the UK.

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

2.11.3 Lyssavirus (rabies) in animals

A. Lyssavirus (rabies) in Animals All animals

Monitoring system

Sampling strategy

If rabies is suspected on the basis of clinical signs in an animal, it is compulsory to notify the relevant government departments and further investigations are carried out. In England, Wales and Scotland the Animal Health Veterinary Laboratories Agency (AHVLA) and in Northern Ireland the Department for Agriculture and Rural Development Veterinary Services must be notified.

Type of specimen taken

Organs/tissues: central nervous system tissue

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

A number of tests may be used including Fluorescent Antibody Test (FAT), Mouse inoculation test, histology, PCR etc.

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.

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 pets 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 2010, 94,026 dogs, cats and ferrets entered the UK under the Pet Travel Scheme (PETS). There have been no cases of imported rabies in the UK in animals that have used the PETS .

Table Rabies in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Bats - wild - Surveillance ¹⁾	NRL	Animal		609	0	0	0	0
Bats - zoo animal - Monitoring	NRL	Animal		83	0	0	0	0
Cats - Monitoring (at quarantine)	NRL	Animal		16	0	0	0	0
Dogs - Monitoring (at quarantine)	NRL	Animal		18	0	0	0	0
Foxes - wild - Monitoring	NRL	Animal		2	0	0	0	0
Zoo animals, all - Monitoring ²⁾	NRL	Animal		3	0	0	0	0

Comments:

¹⁾ Passive surveillance programme

²⁾ African wild dog (1), primates (2)

Footnote:

NRL = National Reference Laboratory

2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.13 Q-FEVER

2.13.1 General evaluation of the national situation

A. *Coxiella burnetii* (Q-fever) general evaluation

History of the disease and/or infection in the country

Humans:

In the UK, most Q fever cases are thought to be associated with exposure to farm animals or farm environments, however the source and route of transmission for most sporadic cases is usually not determined.

Animals:

Q fever is considered an endemic disease in UK livestock. A small number of cases of Q fever associated with abortion in cattle, sheep or goats are diagnosed each year.

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

Human disease:

Although Q fever cases in humans are generally considered sporadic, a number of outbreaks have been reported. Most recently, these included an outbreak in Cheltenham in 2007 (32 confirmed cases), thought to be due to wind-borne spread from a farm source, and an outbreak at a meat processing plant in Scotland in 2006 (142 cases), thought to be caused by airborne transmission from a sheep lairage.

The annual mean incidence rate of human infection in the UK (based on analysis of data from 1999 to 2008) is around 0.18 cases per 100,000 population/year. Mean annual incidence rates are usually higher in Northern Ireland (1.17 per 100,000/year for the period 1999 - 2008) than in England and Wales (0.14 per 100,000/year) and Scotland (0.37 per 100,000/year). In 2009, routine laboratory surveillance identified 15 cases in England and Wales, while two cases were reported in Scotland and two in Northern Ireland.

The regional distribution of human cases is similar to the distribution and density of sheep populations, with the majority of cases reported from South West England, Wales, Scotland and Northern Ireland (although there were fewer human cases than might be expected in the northern regions of England).

Animal Disease:

Between 3 and 7 incidents of Q fever detection in UK livestock through clinical disease investigations have been reported annually from 2006 - 2010.

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

The organism is shed in the urine, faeces, milk and birth products of infected ruminants. The organism can survive in the environment for prolonged periods and withstand many disinfectants and extremes of temperature. Humans are usually infected through inhalation of dust or aerosols containing *C. burnetii*, which may be produced during birth or at slaughter. Farm workers, veterinarians, and abattoir workers

have historically been at high risk of infection, however the source and route of transmission for most sporadic cases is usually not determined. In the UK, cases generally peak during the Spring/early Summer lambing season when infected animals shed high numbers of organisms during lambing. Other modes of transmission to humans, including tick bites and human to human transmission, are rare. There is a weight of evidence against the foodborne route of transmission for *C. burnetii*. It can be excreted into milk but is destroyed by pasteurisation.

Recent actions taken to control the zoonoses

Recent UK outbreaks and an ongoing outbreak of Q fever in humans in Europe have raised awareness of the risks of contracting this disease, especially to those exposed to high concentrations of the organism from placenta or birth fluids. Advice to farmers on preventing infection has recently been updated and risks from infection are highlighted annually by the Health Protection Agency (HPA) and Defra. Information on Q fever infection risks during the lambing season are available at:

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

2.13.2 Coxiella (Q-fever) in animals

A. C. burnetii in animal

Monitoring system

Sampling strategy

Government funded scanning surveillance programmes are delivered by the Veterinary Laboratories Agency (VLA), the Scottish Agricultural College (SAC) and the Agri-food and Biosciences Institute (AFBI). These programmes are built upon the subsidised diagnosis and disease investigation service offered to livestock farmers through their private veterinary surgeons. Through this scanning surveillance programme, a small number of cases of Q fever associated with abortion in cattle, sheep or goats are diagnosed each year.

Frequency of the sampling

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

Type of specimen taken

Other: tissue samples/cotyledons and foetal fluid submitted for clinical diagnosis
Blood samples

Diagnostic/analytical methods used

Modified Ziehl Nielsen (MZN) staining, Complement Fixation (CF) test, ELISA, PCR, histology and immunohistochemistry.

PCR method: Jones, R.M., Twomey, F., Hannon, S., Errington, J., Pritchard, G.C & Sawyer, J (2010) Detection of *Coxiella burnetii* in placenta and abortion samples from British ruminants using real-time PCR *Veterinary Record* 167, 965-967.

ELISA: Horgan, M.W., Bell, M.M., Pollard, T.R., Sayers, A.R & Pritchard, G.C. Q fever diagnosis in domestic ruminants: comparison between Complement Fixation and commercial ELISA tests. Submitted to *Journal of Veterinary diagnostic Investigation* (in press).

Vaccination policy

Vaccination for Q fever infection is not generally utilised in the UK.

Control program/mechanisms

The control program/strategies in place

Advice to farmers on preventing infection has recently been updated and risks from infection are highlighted annually by the Health Protection Agency (HPA) and Defra.

Control of Q fever is aimed primarily at the provision of advice on disease control through management and good hygiene measures on farm. Information on Q fever and the updated guidance on measures to avoid infection is available on the Defra, Scottish Government, Welsh Assembly Government, Department for Agriculture and Rural Development, HPA and Health and Safety Executive websites. (A leaflet, entitled

“Q fever: information for farmers” provides general advice for farmers and others involved with farm livestock, both for their own personal protection and to reduce health risks to the wider population - available at www.hse.gov.uk).

Notification system in place

Q fever is not notifiable in animals in the UK. In Northern Ireland, Q fever is a designated organism under the Zoonoses Order (NI) 1991. If found during post mortem, the Agri-Food and Biosciences Institute (AFBI) will notify DARD, and an advisory letter which includes public health advice will be issued to the animals' owner.

Results of the investigation

Overall, there was no evidence of an increase in Q fever in livestock based on submissions to VLA Regional Laboratories, SAC Disease Surveillance Centres and AFBI/DARD Veterinary Services during 2010.

Northern Ireland:

There were no reported cases of detection of Q fever in livestock in Northern Ireland in 2010.

Great Britain:

Clinical investigations: there were 4 incidents of Q fever infection reported in 2010, following examination of clinical diagnostic samples submitted by private veterinary surgeons to government veterinary diagnostic laboratories after detection of abortion in a herd/flock. 2 incidents were in cattle, 1 in sheep and 1 in goats - overall 4 farm premises involved. Diagnosis was made by routine examination of stained placental smears with the newly introduced PCR used for confirmation.

Survey: A PCR survey using abortion material collected from randomly selected abortion submissions during 2010/ 2011 where Q fever was not suspected is still in progress. During 2010, testing of 192 ovine cotyledons, all from different farms, did not reveal any positives which indicates that prevalence in the sample population is less than 1% (95% confidence).

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

There were 3 incidents of Q fever infection reported in 2009: 2 incidents were in cattle and 1 in goats - overall 3 farm premises involved. These incidents were all reported in Great Britain - there were no recorded incidents of Q fever diagnosis in Northern Ireland during the year. Through the general scanning surveillance carried out during 2008, 5 cases were identified in Great Britain (2 cattle, 2 sheep, 1 goat), 4 in 2007 and 7 in 2006.

In 2009, the VLA undertook a structured serological survey of samples collected from sheep and goats in Great Britain in 2008. Approximately 9.7% of sheep flocks and 2.8% of goat flocks were positive for *C. burnetii* but the within flock prevalence was much higher in goat herds (41.7%) compared with sheep flocks (2.2%), which may reflect the size of flocks and the intensive husbandry practices associated with goat farming in Great Britain. Further detail is available in the 2009 annual report.

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

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/AFBI	Animal	unknown	2	2
Goats - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	1	1
Sheep - at farm - Clinical investigations	VLA/AFBI	Animal	unknown	1	1
Sheep - at farm - Survey ¹⁾	VLA	Animal	192	0	0

Comments:

¹⁾ Ovine cotyledons randomly selected from abortion submissions (from 192 different flocks/premises) and subjected to PCR testing.

Footnote:

VLA = Veterinary Laboratories Agency in Great Britain.

AFBI = Agri-food and Biosciences Institute in Northern Ireland.

The Scottish Agricultural College (SAC) supplies data on recorded incidents in Scotland to the VLA for inclusion in the Veterinary Investigation Diagnostic Analysis (VIDA) system.

Clinical investigations: diagnoses made from clinical diagnostic material submitted to government veterinary laboratories VLA/SAC/AFBI. The total units tested are not known because the laboratory does not report negative results, unless part of an official control programme or survey. The numbers recorded are numbers of incidents and testing carried out is usually part of abortion investigations. There may be more than one diagnosis in the same incident.

Survey: a PCR survey using abortion material collected from randomly selected abortion submissions where Q fever was not suspected was carried out on 192 ovine submissions. The samples were all from different farms and testing did not reveal any positives which indicates that prevalence in the sample population is less than 1% (95% confidence)

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

A. Escherichia coli general evaluation

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

A survey was carried out in 2003 on a statically based sample of cattle, sheep and pigs arriving for slaughter at abattoirs in GB to determine the prevalence of foodborne pathogens in faecal samples (see report for 2003). Isolates of commensal *E. coli* were used from this survey for studies of antimicrobial resistance and these results were reported in 2004. Surveys of *E. coli* recovered from broilers (caecal contents taken from birds at slaughter at abattoirs) and *E. coli* recovered from turkey farms (boot swab sampling of litter) were completed over the periods January 2008 – January 2009 and October 2006 – September 2007 respectively. These surveys were primarily designed to determine the presence (and where appropriate the prevalence) of ESBL *E. coli* and results have been published in the scientific literature. In addition, a number of isolates resulting from submission of diagnostic samples have been tested for antimicrobial resistance in 2010 and the results are presented in the tables.

3.1.2 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. Isolates resistant to the indicator third generation cephalosporins can possess a number of resistance mechanisms, including ESBL and ampC enzymes.

Monitoring of veterinary *E. coli* isolates through the enhanced surveillance system instituted in 2006 continued in 2010.

Results of the investigation

Resistance to the indicator cephalosporin cefpodoxime was detected in low numbers of *E. coli* isolates from clinical diagnostic samples from pigs (7%; N=181) and chickens (10%; N=266) in 2010; a lower prevalence of resistance (4%; N=28) was detected in the isolates examined from turkeys. Resistance to cefpodoxime can be conferred by mechanisms other than ESBL or AmpC beta-lactamase production and the prevalence of ESBL *E. coli* in chicken and pig clinical diagnostic samples remains low. A higher prevalence of resistance to cefotaxime was observed in *E. coli* from cattle (16%; N=1526) than in the other farmed species in 2010 and most of the resistant isolates originated from calves. Resistance to cefotaxime may be conferred by ESBL or AmpC beta-lactamase production, or in some cases by other resistance mechanisms. 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 2010 are not available at this stage. Previous 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 12% in 2010, 10% in 2009 and 2008, compared to 6.5% in 2007. Resistance to enrofloxacin was detected at a low prevalence in *E. coli* isolates from pigs (6%), and was not detected in chickens although 29% of isolates from turkeys (N=28) were resistant in 2010.

Additional information

The survey for ESBL *E. coli* in the caecal contents of broilers at slaughter in abattoirs was performed using selective media for ESBL *E. coli*. The percentage of individual broiler caecal samples (n=388) positive for CTX-M *E. coli* was 3.6%. The percentage of abattoirs (n=23) from which CTX-M *E. coli* were isolated was 52.2%. Broiler chickens originating from 12/21 (57.1%) companies were positive for CTX-M *E. coli*. The predominant CTX-M types detected were 1 (accounting for 78% of CTX-M isolates), 3 and 15.

Sampling for ESBL *E. coli* on turkey farms was carried out during the EU Baseline Survey for Salmonella in turkey flocks. Five boot swabs were collected per flock and cultured using selective media. 5.2% of meat farms were positive for CTX-M *E. coli* (n=308 farms) and 6.9% of breeding farms were positive for CTX-M *E. coli* (n=29 farms). The CTX-M types detected included CTX-M-1, -14, -15 and -55, of which CTX-M-14 was predominant and the only CTX-M ESBL detected on breeding farms.

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
	Isolates out of a monitoring program (yes/no)	no
Number of isolates available in the laboratory	1736	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	1519	803
Fluoroquinolones - Enrofloxacin	1736	201
Aminoglycosides - Streptomycin	1519	1080
Trimethoprim + Sulphonamides	1736	795
Penicillins - Ampicillin	1736	1297
Tetracyclines - Tetracycline	1736	1287
Resistant to >4 antimicrobials	1736	1224
Cephalosporins - Cefotaxim	1526	240

Footnote:

Data for Great Britain - England, Scotland and Wales only.

Isolates derived from clinical diagnostic samples.

Table Antimicrobial susceptibility testing of E. coli in Pigs

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
	no	
Isolates out of a monitoring program (yes/no)	181	
Number of isolates available in the laboratory	N	n
Antimicrobials:		
Fluoroquinolones - Enrofloxacin	181	11
Aminoglycosides - Streptomycin	94	43
Trimethoprim + Sulphonamides	181	96
Penicillins - Ampicillin	181	89
Tetracyclines - Tetracycline	181	115
Resistant to >4 antimicrobials	181	82
Cephalosporins - Cefpodoxime	181	13

Footnote:

Data for Great Britain - England, Scotland and Wales only.

Isolates derived from clinical diagnostic samples.

Table Antimicrobial susceptibility testing of *E. coli* in *Gallus gallus* (fowl)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
	Isolates out of a monitoring program (yes/no)	no
Number of isolates available in the laboratory	266	
Antimicrobials:	N	n
Fluoroquinolones - Enrofloxacin	266	0
Aminoglycosides - Neomycin	210	11
Trimethoprim + Sulphonamides	266	52
Penicillins - Ampicillin	266	105
Tetracyclines - Tetracycline	266	133
Resistant to >4 antimicrobials	266	58
Aminoglycosides - Spectinomycin	266	44
Cephalosporins - Cefpodoxime	266	27

Table Antimicrobial susceptibility testing of E. coli in Turkey

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
	Isolates out of a monitoring program (yes/no)	no
Number of isolates available in the laboratory	28	
Antimicrobials:	N	n
Fluoroquinolones - Enrofloxacin	28	8
Aminoglycosides - Neomycin	6	0
Trimethoprim + Sulphonamides	28	8
Penicillins - Ampicillin	28	17
Tetracyclines - Tetracycline	28	21
Resistant to >4 antimicrobials	28	12
Aminoglycosides - Spectinomycin	28	3
Cephalosporins - Cefpodoxime	28	1

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

Test Method Used	Standard methods used for testing
Disc diffusion	VLA/BSAC

		Concentration (microg/ml)		Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol	BSAC		20
Tetracyclines	Tetracycline	VLA		13
Fluoroquinolones	Enrofloxacin	VLA		13
Aminoglycosides	Streptomycin	BSAC		12
	Gentamicin	BSAC		19
	Neomycin	VLA		13
Trimethoprim + Sulphonamides	Trimethoprim + Sulphonamides	BSAC		15
Cephalosporins	Cefotaxim	BSAC		29
	Ceftazidim	BSAC		21
Penicillins	Ampicillin	BSAC		14

Footnote:
 Standards used for testing = VLA historical standards based on British Society for Antimicrobial Chemotherapy standard (BSAC used where VLA standard not available for specific antimicrobial)

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

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, epidemiological investigations and reporting of foodborne outbreaks

The Health Protection Agency has operated a system of surveillance for general outbreaks of infectious intestinal disease (foodborne and non-foodborne) in England and Wales since 1992 (GSURV) and similar systems exist in Scotland and Northern Ireland.

Health Protection Services Colindale, Health Protection Agency, Health Protection Scotland and Health Protection Agency Communicable Disease Surveillance Centre 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 protection unit/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 protection unit/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

The investigation and reporting of foodborne outbreaks within the European Union became mandatory from 2004 (Directive 2003/99/EC). In order to align with the new requirements laid out by the European Food Safety Authority (EFSA) in 2007, as well as modernising the system by enhancing and improving the capture of outbreak information, a stand alone surveillance system from GSURV: eFOSS (HPA electronic Foodborne and non-foodborne gastrointestinal Outbreak Surveillance System), commenced in England and Wales in 2009.

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 disease outbreak or specific zoonotic pathogen.

Description of the types of outbreaks covered by the reporting:

The definitions used in this report are those given in the EFSA Manual for reporting of foodborne outbreaks in accordance with Directive 2003/99/EC from the year 2010.

The UK only reports data for general outbreaks of foodborne infections. A general outbreak is an incident in which two or more people, from more than one household, or residents of an institution, thought to have

a common exposure, experience a similar illness or proven infection (at least one of them having been ill). Data on household outbreaks are not included in the 2010 UK data. This is because it is considered that household outbreaks will be under-ascertained by comparison with general outbreaks, not all household outbreaks involve acquiring 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.

For previous years, the definitions in the relevant annual EFSA manuals were used. The UK submitted all the foodborne outbreak data as possible outbreaks from 2007 to 2009. The reporting of only "possible" outbreaks was specifically a legal issue - publication of this information in these defined categories made it difficult for the UK authorities to prosecute in instances where the foodborne outbreak was reported as a "possible" outbreak as opposed to a "verified" outbreak. In addition, the legal aspects were not considered consistent with the criteria provided in the Guidance Document.

For this year's reporting, the UK has reported the 2010 data using the new reporting system for the distinction between outbreaks based on the evidence implicating a foodstuff. Both foodborne outbreaks with weak and strong evidence are reported.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

There were a total of 69 foodborne outbreaks reported in the UK in 2010. Of these, 52 outbreaks were reported where the strength of the evidence implicating the foodstuff was classified as strong. The annual number of general foodborne outbreaks reported in 2010 was lower compared to 2009 (69 vs 96) and the relative proportions of outbreaks caused by *Campylobacter* and *Salmonella* changed in 2010. The number of outbreaks caused by *Salmonella* (13% or 9/69) decreased in 2010 whereas those caused by *Campylobacter* (27.5% or 19/69) increased. This mirrored the reported decreases in *Salmonella* laboratory confirmed cases and reported increases in *Campylobacter* laboratory confirmed cases in 2010. Noroviruses were the second most commonly reported pathogen after *Campylobacter*, implicated in 18.8% (13/69) of outbreaks. In 20.3% (14/69) of foodborne outbreaks reported during 2010, the causative agent was not determined.

2007 - 2009:

There were a total of 96 possible food-borne outbreaks reported in 2009 in the UK. Outbreaks caused by *Salmonella* species and norovirus were the most commonly reported pathogens in 2009 (30/96, 31% and 17/96, 17%, respectively) while *Campylobacter* was the next most common (14/96, 15%). There were a total of 50 possible foodborne outbreaks reported in 2008 in the UK. The most common causative agent identified in the outbreaks was *Salmonella* species (25 outbreaks). In 2007, there were 25 possible foodborne outbreaks reported in the UK. During the year, the most common causative agent identified in the outbreaks was *Salmonella* species (8 outbreaks).

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

England and Wales:

In 84% (51/61) of the reported outbreaks, a food vehicle was identified. Poultry meat was most frequently identified (20/63, 32%), followed crustacea & shellfish (13/63, 21%). Consumption of poultry liver pate/parfait (14/63, 22%) and oysters (11/63, 17%) were the most common specific foods identified in outbreaks during 2010. Eighty percent (16/20) of poultry associated outbreaks were caused by *Campylobacter*, while all crustacea & shellfish outbreaks were the result of confirmed or suspected norovirus. Red meat outbreaks were linked with a range of causative agents including *Campylobacter* (2), norovirus (2), *Clostridium perfringens* (3), *Listeria monocytogenes* and those of unknown aetiology (2).

The evidence implicating a food vehicle in outbreaks included analytical epidemiology plus microbiological in 5% (3/61), microbiological evidence alone in 20% (12/61), analytical epidemiology alone in 16% (10/61) and descriptive epidemiology in 43% (26/61).

Scotland:

Consumption of chicken and haggis terrine was linked to one food-borne outbreak caused by *Campylobacter* and *Salmonella* Bareilly was linked to the consumption of bean sprouts in another outbreak. Both these foodborne outbreaks had foodstuffs implicated with strong (epidemiological and/or microbiological evidence). A further five foodborne outbreaks were reported during the year with either no food vehicle identified or weak evidence.

Northern Ireland:

There was one foodborne outbreak in 2010 caused by Norovirus and linked to consumption of oysters.

Relevance of the different type of places of food production and preparation in outbreaks

Analysis of the data for England and Wales for 2010 indicated that foodborne outbreaks more often occurred in the food service sector (52/61, 85%), followed by institutional/residential (6/61, 10%) and retail (3/61, 5%) settings. Of the food service sector associated outbreaks, restaurant and takeaway premises accounted for over half (30, 58%) of these, with the majority serving British (12/30, 40%), or Seafood cuisines (6/30, 20%). Specifically by pathogen, 94% (17/18) and 100% (10/10) of *Campylobacter* and norovirus outbreaks, respectively, were linked to food service premises. *Salmonella* spp. outbreaks were in the main also linked to food service premises (4/8, 50%) but also occurred in institutional and residential (2/8, 25%) and retail premises (2/8, 25%).

Factors that contributed to the outbreak were reported in 87% (53/61) of the foodborne outbreaks. Inadequate heat treatment/cooking was the most commonly reported factor (36%, 24/66) in the outbreaks followed by cross contamination (18%, 12/66), an infected food handler (14%, 9/66) poor storage (i.e. storage too warm or too long) (14%, 9/66), an unprocessed contaminated ingredient (6%, 4/66), poor personal hygiene (5%, 3/66), poor hand-washing facilities (5%, 3/66), and inadequate chilling (3%, 2/66). *Campylobacter* outbreaks were most frequently caused by inadequate heat treatment of the implicated food (58%, 14/24) or a cross contamination event (21%, 5/24) while norovirus outbreaks were primarily caused by infected food handlers (67%, 6/9).

In Scotland, the food-borne outbreaks recorded with strong evidence during the year occurred at a restaurant (1) and in the community (1). No information was available on outbreak setting for the single reported outbreak in Northern Ireland.

Additional information

Evidence from reported foodborne outbreaks occurring in the UK during 2010 has again shown that the majority of outbreaks were linked specifically to food service premises, and that these were related to inadequate cooking of the food and/or cross contamination in the kitchen. The Health Protection Agency and the UK Food Standards Agency has reminded caterers to make sure poultry livers are cooked thoroughly and of the need to adopt appropriate control measures and follow food safety advice provided by the UK Food Standards Agency (Reference: Food Standards Agency. Safer Food, Better Business. Available at:

<http://www.food.gov.uk/foodindustry/regulation/hygleg/hyglegresources/sfbb/>).

Improving hygiene and lowering the risk of introducing *Campylobacter*, *Salmonella*, norovirus and other pathogens into the food service sector are needed in order to reduce the risk of infection.

Table Foodborne Outbreaks: summarised data

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Salmonella - S. Typhimurium	1	5	0	0	1	2
Salmonella - S. Enteritidis	0	0	0	0	2	2
Salmonella - Other serovars	1	24	2	0	4	5
Campylobacter	2	92	4	0	17	19
Listeria - Listeria monocytogenes	0	0	0	0	2	2
Listeria - Other Listeria	0	0	0	0	0	0
Yersinia	0	0	0	0	0	0
Escherichia coli, pathogenic -	2	5	1	0	0	2
Bacillus - B. cereus	0	0	0	0	0	0
Bacillus - Other Bacillus	0	0	0	0	0	0
Staphylococcal enterotoxins	0	0	0	0	0	0
Clostridium - Cl. botulinum	0	0	0	0	0	0
Clostridium - Cl. perfringens	2	33	2	0	3	5
Clostridium - Other Clostridia	0	0	0	0	0	0
Other Bacterial agents - Brucella	0	0	0	0	0	0

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Other Bacterial agents - Shigella	0	0	0	0	0	0
Other Bacterial agents - Other Bacterial	0	0	0	0	0	0
Parasites - Trichinella	0	0	0	0	0	0
Parasites - Giardia	0	0	0	0	0	0
Parasites - Cryptosporidium	0	0	0	0	0	0
Parasites - Anisakis	0	0	0	0	0	0
Parasites - Other Parasites	0	0	0	0	0	0
Viruses - Norovirus	6	167	1	0	7	13
Viruses - Hepatitis viruses	0	0	0	0	0	0
Viruses - Other Viruses	0	0	0	0	0	0
Other agents - Histamine	0	0	0	0	4	4
Other agents - Marine biotoxins	0	0	0	0	0	0
Other agents - Other Agents	1	20	0	0	0	1
Unknown agent	2	12	0	0	12	14

One outbreak with mixed aetiology (Campylobacter and Norovirus) recorded under "Other Agents" in the table

Table Foodborne Outbreaks: detailed data for Campylobacter

Please use CTRL for multiple selection fields

Campylobacter spp., unspecified

Value

FBO Code	2010/104
Number of outbreaks	1
Number of human cases	24
Number of hospitalisations	1
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/103
Number of outbreaks	1
Number of human cases	21
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	Beef burgers and sausages, chicken quarters, prepared vegetable and pasta salad dishes
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Cross-contamination;Inadequate heat treatment;Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were bovine meat and products thereof; broiler meat (<i>Gallus gallus</i>) and products thereof; mixed or buffet meals. Analytical epidemiological evidence: cohort study.

Campylobacter spp., unspecified

Value

FBO Code	2010/44
Number of outbreaks	1
Number of human cases	36
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Analytical epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: cohort study

Campylobacter spp., unspecified

Value

FBO Code	2010/100
Number of outbreaks	1
Number of human cases	44
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Tap water, including well water
More food vehicle information	Private drinking water supply, meat sausages, chicken drumsticks
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were private water supply; bovine meat and products thereof; broiler meat (<i>Gallus gallus</i>) and products thereof. Analytical epidemiological evidence: cohort study

Campylobacter spp., unspecified

Value

FBO Code	2010/102
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	1
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver parfait
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/123
Number of outbreaks	1
Number of human cases	13
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Analytical epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: case control study

Campylobacter spp., unspecified

Value

FBO Code	2010/59
Number of outbreaks	1
Number of human cases	26
Number of hospitalisations	1
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken liver parfait
Nature of evidence	Analytical epidemiological evidence; Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Intra EU trade
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: cohort study. Inns T, Foster K, Gorton R. Cohort study of a campylobacteriosis outbreak associated with chicken liver parfait, United Kingdom, June 2010. <i>Euro Surveill.</i> 2010;15(44):pii=19704. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19704

Campylobacter spp., unspecified

Value

FBO Code	2010/26
Number of outbreaks	1
Number of human cases	15
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken liver parfait
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Overview of Campylobacter foodborne outbreaks associated with poultry liver pate published: Health Protection Agency. (2010). Foodborne outbreaks of Campylobacter associated with consumption of poultry liver pâté/parfait – spotlight on caterers and food safety. Health Protection Report (serial online) 2010; 4 (48); news. Available at: http://www.hpa.org.uk/hpr/archives//2010/hpr4810.pdf

Campylobacter spp., unspecified

Value

FBO Code	2010/56
Number of outbreaks	1
Number of human cases	6
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken liver parfait
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: cohort study

Campylobacter spp., unspecified

Value

FBO Code	2010/89
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment;Infected food handler;Unprocessed contaminated ingredient;Water treatment failure
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/101
Number of outbreaks	1
Number of human cases	17
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken liver parfait, poached quail eggs with spinach and hollandais sauce
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination;Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were broiler meat (<i>Gallus gallus</i>) and products thereof; mixed or buffet meals

Campylobacter spp., unspecified

Value

FBO Code	2010/93
Number of outbreaks	1
Number of human cases	19
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken thighs, duck liver pate (with orange)
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination;Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/108
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/47
Number of outbreaks	1
Number of human cases	34
Number of hospitalisations	2
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Intra EU trade
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/124
Number of outbreaks	1
Number of human cases	6
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	2010/114
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken liver pate
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	

Campylobacter spp., unspecified

Value

FBO Code	10-3-41
Number of outbreaks	1
Number of human cases	18
Number of hospitalisations	2
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	Chicken and Haggis terrine
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were broiler meat and products thereof and sheep meat and products thereof

Table Foodborne Outbreaks: detailed data for Clostridium

Please use CTRL for multiple selection fields

C. perfringens

Value

FBO Code	2010/76
Number of outbreaks	1
Number of human cases	23
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Other or mixed red meat and products thereof
More food vehicle information	Beef, pork and turkey.
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles included Bovine meat and products thereof; Pig meat and products thereof; Turkey meat and products thereof

C. perfringens

Value

FBO Code	2010/119
Number of outbreaks	1
Number of human cases	25
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Other or mixed red meat and products thereof
More food vehicle information	Beef and lamb
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles included Bovine meat and products thereof; Sheep meat and products thereof

C. perfringens

Value

FBO Code	2010/62
Number of outbreaks	1
Number of human cases	5
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Other or mixed red meat and products thereof
More food vehicle information	Goat curry, fish
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination;Inadequate heat treatment;Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were Other or mixed red meat and products thereof; Fish and fish products. Contributory factors included food safety management system not in place

Table Foodborne Outbreaks: detailed data for Listeria

Please use CTRL for multiple selection fields

L. monocytogenes - L. monocytogenes serovar 1/2a

Value

FBO Code	2010/127
Number of outbreaks	1
Number of human cases	10
Number of hospitalisations	10
Number of deaths	2
Food vehicle	Other or mixed red meat and products thereof
More food vehicle information	Tongue, Beef, Pork, Ham, Chicken, Turkey.
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Disseminated cases
Place of origin of problem	Processing plant
Origin of food vehicle	Domestic market
Contributory factors	Cross-contamination
Mixed Outbreaks (Other Agent)	
Additional information	Listeria monocytogenes serotype 1/2a, Amplified Fragment Length Polymorphism (AFLP) type XIV, fluorescent AFLP type 6a infection. Food vehicles: Bovine meat and products thereof; Pig meat and products thereof; Broiler meat (Gallus gallus) and products thereof; Turkey meat. This was a national incident linked to a nationally distributed retail meats.

L. monocytogenes - L. monocytogenes O4

Value

FBO Code	2010/125
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	4
Number of deaths	1
Food vehicle	Other foods
More food vehicle information	Salmon and cress sandwiches, Egg mayonnaise sandwiches
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Hospital/medical care facility
Place of origin of problem	Processing plant
Origin of food vehicle	Domestic market
Contributory factors	Cross-contamination;Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	L. monocytogenes serotype 4 Amplified Fragment Length Polymorphism (AFLP) type I, fluorescent AFLP type 33

Table Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

Histamine

Value

FBO Code	2010/126
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	2
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	Tuna
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	Scrombotoxin

Histamine

Value

FBO Code	2010/32
Number of outbreaks	1
Number of human cases	15
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Cheese
More food vehicle information	Marcaroni cheese made with vegetarian cheddar
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Processing plant
Origin of food vehicle	Intra EU trade
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Place of origin of problem: cheese manufacturer. Contributory factor: histamine production during ripening stage of cheese production

Histamine

Value

FBO Code	2010/71
Number of outbreaks	1
Number of human cases	5
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	Tuna - canned
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	Causative agent: scrombotoxin. Overview of scombrotoxin foodborne outbreaks associated with tuna published: Health Protection Agency (2010). Recent outbreaks and incidents of scombrotoxic fish poisoning in England. Health Protection Report (serial online) 2010; 4 (32); news. Available at: http://www.hpa.org.uk/hpr/archives/2010/hpr3210.pdf

Histamine

Value

FBO Code	2010/78
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	Tuna pasta salad, tuna sandwiches.
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Imported from outside EU
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	Scrombotoxin

Table Foodborne Outbreaks: detailed data for Salmonella

Please use CTRL for multiple selection fields

S. Enteritidis - PT 4

Value

FBO Code	2010/14
Number of outbreaks	1
Number of human cases	11
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	School meals
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	

S. Typhimurium - DT 8

Value

FBO Code	2010/77
Number of outbreaks	1
Number of human cases	81
Number of hospitalisations	5
Number of deaths	1
Food vehicle	Eggs and egg products
More food vehicle information	Duck eggs
Nature of evidence	Descriptive epidemiological evidence; Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans; Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Disseminated cases
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Multiple settings involved including: Mobile retailer/Market/Street vendor (farm gate sales), Restaurant/Café/Pub/bar/Hotel. Noble, D.J, Lane, C., Little, C.L., Davies, R., de Pinna, E., Larkin, L., Morgan, D. (2011). Revival of an old problem: An increase of Salmonella enterica serovar Typhimurium Definitive Phage Type 8 Infections in 2010 in England and Northern Ireland linked to duck eggs. <i>Epidemiology & Infection</i> : In press 2011.

S. Kottbus

Value

FBO Code	2010/13
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Bean sprouts
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Take-away or fast-food outlet
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	

S. Bareilly

Value

FBO Code	2010/87
Number of outbreaks	1
Number of human cases	231
Number of hospitalisations	32
Number of deaths	1
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Bean sprouts
Nature of evidence	Analytical epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Imported from outside EU
Contributory factors	Inadequate heat treatment;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: case control study. Cleary P, Browning L, Coia J, Cowden J, Fox A, Kearney J, Lane C, Mather H, Quigley C, Syed Q, Tubin-Delic D, on behalf of the outbreak control team. A foodborne outbreak of Salmonella Bareilly in the United Kingdom, 2010. Euro Surveill. 2010;15(48):pii=19732. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19732

S. Enteritidis - PT 6a

Value

FBO Code	2010/95
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Cereal products including rice and seeds/pulses (nuts, almonds)
More food vehicle information	Egg fried rice
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Take-away or fast-food outlet
Place of origin of problem	Take-away or fast-food outlet
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination;Inadequate chilling;Inadequate heat treatment;Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	

S. Bareilly

Value

FBO Code	10-3-51
Number of outbreaks	1
Number of human cases	21
Number of hospitalisations	3
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Bean sprouts
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Other setting
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	Setting: in the community

S. Paratyphi B var. Java

Value

FBO Code	2010/92
Number of outbreaks	1
Number of human cases	130
Number of hospitalisations	16
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Mixed lettuce leaves
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Disseminated cases
Place of origin of problem	Unknown
Origin of food vehicle	Domestic market
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	<p>Causative agent Salmonella Java PT3 VAR9</p> <p>Analytical epidemiological evidence: case control study.</p> <p>This was a national incident linked to nationally distributed lettuce to retail and catering sectors.</p> <p>Health Protection Agency. (2010). S. Java. Health Protection Report (serial online) 2010; 4 (40); news. Available at:</p> <p>http://www.hpa.org.uk/hpr/archives/2010/hpr4010.pdf</p>

Table Foodborne Outbreaks: detailed data for Unknown agent

Please use CTRL for multiple selection fields

Unknown

Value

FBO Code	2010/19
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/5
Number of outbreaks	1
Number of human cases	30
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Intra EU trade
Contributory factors	Infected food handler;Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/4
Number of outbreaks	1
Number of human cases	5
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/60
Number of outbreaks	1
Number of human cases	11
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Prawn cocktail
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	

Unknown

Value

FBO Code	2010/68
Number of outbreaks	1
Number of human cases	24
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Bovine meat and products thereof
More food vehicle information	Beef
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: cohort study

Unknown

Value

FBO Code	2010/25
Number of outbreaks	1
Number of human cases	7
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/22
Number of outbreaks	1
Number of human cases	40
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	Lamb curry, lamb kebab, boiled rice
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Inadequate heat treatment;Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	

Unknown

Value

FBO Code	2010/11
Number of outbreaks	1
Number of human cases	16
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/6
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/109
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (<i>Gallus gallus</i>) and products thereof
More food vehicle information	Chicken
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Analytical epidemiological evidence: case control study

Unknown

Value

FBO Code	2010/38
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Unknown

Value

FBO Code	2010/24
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Table Foodborne Outbreaks: detailed data for Viruses

Please use CTRL for multiple selection fields

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/3
Number of outbreaks	1
Number of human cases	16
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Origin of food vehicle was intracommunity trade and domestic market. Contributory factor: inadequate depuration

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/34
Number of outbreaks	1
Number of human cases	20
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Mixed vegetable salad
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination;Infected food handler;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/23
Number of outbreaks	1
Number of human cases	26
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Bovine meat and products thereof
More food vehicle information	Beef
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate heat treatment
Mixed Outbreaks (Other Agent)	
Additional information	Evidence: cohort study

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/17
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/9
Number of outbreaks	1
Number of human cases	16
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	Fresh fruit salad & cream meringue, Pork
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Other
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination; Infected food handler; Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Food vehicles were Other foods; Pig meat & products thereof. Contributory factors included Infected food handler, Cross-contamination, Poor personal hygiene (staff)

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/18
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Oysters
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Domestic market
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	Contributory factor: inadequate depuration

Calicivirus - norovirus (Norwalk-like virus)

Value

FBO Code	2010/12
Number of outbreaks	1
Number of human cases	20
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Prawns with mayonnaise
Nature of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	Evidence: cohort study