European Food Safety Authority

ZOONOSES MONITORING

BELGIUM

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

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

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

IN 2009

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Belgium

Reporting Year:

Laboratory name	Description	Contribution
FASFC AFSCA FAVV	Federal Agency for the Safety of the Food Chain	
IPH WIV ISP	Scientific Institute of Public Health	
VAR CODA CERVA	Veterinary and Agrochemical Research Centre	
ITG	Institute of Tropical Medicine	
IPH Pasteur Institute	Pasteur Institute of the Scientific Institute of Public Health	

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 Belgium during the year 2009 .

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

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

SANITRACE and BELTRACE database of the Federal Agency for the Safety of the Food Chain.

Dates the figures relate to and the content of the figures

Number of animals = number of animals at a certain time point of the year.
Number of slaughtered animals = total number of slaughtered animals during the year.

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

Holding: any establishment, construction or, in the case of an open-air farm, any place in which animals are held, kept or handled.
The location of the holding is based on the address and the coordinates of the geographical entity. A geographical entity is a unit of one building or a complex of buildings included grounds and territories where an animal species is or could be hold.

Herd: an animal or group of animals kept on a holding as an epidemiological unit; if more than one herd is kept on a holding, each of these herds shall form a distinct unit and shall have the same health status.

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

For the last years, there's a significant decrease in total number of holdings for bovines. On the other hand, the total number of bovine animals is only slightly decreasing what means that the mean total number of animals per premise is increasing.

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

Belgium can be geographically divided into two regions: the Flemish region situated in the north of the country and the Walloon region situated in the south. There's a very dense animal population of bovines, swine and poultry in the Flemish region. The Walloon region is important for his cattle breeding holdings of the Belgian Blue White race. The number of swine and poultry holdings in this region is limited.

Table Susceptible animal populations

* Only if different than current reporting year

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	meat production animals			480068					
	calves (under 1 year)			319188					
	- in total			799256		2594358		36064	
Deer	farmed - in total			611		9502		2810	
	wild - at game handling establishment			10392					
Ducks	meat production flocks					42040		17	
	- in total			52581		42040			
Gallus gallus (fowl)	elite breeding flocks, unspecified - in total [1)]	4	2009			24840	2009	2	2009
	parent breeding flocks, unspecified - in total [2)]	824	2009			3273189	2009	214	2009
	broilers	8049	2009	262935369		23718984	2009	838	2009
	laying hens [3)]	1046	2009	27621546		8449074	2009	384	2009
	- in total			290556915		35466087			
Geese	meat production flocks					400		1	

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Geese	- in total			1107		400			
Goats	- in total			6143		57371		12530	
Pigs	breeding animals			170474		598857			
	fattening pigs			11507409		5113202			
	- in total			11677883		5712059		9243	
Sheep	- in total			135071		215262		30626	
Solipeds, domestic	horses - in total			8910		179141			
Turkeys	meat production flocks			916554		272705		37	
	- in total			916554		272705			
Wild boars	farmed - in total			36					
	wild - at game handling establishment			10744					

Comments:

[1)] animals: max capacity
[2)] animals: max capacity
[3)] livestock numbers: max capacity

2. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

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

2.1 SALMONELLOSIS

2.1.1 General evaluation of the national situation

2.1.2 Salmonella in foodstuffs

A. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring program was organized by the FASFC in slaughterhouses and cutting plants.
Sampling was done by a specially trained staff. For most matrices, approximately 100 - 200 independent samples were taken per matrix in order to detect a minimal contamination rate of 1% with 95% confidence.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

At meat processing plant

Sampling distributed evenly throughout the year

At retail

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Minced meat, ham, sausages and other

At retail

Meat, minced meat, ham, pate, sausages, meat salads and other

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The matrices were carcasses, cuts and minced meat of pork. Sampling of pork carcasses was done by means of swabs. The following contamination levels were analyzed: 10 g or 25g (cutting, minced meat of pork) and 600 cm2 (pork carcasses).

At meat processing plant

The samples were more than 200 g of meat. The detection of Salmonella has been assessed in 10g or 25g of sample.

At retail

The presence of Salmonella has been assessed in 10g or 25g of sample.

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive in case of detection of Salmonella in the sample.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: ISO 6579:2002

B. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring program was organized by the FASFC. More than 200 Belgian slaughterhouses, more than 100 meat cutting plants and more than 100 retail trades representative of the Belgian production of carcasses and meat were selected.
The matrices were carcasses, cuts and minced meat of beef.
The following contamination levels were analyzed: 10 g or 25g cutting or minced meat of beef.
Sampling was done by a specially trained staff. For most matrices, approximately 100 - 300 independent samples were taken per matrix in order to detect a minimal contamination rate of 1% with 95% confidence.

Frequency of the sampling

At meat processing plant

Sampling distributed evenly throughout the year

At retail

Sampling distributed evenly throughout the year

Type of specimen taken

At meat processing plant

Minced meat, sausages and other

At retail

Meat, minced meat, pate, sausages, meat salads and other

Methods of sampling (description of sampling techniques)

At meat processing plant

The samples were more than 200 g of meat. The detection of Salmonella has been assessed in 10g or 25g of sample.

At retail

The presence of Salmonella has been assessed in 10g or 25g of sample.

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive in case of detection of Salmonella in the sample.

C. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring program in Belgian slaughterhouses and cutting plants was organized by the FASFC.
The matrices were carcasses, fillets and meat preparation of broilers. The carcass samples of broiler consisted of 10g of neck skin. The following contamination levels were analysed: 25g cutting meat and 10g of minced meat of chicken and 1g of chicken carcasses.
Sampling was done by a specially trained staff. For most matrixes, independent samples were taken per matrix in order to detect a minimal contamination rate of 1% with 95% confidence.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

At meat processing plant

Sampling distributed evenly throughout the year

At retail

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Minced meat, sausages, meat and other

At retail

Minced meat, sausages, meat and other

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The matrices were carcasses, fillets and meat preparation of broilers. The carcass samples of broiler consisted of 10g of neck skin. The following contamination levels were analyzed: 25g cutting meat and 10g of minced meat of chicken and 1g of chicken carcasses.

At meat processing plant

The samples were about 200 g of meat. The detection of Salmonella has been assessed in 10g of sample.

At retail

The presence of Salmonella has been assessed in 10g of sample.

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive in case of detection of Salmonella in the sample.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: ISO 6579:2002

D. Salmonella spp. in food

Monitoring system

Sampling strategy

A monitoring program was organized by the Federal Agency for the Safety of the Food Chain. More than 200 Belgian slaughterhouses, more than 100 meat cutting plants and more than 100 retail trades representative of the Belgian production, were selected for this study. The samples assayed were carcasses, cuts and minced meat from pork, carcasses, cuts and meat preparation from chicken, layer carcasses, beef minced meat and other foodstuffs. Sampling was done by a specially trained staff of the Federal Agency for the Safety of the Food Chain. For most of the matrices, approximately 100 - 300 independent samples were taken per matrix in order to detect a minimal contamination rate of 1% with 95% confidence. Salmonella isolates were serotyped and serotypes Typhimurium, Enteritidis, Virchow and Hadar were lysotyped. The antibiotic resistance profiles were determined for all isolates, and included ceftriaxone, ampicillin, kanamycin, sulfamethoxazole, tetracycline, nalidixic acid, ciprofloxacin, chloramphenicol and trimethoprim.

Frequency of the sampling

Samples have been taken every week from the first to the 52nd week, except during the 30th week.

Type of specimen taken

Meat

Methods of sampling (description of sampling techniques)

Sampling of pork carcasses was done by means of swabs. The carcass samples of broiler and layer consisted of 10g of neck skin. The other samples were about 200g of meat.
The detection of Salmonella has been assessed in these dilutions: 25g (cutting and minced meat of pork, chicken cuts and beef), 600 cm2 (pork carcasses), and 1g (chicken and layer carcasses, chicken meat preparation).

Definition of positive finding

A sample is considered to be positive after biochemical confirmation of one Salmonella spp. in the sample.

Diagnostic/analytical methods used

Five laboratories licensed by the Federal Agency for the Safety of the Food Chain and accredited following ISO 17025 standard analyzed all the samples. The Belgian official method SP-VG-M002 was used for the detection of Salmonella in 25g, 1g or on swabs:
- pre-enrichment in buffered peptone water at 37°C for 16 to 20 h,
- selective enrichment on the semi-solid Diassalm medium at 42°C for 24 h,
- isolation of positive colonies on XLD at 37°C for 24 h,
- confirmation of minimum 2 colonies on TSI at 37°C and miniaturised biochemical tests,
- serotyping and lysotyping were done at the National Reference Center for Salmonella and Shigella (NRCSS-IPH) and at the Institute Pasteur, both located in Brussels, respectively.
- antibiotic resistance determination by IPH Brussels by disk diffusion method.

Preventive measures in place

Controls are made in place by the Federal Agency in case of notification.

Control program/mechanisms

The control program/strategies in place

Notification is mandatory since 1/3/2004 (Ministerial Decree on mandatory notification in the food chain of 22/1/2004). For Salmonella, absence in 25g in ready-to-eat food putted on the market is mandatory. Laboratories have to inform the Federal Agency in case of a positive sample.

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Not typeable	S. 9:-:-	S. Agona
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse	FASFC DPA003	Single	1g	422	25		3		6	1	
Meat from broilers (Gallus gallus) - fresh - at processing plant	FASFC TRA200	Single	25g	415	34	4			7	1	3
Meat from broilers (Gallus gallus) - fresh - at retail	FASFC DIS 821	Single	25g	119	7				2		
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant	FASFC TRA202	Batch	10g	60	10	1	2		1		3
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail	FASFC DIS826 DIS863	Batch	10g	60	17	1	1	7			2
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at processing plant	FASFC TRA208	Batch	10g	37	0						
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at retail	FASFC DIS876	Batch	10g	55	1						
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant	FASFC TRA303	Batch	10g	11	1						
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at retail	FASFC DIS880	Batch	10g	66	13			6			1
Meat from turkey - fresh - at retail	FASFC DIS821	Single	25g	1	0						
Meat from turkey - meat preparation - intended to be eaten cooked - at retail	FASFC DIS826 DIS863	Batch	10g	3	0						

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Not typeable	S. 9:-:-	S. Agona
Meat from turkey - meat products - raw but intended to be eaten cooked - at retail	FASFC DIS876	Batch	10g	23	0						
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant	FASFC TRA303	Batch	10g	1	0						
Meat from turkey - minced meat - intended to be eaten cooked - at retail	FASFC DIS880	Batch	10g	2	0						
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - Survey - EU baseline survey	FASFC DPA035	Batch	25g	380	77		11		15		5
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling	FASFC DPA019	Batch	25g	178	46			46			
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling	FASFC DPA020	Batch	25g	171	73			73			
Meat from other poultry species - fresh - at slaughterhouse - Monitoring - official sampling - objective sampling [1)]	FASFC DPA004	Single	1g	350	126	78	3		12	1	

	S. Anatum	S. Bareilly	S. Blockley	S. Braenderup	S. California	S. Corvallis	S. Hadar	S. Havana	S. Heidelberg	S. Indiana	S. Infantis
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse	3										1
Meat from broilers (Gallus gallus) - fresh - at processing plant									1		1

Table Salmonella in poultry meat and products thereof

	S. Anatum	S. Bareilly	S. Blockley	S. Braenderup	S. California	S. Corvallis	S. Hadar	S. Havana	S. Heidelberg	S. Indiana	S. Infantis
Meat from broilers (Gallus gallus) - fresh - at retail											
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant											
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail											
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at processing plant											
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at retail											
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant											
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at retail											
Meat from turkey - fresh - at retail											
Meat from turkey - meat preparation - intended to be eaten cooked - at retail											
Meat from turkey - meat products - raw but intended to be eaten cooked - at retail											
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant											
Meat from turkey - minced meat - intended to be eaten cooked - at retail											

Table Salmonella in poultry meat and products thereof

	S. Anatum	S. Bareilly	S. Blockley	S. Braenderup	S. California	S. Corvallis	S. Hadar	S. Havana	S. Heidelberg	S. Indiana	S. Infantis
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - Survey - EU baseline survey	3		3				1		1	1	7
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling											
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling											
Meat from other poultry species - fresh - at slaughterhouse - Monitoring - official sampling - objective sampling [1)]		1		1	1	2		1		3	7

	S. Livingstone	S. Mbandaka	S. Montevideo	S. Newport	S. Paratyphi B	S. Paratyphi B var. Java	S. Tokoin	S. Typhimurium var. Copenhagen	S. Virchow
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse				1	7	2		1	
Meat from broilers (Gallus gallus) - fresh - at processing plant				2	10	2			3
Meat from broilers (Gallus gallus) - fresh - at retail	1	1	1		2				
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant					1	1			1

Table Salmonella in poultry meat and products thereof

	S. Livingstone	S. Mbandaka	S. Montevideo	S. Newport	S. Paratyphi B	S. Paratyphi B var. Java	S. Tokoin	S. Typhimurium var. Copenhagen	S. Virchow
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail					6				
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at processing plant									
Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - at retail					1				
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant						1			
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at retail					6				
Meat from turkey - fresh - at retail									
Meat from turkey - meat preparation - intended to be eaten cooked - at retail									
Meat from turkey - meat products - raw but intended to be eaten cooked - at retail									
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant									
Meat from turkey - minced meat - intended to be eaten cooked - at retail									
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - Survey - EU baseline survey	3		2			7			18

Table Salmonella in poultry meat and products thereof

	S. Livingstone	S. Mbandaka	S. Montevideo	S. Newport	S. Paratyphi B	S. Paratyphi B var. Java	S. Tokoin	S. Typhimurium var. Copenhagen	S. Virchow
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling									
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - caecum - Monitoring - official sampling - objective sampling									
Meat from other poultry species - fresh - at slaughterhouse - Monitoring - official sampling - objective sampling [1)]	2	1			3			2	8

Comments:

[1)] spent hens

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Not typeable	S. 9:-:-	S. Agona
Meat from pig - fresh - at slaughterhouse	FASFC DPA002	Single	600cm2	840	115		51		3		1
Meat from pig - fresh - at processing plant	FASFC TRA306	Single	25g	239	8	1	2				
Meat from bovine animals and pig - at processing plant (Mechanically separated meat (MSM))	FASFC TRA209	Batch	10g	116	18	2	4	2			
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at processing plant	FASFC TRA312	Batch	10g	154	6						
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at retail	FASFC DIS875	Batch	10g	157	2						
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at processing plant	FASFC TRA304 TRA316	Batch	25g	229	2		2				
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at retail	FASFC DIS815 DIS874	Batch	25g	198	2						
Meat from bovine animals and pig - meat products - at processing plant (cooked, ready-to-eat)	FASFC TRA317	Batch	25g	179	3		1			2	
Meat from bovine animals and pig - meat products - at retail (cooked, ready-to-eat)	FASFC DIS801	Batch	25g	45	0						
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at processing plant	FASFC TRA303	Batch	25g	41	1						
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail	FASFC DIS888	Batch	10g	239	2		2				

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	Not typeable	S. 9:-:-	S. Agona
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at processing plant	FASFC TRA304	Batch	25g	75	0						
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail	FASFC DIS823	Batch	25g	240	8		6				

	S. Braenderup	S. Brandenburg	S. Derby	S. Goldcoast	S. Heidelberg	S. Infantis	S. Kentucky	S. Livingstone	S. London	S. Muenchen	S. Ohio
Meat from pig - fresh - at slaughterhouse		9	8			1		1	3	1	12
Meat from pig - fresh - at processing plant		1		1							
Meat from bovine animals and pig - at processing plant (Mechanically separated meat (MSM))			1		1	2	1				
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at processing plant											
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at retail											
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at processing plant											
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at retail											
Meat from bovine animals and pig - meat products - at processing plant (cooked, ready-to-eat)											

Table Salmonella in red meat and products thereof

	S. Braenderup	S. Brandenburg	S. Derby	S. Goldcoast	S. Heidelberg	S. Infantis	S. Kentucky	S. Livingstone	S. London	S. Muenchen	S. Ohio
Meat from bovine animals and pig - meat products - at retail (cooked, ready-to-eat)											
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at processing plant											
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail											
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at processing plant											
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail											

	S. Panama	S. Paratyphi B	S. Rissen	S. Senftenberg	S. Tokoin	S. Typhimurium var. Copenhagen	S. Virchow
Meat from pig - fresh - at slaughterhouse	1		6	1		17	
Meat from pig - fresh - at processing plant		1	1			1	
Meat from bovine animals and pig - at processing plant (Mechanically separated meat (MSM))		3	1				1
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at processing plant		2				4	
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at retail						2	

Table Salmonella in red meat and products thereof

	S. Panama	S. Paratyphi B	S. Rissen	S. Senftenberg	S. Tokoin	S. Typhimurium var. Copenhagen	S. Virchow
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at processing plant							
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at retail						2	
Meat from bovine animals and pig - meat products - at processing plant (cooked, ready-to-eat)							
Meat from bovine animals and pig - meat products - at retail (cooked, ready-to-eat)							
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at processing plant					1		
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail							
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at processing plant							
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail						2	

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	S. Infantis
Crustaceans - at retail	FASFC DIS852	Batch	25g	60	0				
Crustaceans - unspecified - cooked - at processing plant	FASFC TRA401	Batch	25g	31	0				
Egg products - at processing plant	FASFC TRA105	Batch	25g	76	1	1			
Egg products - at retail	FASFC DIS885	Batch	25g	15	0				
Eggs - table eggs - at retail	FASFC DIS868	Batch	25g	118	0				
Fishery products, unspecified - at retail	FASFC DIS873	Batch	25g	62	0				
Foodstuffs intended for special nutritional uses - dried dietary foods for special medical purposes intended for infants below 6 months	FASFC DIS862	Batch	25g	80	0				
Fruits and vegetables - precut	FASFC DIS813	Batch	25g	60	1			1	
Fruits and vegetables - precut - ready-to-eat	FASFC TRA502	Batch	25g	31	0				
Infant formula - dried - intended for infants below 6 months	FASFC TRA127	Batch	25g	10	0				
Juice - fruit juice - unpasteurised	FASFC TRA517	Batch	25g	4	0				
Live bivalve molluscs	FASFC DIS806	Batch	25g	94	1				1
Molluscan shellfish - cooked - at retail	FASFC DIS852	Batch	25g	22	0				
Molluscan shellfish - raw - at retail	FASFC DIS852	Batch	25g	38	0				

Table Salmonella in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant	FASFC TRA134	Batch	25g	82	0			
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at retail	FASFC DIS818	Batch	25g	100	0			
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant	FASFC TRA133	Batch	25g	40	0			
Cheeses made from goats' milk - soft and semi-soft - at processing plant	FASFC TRA134	Batch	25g	15	0			
Cheeses made from goats' milk - soft and semi-soft - made from pasteurised milk - at processing plant	FASFC TRA133	Batch	25g	14	0			
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at retail	FASFC DIS858	Batch	25g	11	0			
Dairy products (excluding cheeses) - cream - made from raw or low heat-treated milk - at processing plant	FASFC TRA190	Batch	25g	23	0			
Dairy products (excluding cheeses) - ice-cream - at retail	FASFC DIS859 DIS887	Batch	25g	61	0			
Dairy products (excluding cheeses) - milk powder and whey powder - at processing plant	FASFC TRA123	Batch	25g	45	0			

2.1.3 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)

Breeding flocks are sampled as day-old chicks, at the age of 4 and 16 weeks and every 2 weeks during production. An official control takes place at 22 weeks, 46 weeks and 58 or 62 weeks. A specific Salmonella control is performed 4 times a year in the hatcheries by the owner.

Frequency of the sampling

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

Every flock is sampled

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

At the age of 4 and 16 weeks

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

Every 2 weeks

Type of specimen taken

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

Internal linings of delivery boxes

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

Socks/ boot swabs

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

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

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

At the farm, pieces (5 by 5 cm) of the inner linnings of delivery boxes are taken of each flock. 2 samples are taken, one for the hen-chicks and one for the cock-chicks. Each sample consists of 20 pieces of innerlining. The two samples are analysed separately. On voluntary basis, 20 living hen-chicks and 20 living cock-chicks are brought to the laboratory for serological testing.
The samples have to be taken the day of delivery, the samples have to reach the lab within 24 hours of sampling.
In the hatcheries, pooled samples from dead-in-the-shell chicks and of fluff and meconium, are taken by the owner every 3 months. These are sent to an accredited laboratory.

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

Samples are taken by the owner at 4 weeks and by one of the animal health organisations at 16 weeks, both in accordance with regulation (EC) Nr. 1003/2005.

Breeding flocks: Production period

All samples are taken in accordance with Regulation (EC) Nr. 1003/2005.

Case definition

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

A sample is considered positive if Salmonella Enteritidis, Typhimurium, Hadar, Infantis or Virchow is isolated from a sample. A flock is considered positive as soon as one sample is positive.

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

A sample is considered positive if Salmonella Enteritidis, Typhimurium, Hadar, Infantis or Virchow is isolated. A flock is considered positive as soon as one sample is positive. If the farmer requests a confirmation sampling, new samples (5 feces and 2 dust samples) are taken by or under the supervision of the competent authority. The result of the confirmation samples are binding.

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

A sample is considered positive if Salmonella Enteritidis, Typhimurium, Hadar, Infantis or Virchow is isolated. A flock is considered positive as soon as one sample is positive. If the farmer requests a confirmation sampling, new samples (5 feces and 2 dust samples) are taken by or under the supervision of the competent authority. The result of the confirmation samples are binding.

Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

Vaccination policy

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

Vaccination against Salmonella Enteritidis is compulsory for parent flocks and prohibited for grand parent flocks. Vaccination against Salmonella Typhimurium is strongly recommended for parent flocks and prohibited for grandparent flocks.

Other preventive measures than vaccination in place

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

All breeding flocks must have Health Qualification A. The qualification consists of minimal requirements for infrastructure, management and biosecurity measures.

Control program/mechanisms

The control program/strategies in place

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

The national control programme for Salmonella in breeding flocks is based on Regulations (EG) Nrs. 2160/2003, 1003/2005 and 1177/2006.

Measures in case of the positive findings or single cases

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

1) Incubation of hatching eggs is prohibited.

2) Incubated hatching eggs are removed and destroyed.

3) Not yet incubated hatching eggs may be pasteurized and put on the market for human consumption.

4) Positive breeding flocks are slaughtered within the month.

5) Cleaning and disinfection of housing after removal of the breeding flock.

6) A new flock is admitted if Salmonella can not be found after cleaning and disinfection.

Notification system in place

Zoonotic Salmonella is notifiable since the first of Januari 2004. Notification is done by phone, fax or electronic to the Federal Agency for the Safety of the Food Chain. Laboratories and farmers are submitted to the notification.

Results of the investigation

There were no batches of day old chicks found positive for Salmonella. During rearing, of the 302 flocks, 1 flock was positive for Salmonella Hadar, 1 flock for Salmonella Cubana and 1 flock of S. O3,19.
During production, of the 526 flocks (grandparent and parent flocks) 16 flocks were positive for other than the 5 serotypes for which a target is set. In addition, 6 flocks were considered negative for Salmonella Typhimurium after confirmation sampling and 1 flock for Salmonella Hadar.
302

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

During rearing, the number of positive flocks (all Salmonella spp.) decreased from 6 in 2008 to 3 in 2009. The total number of rearing flocks was also higher in 2009 compared to 2008.
During production, the number of positive flocks for Salmonella serotypes for which a target is set decreased to 0. The number of positive flocks of other serotypes has decreased considerably compared to 2008 (from 40 to 16).

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

The official surveillance program for broilers in accordance with to Regulations (EC) 2160/2003 and 646/2007 started in 2009. It is compulsory to sample all flocks on farms with more than 200 birds in the last three weeks before slaughter. Sampling of day-old chicks in the framework of the sanitary qualification is optional.

Frequency of the sampling

Broiler flocks: Day-old chicks

Other: not compulsory

Broiler flocks: Before slaughter at farm

Every hatch is sampled in the last 3 weeks before slaughter.

Type of specimen taken

Broiler flocks: Day-old chicks

Internal linings of delivery boxes

Broiler flocks: Before slaughter at farm

Faeces

Broiler flocks: At slaughter (flock based approach)

Organs: caeca

Methods of sampling (description of sampling techniques)

Broiler flocks: Day-old chicks

Pieces of inner linings of the delivery boxes are sampled by the owner in the same way as for breeding flocks. The samples have to reach an accredited laboratory within 48 hours of sampling.

Broiler flocks: Before slaughter at farm

All flocks are sampled, by the owner, within 3 weeks before slaughter. The sampling is performed conform Regulation (EC) n° 646/2007. Samples have to reach an accredited laboratory within 48 hours.

Case definition

Broiler flocks: Day-old chicks

A sample is considered positive if a Salmonella spp. is isolated. A flock is considered positive as soon as one sample is positive.

Broiler flocks: Before slaughter at farm

A sample is considered positive if a Salmonella spp. is isolated. A flock is considered positive as soon as one sample is positive.

Diagnostic/analytical methods used

Broiler flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Broiler flocks

There is no vaccination policy for broiler flocks.

Other preventive measures than vaccination in place

Broiler flocks

Minimal requirements are laid down for holdings with broilers on infrastructure, management and bio-security issues.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

The sanitary qualification for farms with more than 200 birds contains preventive measures (infrastructure, management and biosecurity) for the control of Salmonella.
Following measures are taken when a flock is positive for Salmonella spp:
1° logistic slaughter of the flock at the end of production.
2° mandatory cleaning and disinfection.
3° hygienogram after disinfection and after the house has dried up.
4° swab control on the presence of Salmonella before restocking the house.
If the following flock is positive for the same serotype of Salmonella, the disinfection must be performed by an external company.
When the same serotype of Salmonella is found at three consecutive times, the farm must be evaluated on biosecurity and hygiene by the farm veterinarian and necessary measures must be taken. An epidemiological investigation and tests are performed to find the source of the infection.
It is at all times prohibited to treat for Salmonella with antibiotics.

Measures in case of the positive findings or single cases

Broiler flocks: Day-old chicks

It is prohibited to treat the flock for Salmonella with antibiotics.

Broiler flocks: Before slaughter at farm

See 'the control program/strategies' in place.

Notification system in place

Zoonotic Salmonella is notifiable since the first of January 2004. Notification is done by phone, fax or by e-mail to the Federal Agency for the Safety of the Food Chain. Farmers and laboratories are obliged to notify.

Results of the investigation

5226 flocks of broilers were sampled as day old chicks of which 7 were positive for Salmonella spp. Serotype is known for 3 samples (1 S. Enteritids, 1 S. Typhimurium and 1 S. Paratyphi B). This is an increase compared to 2008 (4 flocks were positive).
8.049 flocks of broilers were sampled in the last 3 weeks of production. 238 were positive for Salmonella spp. An additonal 10 flocks were positive for a Salmonella spp as result of an official control. This means a stabilisation of the prevelance for all serotypes compared to 2008.

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

Monitoring system

Sampling strategy

Laying hens flocks

All laying hen flocks on farms with at least 200 laying hens are under a Salmonella control program. Flocks are sampled by the owner at the age of day old chicks, 16, 24, 39 and 54 weeks and in the last 3 weeks of production.

Frequency of the sampling

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

At the age of 16 weeks

Laying hens: Production period

Every 15 weeks

Laying hens: Before slaughter at farm

Every flock is sampled

Laying hens: At slaughter

Sampling distributed evenly throughout the year

Type of specimen taken

Laying hens: Day-old chicks

Internal linings of delivery boxes

Laying hens: Rearing period

Faeces

Laying hens: Production period

Faeces

Laying hens: Before slaughter at farm

Faeces

Laying hens: At slaughter

Other: caeca

Methods of sampling (description of sampling techniques)

Laying hens: Day-old chicks

Pieces of inner linings of the delivery boxes are sampled by the owner in the same way as for breeding flocks. The samples have to reach an accredited laboratory within 48 hours of sampling.

Laying hens: Rearing period

Samples are taken in accordance with Regulation (EC) No. 1168/2006.

Laying hens: Production period

Samples are taken in accordance with Regulation (EC) No. 1168/2006.

Laying hens: Before slaughter at farm

Samples are taken in accordance with Regulation (EC) No. 1168/2006.

Case definition

Laying hens: Day-old chicks

A sample is considered positive if Salmonella Enteritidis or Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

Laying hens: Rearing period

A sample is considered positive if Salmonella Enteritidis or Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

Laying hens: Production period

A sample is considered positive if Salmonella Enteritidis or Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

Laying hens: Before slaughter at farm

A sample is considered positive if Salmonella is isolated. A flock is considered positive as soon as one sample is positive.

Diagnostic/analytical methods used

Laying hens: Day-old chicks

Bacteriological method: ISO 6579:2002

Laying hens: Rearing period

Bacteriological method: ISO 6579:2002

Laying hens: Production period

Bacteriological method: ISO 6579:2002

Laying hens: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Laying hens flocks

Vaccination against Salmonella Enteritidis is compulsory and vaccination against Salmonella Typhimurium is strongly recommended.

Other preventive measures than vaccination in place

Laying hens flocks

Minimal requirements for infrastructure, management and bio-security issues are laid down under health qualification B.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

The national control program for Salmonella in laying hens is based on Regulations (EC) No. 2160/2003, 1177/2006 and 1168/2006.

Measures in case of the positive findings or single cases

Laying hens flocks

1) Pasteurization of eggs before human consumption.
2) Cleaning and disinfection of housing after removal of the positive flock.
3) Swab sampling of housing before entering new flock. If result is positive for Salmonella, cleaning and

disinfection has to be repeated.

Notification system in place

Zoonotic Salmonella is notifiable by the farmer and the laboratory since the first of January 2004.
Notification is done by phone, fax or electronic to the Federal Agency for the Safety of the Food Chain.

Results of the investigation

Of the 283 batches of day old chicks, none were found positive for Salmonella.
During rearing, 283 flocks were samples of which 2 were positive for Salmonella spp (1 Salmonella Typhimurium).
During production, 763 flocks were sampled by the owner of which 29 were positive for Salmonella (13 for S. Enteritidis and 1 for S. Typhimurium). 295 flocks were sampled by the competent authority. 28 were positive for Salmonella, of which 2 for S. Typhimurium and 13 for S. Enteritidis.

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

The prevalence for S. Enteritidis and S. Typimurium stabilised compared to 2008, the prevalence for other serotypes decreased.

D. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

There was no official monitoring of cattle in 2009 in Belgium. Isolates were diagnostic samples sent to the NRL Salmonella, animal health, for serotyping.

Vaccination policy

In 2009, no vaccine was authorized for the vaccination of cattle against salmonellosis.

Results of the investigation

The number of Salmonella isolates from cattle (n=81) has decreased as compared to 2008 (n=112 in 2008). Most frequently found serotype is Dublin (58.0%), followed by serotype Typhimurium (33.3%), which are exactly the same figures as in 2008.

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

In cattle, S. Dublin continues to be the principal serotype since 2002, and reaches a proportion of about 60% among cattle strains. S. Typhimurium (about 30%) is the second most important.

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

Monitoring system

Sampling strategy

Breeding flocks

Health Qualification A is mandatory for all commercial breeding flocks. They are at least sampled as day-old chick, when entering the production unit if this is on a different farm than the rearing unit, at one point during production and within the last 3 weeks before slaughter.

Meat production flocks

On voluntary basis (Health Qualification A), day-old chicks are sampled.
On farms with a capacity of 5000 or more birds (Health Qualification B), all flocks are sampled within 3 weeks before slaughter.

Frequency of the sampling

Breeding flocks: Day-old chicks

Every flock is sampled

Breeding flocks: Production period

Every flock is sampled

Meat production flocks: Day-old chicks

Control 'at entry' is not mandatory.

Meat production flocks: Before slaughter at farm

Other: ____meat production flocks are sampled within 3 weeks before slaughter on a voluntary basis.

Type of specimen taken

Breeding flocks: Day-old chicks

Internal linings of delivery boxes

Breeding flocks: Production period

Blood

Meat production flocks: Day-old chicks

Internal linings of delivery boxes

Meat production flocks: Before slaughter at farm

Faeces

Methods of sampling (description of sampling techniques)

Breeding flocks: Day-old chicks

At the farm, pieces (5 by 5 cm) of the inner linings of delivery boxes are taken of each flock. 2 samples are taken, one for the hen-chicks and one for the cock-chicks. Each sample consists of 20 pieces of inner lining. The two samples are analyzed separately.

Breeding flocks: Production period

Faeces samples are taken by the owner from the delivery boxes at time of delivery. A sample made of 60 X 5-10g subsamples is taken of every flock with different origin of rearing. The samples have to reach an accredited and validated laboratory within 48 hours of sampling.
Once during production, 60 blood samples are taken of each flock. If one or more blood sample is positive, additional faeces samples are taken to confirm the result.

Within 3 weeks before slaughter, a pooled faeces sample consisting of 60 X 1g subsamples is taken of each flock.

Meat production flocks: Day-old chicks

Pieces of inner linings of the delivery boxes are sampled by the owner on a voluntary basis (Health Qualification A) in the same way as for breeding flocks.

Meat production flocks: Before slaughter at farm

On farms with more than 5000 birds (Health Qualification B), all flocks are sampled, by the owner, within 3 weeks before slaughter. The sampling can be performed in 3 ways. 1) A pooled faeces sample (60 X 1g) taken with swabs. 2) A pooled faeces sample (60 X 1g) taken by hand. 3) Two pair of overshoes, pooled. The samples have to reach an accredited laboratory within 48 hours.

Case definition

Breeding flocks: Day-old chicks

A flock is positive if Salmonella is found.

Breeding flocks: Production period

A flock is positive if Salmonella is found.

Meat production flocks: Day-old chicks

A flock is positive if Salmonella is found.

Meat production flocks: Before slaughter at farm

A flock is positive if Salmonella is found.

Diagnostic/analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Breeding flocks: Production period

Serological method: ELISA, if positive followed by bacteriological confirmation.

Meat production flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Breeding flocks

There is no vaccination policy.

Meat production flocks

There is no vaccination policy.

Other preventive measures than vaccination in place

Breeding flocks

Health Qualification A is mandatory. Hygienic infrastructural and management obligations are included.

Meat production flocks

If the holding has a capacity of 5000 birds or more, Health Qualification B is mandatory, A is optional. Both include hygienic infrastructural and management obligations.

Measures in case of the positive findings or single cases

Samples are taken for monitoring purposes only. Flocks are slaughtered at the end of the day (logistic slaughter) if samples taken before slaughter are positive.

Notification system in place

A notification system for zoonotic Salmonella is in place since 1 January 2004. The notification can be done by e-mail, fax or phone.

Results of the investigation

There were no breeding flocks or meat production flocks tested in 2009.

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

Monitoring system

Sampling strategy

Breeding flocks

Health Qualification A is mandatory for all commercial breeding flocks. They are at least sampled as day-old chick, when entering the production unit if this is on a different farm than the rearing unit, at one point during production and within the last 3 weeks before slaughter.

Frequency of the sampling

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

Every flock is sampled

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

Once a year

Meat production flocks: Day-old chicks

Control 'at entry' is not mandatory.

Meat production flocks: Before slaughter at farm

Other: ____within 3 weeks prior to slaughter. This is not mandatory in all cases.

Type of specimen taken

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

Internal linings of delivery boxes

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

Blood

Meat production flocks: Day-old chicks

Internal linings of delivery boxes

Meat production flocks: Before slaughter at farm

Faeces

Methods of sampling (description of sampling techniques)

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

At the farm, pieces of the inner linings of delivery boxes are taken of each flock. Two samples are taken, one for the hen-chicks and one for the cock-chicks. Each sample consists of 20 pieces of inner lining. The two samples are analyzed separately.

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

Faeces samples are taken by the owner from the delivery boxes at time of delivery. A sample made of 60 X 5-10g subsamples is taken of every flock with different origin of rearing. The samples have to reach an accredited and validated laboratory within 48 hours of sampling.
Once during production, 60 blood samples are taken of each flock. If one or more blood sample is positive, additional feaces samples are taken to confirm the result.
Within 3 weeks before slaughter, a pooled faeces sample consisting of 60 X 1g subsamples is taken of each flock.

Meat production flocks: Day-old chicks

Pieces of inner linings of the delivery boxes are sampled by the owner on a voluntary basis (Health Qualification A) in the same way as for breeding flocks.

Meat production flocks: Before slaughter at farm

On farms with more than 5000 birds, all flocks are sampled, by the owner, within 3 weeks before slaughter. The sampling can be performed in 3 ways. 1) A pooled faeces sample (60 X 1g) taken with swabs. 2) A pooled faeces sample (60 X 1g) taken by hand. 3) Two pair of overshoes, pooled. The samples have to reach an accredited laboratory within 48 hours.

Case definition

Breeding flocks: Day-old chicks

A flock is positive if Salmonella is found.

Breeding flocks: Production period

A flock is positive if Salmonella is found.

Meat production flocks: Day-old chicks

A flock is positive if Salmonella is found.

Meat production flocks: Before slaughter at farm

A flock is positive if Salmonella is found.

Diagnostic/analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Breeding flocks: Production period

Serological method: ____ELISA, if positive, followed by bacteriological confirmation.

Meat production flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Breeding flocks

There is no vaccination policy for breeding flocks.

Meat production flocks

There is no vaccination policy for meat production flocks.

Other preventive measures than vaccination in place

Breeding flocks

Health Qualification A is mandatory for breeding flocks, hygienic infrastructural and management obligations are included.

Meat production flocks

If the holding has a capacity of 5000 birds or more, Health Qualification B is mandatory, A optional. Both include hygienic infrastructural and management obligations.

Measures in case of the positive findings or single cases

Breeding flocks

The samples are taken for monitoring purposes. At this moment, no measures are implemented in case of a positive finding. At time of slaughter, poultry positive for Salmonella is slaughtered at the end of the day (logistic slaughter).

Meat Production flocks

If samples taken within 3 weeks before slaughter are positive for Salmonella, the flock is slaughtered at the end of the day (logistic slaughter).

Notification system in place

A notification system for zoonotic Salmonella is in place since 1 January 2004. The notification can be done by e-mail, fax or post.

Results of the investigation

No breeding flocks or meat production flocks were tested.

G. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

For diagnostic purposes and in the framework of research projects, pigs are sampled and isolates are sent to the NRL Salmonella, Animal Health for serotyping and resistance analysis.

Multiplying herds

For diagnostic purposes and in the framework of research projects, pigs are sampled and isolates are sent to the NRL Salmonella, AH for serotyping and resistance analysis.

Fattening herds

Every 4 months, 12 blood samples are taken for the serological surveillance of Salmonella in fattening pig farms with at least 30 pigs.
Samples are taken for bacteriological detection on farms that are considered risk herds for Salmonella.

For diagnostic purposes and in the framework of research projects, pigs are sampled and isolates are sent to the NRL Salmonella, AH for serotyping and resistance analysis.

Frequency of the sampling

Fattening herds at farm

4

Type of specimen taken

Fattening herds at farm

Blood

Methods of sampling (description of sampling techniques)

Fattening herds at farm

The Belgian Federal Agency for the Safety of the Food Chain (FASFC) installed a national Salmonella surveillance and control programme in pigs in January 2005 which became compulsory by means of a Royal decree in July 2007.
Depending on the capacity of the farm, 10 to 12 blood samples are taken of the fattening pigs. The blood samples are taken of all ages.

Case definition

Fattening herds at farm

Risk farms are identified as farms with a mean SP ratio higher than 0.6 for 3 consecutive sampling rounds.

Diagnostic/analytical methods used

Fattening herds at farm

indirect LPS--Salmonella ELISA

Vaccination policy

Breeding herds

No vaccine is authorized in Belgium for the vaccination of pigs against Salmonellosis.

Multiplying herds

No vaccine is authorized in Belgium for the vaccination of pigs against salmonellosis.

Fattening herds

No vaccine is authorized in Belgium for the vaccination of pigs against salmonellosis.

Control program/mechanisms

The control program/strategies in place

Fattening herds

Risk farms are identified as farms with a mean SP ratio equal or higher than 0.6 for 3 consecutive sampling rounds. Following mandatory measures are applied on risk farms:
1) completion of a checklist on bio-security and other measures;
2) formulating and implementing a herd specific salmonella action plan, based on the result of the checklist;
3) bacteriological evaluation of the farm.

Measures in case of the positive findings or single cases

The measures are explained under control strategy in place.

Notification system in place

Zoonotic Salmonella is notifiable by operators and laboratoria since the first of January 2004. Notification is done by phone, fax or electronic to the Federal Agency of the Safety of the Food Chain.

Results of the investigation

6395 herds with fattening pigs were sampled in 2009. 2086 farms had at least once a mean S/P ratio of more than 0.6. 315 herds were classified as Salmonella risk herds of which 84 herds were classified as a Salmonella risk herd for the second time.

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

Laboratory findings from the NRL Salmonella, AH concerning isolates that were sent in for serotyping in 2009 are available. The number of pig strains tested in 2009 resembled that of 2007 (n=536, 1 017 and 481 in 2009, 2008 and 2007 respectively). More S. Typhimurium isolates were found (63.8%; 48.5% in 2008), but an equal proportion of S. Derby (13.4%; 15.6% in 2008). Nine percent of pig strains were only partially characterized, and belonged to group B Salmonella.

Evolution in Belgium: S. Typhimurium still is the most prevalent serotype among pig isolates, representing more than 60% of pig Salmonella. Serotype Derby is the second most important serotype, and represents about 13% of the strains.

H. 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)

Health Qualification A is mandatory for all commercial breeding flocks. They are at least sampled as day-old chick, when entering the production unit if this is on a different farm than the rearing unit, at the age of 26 weeks and within the last 3 weeks before slaughter.

Meat production flocks

If the holding has a capacity of more than 5000 birds (Health Qualification B), all flocks are sampled within three weeks of slaughter.

Frequency of the sampling

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

Every flock is sampled

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

26

Meat production flocks: Day-old chicks

Control 'at entry' is not mandatory.

Meat production flocks: Before slaughter at farm

Every flock is sampled

Type of specimen taken

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

Internal linings of delivery boxes

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

Blood

Meat production flocks: Day-old chicks

Internal linings of delivery boxes

Meat production flocks: Before slaughter at farm

Faeces

Methods of sampling (description of sampling techniques)

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

At the farm, pieces (5 by 5 cm) of the inner linings of delivery boxes are taken of each flock. 2 samples are taken, one for the hen-chicks and one for the cock-chicks. Each sample consists of 20 pieces of inner lining. The two samples are analyzed separately.

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

Faeces samples are taken by the owner from the delivery boxes at time of delivery. A sample made of 60 X 5-10g subsamples is taken of every flock with different origin of rearing. The samples have to reach an accredited and validated laboratory within 48 hours of sampling.
At 26 weeks, 60 blood samples are taken of each flock. If one or more blood sample is positive, additional faeces samples are taken to confirm the result.
Within 3 weeks before slaughter, a pooled faeces sample consisting of 60 X 1g subsamples is taken of

each flock.

Meat production flocks: Day-old chicks

Pieces of inner linings of the delivery boxes are sampled by the owner on a voluntary basis (Health Qualification A) in the same way as for breeding flocks. The samples have to reach an accredited laboratory within 48 hours of sampling.

Meat production flocks: Before slaughter at farm

On farms with more than 5000 birds (Health Qualification B), all flocks are sampled, by the owner, within 3 weeks before slaughter. The sampling can be performed in 3 ways. 1) A pooled faeces sample (60 X 1g) taken with swabs. 2) A pooled faeces sample (60 X 1g) taken by hand. 3) Two pair of overshoes, pooled. The samples have to reach an accredited laboratory within 48 hours.

Case definition

A flock is positive if Salmonella is found.

Monitoring system

Case definition

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

A flock is positive if Salmonella is found.

Meat production flocks: Day-old chicks

A flock is positive if Salmonella is found.

Meat production flocks: Before slaughter at farm

A flock is positive if Salmonella is found.

Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002

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

Serological method: ____ELISA, bacteriological confirmation if positive.

Meat production flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Meat production flocks

There is no vaccination policy for meat production flocks.

Other preventive measures than vaccination in place

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

Health Qualification A: infrastructural and management obligations.

Meat production flocks

Health Qualification B: infrastructural and management obligations.

Measures in case of the positive findings or single cases

Only measures are taken at time of slaughter, if Salmonella positive, a flock is slaughtered at the end of

the day (logistic slaughter).

Notification system in place

Zoonotic Salmonella is notifiable since 1 January 2004. Notification is done by phone, fax or e-mail.

Results of the investigation

There are no turkey breeding flocks in Belgium that have to follow the program.
167 meat production flocks were tested in 2008. 4 flocks were positive for Salmonella.

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	Salmonella spp., unspecified
Gallus gallus (fowl) - parent breeding flocks, unspecified - day-old chicks	302	DGZ/ARSIA	Flock	302	0						
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period	302	DGZ/ARSIA	Flock	302	3		1				
Gallus gallus (fowl) - parent breeding flocks, unspecified - adult	522	DGZ/ARSIA	Flock	522	16						
Gallus gallus (fowl) - grandparent breeding flocks, unspecified	4	DGZ/ARSIA	Flock	4	0						

	S. 3,19:-:-	S. 9,46:-:-	S. Corvallis	S. Cubana	S. Lexington	S. Livingstone	S. Mbandaka	S. Minnesota	S. Senftenberg
Gallus gallus (fowl) - parent breeding flocks, unspecified - day-old chicks									
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period	1			1					
Gallus gallus (fowl) - parent breeding flocks, unspecified - adult		1	1		2	1	3	2	6
Gallus gallus (fowl) - grandparent breeding flocks, unspecified									

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	Salmonella spp., unspecified	Not typeable	Other serotypes	S. 3,19:-:-
Gallus gallus (fowl) - laying hens - day-old chicks	283	approved labs	Flock	256	0						
Gallus gallus (fowl) - laying hens - during rearing period	283	approved labs	Flock	283	2		1			1	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling		approved albs / FASFC	Flock	763	54	26	3		2	1	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	763	approved labs	Flock	763	29	13	1		2		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	763	FASFC	Flock	292	27	13	2				
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling	763	FASFC	Flock	3	2	0	1			1	
Gallus gallus (fowl) - broilers - day-old chicks	8049	approved labs	Flock	5226	7	1	1	4			
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling [1)]	8049	approved labs	Flock	8049	247	14	26		12	1	1
Turkeys - meat production flocks		approved labs	Flock	155	6			2	1		

Table Salmonella in other poultry

	S. 4,5:i:-	S. 6,7:-:-	S. 6,7:z10:-	S. Adelaide	S. Agona	S. Anatum	S. Banana	S. Blockley	S. Derby	S. Dublin	S. Duisburg
Gallus gallus (fowl) - laying hens - day-old chicks											
Gallus gallus (fowl) - laying hens - during rearing period											
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling		1			2	2			1		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry					1				1		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling		1			1	2					
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling											
Gallus gallus (fowl) - broilers - day-old chicks											
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling [1)]	1	1	1	1	18	1	1	7	1	1	1
Turkeys - meat production flocks								1			

	S. Hadar	S. Heidelberg	S. Idikan	S. Indiana	S. Infantis	S. Inganda	S. Jerusalem	S. Kentucky	S. Kottbus	S. Lexington	S. Livingstone
Gallus gallus (fowl) - laying hens - day-old chicks											

Table Salmonella in other poultry

	S. Hadar	S. Heidelberg	S. Idikan	S. Indiana	S. Infantis	S. Inganda	S. Jerusalem	S. Kentucky	S. Kottbus	S. Lexington	S. Livingstone
Gallus gallus (fowl) - laying hens - during rearing period											
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	1		1		6		1				2
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry			1		3						2
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	1				3		1				
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling											
Gallus gallus (fowl) - broilers - day-old chicks											
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling [1)]	9	2		4	7	1	4	5		2	17
Turkeys - meat production flocks				1					1		

	S. Mbandaka	S. Minnesota	S. Montevideo	S. Newport	S. Paratyphi B	S. Paratyphi B var. Java	S. Rissen	S. Saintpaul	S. Senftenberg	S. Tennessee	S. Virchow
Gallus gallus (fowl) - laying hens - day-old chicks											
Gallus gallus (fowl) - laying hens - during rearing period											

Table Salmonella in other poultry

	S. Mbandaka	S. Minnesota	S. Montevideo	S. Newport	S. Paratyphi B	S. Paratyphi B var. Java	S. Rissen	S. Saintpaul	S. Senftenberg	S. Tennessee	S. Virchow
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	2	1					3				2
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	2	1					2				1
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling							1				1
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling											
Gallus gallus (fowl) - broilers - day-old chicks					1						
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling [1)]	7	12	5	2	22	18	11	1	3	2	12
Turkeys - meat production flocks											

	S. Yoruba	S. group O:4
Gallus gallus (fowl) - laying hens - day-old chicks		
Gallus gallus (fowl) - laying hens - during rearing period		

Table Salmonella in other poultry

	S. Yoruba	S. group O:4
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	1	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling		
Gallus gallus (fowl) - broilers - day-old chicks		
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling [1)]		17
Turkeys - meat production flocks		

Comments:

[1)] off and industry

Footnote:

There are no breeding turkeys under the Salmonella Control Programme. Salmonella results for other poultry species/categories are not available.

Laying hens industry sampling: 29 positive flocks of which 2 were positive for 2 different serotypes.
Laying hens official and industry sampling: 54 positive flocks of which 4 were positive for 2 serotypes.

Broilers before slaughter - industry and official sampling: 1 flock positive for S. Typhimurium and S. O4:-:-, 1 flock positive for S. Livingstone and S. Virchow and 1 flock positive for S. Typhimurium, S. Agona and S. O4:-:-.

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Brandenburg	S. Derby	S. Dublin	S. Livingstone
Cattle (bovine animals)	NRL	Animal	81	81	0	27	3	0	0	47	0
Pigs	NRL	Animal	536	536	0	342	46	11	72	0	17

	S. group B
Cattle (bovine animals)	4
Pigs	48

2.1.4 Salmonella in feedingstuffs

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	S. Anatum	S. Cerro	S. Jerusalem
Compound feedingstuffs for cattle - final product - Monitoring - official sampling	TRA 055	Batch	25g	38	0						
Compound feedingstuffs for pigs - final product - Monitoring - official sampling	TRA 055	Batch	25g	79	2				1		
Compound feedingstuffs for poultry (non specified) - final product - Monitoring - official sampling	TRA 055	Batch	25g	8	0						
Compound feedingstuffs for poultry - broilers - final product - Monitoring - official sampling	TRA 055	Batch	25g	126	5				1		1
Compound feedingstuffs for poultry - laying hens - final product - Monitoring - official sampling [1)]	TRA 055	Batch	25g	138	2					1	
Compound feedingstuffs for poultry -breeders - final product - Monitoring - official sampling	TRA 055	Batch	25g	99	1						
Compound feedingstuffs for sheep - final product - Monitoring - official sampling	TRA 055	Batch	25g	4	0						
Compound feedingstuffs for turkeys - final product - Monitoring - official sampling	TRA 055	Batch	25g	1	0						
Compound feedingstuffs, not specified - final product - Monitoring - official sampling	AFSCA	Batch	25g	27	0						
Pet food - final product - Monitoring - official sampling	IEC 401	Batch	25g	17	0						

Table Salmonella in compound feedingstuffs

	S. Livingstone	S. Minnesota	S. Oranienburg	S. Rissen	S. Schwarzengrund	S. Senftenberg
Compound feedingstuffs for cattle - final product - Monitoring - official sampling						
Compound feedingstuffs for pigs - final product - Monitoring - official sampling			1			
Compound feedingstuffs for poultry (non specified) - final product - Monitoring - official sampling						
Compound feedingstuffs for poultry - broilers - final product - Monitoring - official sampling	2				1	
Compound feedingstuffs for poultry - laying hens - final product - Monitoring - official sampling [1)]		1		1		
Compound feedingstuffs for poultry -breeders - final product - Monitoring - official sampling						1
Compound feedingstuffs for sheep - final product - Monitoring - official sampling						
Compound feedingstuffs for turkeys - final product - Monitoring - official sampling						
Compound feedingstuffs, not specified - final product - Monitoring - official sampling						
Pet food - final product - Monitoring - official sampling						

Comments:

[1)] one batch with 2 serotypes: S. Rissen and S. Minnesota

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	S. Emek	S. Infantis	S. Lexington
Feed material of oil seed or fruit origin - linseed derived - Monitoring - official sampling	TRA 055/IEC 207	Batch	25g	17	0						
Feed material of oil seed or fruit origin - other oil seeds derived - Monitoring - official sampling	TRA 055	Batch	25g	3	1				1		
Feed material of oil seed or fruit origin - palm kernel derived - Monitoring - official sampling	TRA 055/IEC 207	Batch	25g	9	0						
Feed material of oil seed or fruit origin - rape seed derived - Monitoring - official sampling	TRA 055/IEC 207	Batch	25g	15	0						
Feed material of oil seed or fruit origin - soya (bean) derived - Monitoring - official sampling [1)]	TRA 055/IEC 207	Batch	25g	59	2					1	1
Feed material of oil seed or fruit origin - sunflower seed derived - Monitoring - official sampling	TRA 055/IEC 207	Batch	25g	9	0						

	S. Rissen
Feed material of oil seed or fruit origin - linseed derived - Monitoring - official sampling	
Feed material of oil seed or fruit origin - other oil seeds derived - Monitoring - official sampling	
Feed material of oil seed or fruit origin - palm kernel derived - Monitoring - official sampling	
Feed material of oil seed or fruit origin - rape seed derived - Monitoring - official sampling	

Table Salmonella in other feed matter

	S. Rissen
Feed material of oil seed or fruit origin - soya (bean) derived - Monitoring - official sampling [1)]	1
Feed material of oil seed or fruit origin - sunflower seed derived - Monitoring - official sampling	

Comments:

[1)] One batch with 2 serotypes: S. Lexington and S. Infantis

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	S. Bredeney	S. Montevideo
Feed material of land animal origin - animal fat - Monitoring - official sampling	TRA 055	Batch	25g	39	0					
Feed material of land animal origin - blood products - Monitoring - official sampling	TRA 055	Batch	25g	3	0					
Feed material of land animal origin - meat and bone meal - Monitoring - official sampling	TRA 055	Batch	25g	6	0					
Feed material of land animal origin - meat meal - Monitoring - official sampling [1)]	TRA 055	Batch	25g	4	1				1	1
Feed material of land animal origin - poultry offal meal - Monitoring - official sampling	TRA 055	Batch	25g	4	0					
Feed material of marine animal origin - Monitoring - official sampling	TRA 055	Batch	25g	9	0					

Comments:

[1)] One batch with 2 serotypes: S. Montevideo and S. Bredeney

2.1.5 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Type of specimen taken

Laboratory findings of the NRL Salmonella, animal health.

Methods of sampling (description of sampling techniques)

Diagnostic samples sent to NRL.

See: "Antimicrobial resistance of Salmonella spp. in animals - All animals" for more details.

Control program/mechanisms

The control program/strategies in place

There was no monitoring programme for Salmonella in cattle in 2009.

Results of the investigation

A total of 44 Salmonella isolates were tested for their susceptibility. Twenty were S. Typhimurium and 18 S. Dublin.

Thirteen strains were fully susceptible, which represents 29,5%. Most resistance was found against ampicillin (54,5%), streptomycin (54,5%), sulfonamides (54,5%), tetracycline (52,3%), but also against chloramphenicol (36,4%) and florphenicol (15,9%).

B. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Sampling strategy used in monitoring

Procedures for the selection of isolates for antimicrobial testing

All strains isolated during the zoonosis monitoring program were sent to the Institute of Public Health for serotyping and determination of antimicrobial resistance.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The antimicrobials tested and the breakpoints used are listed in the following table.

AntimicrobialBreakpoints (µg / ml)	
Ampicillin	4
Cefotaxime	0.5
Ceftazidim	2
Chlormaphenicol	16
Ciprofloxacin	0.06
Colistin	16
Florfenicol	16
Gentamycin	2
Kanamycin	8
Nalidixic acid	16
Streptomycin	32
Sulphamethoxazole	256
Tetracycline	8
Trimethoprim	2

Minimum Inhibitory Concentrations were determined following the NCCLS standards.

Results of the investigation

In total, 200 Salmonella strains from pork were tested for their antibiotic susceptibility. This included strains from carcasses and cut meats. High resistance was observed to tetracyclin (47%), ampicillin (44%), sulphamethoxazole (44%) and streptomycine (37%). Resistance to four or more antibiotics was observed in 35% of the tested isolates. In total, 77 strains were sensitive to all antibiotics tested (39%). All strains were sensitive to colistin, nalidixic acid and gentamycin. Low resistance was observed for cefotaxime (4%), ceftazidim (3%), kanamycin (1%), ciprofloxacin (4%) and florfenicol (1%). Compared to 2008, overall resistance has slightly decreased in 2009.

Salmonella Typhimurium was the most dominantly isolated serotype (56%) from pork. The observed trends are similar as described above, with high resistance to ampicillin (69%), tetracycline (61%), sulphamethoxazole (60) and streptomycin (54%). However, only 22% of all Typhimurium strains were sensitive to all antibiotics. It is clear that Typhimurium strains are more resistant than other Salmonella strains found on pork.

C. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Procedures for the selection of isolates for antimicrobial testing

All strains isolated during the zoonosis monitoring program were sent to the Institute of Public Health for serotyping and determination of antimicrobial resistance.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The antimicrobials tested and the breakpoints used are listed in the following table.

Antimicrobial	Breakpoints (µg / ml)
Ampicillin	4
Cefotaxime	0.5
Ceftazidim	2
Chlormaphenicol	16
Ciprofloxacin	0.06
Colistin	16
Florfenicol	16
Gentamycin	2
Kanamycin	8
Nalidixic acid	16
Streptomycin	32
Sulphamethoxazole	256
Tetracycline	8
Trimethoprim	2

Minimum Inhibitory Concentrations were determined following the NCCLS standards.

Results of the investigation

In 2009, 399 Salmonella isolates from poultry meats were tested for their antimicrobial susceptibility. A total of 49% were sensitive to all tested antibiotics. Resistance to ampicillin (43%), trimethoprim (39%), sulfamethoxazol (37%) and streptomycin (29%) were most prevalent. Multiresistance (resistance to more than four antibiotics) was observed in 22% of all isolates. Little or no resistance was found for colistin (0%), gentamycin (1%), florfenicol (1%) and kanamycin (3%). The resistance to chloramphenicol decreased by 4% to 1%, compared to 2008.

The resistance to ciprofloxacin was significantly decreased from 33% in 2008 to 20% in 2009, but remains high compared to previous years. Also, resistance to trimethoprim was decreased from 47% in 2008 to 39% in 2009. The differences in ciprofloxacin and trimethoprim resistance compared to earlier years can be attributed to a serious lowering of the breakpoint values since 2008.

Compared to these general results, higher resistances were observed in chicken meat for cooked consumption and chicken parts (no carcasses), with 98% and 61% of the isolates resistant to trimethoprim, 83% and 53% to sulphamethoxizole, and 96% and 69% to ampicillin, respectively. Especially in chicken meat for cooked consumption the resistance to these three antibiotics drastically increased, compared to 2008. However, multiresistance significantly decreased among these isolates to

42% and 33%, respectively (compared to 68% and 65% in 2008). On the other hand, Salmonella isolates from spent hens showed little antibiotic resistance, with only 9% showing multiresistance.

In total, 101 Salmonella Paratyphi B isolates from poultry-derived food products were tested for their antibiotic susceptibility. The resistance of this serotype was very high, though slightly decreasing, with 89%, 78% and 71% of the isolates being resistant to trimethoprim, ampicillin and streptomycin, respectively. The degree of multiresistance observed was high, but significantly decreased from 73% in 2008 to 49% in 2009.

All 84 isolates from Salmonella Enteritidis showed very low resistance against all tested antibiotics, as was found in previous years. Only 11 isolates showed resistance, of which two were multiresistant.

D. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Type of specimen taken

Laboratory findings of the NRL Salmonella, animal health.

Methods of sampling (description of sampling techniques)

Diagnostic samples sent to the NRL Salmonella, animal health.

See: "Antimicrobial resistance of Salmonella spp. in animals - All animals" for more details.

Results of the investigation

A total of 272 Salmonella isolates from pigs were tested for their susceptibility. Most of the strain tested were S. Typhimurium (n=186) and S. Derby (n=23).
21% of strains were fully susceptible. Most resistance was found against ampicillin (68.0%), sulfonamides (65.1%), tetracycline (59.6%) and streptomycin (55.1%).

E. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Type of specimen taken

Laboratory findings of the NRL Salmonella, animal health.

Methods of sampling (description of sampling techniques)

Analysis of diagnostic samples sent to the NRL Salmonella, animal health.

See: "Antimicrobial resistance of Salmonella spp. in animals - All animals" for more details.

Results of the investigation

Fife hundred eighty poultry Salmonella isolates were tested for their susceptibility. Of these, 113 were S. Enteritidis, 70 Paratyphi B, 52 S. Typhimurium, 32 S. Agona,
31 S. Infantis and 28 each of S. Livingstone and S. Mbandaka.

Three hundred seventy-eight strains were fully susceptible, which represents 75,6%. Most resistance was found against ampicillin (26.7%), nalidixic acid (20.0%), sulfonamides (18.8%), trimetoprim-sulfonamides (14.8%) and tetracyclines (14.7%).

F. Antimicrobial resistance of Salmonella spp. in food

Sampling strategy used in monitoring

Procedures for the selection of isolates for antimicrobial testing

All strains isolated during the zoonosis monitoring program were sent to the Institute of Public Health for serotyping and determination of antimicrobial resistance.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The antimicrobials tested are listed in the following table.

Antimicrobial
Ampicillin
Ceftriaxon
Streptomycin
Kanamycin
Tetracycline
Sulfamethoxazole
Trimethoprim
Trimethoprim - sulfonamides
Nalidixic acid
Ciprofloxacin
Chloramphenicol

Cut-off values used in testing

Minimum Inhibitory Concentrations (MIC) were determined by the use of E-test following the NCCLS standards.

The antimicrobials tested and the breakpoints used are listed in the following table.

AntimicrobialBreakpoints(microg / ml)
Ampicillin8 - 32
Ceftriaxon8 - 64
Streptomycin8 - 32
Kanamycin16 - 64
Tetracycline4 - 16
Sulfamethoxazole256 - 512
Trimethoprim8 - 16
Trimethoprim - sulfonamides2 - 4
Nalidixic acid16 - 32
Ciprofloxacin1 - 4
Chloramphenicol8 - 32

G. Antimicrobial resistance of Salmonella spp. in animal - All animals - farmed

Sampling strategy used in monitoring

Methods used for collecting data

All requests to CODA - CERVA for isolation of Salmonella and for typing of Salmonella strains were routinely encoded in the Laboratory Management Information System (LIMS). Subsequently, the analytical results were introduced in the same database. The data on Salmonella isolation, serotyping and on antibiotic resistance as presented in this document were extracted from the LIMS files that were closed in 2009.

Laboratory methodology used for identification of the microbial isolates

Isolation of Salmonella at CODA - CERVA was done based on ISO6579:2002. The Salmonella isolates were serotyped following the Kauffmann-White scheme (see http://www.pasteur.fr/ip/portal/action/WebdriveActionEvent/oid/01s-000036-089 for information). In a number of cases strains were sent to the Scientific Institute for Public Health (www.iph.be) in Brussels, which is the National Reference center for Salmonella and Shigella for Public Health. Both isolation and serotyping at CODA - CERVA and the serotyping at IPH were done under BELAC (www.belac.fgov.be) accreditation (ISO 17025).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

List of the antimicrobials tested

Abbreviation	Antimicrobial	Amount of antimicrobial
Ap	Ampicillin	33microg
Cef	Ceftiofur	30microg
Sm	Streptomycin	100microg
Ne	Neomycin	120microg
Gm	Gentamicin	40microg
Tc	Tetracycline	80microg
Su	Sulfonamides	240microg
Tsu	Trimethoprim - sulfonamides	5,2microg + 240microg
Nal	Nalidixic acid	130microg
Enr	Enrofloxacin	10microg
Cm	Chloramphenicol	60microg
Ff	Florfenicol	30microg

Susceptibility tests were performed by the disk diffusion test, using Neo-Sensitabs (Rosco). Tests and interpretation were done according to the manufacturers guidelines using an inoculum and breakpoints as described by CLSI (Kirby-Bauer). Internal control was performed with quality control strain E. coli ATCC25922. Results were accepted when results with the QC strain were within the limits as proposed by Rosco.

Cut-off values used in testing

Agar diffuSion tests are used (ROSCO), with the following limits (in mm):

ampicillin: 17-19
ceftiofur: 20-22
streptomycin: 23-25
neomycin: 20-22
gentamicin: 20-22

tetracyclin: 20-22
sulfonamides: 20-22
trimethoprim + sulfonamides: 27-31
nalidixic acid: /
enrofloxacin: 20-22
chloramphenicol: 21-24
florfenicol: 15-18

Results of the investigation

The susceptibility of 1 128 Salmonella isolates was tested in 2009. In order to reduce bias due to multiple strains from the same origin at the same sampling time and belonging to the same serotype, only one isolate per serotype and per origin was selected for susceptibility testing. Therefore, strains were likely to be independent from each other.

A total of 613 Salmonella isolates (54.3%) were fully susceptible to all antimicrobial drugs tested. In 2008, 62.6% of strains were susceptible, which may be due to the lower proportion of S. Enteritidis strains tested in 2009. Resistance was mainly found against Ap (37.6%), Su (32.1%), Tc (28.2%), St (23.9%), but also against TSu (21.8%). Noteworthy is the resistance against Nal (13.3%) and against Cef (7.1%), both considerably higher than in 2008 (8.7% and 3.0%, respectively). Resistance against Ne, Gm and Enr (all 0.4%), and against Cm and Ff (7.6% and 3.5%, respectively) was similar to that of 2008.
Salmonella strains from poultry were found less resistant (34.0%) as compared to those from pigs and cattle (79.0% and 71.5%, respectively). Resistance against Ap, St, Tc, Su, TSu, Cm and Ff were all found higher in cattle and pig strains as compared to poultry isolates. On the contrary, 11.0% of poultry isolates were resistant against Cef, whereas this was the case for 4.5% and 1.8% of cattle and pig strains, respectively. Twenty percent of poultry Salmonella were found resistant against Nal, but hardly against Enr (0.3%).
Most of S. Agona isolates (n=48; 32 from poultry) were fully susceptible (81.3%) for all antimicrobials tested. Most resistance was found against Ap and against Su (both 14.6%).
Only 7 S. Blockley isolates, all from poultry, were tested, and all had resistance profile Ap Tc Su Tsu Nal.
More than 60% of S. Derby strains (n=26; most from pigs) were sensitive (61.5%), although some resistance against Su (26.9%), St and Tc (23.1%) was noticed.
As for S. Dublin isolates (n=20; most from cattle), half of them were found completely susceptible.
S. Enteritidis isolates (n=115) were mainly susceptible (96.5%). One isolate from poultry showed the profile Ap St Tc.
Twenty-two S. Hadar strains were tested and only one (from poultry) was found sensitive. Resistance profiles Ap Tc Nal and Tc Nal were most often demonstrated (45.5% and 40.9%, respectively).
All 17 S. Indiana strains were multi-resistant of which 16 showed profile Ap St Su TSu.
Most of the S. Infantis strains (n=47) were susceptible (89.4%). Two strains were Cef resistant.
About 60% of S. Mbandaka isolates (n=48) were susceptible to all antimicrobials tested. Ten strains showed profile Ap Su Tsu and 9 (all from poultry) were Cef resistant.
Sixteen from 21 S. Minnesota isolates were sensitive, but four (all from poultry) had profile Ap Cef Su Tsu.
Only 5.1% of S. Paratyphi B (n=78) strains were fully sensitive. The most abundant profile was Ap Nal (69.2%). Almost half of the strains were found Cef resistant.
A limited number of S. Regent strains were tested (n=14), and all but one isolate were resistant against Ap and Nal. No sensitive isolates were identified.
Only 23.9% of S. Typhimurium isolates (n=289) were found susceptible. Pentaresistance Ap St Tc Su Cm was encountered in 17.3% of the isolates. Ff resistance was detected in 11.4% of the strains, and Cef resistance in 2.4% of S. Typhimurium.
About three quarter of S. Virchow isolates (n=13) were resistant against all antimicrobials tested. As in former years, most resistance was found against Ap (69.2%) and Nal (53.8%). Cef resistance was

remarkably high: 38.5%.
Strains belonging to other serotypes were also tested, but to a lesser extent. Most of these isolates were fully sensitive for all the antimicrobials tested.

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

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Infantis		S. Mbandaka		S. Paratyphi B	
Isolates out of a monitoring program (yes/no)												
Number of isolates available in the laboratory	315		76				37		46		231	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol	113	0	52	6			31	0	28	0	70	1
Amphenicols - Florfenicol	113	0	52	2			31	0	28	0	70	0
Cephalosporins - 3rd generation cephalosporins	113	0	52	2			31	1	28	8	70	33
Fluoroquinolones - Enrofloxacin	113	0	52	1			31	0	28	0	70	0
Quinolones - Nalidixic acid	113	1	52	4			31	0	28	0	70	56
Sulfonamides - Sulfonamide	113	1	52	23			31	3	28	1	70	42
Aminoglycosides - Streptomycin	113	1	52	20			31	0	28	0	70	25
Aminoglycosides - Gentamicin	113	0	52	0			31	0	28	0	70	3
Aminoglycosides - Neomycin	113	0	52	0			31	0	28	0	70	1
Trimethoprim + sulfonamides	113	0	52	5			31	3	28	0	70	43
Penicillins - Ampicillin	113	1	52	22			31	2	28	8	70	62
Tetracyclines - Tetracycline	113	1	52	22			31	0	28	1	70	18
Fully sensitive	113	110	52	23			31	27	28	19	70	4
Resistant to 1 antimicrobial	113	2	52	5			31	0	28	1	70	1
Resistant to 2 antimicrobials	113	0	52	2			31	3	28	7	70	16
Resistant to 3 antimicrobials	113	1	52	2			31	0	28	1	70	9
Resistant to 4 antimicrobials	113	0	52	12			31	0	28	0	70	7
Resistant to >4 antimicrobials	113	0	52	8			31	0	28	0	70	33

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Brandenburg		S. Derby		S. Livingstone		S. group B	
Isolates out of a monitoring program (yes/no)														
Number of isolates available in the laboratory	0		342				11		72		17		48	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			186	51			4	0	23	0	7	0	28	2
Amphenicols - Florfenicol			186	25			4	0	23	0	7	0	28	1
Cephalosporins - 3rd generation cephalosporins			186	4			4	0	23	0	7	0	28	0
Fluoroquinolones - Enrofloxacin			186	0			4	0	23	0	7	0	28	0
Quinolones - Nalidixic acid			186	2			4	0	23	0	7	0	28	1
Sulfonamides - Sulfonamide			186	139			4	2	23	6	7	1	28	23
Aminoglycosides - Streptomycin			186	116			4	1	23	5	7	0	28	22
Aminoglycosides - Gentamicin			186	1			4	0	23	0	7	0	28	0
Aminoglycosides - Neomycin			186	2			4	0	23	0	7	0	28	0
Trimethoprim + sulfonamides			186	79			4	2	23	4	7	1	28	18
Penicillins - Ampicillin			186	145			4	2	23	7	7	0	28	24
Tetracyclines - Tetracycline			186	128			4	1	23	5	7	0	28	21
Fully sensitive			186	20			4	2	23	14	7	6	28	1
Resistant to 1 antimicrobial			186	17			4	0	23	1	7	0	28	3
Resistant to 2 antimicrobials			186	18			4	0	23	2	7	1	28	2
Resistant to 3 antimicrobials			186	13			4	1	23	3	7	0	28	1
Resistant to 4 antimicrobials			186	33			4	1	23	2	7	0	28	7
Resistant to >4 antimicrobials			186	85			4	0	23	1	7	0	28	14

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

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Dublin	
Isolates out of a monitoring program (yes/no)	no		no					
Number of isolates available in the laboratory	0		27				47	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			20	7			18	6
Amphenicols - Florfenicol			20	5			18	0
Cephalosporins - 3rd generation cephalosporins			20	1			18	1
Fluoroquinolones - Enrofloxacin			20	1			18	0
Quinolones - Nalidixic acid			20	0			18	3
Sulfonamides - Sulfonamide			20	11			18	8
Aminoglycosides - Streptomycin			20	11			18	8
Aminoglycosides - Gentamicin			20	0			18	0
Aminoglycosides - Neomycin			20	1			18	0
Trimethoprim + sulfonamides			20	7			18	1
Penicillins - Ampicillin			20	14			18	5
Tetracyclines - Tetracycline			20	13			18	4
Fully sensitive			20	4			18	9
Resistant to 1 antimicrobial			20	5			18	0
Resistant to 2 antimicrobials			20	0			18	1
Resistant to 3 antimicrobials			20	0			18	1
Resistant to 4 antimicrobials			20	1			18	5
Resistant to >4 antimicrobials			20	10			18	2

Table Antimicrobial susceptibility testing of Salmonella in meat from other poultry species

Salmonella	Salmonella spp.		S. Paratyphi B	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	115		35	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	115	1	35	0
Amphenicols - Florfenicol	115	0	35	0
Fluoroquinolones - Ciprofloxacin	115	29	35	17
Quinolones - Nalidixic acid	115	24	35	12
Trimethoprim	115	49	35	31
Sulfonamides - Sulfonamide	115	35	35	17
Aminoglycosides - Streptomycin	115	42	35	26
Aminoglycosides - Gentamicin	115	2	35	2
Aminoglycosides - Kanamycin	115	7	35	7
Penicillins - Ampicillin	115	50	35	27
Tetracyclines - Tetracycline	115	9	35	7
Cephalosporins - Cefotaxim	115	27	35	16
Cephalosporins - Ceftazidim	115	19	35	8
Polymyxins - Colistin	115	0	35	0

Table Antimicrobial susceptibility testing of Salmonella in meat from broilers (Gallus gallus)

Salmonella	Salmonella spp.		S. Paratyphi B	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	36		11	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	36	0	11	0
Amphenicols - Florfenicol	36	0	11	0
Fluoroquinolones - Ciprofloxacin	36	7	11	4
Quinolones - Nalidixic acid	36	7	11	4
Trimethoprim	36	14	11	8
Sulfonamides - Sulfonamide	36	17	11	8
Aminoglycosides - Streptomycin	36	15	11	9
Aminoglycosides - Gentamicin	36	0	11	0
Aminoglycosides - Kanamycin	36	2	11	1
Penicillins - Ampicillin	35	18	11	8
Tetracyclines - Tetracycline	36	9	11	3
Cephalosporins - Cefotaxim	36	8	11	4
Cephalosporins - Ceftazidim	36	8	11	4
Polymyxins - Colistin	36	0	11	0

Table Antimicrobial susceptibility testing of Salmonella in meat from pig

Salmonella	Salmonella spp.		S. Typhimurium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	200		111	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	200	6	111	5
Amphenicols - Florfenicol	200	2	111	2
Fluoroquinolones - Ciprofloxacin	200	7	111	4
Quinolones - Nalidixic acid	200	5	111	3
Trimethoprim	200	49	111	30
Sulfonamides - Sulfonamide	200	87	111	66
Aminoglycosides - Streptomycin	200	73	111	60
Aminoglycosides - Gentamicin	200	2	111	1
Aminoglycosides - Kanamycin	200	2	111	2
Penicillins - Ampicillin	200	87	111	76
Tetracyclines - Tetracycline	200	94	111	68
Cephalosporins - Cefotaxim	200	7	111	3
Cephalosporins - Ceftazidim	200	6	111	2
Polymyxins - Colistin	200	0	111	0

Table Antimicrobial susceptibility testing of Salmonella in meat from bovine animals

Salmonella	Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	20	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	20	3
Amphenicols - Florfenicol	20	0
Fluoroquinolones - Ciprofloxacin	20	0
Quinolones - Nalidixic acid	20	0
Trimethoprim	20	0
Sulfonamides - Sulfonamide	20	3
Aminoglycosides - Streptomycin	20	3
Aminoglycosides - Gentamicin	20	0
Aminoglycosides - Kanamycin	20	0
Penicillins - Ampicillin	20	0
Tetracyclines - Tetracycline	20	1
Cephalosporins - Cefotaxim	20	0
Cephalosporins - Ceftazidim	20	0
Polymyxins - Colistin	20	0

Table Antimicrobial susceptibility testing of Salmonella in Meat from poultry, unspecified - Monitoring

Salmonella	S. Enteritidis		S. Paratyphi B		S. Typhimurium		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes		yes		yes	
Number of isolates available in the laboratory	84		101		18		399	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol	84	0	101	0	18	4	399	4
Amphenicols - Florfenicol	84	0	101	0	18	3	399	3
Tetracyclines - Tetracycline	84	5	101	17	18	11	399	46
Fluoroquinolones - Ciprofloxacin	84	2	101	45	18	3	399	80
Quinolones - Nalidixic acid	84	2	101	39	18	4	399	74
Trimethoprim	84	3	101	90	18	4	399	157
Sulfonamides - Sulfonamide	84	6	101	64	18	12	399	146
Aminoglycosides - Streptomycin	84	5	101	72	18	11	399	115
Aminoglycosides - Gentamicin	84	0	101	2	18	0	399	2
Aminoglycosides - Kanamycin	84	1	101	9	18	0	399	12
Penicillins - Ampicillin	84	4	101	79	18	14	398	172
Cephalosporins - Cefotaxim	84	1	101	39	18	2	399	65
Cephalosporins - Ceftazidim	84	0	101	28	18	2	399	51
Polymyxins - Colistin	84	0	101	0	18	0	399	0

Table Antimicrobial susceptibility testing of Salmonella in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring

Salmonella	S. Enteritidis		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	73		126	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	73	0	126	3
Amphenicols - Florfenicol	73	0	126	3
Tetracyclines - Tetracycline	73	4	126	10
Fluoroquinolones - Ciprofloxacin	73	0	126	8
Quinolones - Nalidixic acid	73	0	126	7
Trimethoprim	73	2	126	11
Sulfonamides - Sulfonamide	73	5	126	19
Aminoglycosides - Streptomycin	73	4	126	17
Aminoglycosides - Gentamicin	73	0	126	0
Aminoglycosides - Kanamycin	73	1	126	1
Penicillins - Ampicillin	73	3	126	16
Cephalosporins - Cefotaxim	73	1	126	7
Cephalosporins - Ceftazidim	73	0	126	5
Polymyxins - Colistin	73	0	126	0

Table Antimicrobial susceptibility testing of Salmonella in Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - Monitoring

Salmonella	S. Paratyphi B		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	28		48	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	28	0	48	0
Amphenicols - Florfenicol	28	0	48	0
Tetracyclines - Tetracycline	28	3	48	9
Fluoroquinolones - Ciprofloxacin	28	8	48	17
Quinolones - Nalidixic acid	28	8	48	17
Trimethoprim	28	25	48	47
Sulfonamides - Sulfonamide	28	20	48	40
Aminoglycosides - Streptomycin	28	16	48	23
Aminoglycosides - Gentamicin	28	0	48	0
Aminoglycosides - Kanamycin	28	0	48	0
Penicillins - Ampicillin	28	24	48	46
Cephalosporins - Cefotaxim	28	7	48	42
Cephalosporins - Ceftazidim	28	7	48	11
Polymyxins - Colistin	28	0	48	0

Table Antimicrobial susceptibility testing of Salmonella in Meat from poultry, unspecified - meat products - Monitoring

Salmonella	Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	36	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	36	0
Amphenicols - Florfenicol	36	0
Tetracyclines - Tetracycline	36	4
Fluoroquinolones - Ciprofloxacin	36	14
Quinolones - Nalidixic acid	36	13
Trimethoprim	36	22
Sulfonamides - Sulfonamide	36	19
Aminoglycosides - Streptomycin	36	11
Aminoglycosides - Gentamicin	36	0
Aminoglycosides - Kanamycin	36	0
Penicillins - Ampicillin	36	25
Cephalosporins - Cefotaxim	36	10
Cephalosporins - Ceftazidim	36	8
Polymyxins - Colistin	36	0

Table Antimicrobial susceptibility testing of Salmonella in Meat from poultry, unspecified - meat preparation - Monitoring

Salmonella	Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	23	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	23	0
Amphenicols - Florfenicol	23	0
Tetracyclines - Tetracycline	23	3
Fluoroquinolones - Ciprofloxacin	23	4
Quinolones - Nalidixic acid	23	5
Trimethoprim	23	12
Sulfonamides - Sulfonamide	23	14
Aminoglycosides - Streptomycin	23	5
Aminoglycosides - Gentamicin	23	0
Aminoglycosides - Kanamycin	23	1
Penicillins - Ampicillin	23	15
Cephalosporins - Cefotaxim	23	1
Cephalosporins - Ceftazidim	23	0
Polymyxins - Colistin	23	0

Table Antimicrobial susceptibility testing of Salmonella in All foodstuffs - Monitoring

Salmonella	S. Enteritidis		S. Paratyphi B		S. Typhimurium		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes		yes		yes	
Number of isolates available in the laboratory	89		113		153		682	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol	89	0	113	2	153	10	682	16
Amphenicols - Florfenicol	89	0	113	2	153	6	682	8
Tetracyclines - Tetracycline	89	6	113	19	153	89	682	154
Fluoroquinolones - Ciprofloxacin	89	3	113	51	153	10	682	98
Quinolones - Nalidixic acid	89	3	113	45	153	10	682	90
Trimethoprim	89	4	113	97	153	42	682	226
Sulfonamides - Sulfonamide	89	8	113	69	153	95	682	258
Aminoglycosides - Streptomycin	89	7	113	79	153	90	682	216
Aminoglycosides - Gentamicin	89	0	113	2	153	1	682	4
Aminoglycosides - Kanamycin	89	1	113	9	153	2	682	14
Penicillins - Ampicillin	89	7	113	84	153	104	681	287
Cephalosporins - Cefotaxim	89	2	113	42	153	6	682	79
Cephalosporins - Ceftazidim	89	1	113	30	153	5	682	64
Polymyxins - Colistin	89	0	113	0	153	0	682	0

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from bovine animals - carcass - Monitoring - official sampling - quantitative data [Dilution method]

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

Salmonella spp.	Meat from bovine animals - carcass - Monitoring - official sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	20																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	20	3										8	9			3							4	64
Amphenicols - Florfenicol	16	20	0								0	1	13	6										2	8
Tetracyclines - Tetracycline	8	20	1								19						1							1	64
Fluoroquinolones - Ciprofloxacin	0.06	20	0				20																	0.06	0.06
Quinolones - Nalidixic acid	16	20	0										20											4	4
Trimethoprim	2	20	0							20														0.5	0.5
Aminoglycosides - Streptomycin	32	20	3										1		16		3							4	64
Aminoglycosides - Gentamicin	2	20	0						2	11	5	2												0.25	2
Aminoglycosides - Kanamycin	4	20	0										20											4	4
Penicillins - Ampicillin	4	20	0							9	9	2												0.5	2
Cephalosporins - Cefotaxim	0.5	20	0				7	12	1															0.06	0.25
Sulfonamides	256	20	3											2	5	3	7				3			8	1024
Cephalosporins - Ceftazidim	2	20	0						5	15														0.25	0.5
Polymyxins - Colistin	8	20	0											20										8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from pig - in total - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from pig - in total - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	200																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	200	6			1							123	69	1		6						0.03	64
Amphenicols - Florfenicol	16	200	2							1		8	173	13	3	2							0.5	32
Tetracyclines - Tetracycline	8	200	94								85	19	2		3	5	86						1	64
Fluoroquinolones - Ciprofloxacin	0.06	200	7			188	5		3	2	1			1									0.03	8
Quinolones - Nalidixic acid	16	200	5										185	8	2		5						4	64
Trimethoprim	2	200	49							147	4					49							0.5	32
Aminoglycosides - Streptomycin	32	200	73										5	40	66	16	3	69			1		4	1024
Aminoglycosides - Gentamicin	2	200	2						7	130	58	3	1			1							0.25	32
Aminoglycosides - Kanamycin	16	200	2										182	16	1			1					4	128
Penicillins - Ampicillin	4	200	87				1			49	59	4				87							0.06	32
Cephalosporins - Cefotaxim	0.5	200	7				140	47	6				7										0.06	4
Sulfonamides	256	200	87											1	17	45	43	7		1	86		8	1024
Cephalosporins - Ceftazidim	2	200	6						143	48	2	1	1		5								0.25	16
Polymyxins - Colistin	8	200	0										1	198	1								4	16

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from poultry, unspecified - in total - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from poultry, unspecified - in total - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	399																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	399	4			2						11	255	126	1	1	3							0.03	64
Amphenicols - Florfenicol	16	399	3			2						53	301	40		1	2							0.03	64
Tetracyclines - Tetracycline	8	399	46			2					283	65	2	1	1	7	38							0.03	64
Fluoroquinolones - Ciprofloxacin	0.06	399	80			289	30	3	44	24	8	1												0.03	2
Quinolones - Nalidixic acid	16	399	74			2							289	29	5	1	73							0.03	64
Trimethoprim	2	399	157			2				231	8	1				157								0.03	32
Aminoglycosides - Streptomycin	32	399	115			2						2	80	48	102	50	68	47						0.03	128
Aminoglycosides - Gentamicin	2	399	2			2			95	213	79	8	2											0.03	4
Aminoglycosides - Kanamycin	16	399	12			2							372	13	3			9						0.03	128
Penicillins - Ampicillin	4	398	172			1				74	145	6				172								0.03	32
Cephalosporins - Cefotaxim	0.5	399	65			2	204	102	25	1		7	58											0.03	4
Sulfonamides	256	399	146			2								9	55	104	76	6	1	1	145			0.03	1024
Cephalosporins - Ceftazidim	2	399	51			2			231	100	5	10	14	7	30									0.03	16
Polymyxins - Colistin	8	399	0			2								396	1									0.03	16

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from broilers (Gallus gallus) - carcass - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from broilers (Gallus gallus) - carcass - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	36																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	36	0			2						3	22	9										0.03	8
Amphenicols - Florfenicol	16	36	0			2						7	25	2										0.03	8
Tetracyclines - Tetracycline	8	36	9			2					21	4					9							0.03	64
Fluoroquinolones - Ciprofloxacin	0.06	36	7			28	1		4	2	1													0.03	1
Quinolones - Nalidixic acid	16	36	7			2							26	1			7							0.03	64
Trimethoprim	2	36	14			2				20						14								0.03	32
Aminoglycosides - Streptomycin	32	36	15			2							5	5	6	3	6	9						0.03	128
Aminoglycosides - Gentamicin		36	0			2			6	20	7	1												0.03	2
Aminoglycosides - Kanamycin	8	36	2			2							31	1				2						0.03	128
Penicillins - Ampicillin	4	35	18			1				6	8	2				18								0.03	64
Cephalosporins - Cefotaxim	0.5	36	8			2	20	4	2				8											0.03	4
Sulfonamides	256	36	17			2										5	6	6			17			0.03	1024
Cephalosporins - Ceftazidim	2	36	8			2			20	6			4	1	3									0.03	16
Polymyxins - Colistin	16	36	0			2								34										0.03	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	126																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	126	3									3	98	22			3							2	64
Amphenicols - Florfenicol	16	126	3									9	110	4		1	2							2	64
Tetracyclines - Tetracycline	8	126	10								102	13	1		1	4	5							1	64
Fluoroquinolones - Ciprofloxacin	0.06	126	8			116	2	1	6	1														0.03	0.5
Quinolones - Nalidixic acid	16	126	7										116	3			7							4	64
Trimethoprim	2	126	11							112	3					11								0.5	32
Aminoglycosides - Streptomycin	32	126	17									1	62	21	20	5	5	12						2	128
Aminoglycosides - Gentamicin	2	126	0						20	75	29	2												0.25	2
Aminoglycosides - Kanamycin	4	126	1										123	2				1						4	128
Penicillins - Ampicillin	4	126	16							37	71	2				16								0.5	32
Cephalosporins - Cefotaxim	0.5	126	7				93	25	1				7											0.06	4
Sulfonamides	256	126	19												13	47	45	2			19			16	1024
Cephalosporins - Ceftazidim	2	126	5						108	10	1	2	1	1	3									0.25	16
Polymyxins - Colistin	8	126	0											126										8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	48																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	48	0									3	18	27									2	8
Amphenicols - Florfenicol	16	48	0									11	21	16									2	8
Tetracyclines - Tetracycline	8	48	9								20	17	1	1		2	7						1	64
Fluoroquinolones - Ciprofloxacin	0.06	48	17			17	14		11	6													0.03	0.5
Quinolones - Nalidixic acid	16	48	17										18	13			17						4	64
Trimethoprim	2	48	47							1						47							0.5	32
Aminoglycosides - Streptomycin	32	48	23										1		9	15	20	3					4	128
Aminoglycosides - Gentamicin	2	48	0						27	14	7												0.25	1
Aminoglycosides - Kanamycin	64	48	0										48										4	4
Penicillins - Ampicillin	4	48	46							1	1					46							0.5	32
Cephalosporins - Cefotaxim		48	12				17	9	9	1		1	11										0.06	4
Sulfonamides	256	48	40												6	1			1		40		16	1024
Cephalosporins - Ceftazidim	2	48	11						12	24		1	1	3	7								0.25	16
Polymyxins - Colistin	8	48	0											48									8	8

Table Antimicrobial susceptibility testing of S. Typhimurium in Meat from pig - Monitoring - quantitative data [Dilution method]

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

S. Typhimurium	Meat from pig - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	111																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	111	5										68	38			5							4	64
Amphenicols - Florfenicol	16	111	2									7	94	5	3	2								2	32
Tetracyclines - Tetracycline	8	111	68								33	10			3	1	64							1	64
Fluoroquinolones - Ciprofloxacin	0.06	111	4			105	2		2	1	1													0.03	1
Quinolones - Nalidixic acid	16	111	3										103	5			3							4	64
Trimethoprim	2	111	30								81					30								1	32
Aminoglycosides - Streptomycin	32	111	60										6	11	25	9	2	58						4	128
Aminoglycosides - Gentamicin	2	111	1						2	70	37	1				1								0.25	32
Aminoglycosides - Kanamycin	4	111	2										102	7	1			1						4	128
Penicillins - Ampicillin	4	111	76							14	20	1				76								0.5	32
Cephalosporins - Cefotaxim	0.5	111	3				87	17	4				3											0.06	4
Sulfonamides	256	111	66											1	12	20	11	1			66			8	1024
Cephalosporins - Ceftazidim	2	111	2						98	10		1			2									0.25	16
Polymyxins - Colistin	8	111	0											110	1									8	16

Table Antimicrobial susceptibility testing of S. Typhimurium in Meat from poultry, unspecified - Monitoring - quantitative data [Dilution method]

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

S. Typhimurium	Meat from poultry, unspecified - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	18																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	18	4										11	3		1	3							4	64
Amphenicols - Florfenicol	16	18	3									1	10	4		1	2							2	64
Tetracyclines - Tetracycline	8	18	11								5	2				3	8							1	64
Fluoroquinolones - Ciprofloxacin	0.06	18	3			13	2		3															0.03	0.25
Quinolones - Nalidixic acid	16	18	4										13	1		1	3							4	64
Trimethoprim	2	18	4							14						4								0.5	32
Aminoglycosides - Streptomycin	32	18	11										1		3	3		11						4	64
Aminoglycosides - Gentamicin	2	18	0						2	11	5													0.25	1
Aminoglycosides - Kanamycin	16	18	0										17	1										4	8
Penicillins - Ampicillin	4	18	14							2	2					14								0.5	32
Cephalosporins - Cefotaxim	0.5	18	2				10	6					2											0.06	4
Sulfonamides	256	18	12											1	1	3	1				12			8	1024
Cephalosporins - Ceftazidim	2	18	2						14	2					2									0.25	16
Polymyxins - Colistin	2	18	0											18										8	8

Table Antimicrobial susceptibility testing of S. Paratyphi B in Meat from poultry, unspecified - Monitoring - quantitative data [Dilution method]

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

S. Paratyphi B	Meat from poultry, unspecified - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	101																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	101	0									1	57	43										2	8
Amphenicols - Florfenicol	16	101	0									20	58	23										2	8
Tetracyclines - Tetracycline	8	101	17								45	37	1	1		2	15							1	64
Fluoroquinolones - Ciprofloxacin	0.06	101	45			30	26	2	20	15	7	1												0.03	2
Quinolones - Nalidixic acid	16	101	39										34	23	5		39							4	64
Trimethoprim	2	101	90							10	1					90								0.5	32
Aminoglycosides - Streptomycin	32	101	72										2	2	4	21	53	19						4	128
Aminoglycosides - Gentamicin	2	101	2						56	33	6	4	2											0.25	4
Aminoglycosides - Kanamycin	4	101	9										90	2	3			6						4	128
Penicillins - Ampicillin	4	101	79							6	14	2				79								0.5	32
Cephalosporins - Cefotaxim		101	39				22	21	18	1		5	34											0.06	4
Sulfonamides	256	101	64											1	21	12	3				64			8	1024
Cephalosporins - Ceftazidim	2	101	28						30	32	4	7	7	4	17									0.25	16
Polymyxins - Colistin	2	101	0											100	1									8	16

Table Antimicrobial susceptibility testing of S. Enteritidis in Meat from poultry, unspecified - Monitoring - quantitative data [Dilution method]

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

S. Enteritidis	Meat from poultry, unspecified - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	84																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	84	0									2	73	9									2	8
Amphenicols - Florfenicol	16	84	0									3	76	5									2	8
Tetracyclines - Tetracycline	8	84	5								71	8			1	1	3						1	64
Fluoroquinolones - Ciprofloxacin	0.06	84	2			81	1		2														0.03	0.25
Quinolones - Nalidixic acid	16	84	2										81	1			2						4	64
Trimethoprim	2	84	3							79	2					3							0.5	32
Aminoglycosides - Streptomycin	32	84	5									1	54	16	7	1		5					2	128
Aminoglycosides - Gentamicin	2	84	0						14	52	17	1											0.25	2
Aminoglycosides - Kanamycin	4	84	1										79	4				1					4	128
Penicillins - Ampicillin	4	84	4							21	57	2				4							0.5	32
Cephalosporins - Cefotaxim	0.5	84	1				69	13	1				1										0.06	4
Sulfonamides	256	84	6												3	36	36	2	1		6		16	1024
Cephalosporins - Ceftazidim	2	84	0						76	7		1											0.25	2
Polymyxins - Colistin	2	84	0											84									8	8

Table Antimicrobial susceptibility testing of S. Paratyphi B in Meat from broilers (Gallus gallus) - Monitoring - quantitative data [Dilution method]

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

S. Paratyphi B	Meat from broilers (Gallus gallus) - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	11																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	11	0										8	3									4	8
Amphenicols - Florfenicol	16	11	0									2	8	1									2	8
Tetracyclines - Tetracycline	8	11	3								6	2					3						1	64
Fluoroquinolones - Ciprofloxacin	0.06	11	4			6	1		3		1												0.03	1
Quinolones - Nalidixic acid	16	11	4										6	1			4						4	64
Trimethoprim	2	11	8							3						8							0.5	32
Aminoglycosides - Streptomycin	32	11	9											1		1	5	4					8	128
Aminoglycosides - Gentamicin	2	11	0						5	3	2	1											0.25	2
Aminoglycosides - Kanamycin	8	11	1										10					1					4	128
Penicillins - Ampicillin	4	11	8							1	2					8							0.5	32
Cephalosporins - Cefotaxim	0.5	11	4				4	1	2				4										0.06	4
Sulfonamides	256	11	8												1	1	1				8		16	1024
Cephalosporins - Ceftazidim	2	11	4						3	4			2	1	1								0.25	16
Polymyxins - Colistin	2	11	0											11									8	8

Table Antimicrobial susceptibility testing of S. Enteritidis in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring - quantitative data [Dilution method]

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

S. Enteritidis	Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	73																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	73	0									1	65	7									2	8
Amphenicols - Florfenicol	16	73	0									2	67	4									2	8
Tetracyclines - Tetracycline	8	73	4								62	7			1		3						1	64
Fluoroquinolones - Ciprofloxacin	0.06	73	0			72	1																0.03	0.06
Quinolones - Nalidixic acid	16	73	0										72	1									4	8
Trimethoprim	2	73	2							69	2					2							0.5	32
Aminoglycosides - Streptomycin	32	73	4									1	46	15	6	1		4					2	128
Aminoglycosides - Gentamicin	2	73	0						12	45	15	1											0.25	2
Aminoglycosides - Kanamycin	4	73	1										70	2				1					4	128
Penicillins - Ampicillin	4	73	3							17	51	2				3							0.5	32
Cephalosporins - Cefotaxim	0.5	73	1				59	12	1				1										0.06	4
Sulfonamides	256	73	5												3	30	33	2			5		16	1024
Cephalosporins - Ceftazidim	2	73	0						68	4		1											0.25	2
Polymyxins - Colistin	8	73	0											73									8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from other poultry species - carcass - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from other poultry species - carcass - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	115																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	115	1									1	63	50		1								2	32
Amphenicols - Florfenicol	16	115	0									10	92	13										2	8
Tetracyclines - Tetracycline	8	115	9								83	23				1	8							1	64
Fluoroquinolones - Ciprofloxacin	0.06	115	29			74	12	1	10	13	4	1												0.03	2
Quinolones - Nalidixic acid	16	115	24										76	10	5		24							4	64
Trimethoprim	2	115	49							62	4					49								0.5	32
Aminoglycosides - Streptomycin	32	115	42										4	12	42	15	25	17						4	128
Aminoglycosides - Gentamicin	2	115	2						27	59	22	5	2											0.25	4
Aminoglycosides - Kanamycin	4	115	7										102	6	3			4						4	128
Penicillins - Ampicillin	4	115	50							19	45	1				50								0.5	32
Cephalosporins - Cefotaxim	0.5	115	27				45	33	10			5	22											0.06	4
Sulfonamides	256	115	35											6	24	30	17	3		1	34			8	1024
Cephalosporins - Ceftazidim	2	115	19						55	33	4	4	6	2	11									0.25	16
Polymyxins - Colistin	2	115	0											114	1									8	16

Table Antimicrobial susceptibility testing of S. Paratyphi B in Meat from other poultry species - carcass - Monitoring - quantitative data [Dilution method]

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

S. Paratyphi B	Meat from other poultry species - carcass - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	35																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	35	0										16	19									4	8
Amphenicols - Florfenicol	16	35	0									2	24	9									2	8
Tetracyclines - Tetracycline	8	35	7								12	16				1	6						1	64
Fluoroquinolones - Ciprofloxacin	0.06	35	17			8	10	1	2	9	4	1											0.03	2
Quinolones - Nalidixic acid	16	35	12										11	7	5		12						4	64
Trimethoprim	2	35	31							3	1					31							0.5	32
Aminoglycosides - Streptomycin	32	35	26										1	1	1	6	14	12					4	128
Aminoglycosides - Gentamicin	2	35	2						18	10	2	3	2										0.25	4
Aminoglycosides - Kanamycin	4	35	7										26	2	3			4					4	128
Penicillins - Ampicillin	4	35	27							1	6	1				27							0.5	32
Cephalosporins - Cefotaxim	0.5	35	16				5	7	7			5	11										0.06	4
Sulfonamides		35	17											1	13	4					17		8	1024
Cephalosporins - Ceftazidim	2	35	8						9	10	4	4	2	1	5								0.25	16
Polymyxins - Colistin	2	35	0											34	1								8	16

Table Antimicrobial susceptibility testing of S. Paratyphi B in Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - Monitoring - quantitative data [Dilution method]

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

S. Paratyphi B	Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	28																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	28	0									1	8	19									2	8
Amphenicols - Florfenicol	16	28	0									7	8	13									2	8
Tetracyclines - Tetracycline	8	28	3								7	17		1		1	2						1	64
Fluoroquinolones - Ciprofloxacin	0.06	28	8			6	14		4	4													0.03	0.5
Quinolones - Nalidixic acid	16	28	8										8	12			8						4	64
Trimethoprim	2	28	25							3						25							0.5	32
Aminoglycosides - Streptomycin	32	28	16												3	9	15	1					16	128
Aminoglycosides - Gentamicin	4	28	0						20	5	3												0.25	1
Aminoglycosides - Kanamycin	16	28	0										27	1									4	8
Penicillins - Ampicillin		28	24							2	2					24							0.5	32
Cephalosporins - Cefotaxim	0.5	28	7				2	10	8	1			7										0.06	4
Sulfonamides	256	28	20												4	1	3				20		16	1024
Cephalosporins - Ceftazidim	2	28	7						4	17			1	2	4								0.25	16
Polymyxins - Colistin	2	28	0											28									8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from poultry, unspecified - meat products - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from poultry, unspecified - meat products - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	36																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	36	0										29	7										4	8
Amphenicols - Florfenicol	16	36	0									12	22	2										2	8
Tetracyclines - Tetracycline	8	36	4								28	4					4							1	64
Fluoroquinolones - Ciprofloxacin	0.06	36	14			22			10	2	2													0.03	1
Quinolones - Nalidixic acid	16	36	13										22	1			13							4	64
Trimethoprim	2	36	22							14						22								0.5	32
Aminoglycosides - Streptomycin	32	36	11										5	3	9	8	9	2						4	128
Aminoglycosides - Gentamicin	2	36	0						8	24	4													0.25	1
Aminoglycosides - Kanamycin	4	36	0										35	1										4	8
Penicillins - Ampicillin	4	36	25							4	6	1				25								0.5	32
Cephalosporins - Cefotaxim	0.5	36	10				14	10	2			1	9											0.06	4
Sulfonamides	256	36	19											1	3	10	3				19			8	1024
Cephalosporins - Ceftazidim	2	36	8						17	9		2	2		6									0.25	16
Polymyxins - Colistin	8	36	0											36										8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in Meat from poultry, unspecified - meat preparation - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	Meat from poultry, unspecified - meat preparation - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	23																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	23	0									1	18	4										2	8
Amphenicols - Florfenicol	16	23	0									4	19											2	4
Tetracyclines - Tetracycline	8	23	3								20						3							1	64
Fluoroquinolones - Ciprofloxacin	0.06	23	4			19		1	2		1													0.03	1
Quinolones - Nalidixic acid	16	23	5										18			1	4							4	64
Trimethoprim	2	23	12							11						12								0.5	32
Aminoglycosides - Streptomycin	32	23	5									1	1	4	9	3	1	4						2	128
Aminoglycosides - Gentamicin		23	0						4	14	5													0.25	1
Aminoglycosides - Kanamycin	4	23	1										20	2				1						4	128
Penicillins - Ampicillin	4	23	15							4	4					15								0.5	32
Cephalosporins - Cefotaxim	0.5	23	1				8	13	1				1											0.06	4
Sulfonamides	256	23	14											1	1	7					14			8	1024
Cephalosporins - Ceftazidim	2	23	0						11	11		1												0.25	2
Polymyxins - Colistin	8	23	0											23										8	8

Table Antimicrobial susceptibility testing of Salmonella spp. in All foodstuffs - Monitoring - quantitative data [Dilution method]

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

Salmonella spp.	All foodstuffs - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	682																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	682	16			3						11	427	222	3	1	15							0.03	64
Amphenicols - Florfenicol	16	682	8			2				1		66	540	62	3	5	3							0.03	64
Tetracyclines - Tetracycline	8	682	154			2					426	94	5	1	4	15	135							0.03	64
Fluoroquinolones - Ciprofloxacin	0.06	682	98			545	39	3	55	28	10	1		1										0.03	8
Quinolones - Nalidixic acid	16	682	90			2							544	39	7	1	89							0.03	64
Trimethoprim	2	682	226			2				442	11	1				226								0.03	32
Aminoglycosides - Streptomycin	32	682	216			2						3	91	99	201	70	84	131			1			0.03	1024
Aminoglycosides - Gentamicin	2	682	4			2			117	393	153	13	3			1								0.03	32
Aminoglycosides - Kanamycin	4	682	14			2							635	31	4			10						0.03	128
Penicillins - Ampicillin	4	681	287			1	1			143	236	13		1		286								0.03	32
Cephalosporins - Cefotaxim	0.5	682	79			2	388	177	35	1		7	72											0.03	4
Sulfonamides		682	258			2								14	93	168	133	13	1	2	256			0.03	1024
Cephalosporins - Ceftazidim	2	682	64			2			420	177	8	11	17	7	40									0.03	16
Polymyxins - Colistin	2	682	0			2			420	177	8	11	17	7	40									0.03	16

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

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

S. Typhimurium	All foodstuffs - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	153																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	153	10										94	48	1	1	9							4	64
Amphenicols - Florfenicol	16	153	6									8	127	9	3	4	2							2	64
Tetracyclines - Tetracycline	8	153	89								47	16	1		3	5	81							1	64
Fluoroquinolones - Ciprofloxacin	0.06	153	10			139	4		5	3	2													0.03	1
Quinolones - Nalidixic acid	16	153	10										136	7		1	9							4	64
Trimethoprim	2	153	42							109	2					42								0.5	32
Aminoglycosides - Streptomycin	32	153	90										6	13	33	11	6	84						4	128
Aminoglycosides - Gentamicin	2	153	1						6	91	54	1				1								0.25	32
Aminoglycosides - Kanamycin	4	153	2										142	9	1			1						4	128
Penicillins - Ampicillin	4	153	104							19	28	2				104								0.5	32
Cephalosporins - Cefotaxim	0.5	153	6				113	30	4				6											0.06	4
Sulfonamides	256	153	95											3	15	29	10	1			95			8	1024
Cephalosporins - Ceftazidim	2	153	5						131	16		1	1		4									0.25	16
Polymyxins - Colistin	2	153	0											151	2									8	16

Table Antimicrobial susceptibility testing of S. Paratyphi B in All foodstuffs - Monitoring - quantitative data [Dilution method]

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

S. Paratyphi B	All foodstuffs - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	113																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	113	2									1	60	50			2							2	64
Amphenicols - Florfenicol	16	113	2									22	66	23		1	1							2	64
Tetracyclines - Tetracycline	8	113	19								51	41	1	1		4	15							1	64
Fluoroquinolones - Ciprofloxacin	0.06	113	51			36	26	2	26	15	7	1												0.03	2
Quinolones - Nalidixic acid	16	113	45										40	23	5		45							4	64
Trimethoprim	2	113	97							15	1					97								0.5	32
Aminoglycosides - Streptomycin	32	113	79										3	2	6	23	57	22						4	128
Aminoglycosides - Gentamicin	2	113	2						60	41	6	4	2											0.25	4
Aminoglycosides - Kanamycin	4	113	9										100	4	3			6							
Penicillins - Ampicillin	4	113	84							7	20	2				84								0.5	32
Cephalosporins - Cefotaxim	0.5	113	42				25	25	20	1		5	37											0.06	4
Sulfonamides	256	113	69											1	27	12	4				69			8	1024
Cephalosporins - Ceftazidim	2	113	30						35	35	6	7	8	4	18									0.25	16
Polymyxins - Colistin	2	113	0											112	1									8	16

Table Antimicrobial susceptibility testing of S. Enteritidis in All foodstuffs - Monitoring - quantitative data [Dilution method]

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

S. Enteritidis	All foodstuffs - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	89																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	89	0									2	78	9									2	8
Amphenicols - Florfenicol	16	89	0									3	81	5									2	8
Tetracyclines - Tetracycline	8	89	6								75	8			1	1	4						1	64
Fluoroquinolones - Ciprofloxacin	0.06	89	3			85	1		2	1													0.03	0.5
Quinolones - Nalidixic acid	16	89	3										85	1			3						4	64
Trimethoprim	2	89	4							83	2					4							0.5	32
Aminoglycosides - Streptomycin	32	89	7									1	54	18	8	1		7					2	128
Aminoglycosides - Gentamicin		89	0						15	55	18	1											0.25	2
Aminoglycosides - Kanamycin	4	89	1										84	4				1					4	128
Penicillins - Ampicillin	4	89	7							21	59	2				7							0.5	32
Cephalosporins - Cefotaxim	0.5	89	2				73	13	1				2										0.06	4
Sulfonamides	256	89	8												4	36	38	2	1		8		16	1024
Cephalosporins - Ceftazidim	2	89	1						80	7		1			1								0.25	16
Polymyxins - Colistin	2	89	0											89									8	8

Table Cut-off values for antibiotic resistance testing of Salmonella in Animals

Test Method Used	Standard methods used for testing
Disc diffusion	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol	60	21	24
	Florfenicol	30	15	18
Tetracyclines	Tetracycline	80	20	22
Fluoroquinolones	Enrofloxacin	10	20	22
Quinolones	Nalidixic acid	130	21	24
Sulfonamides	Sulfonamide	240	20	22
Aminoglycosides	Streptomycin	100	23	25
	Gentamicin	40	20	22
	Neomycin	120	20	22
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	5.2+240	27	31
Cephalosporins	3rd generation cephalosporins	30	20	22
Penicillins	Ampicillin	33	17	19

Table Cut-off values for antibiotic resistance testing of Salmonella in Food

Test Method Used	Standard methods used for testing
Broth dilution	ISO 20776 1

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
	Florfenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
	Kanamycin		8	
Cephalosporins	Cefotaxim		0.5	
	Ceftazidim		2	
Penicillins	Ampicillin		4	
Polymyxins	Colistin		16	

Table Cut-off values for antibiotic resistance testing of Salmonella in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

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

Campylobacteriosis is a leading bacterial foodborne gastrointestinal disease in humans in all parts of the world. It can also cause post-infectious complications as Guillain-Barré syndrome.
In 80% of the cases, the infection route of campylobacteriosis is food, but domestic animals including pets can also be involved. The transmission of this pathogen to humans is mostly due to consumption of undercooked poultry, pork and beef, unpasteurized milk, contaminated drinking water, or contacts with the faeces of infected pets. This report will focus on Campylobacter jejuni and Campylobacter coli that are the principal strains causing enteritis in humans.
The contamination with Campylobacter of poultry carcasses and meat is monitored since 2000 by the Federal Agency for the Safety of the Food Chain. The rate of positive poultry samples is stable, but high. Chicken and layer meat have to be well cooked and cross-contamination should be avoided during preparation.

2.2.2 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring program was organized by FASFC to evaluate the level of Campylobacter spp. contamination of broiler meat in Belgian slaughterhouses and cutting plants.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

At meat processing plant

Sampling distributed evenly throughout the year

At retail

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Meat, minced meat, sausages and other

At retail

Meat, minced meat, sausages and other

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The matrices were carcasses, cuts and meat preparation of broilers. The Campylobacter spp. contamination levels were analyzed : 0,01g carcasses, 1g cutting meat and 1g meat preparation.

At meat processing plant

The samples were about 200 g of meat. The amount of Campylobacter has been assessed in 1g of sample.

At retail

The amount of Campylobacter has been assessed in 1g of sample.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: ISO 10272:1995

B. C.,thermophilic in food

Monitoring system

Sampling strategy

A monitoring program was organized by the Federal Agency for the Safety of the Food Chain. More than 200 Belgian slaughterhouses, more than 100 meat cutting plants and more than 100 retail trades representative of the Belgian production of carcasses and meat, were selected for this study. The samples assayed were carcasses and minced meat from pork, carcasses, cuts and meat preparation from chicken, and layer carcasses. Sampling was done by a specially trained staff of the Federal Agency for the Safety of the Food Chain.

Frequency of the sampling

Samples have been taken every week from the first to the 52nd week, except during the 30th week.

Type of specimen taken

Meat

Methods of sampling (description of sampling techniques)

Sampling of pork carcasses was done by means of swabs (4 areas from the same half carcass constituting 600 cm2 were putted in the same stomacher bag).
The carcass samples of broiler and layer consisted of 10g of neck skin. The other samples were about 200g of meat. 10g to 25g representative of the whole sample were weighted in the laboratory, and the detection of Campylobacter has been assessed in these quantities or dilutions: 25g for pork minced meat, 600 cm2 (pork carcasses), 0,01g for chicken carcasses and layer carcasses, 1g for chicken meat preparation, and for chicken cuts, 0,1g and 25g.
No pooling has been done.

Definition of positive finding

A sample is considered to be positive after biochemical or genetic confirmation of one Campylobacter in the sample.

Diagnostic/analytical methods used

For detection of Campylobacter in meat samples or swabs the official Belgian SP-VG-M003 method was used following :
- selective enrichment on Preston at 42°C for 48 h,
- isolation on mCCDA at 42°C for 24 h - 120 h,
- confirmation of minimum 1 colony with miniaturised biochemical tests or by PCR typing.

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse [1)]	FASFC DPA003	Single	1g	261	84					84
Meat from broilers (Gallus gallus) - fresh - at processing plant	FASFC TRA200	Single	1g	494	47					47
Meat from broilers (Gallus gallus) - fresh - at retail	FASFC DIS821	Single	1g	199	24					24
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant	FASFC TRA202	Single	1g	53	0					
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail	FASFC DIS863	Batch	1g	56	0					
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant	FASFC TRA303	Batch	1g	30	0					
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at retail	FASFC DIS880	Batch	1g	34	1					1
Meat from turkey - fresh - at slaughterhouse	FASFC DPA005	Single	1g	278	14					14
Meat from turkey - fresh - at processing plant	FASFC TRA200	Single	1g	14	0					
Meat from turkey - meat preparation - intended to be eaten cooked - at processing plant	FASFC TRA202	Batch	1g	8	0					
Meat from turkey - meat preparation - intended to be eaten cooked - at retail	FASFC DIS863	Batch	1g	2	0					
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant	FASFC TRA303	Batch	1g	4	0					

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from turkey - minced meat - intended to be eaten cooked - at retail	FASFC DIS880	Batch	1g	2	0					
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - Survey - EU baseline survey [2)]	FASFC DPA035	Batch	1g	380	134	27	100			7
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	FASFC DPA035	Batch	25g	337	102	28	67			7
Meat from broilers (Gallus gallus) - fresh - skinned - at cutting plant - Monitoring		Single	1g	255	4					4
Meat from broilers (Gallus gallus) - fresh - with skin - at cutting plant - Monitoring		Single	1g	258	40					40

Comments:

[1)] quantification

[2)] enumeration

Table Campylobacter in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Live bivalve molluscs - at retail	FASFC DIS806	Batch	1 g	94	0					
Meat from bovine animals - minced meat - intended to be eaten raw - at retail	FASFC DIS823	Batch	1 g	27	0					
Meat from pig - minced meat - intended to be eaten raw - at processing plant	FASFC TRA303	Batch	1 g	17	0					
Meat from pig - minced meat - intended to be eaten raw - at retail	FASFC DIS823	Batch	1 g	9	0					

2.2.3 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Frequency of the sampling

At slaughter

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughter

caeca

Methods of sampling (description of sampling techniques)

At slaughter

10 caeca pairs are pooled to one sample. 6 samples are taken of each examined flock. The caeca are emptied at the laboratory. The content is examined for Cambylobacter.

Case definition

At slaughter

A sample is positive if Campylobacter is detected.

Measures in case of the positive findings or single cases

Samples are taken for monitoring purposes only. No measures are taken in case of positive findings.

2.2.4 Antimicrobial resistance in Campylobacter isolates

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

Sampling strategy used in monitoring

Procedures for the selection of isolates for antimicrobial testing

All strains isolated in the zoonosis monitoring program and originating from pork were sent to the Institute of Public Health for determination of antimicrobial resistance.

Laboratory methodology used for identification of the microbial isolates

Specification (coli/jejuni) with PCR (Debruyn et al, Res Microbiol, 2008)

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The antimicrobials tested and the breakpoints used are listed in the following table.

AntimicrobialBreakpoints (g / ml)	
	Jejunicoli
Ampicillin	16
Tetracycline	2
Nalidixic acid	16
Ciprofloxacin	1
Erytromycin	4
Gentamicin	1

Minimum Inhibitory Concentrations were determined following the NCCLS standards.

Results of the investigation

In total, 59 Campylobacter isolates were analysed, of which 55 belonged to C. coli and 4 to C. jejuni.
The number of isolates that were sensitive to all tested antibiotics decreased by half to only 7% compared to 2008. The resistance against tetracyclin (73%) was high, and 38% of all isolates showed resistance to three or more antibiotics tested. Complete resistance was not observed.

Compared to 2007, a general increase is observed due to a lowering of the breakpoint concentration (cfr CLSI standards). This trend is most obvious for resistance to gentamycin.

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

Sampling strategy used in monitoring

Procedures for the selection of isolates for antimicrobial testing

All strains isolated in the zoonosis monitoring program and originating from poultry were sent to the Institute Public Health for determination of antimicrobial resistance.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The antimicrobials tested and the breakpoints used are listed in the following table.

AntimicrobialBreakpoints (µg / ml)	
	Jejunicoli
Ampicillin	16
Tetracycline	2
Nalidixic acid	16
Ciprofloxacin	1
Erytromycin	4
Gentamicin	1

Minimum Inhibitory Concentrations were determined following the NCCLS standards.

Results of the investigation

558 Campylobacter strains were isolated in poultry meat and carcasses and tested for antimicrobial susceptibility (313 Campylobacter jejuni and 86 Campylobacter coli strains).
In total 20% of all Campylobacter strains were sensitive to all tested antibiotics. Tetracycline and Nalidixic acid resistance were most dominantly present (54%), followed closely by resistance to ciprofloxacin (52%).
Overall antibiotic resistance was more prevalent in C. coli than in C. jejuni, with only 3 strains sensitive to all antibiotics, and 80% resistant to three or more antibiotics. A high resistance was observed for tetracycline (87%), Nalidixic acid (86%) and ciprofloxacin (81%).
For C. jejuni, 25% of all strains were senstive to all antibiotics tested, and 38% was resistant to three or more antibiotics. High resistance was observed for Nalidixic acid (46%), tretacycline (44%) and ciprofloxacin (43%)

Compared to previous years, resistance to gentamycin (18%) and erytromycin (9%) increased significantly due to adaptation of the breakpoint values.

Table Antimicrobial susceptibility testing of Campylobacter in Meat from pig

Campylobacter	Campylobacter spp., unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	55	
Antimicrobials:	N	n
Fluoroquinolones - Ciprofloxacin	55	20
Quinolones - Nalidixic acid	55	20
Aminoglycosides - Gentamicin	55	14
Macrolides - Erythromycin	55	10
Penicillins - Ampicillin	55	8
Tetracyclines - Tetracycline	55	40

Table Antimicrobial susceptibility testing of Campylobacter in Meat from pig - Monitoring

Campylobacter	C. coli	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	55	
Antimicrobials:	N	n
Tetracyclines - Tetracycline	55	40
Fluoroquinolones - Ciprofloxacin	55	20
Quinolones - Nalidixic acid	55	20
Aminoglycosides - Gentamicin	55	14
Penicillins - Ampicillin	55	8
Macrolides - Erythromycin	55	10

Table Antimicrobial susceptibility testing of Campylobacter in Meat from poultry, unspecified - Monitoring

Campylobacter	C. coli		C. jejuni	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	115		292	
Antimicrobials:	N	n	N	n
Tetracyclines - Tetracycline	115	74	292	131
Fluoroquinolones - Ciprofloxacin	115	82	292	120
Quinolones - Nalidixic acid	115	79	292	132
Aminoglycosides - Gentamicin	115	26	292	72
Penicillins - Ampicillin	115	30	292	116
Macrolides - Erythromycin	115	23	292	35

Table Antimicrobial susceptibility testing of Campylobacter in Meat from poultry, unspecified - mechanically separated meat (MSM) - Monitoring

Campylobacter	C. coli		C. jejuni	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	20		75	
Antimicrobials:	N	n	N	n
Tetracyclines - Tetracycline	20	12	75	34
Fluoroquinolones - Ciprofloxacin	20	15	75	36
Quinolones - Nalidixic acid	20	13	75	39
Aminoglycosides - Gentamicin	20	1	75	19
Penicillins - Ampicillin	20	4	75	39
Macrolides - Erythromycin	20	1	75	10

Table Antimicrobial susceptibility testing of Campylobacter in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring

Campylobacter	C. coli		C. jejuni	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	60		130	
Antimicrobials:	N	n	N	n
Tetracyclines - Tetracycline	60	38	130	59
Fluoroquinolones - Ciprofloxacin	60	43	130	45
Quinolones - Nalidixic acid	60	43	130	50
Aminoglycosides - Gentamicin	60	16	130	35
Penicillins - Ampicillin	60	16	130	48
Macrolides - Erythromycin	60	17	130	14

Table Antimicrobial susceptibility testing of C. coli in Meat from pig - carcass - Monitoring - quantitative data [Dilution method]

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

C. coli	Meat from pig - carcass - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	55																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	55	40			1		1	5	5	2	1			1	2		2	35					0.03	256
Fluoroquinolones - Ciprofloxacin	1	55	20			1	6	9	13	4	2		1	1	1	17								0.03	32
Quinolones - Nalidixic acid	32	55	20								1	8	14	8	4		1	1	18					1	256
Aminoglycosides - Gentamicin	2	55	14							9	27	5	3	3	4	1	1	1	1					0.5	256
Penicillins - Ampicillin	16	55	8							2	18	13	9	3	2	3	1	1	3					0.5	256
Macrolides - Erythromycin	16	55	10								14	16	9	4	2	2			8					1	256

Table Antimicrobial susceptibility testing of C. coli in Meat from poultry, unspecified - Monitoring - quantitative data [Dilution method]

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

C. coli	Meat from poultry, unspecified - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	115																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	115	74			4	2	8	17	5	5		2		1	2	1	5	63					0.03	256
Fluoroquinolones - Ciprofloxacin	1	115	82			2	6	6	16	1	2			1	5	76								0.03	32
Quinolones - Nalidixic acid	32	115	79			2				1	1	9	9	6	4	4	2	1	76					0.03	256
Aminoglycosides - Gentamicin	2	115	26			2	1	1	2	40	32	11	9	2	7	3	1	2	2					0.03	256
Penicillins - Ampicillin	16	115	30			2			1	6	18	21	22	11	4	3	6	2	19					0.03	256
Macrolides - Erythromycin	16	115	23			3			2	20	16	30	12	4	5	5	2		16					0.03	256

Table Antimicrobial susceptibility testing of C. jejuni in Meat from poultry, unspecified - Monitoring - quantitative data [Dilution method]

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

C. jejuni	Meat from poultry, unspecified - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	292																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	292	131			14	6	43	77	16	4	1	3	7	5	11	10	8	87					0.03	256
Fluoroquinolones - Ciprofloxacin	1	292	120			8	37	47	49	17	14	6	2	1	1	109			1					0.03	256
Quinolones - Nalidixic acid	16	292	132			5					21	55	48	25	6	12	3	3	114					0.03	256
Aminoglycosides - Gentamicin	1	292	72			5		2	45	121	47	25	14	11	10	6	4	2						0.03	128
Penicillins - Ampicillin	16	292	116			5			4	13	35	53	32	17	17	29	18	7	62					0.03	256
Macrolides - Erythromycin	4	292	35			5	1		16	69	103	47	16	12	4	5	4	2	8					0.03	256

Table Antimicrobial susceptibility testing of C. coli in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring - quantitative data [Dilution method]

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

C. coli	Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	60																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	60	38				2	5	9	2	4		2		1		1	1	33					0.06	256
Fluoroquinolones - Ciprofloxacin	1	60	43				3	3	9		2			1	2	40									
Quinolones - Nalidixic acid	32	60	43								1	3	6	2	3	2	2	1	40					1	256
Aminoglycosides - Gentamicin	2	60	16						1	21	17	5	5		6	2		1	2					0.25	256
Penicillins - Ampicillin	16	60	16						1	2	9	10	14	5	3	2	2	1	11					0.25	256
Macrolides - Erythromycin	4	60	17			1				11	10	13	8	2	2	4	2		7					0.03	256

Table Antimicrobial susceptibility testing of C. jejuni in Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring - quantitative data [Dilution method]

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

C. jejuni	Meat from broilers (Gallus gallus) - carcass - spent hens - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	130																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	130	59			3	3	17	39	5	3	1	3	6	4	5	2	3	36					0.03	256
Fluoroquinolones - Ciprofloxacin	1	130	45			2	21	26	26	6	4	2	1			41			1					0.03	256
Quinolones - Nalidixic acid	16	130	50								10	26	27	14	3	5	2	2	41					1	256
Aminoglycosides - Gentamicin	1	130	35						18	56	21	13	4	7	5	4	2							0.25	64
Penicillins - Ampicillin	16	130	48						2	7	14	26	15	8	10	17	8	1	22					0.25	256
Macrolides - Erythromycin	4	130	14				1		11	31	44	21	8	2	1	4	2	2	3					0.06	256

Table Antimicrobial susceptibility testing of C. jejuni in Meat from broilers (Gallus gallus) - carcass - Monitoring - quantitative data [Dilution method]

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

C. jejuni	Meat from broilers (Gallus gallus) - carcass - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	30																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	29	16			1		4	6	2						1	2		13					0.03	256
Fluoroquinolones - Ciprofloxacin	1	30	16				2	4	4	2	2	1				15								0.06	32
Quinolones - Nalidixic acid	16	30	19								1	5	2	3		2		1	16					1	256
Aminoglycosides - Gentamicin	1	30	6						7	13	4	1	3		1		1							0.25	64
Penicillins - Ampicillin	16	30	10						1	3	3	3	5	3	2	1		1	8					0.25	256
Macrolides - Erythromycin	4	30	4							9	10	5	2	2	1		1								

Table Antimicrobial susceptibility testing of C. jejuni in Meat from poultry, unspecified - mechanically separated meat (MSM) - Monitoring - quantitative data [Dilution method]

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

C. jejuni	Meat from poultry, unspecified - mechanically separated meat (MSM) - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	75																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	75	34			6	3	15	12	5				1		1	4	4	24					0.03	256
Fluoroquinolones - Ciprofloxacin	1	75	36			1	3	13	13	4	5	1	1		1	33								0.03	32
Quinolones - Nalidixic acid	16	75	39								4	14	10	5	3	5	1		33					1	256
Aminoglycosides - Gentamicin	1	75	19					1	10	33	12	7	5	3	1	1	1	1						0.12	128
Penicillins - Ampicillin	16	75	39						1	2	10	7	9	3	4	9	8	3	19					0.25	256
Macrolides - Erythromycin	4	75	10						3	18	27	14	3	5	1	1	1		2					0.25	256

Table Antimicrobial susceptibility testing of C. coli in Meat from poultry, unspecified - mechanically separated meat (MSM) - Monitoring - quantitative data [Dilution method]

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

C. coli	Meat from poultry, unspecified - mechanically separated meat (MSM) - Monitoring																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	20																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	20	12			1		2	4		1					1		3	8					0.03	256
Fluoroquinolones - Ciprofloxacin	1	20	15					1	3	1					2	13								0.12	32
Quinolones - Nalidixic acid	32	20	13							1		2	1	3					13					0.5	256
Aminoglycosides - Gentamicin	2	20	1				1		1	6	8	3		1										0.06	8
Penicillins - Ampicillin	16	20	4							2	5	2	4	3			1		3					0.5	256
Macrolides - Erythromycin	16	20	1							3	5	7	2	1	1	1								0.5	32

Table Cut-off values used for antimicrobial susceptibility testing of Campylobacter in Animals

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

Table Cut-off values used for antimicrobial susceptibility testing of Campylobacter in Food

Test Method Used
Broth dilution

Standard methods used for testing
ISO 20776 1

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

Table Cut-off values used for antimicrobial susceptibility testing of Campylobacter in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

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

Listeria monocytogenes has become a major concern of the food industry and public health authorities. Ingestion of food contaminated with Listeria monocytogenes may cause either a serious invasive illness affecting people with altered or deficient immune responses, or a non-invasive febrile gastro-enteritis. Although the incidence of listeriosis is low, the high mortality rate, which often reaches as high as 30-40%, requires early diagnosis and appropriate antimicrobial therapy.
Listeriosis is transmitted to humans via contact with animals, cross-infection of foetus or newborn babies and foodborne infection . Listeria is ubiquitous and widely distributed in the environment (soil, vegetables, meat, milk, fish). All food associated with Listeria monocytogenes outbreaks were consumed without further processing or after minimal heat treatment, and many of them had a suitable environment for growth.

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

A monitoring program was organized by the Federal Agency for the Safety of the Food chain. More than 100 meat cutting plants and more than 200 retail trades representative of the Belgian production of meat, were selected for this study.
The matrices were minced meat of pork, beef and poultry, cooked ham, paté, salami, smoked salmon and other foodstuff.
,

Recent actions taken to control the zoonoses

General food hygiene rules are essential for the prevention of human listeriosis. As some persons are at high risk (pregnant women, immunocompromised people), they are advised not to eat certain categories of food with proven elevated risk of Listeria monocytogenes contamination, such as unpasteurized milk and butter, soft cheeses and ice cream made from unpasteurized milk, any soft cheese crust, smoked fish, paté, cooked ham, salami, cooked meat in jelly, raw minced meat from beef, pork and poultry, steak tartar, raw fish and shellfish (oysters, mussels, shrimps), fish, meat and surimi salads, insufficiently rinsed raw vegetables, unpeeled fruit.

2.3.2 Listeriosis in humans

A. Listeriosis in humans

History of the disease and/or infection in the country

2.3.3 Listeria in foodstuffs

A. L. monocytogenes in food

Monitoring system

Sampling strategy

A monitoring program was organieed by the Federal Agency for the Safety of the Food Chain. More than 100 meat cutting plants and more than 100 retail trades, were selected for this study. The samples assayed were minced meat from beef and pork, chicken meat preparation, cheeses, smoked salmon and other foodstuffs. Sampling was done by a specially trained staff of the Federal Agency for the Safety of the Food Chain.

Frequency of the sampling

At the production plant

every week

At retail

every week

Type of specimen taken

At the production plant

Minced meat of pork, beef, chicken, cooked ham, salami, pate, smoked salmon, cheeses and other

At retail

Minced meat of pork, beef, chicken, cooked ham, salami, pate, smoked salmon, chicken meat preparation, cheeses and other

Methods of sampling (description of sampling techniques)

At the production plant

The detection of Listeria monocytogenes has been assessed in 1g for beef and pork minced meat and in 25g for ready-to-eat foods. Enumeration was done in 1g of sample.

At retail

Listeria monocytogenes was quantified in ready-to-eat foods at retail level through enumeration of colony forming units.

Definition of positive finding

At the production plant

A sample is considered to be positive after confirmation of Listeria monocytogenes on chromogenic medium.

At retail

A sample is considered to be positive after confirmation of Listeria monocytogenes on chromogenic medium.

Diagnostic/analytical methods used

At the production plant

Afnor validated VIDAS LMO2 followed by a chromogenic medium (Rapid L. mono or ALOA)

At retail

Afnor validated VIDAS LMO2 followed by a chromogenic medium (Rapid L. mono or ALOA)

Control program/mechanisms

The control program/strategies in place

Controls are realized by the Federal Agency in case of notification.

Notification system in place

Notification is mandatory since 1/3/2004 (Ministerial Decree on mandatory notification in the food chain of 22/1/2004). For Listeria monocytogenes, the criterion of 100 cfu/g in ready-to-eat food putted on the market may not be exceeded. Laboratories have to inform the Federal Agency for the Safety of the Food Chain in case of a positive sample.

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Listeria	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
Fish - smoked - at processing plant	FASFC TRA400	Batch	1g or 25g	26	4	17	4	9	0	0
Fish - smoked - at retail	FASFC DIS847	Batch	1g	199	3	0	0	199	1	2
Infant formula	FASFC TRA127 TRA501	Batch	25g	10	0	10	0	0	0	0
Meat from bovine animals and pig - meat products - at processing plant (cooked, ready-to-eat)	FASFC TRA317	Batch	1g or 25g	185	14	102	12	83	2	0
Meat from bovine animals and pig - meat products - at retail (cooked, ready-to-eat)	FASFC DIS801	Batch	1g	49	0	0	0	49	0	0

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Listeria	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant	FASFC TRA134	Batch	1g or 25g	102	1	73	0	29	1	0
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at retail	FASFC DIS818	Batch	1g	80	0	0	0	80	0	0
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant	FASFC TRA133	Batch	1g or 25g	62	1	38	1	24	0	0
Cheeses made from goats' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant	FASFC TRA133	Batch	1g or 25g	35	1	20	1	15	0	0
Cheeses made from sheep's milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant	FASFC TRA133	Batch	25g	4	0	4	0	0	0	0
Dairy products (excluding cheeses) - butter - at retail	FASFC DIS585	Batch	1g	24	1	0	0	24	1	0
Dairy products (excluding cheeses) - cream - at processing plant	FASFC TRA190	Batch	1g or 25g	94	0	57	0	37	0	0

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/or infection in the country

E. coli O157 is the only VTEC that is looked for at a regular basis in the official monitoring plan. Swabs are taken from cattle carcasses in the slaughterhouse. However, there is no tracing back to the farm of origin in case of detection of contaminated carcasses.

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

Although sporadically VTEC infections were recognised in 2009 in humans, no large outbreaks have been detected. Data on the prevalence of VTEC among cattle are scarce.

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

Zoonotic verotoxin producing E. coli may cause life-threatening diseases in young children or in immunocompromized or elderly people, i.e. hemorrhagic colitis, hemorrhagic uremic syndrome (HUS) and even death. E. coli O157 is the best known and most studied VTEC. Cattle are often indicated as the principal reservoir of VTEC, but are mostly not clinically affected by zoonotic VTEC infection.
Infection of humans takes place via consumption of contaminated food, through contact with contaminated water, or by direct transmission of VTEC from infected humans or animals. Therefore, prevention mainly relies on hygienic measures.

2.4.2 Escherichia coli, pathogenic in foodstuffs

A. Verotoxigenic E. coli (VTEC) in food

Monitoring system

Sampling strategy

A monitoring program was organized by the Federal Agency for the Safety of the Food Chain. More than 200 Belgian slaughterhouses, more than 100 meat cutting plants and more than 100 retail trades representative of the Belgian production, were selected for this study. The samples assayed were carcasses, cuts and minced meat from beef and other foodstuffs. Sampling was done by a specially trained staff of the Federal Agency for the Safety of the Food Chain.

Frequency of the sampling

Samples have been taken every week from the first to the 52nd week, except during the 30th week.

Type of specimen taken

Meat

Methods of sampling (description of sampling techniques)

Sampling of beef carcasses was done by means of swabs (4 areas from the same half carcass constituting 1600 cm2 were putted in the same stomacher bag).
The samples were putted in a cool box and transported to a dispatching center of the Federal Agency for the Safety of the Food Chain and the laboratory take the samples at the dispatching center for analyses.
The other samples were about 200g of meat. The detection of enterohemorrhagic E. coli has been assessed in 1600 cm2 for beef carcasses and in 25g for beef minced meat and beef cuts.
No pooling has been done.

Definition of positive finding

A sample is considered positive after isolation and genetic confirmation of the pathogenicity of the 0157 E. coli strain in the sample.

Diagnostic/analytical methods used

For detection of Escherichia coli O157, the Belgian official SP-VG-M001 method, according to the ISO 16654 (2001) was used :
- pre-enrichment in m-TSB + novobiocin at 42°C for 7 hours,
- enrichment in CT-Mac Conkey at 37°C for 16-18 hours;
- immunoassay O157 (VIDAS ECO, bioMÃ©rieux),
- selective immunomagnetic enrichment (Dynabeads, Dynal or VIDAS ICE, bioMérieux),
- isolation on sorbitol-Mac Conkey and incubation at 42°C for 18 h,
- isolation and confirmation (agglutination of latex particles, Oxoid),
- search for genes encoding for virulence factors in national reference laboratory.

Preventive measures in place

Controls are in place by the Federal Agency in case of notification.

Control program/mechanisms

The control program/strategies in place

Notification is mandatory since 1/3/2004 (Ministerial Decree on mandatory notification in the food chain of 22/1/2004). For enterohemorrhagic E. coli, absence in 25g in ready-to-eat food putted on the market is mandatory. Laboratories have to inform the Federal Agency in case of positive sample.

Measures in case of the positive findings or single cases

Meat from positive carcasses is traced back, destroyed or transformed into cooked meat products.

Table VT E. coli in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC) - VTEC O157	Verotoxigenic E. coli (VTEC) - VTEC non-O157	Verotoxigenic E. coli (VTEC) - VTEC, unspecified
Meat from bovine animals - fresh - at slaughterhouse	FASFC DPA001	Single	1600cm2	995	10	10		
Meat from bovine animals - fresh - at processing plant	FASFC TRA305	Single	25g	294	0			
Meat from bovine animals - minced meat - intended to be eaten raw - at processing plant	FASFC TRA304	Batch	25g	293	0			
Meat from pig - fresh	FASFC TRA306	Single	25g	1	0			

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

Zoonotic tuberculosis (Mycobacterium bovis).
Tuberculosis in humans caused by M. bovis is clinically indistinguishable from tuberculosis caused by M. tuberculosis.
In the past, the most important way of transmission of M. bovis for humans was the consumption of raw milk or raw milk products from infected cattle. Industrial heat treated production methods or pasteurization of raw milk did stop this way of transmission to humans.
Nowadays tuberculosis in humans caused by M. bovis is rare. In regions were M. bovis infections in cattle are largely eliminated, only few residual cases occur among elderly persons as a result of the reactivation of dormant M. bovis within old lesions. Also among migrants from high-prevalence countries, infections with M. bovis are diagnosed.
Agricultural workers may acquire infection by M. bovis by inhaling cough aerosols from infected cattle and may subsequently develop typical pulmonary or genito-urinary tuberculosis. Cervical lymphadenopathy, intestinal lesions, chronic skin tuberculosis (lupus vulgaris) and other non-pulmonary forms are also particularly common as clinical symptoms.

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

In 2002, 2 human cases of bovine tuberculosis were identified. Both patients were farmers that were found positive after the epidemiological investigation of the M. bovis infections in their cattle.
In 2003, 5 human cases of bovine tuberculosis were diagnosed. Molecular typing of strains isolated from cattle and human cases is realized in order to evaluate the presence of similar strains in both species.
Also in 2004, 5 human cases of bovine tuberculosis were diagnosed.
In 2005, 3 human cases of bovine tuberculosis were identified.
In 2006, 1 human case of bovine tuberculosis was identified by the National Reference Laboratory.
In 2007, 3 human cases of bovine tuberculosis were reported to the Belgian Register and identified by molecular techniques in the NRL. No link between these patients and bovine tuberculosis in a Belgian herd could be detected.
One patient had a pulmonary disease and the two other ones (born in Morocco) had an extra- pulmonary form of the disease. Among them, one patient already detected in 2005 (abdominal tuberculosis), was infected by a multidrug resistant isolate. The MIRU-VNTR profile and spoligotype of this isolate were identical to the genetic profiles observed in 2005 and 2006, but the strain acquired resistance to isoniazid and to rifampicin in 2007.

Recent actions taken to control the zoonoses

The surveillance program of tuberculosis is based on Directive 64/432/EEC, which is implemented and adapted in National legislation since 1963 and last modified by Royal Decree of 17 October 2002.
The control implies skin testing of animals at the occasion of trade and intensive testing of infected and contact farms in consequence of a confirmation of a bovine TB suspicious case (tracing-on and tracing-back of all contact animals).

Systematic post mortem examinations at the slaughterhouse are performed with special attention.
The Federal Agency for the Safety of the Food chain is informed about any doubtful or positive result of the skin test of bovines and may decide to re-examine (additional tests e.g. comparative tuberculin test, interferon-gamma test) the animals or to kill them for additional analysis (test slaughter). In case a "TB suspicious" lesion is detected, a tissue sample is sent to the National Reference Laboratory for analysis. Consequently, if Mycobacterium bovis suspicion is confirmed by analysis, all animals in the herd of origin are skin tested and a complete epidemiological investigation is made. The total herd is considered as the 'epidemiological unit'.
Isolation of M. bovis and biochemical testing is exclusively performed in the National Reference Laboratory where also IFN-gamma, PCR and molecular typing by means of RFLP, spoligotyping or more recently MIRU-VNTR are done to support the epidemiological investigations and to eventually prove the link between different cases.

Suggestions to the Community for the actions to be taken

In case a holding is infected and if by epidemiological investigation and tracing-back, animals were found to be exported to another country, the Chief Veterinary Officer of the country of destination has to be informed about the outbreak in the country of origin. This alert can help to a rapid detection of an infection in the concerned holding of destination.
Monitoring of the type of strains circulating in each country could have a valuable contribution to the understanding of the spread of specific strains among the community and could probably bear evidence of epidemiological links between outbreaks.

2.5.2 Tuberculosis, mycobacterial diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Results of the investigation

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

Belgium is officially free from bovine tuberculosis since the 25th of June 2003 (Commission Decision 2003/467/EC)

Free regions

All regions are officially free of bovine tuberculosis for the reporting year.

Monitoring system

Sampling strategy

Surveillance system.
The control of tuberculosis is based on Council Directive 64/432/EEC, which is implemented and adapted in National legislation since 1963 and last modified by Royal Decree of 17 October 2002.

The surveillance program implies:
- skin testing of animals at purchase by the veterinary practioner responsible for the epidemiological surveillance of the holding (contract between farmer and veterinarian);
- intensive skin testing in case of an suspected/infected bovine on all animals of the holding
- intensive testing of all 'contact' animals and herds (tracing-on and tracing-back);
- systematic post-mortem examinations at the slaughterhouse;
- transmission to the National Reference Laboratory of all "TB suspicious" lesions for analysis.

Isolation of M. bovis and biochemical testing is exclusively performed in the National Reference Laboratory where also IFN-gamma, PCR and molecular typing by means of RFLP, spoligotyping and more recently MIRU-VNTR are done.

Frequency of the sampling

Frequency of testing is depending on:
- the introduction of new animals into a herd (mandatory examination at purchase)
- the results of tuberculin testing
- the detection of suspected bovines
- the detection of infected bovines
- the epidemiological investigation related to suspected or infected animals or herds (tracing-on and tracing-back)
- the follow-up testing of infected and/or eradicated herds during 5 years.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Tuberculin skin testing: single (bovine tuberculin) or comparative (bovine/avian tuberculin) testing.
Blood sampling: interferon-gamma tests
Laboratory examination of all suspicious lesions
Organs: lymph nodes, lungs, ...

Case definition

- A bovine is defined as infected with bovine tuberculosis if the animal is positive by skin testing or if Mycobacterium bovis is isolated by culture or confirmed by laboratory analysis (PCR).
- A holding is defined as infected if Mycobacterium bovis was isolated from an animal of the holding.

Diagnostic/analytical methods used

- Simple skin test with bovine tuberculin
- Comparative skin test with bovine and avian tuberculin
- Ziehl-Neelsen coloration
- Culture for isolation
- Interferon-gamma
- PCR on lesions / organs
- PCR on culture
- RFLP typing
- Spoligotyping
- MIRU-VNTR

Vaccination policy

Vaccination is prohibited by Royal Decree of 17 October 2002.

Control program/mechanisms

The control program/strategies in place

National surveillance program by the Competent Authority (FASFC) on mandatory legal base.

Recent actions taken to control the zoonoses

In case of suspicion by tuberculin testing of live animals, complementary blood sampling is performed to improve the detection or to earlier confirm infection by gamma-Interferon test;

Draw special attention and focus on the post-mortem examination of slaughtered animals;

Transmission for further analysis of any lesion that could be 'suspected' of tuberculosis to the National Reference Laboratory;

Culture of M. bovis, biochemical testing, PCR are performed on these 'suspicious' lesions;

Molecular typing by means of RFLP, Spogilotyping and more recently MIRU-VNTR are done systematically on all isolates to support the epidemiological investigations and to eventually prove the link between different cases or outbreaks.

Suggestions to the Community for the actions to be taken

In case of export of bovines, inform the Chief Veterinary Officer of the Member state of destination if tuberculosis has been detected in a holding of the Member State of origin after the date of export. This information can result in an early detection or can avoid a possible further contamination in the Member State of destination.

Measures in case of the positive findings or single cases

If M. bovis is suspected, all animals in the herd of origin are skin tested, the herd is considered as the epidemiological unit. A complete epidemiological investigation is performed. By tracing-back and tracing-on all animals of 'contact' holdings are examined by skin testing. If any doubtful or positive result of the skin test is detected, the FASFC may decide to re-examine the animals(additional tests e.g. comparative skin testing with avian and bovine tuberculin and/or Interferon-gamma testing) or to kill the reactors (test slaughter) for additional analysis. In case a suspicious lesion is detected at post-mortem examination, a sample is sent to the National reference laboratory for analysis. Consequently, if Mycobacterium bovis is

isolated, all skin test positive animals during successive testing are mandatory slaughtered. If many bovines are reacting positive to skin testing, the FASFC can decide that all animals of the holding must be slaughtered compulsory. After stamping-out, new restocked animals are tested during 5 years by annually skin testing to prove the TB free status of the holding.

Notification system in place

Animal Health Law of 24 March 1987 Chapter III and Royal Decree of 25 April 1988 (list of all notifiable animal diseases).

Results of the investigation

In 2001, a total of 23 infected holdings were notified. In total 792 animals reacted after tuberculinisation.
In 2002, a total of 13 infected holdings were notified. A total of 799 animals reacted after tuberculinisation. Stamping-out was performed in 6 herds.
In 2003, a total of 7 infected holdings were notified. Stamping out was done in 5 herds. A total of 409 animals reacted after tuberculinisation. This number corresponds to the intensive testing of infected and contact farms. In total 3.799 herds and 337.260 animals were included in epidemiological investigations. The Federal Agency for the Safety of the Food Chain, the Competent Authority, instructed the slaughter of 1014 animals.
In 2004, a total of 8 infected holdings were detected. In total 229 bovines were slaughtered in consequence of the stamping-out of 3 infected herds.
In 2005, a total of 5 infected holdings were detected. All these herds were eradicated by stamping-out in execution of a TB sanitation plan. In total 752 animals were slaughtered. The carcasses of only 2 animals did have to be destroyed due to general dispersed TB lesions.
In 2006, a total of 8 infected holdings were detected. Seven of these were eradicated by stamping out. In total 1102 animals were slaughtered. A follow-up of the other infected holding is performed after test-slaughter of a few positive reactors, since then all results of tuberculin tests on all the animals of the herd at regular intervals are negative.
In 2007, a total of 5 infected holdings were detected. Three of these were eradicated by stamping-out. In total 487 animals were slaughtered. In the other two infected holdings, partial slaughter and intense follow-up by tuberculin testing was performed.
In 2008, a total of 12 infected holdings were detected. In total 812 animals were slaughtered. Finally 66 animals were detected positive in bacteriological examination.
In 2009, 2 infected holdings were detected. One holding was eradicated by stamping-out. On the other holding, partial slaughter and intense follow-up by tuberculin testing was performed.

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

Number of infected herds since 2000
2000 : 24
2001 : 23
2002 : 13
2003 : 7
2004 : 8
2005 : 5
2006 : 8
2007 : 5
2008 : 12
2009 : 2

Additional information

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

Sampling in case of suspicious TB lesions during post-mortem examinations of "wild" and "farmed" deer at slaughterhouse/ at game handling establishment.

Frequency of the sampling

Depends on the number of hunted/slaughtered animals and the detection of suspicious lesions at post-mortem examination.

Type of specimen taken

Suspicious lesions of lungs, lymph nodes, ...

Methods of sampling (description of sampling techniques)

TB suspicious tissues: lymph nodes, lungs, ...

Case definition

An animal is positive if Mycobacterium bovis is isolated by culture or confirmed by laboratory analysis.

Diagnostic/analytical methods used

- Ziehl-Neelsen coloration
- Culture for isolation
- Interferon-gamma
- PCR on lesions / organs
- PCR on culture

Control program/mechanisms

The control program/strategies in place

Monitoring is done by:
- systematic post-mortem examination at the slaughterhouses/game handling establishment
- post-mortem examination at autopsy of hunted or accidentally killed "wild" deer in the University Center of Liège, Veterinary Medecine Faculty.

In case of suspected TB lesions, tissue samples are sent to the National Reference Laboratory for additional analysis to confirm the suspicion.

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

No Mycobacterium bovis was detected in "hunted" or "farmed" deer.

Table Tuberculosis in farmed deer

Region	Total number of existing farmed deer		Free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Belgique-België	2810	9502	2810	100	0	0	no routine test	0	0	0	0
Total : [1)]	2810	9502	2810	100	0	0	N.A.	0	0	0	0

Comments:

[1)] N.A.

Footnote:

Surveillance of tuberculosis by post-mortem examination at the slaughterhouse.

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	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			
Belgique-België	36064	2594358	36062	99.99	2	.01		294000	395000	90	93
Total : [1)]	36064	2594358	36062	99.99	2	.01	N.A.	294000	395000	90	93

Comments:

[1)] N.A.

Footnote:

Official tuberculosis free status by Decision 2003/467/EC, no routine tests but intensive testing by tracing-back and tracing-on in case of an infected animal or herd and follow-up testing of infected herds.
All suspicious lesions of tuberculosis were positive at bacteriological examination. Three non-suspicious lesions were detected positive in bacteriological examination.

2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

2.6.2 Brucella in foodstuffs

Table Brucella in food

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Milk, cows' - raw milk for manufacture - intended for manufacture of pasteurised/UHT products	FASFC	Batch	60031	0				

Footnote:

Dairy cattle examination of raw bulk milk samples before processing, in total 60.031 pools were tested.

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

Belgium is officially free from bovine brucellosis since the 25th of June 2003 (Commission Decision 2003/467/EC)

Free regions

Belgium remained officially free of bovine brucellosis during this reporting year.

Monitoring system

Sampling strategy

Since Belgium is officially free from bovine brucellosis, the eradication program has been changed in a surveillance program. Beef cattle older than 2 years are monitored once every three years by means of serological tests. The herds for serological sampling and examination are selected by their geographical localization. Dairy cattle are checked at least 4 times a year via tank milk (milk ring test).
Furthermore, all animals are tested at trade (purchase).
Each abortion or premature birth in animals at risk is subject to compulsory notification to the Federal Agency for the Safety of the Food Chain, and testing for brucellosis is obligatory. Aborting females should be kept in isolation until the results of the analysis and the investigation exclude a Brucella infection.
Pooled tank milk is examined by means of the milk ring test.
For animals older than 2 years, serology (i.e. micro-agglutination as screening test; in case of a positive result, an indirect ELISA test is performed) is used if no sufficient milk ring tests were performed (at least 4 ring tests a year).
Bacteriological examination is done when serological and/or epidemiological suspicion is present.
An animal is legally suspected of brucellosis in case of a positive ELISA. If, according to the epidemiology and the results of the blood test, an animal or herd is found to be at risk, a bacteriological investigation always takes place. Hence, a brucellosis animal is defined as an animal in which Brucella has been isolated, and a cattle holding is considered as an outbreak herd if one of the animals is positive for brucellosis by bacteriological examination.

In 2009, a study was realized to evaluate the current national surveillance program of bovine brucellosis. If a Member State has maintained the officially free status of brucellosis for at least 5 consecutive years, the existing surveillance program can be re-evaluated and some modifications on the sampling design are allowed on condition of further proof of freedom of disease (Council Directive 64/432/EEC). The scientific veterinary experts used risk-based models to evaluate different scenarios within the current surveillance program and the study was also based on a statistical confidence level approach. This methodology has underlined a few important features of the current brucellosis surveillance program. The study showed that in order to obtain a 99% confidence level to prove freedom of disease consistently an important decrease in total number of tested animals can be proposed (500.000 to 30.000 tests a year). The study also clearly indicated that the best approach is to test bovines imported from officially free or non-officially free Member States of Brucella spp., to test animals at purchase in consequence of national trade as well as to analyze aborting animals in order to early detect infection. Regarding the passive surveillance (abortions), the study indicated there is a need to increase the number of analyzed abortions. A new surveillance program will be applied for the winterscreening at the end of 2009

Frequency of the sampling

Dairy cattle are checked at least 4 times a year by tank milk.
Beef cattle older than 2 years are monitored once every three years by means of serological tests. The herds for serological examination are selected by geographical localization.
All cattle older than 1 year are tested at the moment of purchase.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood sampling
Bulk milk sampling

Case definition

An animal is defined as infected if Brucella has been isolated.
A herd is defined as infected if one of its animals is positive by bacteriological examination for brucellosis.

Diagnostic/analytical methods used

- Milk ring test on bulk milk samples
- Micro agglutination test
- Indirect ELISA
- Culture for isolation
- Brucellin skin testing(BST)

Vaccination policy

Vaccination is prohibited in Belgium since 1992.

Control program/mechanisms

The control program/strategies in place

National mandatory surveillance program organized by the Competent Authority

Recent actions taken to control the zoonoses

Annual follow-up of 'imported' bovines by serological examination.

Measures in case of the positive findings or single cases

Dairy cattle: in case of a positive milk ring test all animals of the holding older than 2 years are serologically tested.
Beef cattle and dairy cattle: in case of a positive result in the micro-agglutination test the same blood sample is tested with an indirect ELISA. If this indirect ELISA is positive, this result has to be confirmed by a blocking ELISA at the NRL. If this last test is also positive, the animal is considered as infected and is compulsory slaughtered (test slaughter) for additional analysis to detect a Brucella infection.

Notification system in place

Animal Health Law of 24 March 1987 Chapter III, Royal Degree of 25 April 1988 (list of all notifiable diseases)

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

An intensified bovine brucellosis control program started in Belgium in 1988. In case of active brucellosis, i.e. excretion of Brucella, the plan consisted in the culling of all animals of the infected herd (total depopulation). Culled bovines were compensated for based on the replacement value of the animals.
In March 2000, the last case of bovine brucellosis was identified. No infected herd was detected in Belgium since then.

In case of positive serological reactors the Federal Agency for the Safety of the Food Chain instruct follow-up testing or 'test slaughter' for additional analyses. These analyses could not confirm brucellosis. To reduce the number of FPSR (False positive serological reactors) to be slaughtered, the micro-agglutination test has been used as for routine testing whereas the indirect Elisa is accepted as a confirmatory test. This approach avoids the undeserved test slaughter of false positive reacting animals.

Additional information

B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Belgium is officially free of B. melitensis since 29 March 2001 (Commission Decision 2001/292/EC).

Free regions

Belgium is officially free of caprine brucellosis during the reporting year.

Monitoring system

Sampling strategy

Serum samples taken in the framework of a national monitoring program for Visna-Maedi/CAE and at export were examined for Brucella melitensis specific antibodies by means of an ELISA.
Sheep and goats were tested for brucellosis by indirect ELISA(iELISA) at the National Reference Laboratory (Veterinary and Agrochemical Research Center). All positive samples in the ELISA were supplementary tested by the Rose Bengal Test (RBT) and Complement Fixation Test (CFT) as confirmatory tests. Animals that where positive in the two confirmatory tests or that could not be analyzed and/or interpreted in RBT and/or CFT were sampled a second time.
All brucellosis tests performed at VAR are officially accredited (ISO 17025).

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood samples

Case definition

A goat is defined as infected with brucellosis if positive in all three tests: Elisa, Rose Bengal test and Complement Fixation test and isolation of Brucella melitensis by culture.

Diagnostic/analytical methods used

Complement Fixation Test CFT
Rose Bengal Test RBT
Indirect ELISA
Culture for isolation

Notification system in place

Animal Health Law of 24 March 1987 Chapter III and Royal Decree of 25 April 1988 (list of notifiable animal diseases)

Results of the investigation

At the National Reference Laboratory, 2.321 caprine/ovine serum samples were tested. The results confirmed those of previous years, i.e. the absence of any epidemiological or bacteriological evidence of caprine/ovine brucellosis in Belgium.

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Belgium is officially free from B. melitensis since 29 March 2001 (Commission Decision 2001/292/EC).

Free regions

Belgium is officially free of ovine brucellosis during the reporting year.

Monitoring system

Sampling strategy

Serum samples taken in the framework of a national monitoring program for Visna-Maedi/CAE and at export were examined for Brucella melitensis specific antibodies by means of an ELISA. Positive samples were subsequently tested in Rose Bengal and in complement fixation test.
Sheep and goats sera were tested for brucellosis by indirect ELISA (iELISA) at the National Reference Laboratory (Veterinary and Agrochemical Research Center). All positive samples in the ELISA were than tested by the Rose Bengal Test (RBT) and Complement Fixation Test (CFT) as confirmatory tests.
Animals that were positive in the two confirmatory tests or that could not be analyzed and/or interpreted in RBT and/or CFT were sampled a second time.
All brucellosis tests performed at VAR are officially accredited (ISO 17025).

Type of specimen taken

Blood

Case definition

A sheep is defined as infected with brucellosis if positive in all three tests: the Elisa, the Rose Bengal test and the Complement Fixation test and isolation of Brucella melitensis by culture.

Diagnostic/analytical methods used

- Indirect ELISA
- Rose Bengal Test RBT
- Complement Fixation Test CFT
- Culture for isolation
- Brucellin skin test (BST)

Notification system in place

Animal Health Law of 24 March 1987 Chapter III and Royal Decree of 25 April 1988 (list of notifiable animal diseases).

Results of the investigation

At the National Reference Laboratory, 2.321 caprine/ovine serum samples were tested. The results confirmed those of previous years, i.e. the absence of any epidemiological or bacteriological evidence of caprine/ovine brucellosis in Belgium.

D. B. suis in animal

Monitoring system

Sampling strategy

Serological screening for Brucella is done for breeding pigs that are gathered (at a fair for example), at artificial insemination centers and in animals intended for trade. The methods used are Rose Bengal test (RBT), Slow Agglutination test (SAT) according to Wright, Complement Fixation test (CFT) and ELISA. Bacteriological examination for Brucella and Yersinia is done in case of positive serology.
Regularly, false positive serological reactions are reported. These are due to a Yersinia enterocolitica O9 infection and are confirmed by Yersinia enterocolitica 09 isolation in the absence of Brucella spp. isolation.
B. suis biovar 2 may be isolated from wild boars (Sus scrofa). The infection seems to be enzootic in wild boar in Europe. B. suis biovar 2, circulating among wild boars, shows only limited pathogenicity for humans, if pathogenic at all.
The domestic pig population is free of brucellosis (last Brucella isolation in pigs in Belgium was in 1969). It is interesting to note that the Office International des Epizooties (http://www.oie.int) considers that the value of any brucellosis serological test in pigs is questionable.

Methods of sampling (description of sampling techniques)

Blood sampling
Tonsils
Spleen

Case definition

An animal is positive if Brucella suis is isolated by culture or typed by additional laboratory analysis.

Diagnostic/analytical methods used

Rose Bengal test RBT
Slow agglutination test according to Wright
Complement fixation test CFT
Indirect ELISA
Bacteriological examination

Control program/mechanisms

The control program/strategies in place

Regional monitoring program.
Since 2002, an annual surveillance program is organized by the veterinary faculty of the University of Liège (Walloon Region funds) in collaboration with the National Reference Laboratory (Veterinary and Agrochemical Research Center) with the aim to analyze brucellosis in wild boars (Sus scrofa) and lagomorphs in the south of Belgium. Blood samples and organs of hunted and/or dead animals were analysed in order to follow the seroprevalence and to identify bacteriological isolates of Brucella in these species.

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	VAR	Animal	258	0				
Lamas	VAR	Animal	526	0				

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

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
Belgique-België	43156	272633	43156	100	0	0		2321	0	27	0	0	0	0
Total : [1)]	43156	272633	43156	100	0	0	0	2321	0	27	0	0	0	0

Comments:

[1)] N.A.

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds	Number of bovine herds tested	Number of animals or pools tested	Number of infected herds	Number of notified abortions whatever cause	Number of isolations of Brucella infection	Number of abortions due to Brucella abortus	Number of animals tested with serological blood tests	Number of suspended herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Belgique-België	36064	2594358	36064	100	0	0	8580	452016	0	10323	60031	0	3504	0	0	904	0	226	0	47	0
Total : [1)]	36064	2594358	36064	100	0	0	8580	452016	0	10323	60031	0	3504	0	0	904	0	226	0	47	0

Comments:

[1)] N.A.

Footnote:

All serological positive reacting animals were finally negative by repeated analysis with SAT and ELISA (FPSR false positive serological reactors) and bacteriology.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

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

Only a few strains of Y. enterocolitica cause illness in humans. The major animal reservoir for Y. enterocolitica strains that cause human illness are pigs but other strains are also found in many other animals including rodents, rabbits, sheep, cattle, horses, dogs, and cats. In pigs, the bacteria are most likely to be found on the tonsils. Infection is most often acquired by eating contaminated food, especially raw or undercooked pork products. Drinking contaminated unpasteurized milk or untreated water can also transmit the infection.

2.7.2 Yersiniosis in humans

A. Yersinosis in humans

Relevance as zoonotic disease

Y. enterocolitica is a relatively infrequent cause of diarrhea and abdominal pain. Infection with Y. enterocolitica occurs most often in young children. Common symptoms in children are fever, abdominal pain, and diarrhea, which is often bloody. Symptoms typically develop 4 to 7 days after exposure and may last 1 to 3 weeks or longer. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms, and may be confused with appendicitis. In a small proportion of cases, complications such as skin rash, joint pains or spread of bacteria to the bloodstream can occur.

Only a few strains of Y. enterocolitica cause illness in humans. The major animal reservoir for Y. enterocolitica strains that cause human illness are pigs but other strains are also found in many other animals including rodents, rabbits, sheep, cattle, horses, dogs, and cats. In pigs, the bacteria are most likely to be found on the tonsils. Infection is most often acquired by eating contaminated food, especially raw or undercooked pork products. Drinking contaminated unpasteurized milk or untreated water can also transmit the infection.

2.7.3 Yersinia in foodstuffs

Table Yersinia in food

	Source of information	Sampling unit	Sample weight	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
Meat from bovine animals and pig - minced meat	FASFC TRA303 DIS823 DIS888	Batch	1g	217	0						

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

Since 1940, the Competent Authority did organize analysis for Trichinella in pigs at the slaughterhouses. The analysis is generalized since 1991. Trichinella has not been detected in carcasses of pigs and horses produced for human consumption in Belgium. One autochthonous human case, probably caused by a home raised wild boar occurred in 1979.

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

Trichinellosis is virtually absent in Belgian domestic livestock. Since systematic controls of pigs and horses are done at slaughter (EU Directive 92/45/EEC) no positive case was found. The last outbreak in humans in Belgium occurred in 1979 following the consumption of meat from wild boar.
Increased monitoring in the last decade has shown that Trichinella spp. still circulate amongst wildlife, although both the prevalence and the intensities of infection are low.
EU Directive requires that also wild boars hunted in the EU for commercial purpose are examined for Trichinella. In Belgium each year about 10000 sport-hunted wild boars were tested, and recently those numbers are rising. Until now, one animal, in 2004, originating from Mettet (province of Namur), was found to harbour a light infection. The larvae, isolated by artificial digestion were identified by PCR to be Trichinella britovi, a species previously not demonstrated in Belgium. T. britovi has sylvatic carnivores as main hosts. Even if wild boars are not the preferred host they can acquire the infection and consequently pass it to humans. Both T. spiralis and T. britovi have been associated with human infection. One larva was recovered from a pooled sample (originating from three wild boars from a hunting party from Alle-sur-Semois) in 2007. Consecutive digestions could not reveal the causative animal, and unfortunately PCR failed to identify the Trichinella species.
The routine examination of wild boars devoted to the market has proved to be a good measure to protect the consumer against sylvatic trichinellosis. In addition, monitoring of infection through examining sentinel animals, such as the fox, is recommended to access the prevalence of trichinellosis and to follow trends in time. Serological examination might be an alternative for muscle digestion but needs further evaluation.
An extra measure to protect the consumer is to eat meat of wild boar "well done", or to freeze the meat at -20°C for 4 weeks. An important measure to avoid spreading of the infection among wildlife is not to leave offal of animal carcasses in the field after skinning.

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

The last outbreak in humans in Belgium occurred in 1979 following the consumption of meat from wild boar.

Recent actions taken to control the zoonoses

Monitoring of wildlife.
Routine examination of wild boars destined for human consumption
Monitoring of infection through examining sentinel animals such as the fox.
Recommendation to consume wild boar meat after freezing at -20°C for 4 weeks.
Recommendation to travellers not to import raw meats of unknown origin and of susceptible animals, e.g. home made sausages, and not to consume meats of unknown quality abroad.

Suggestions to the Community for the actions to be taken

Considering the lasting negative results in pigs originating form industrial holdings, the creation of the status "negligible risk" could be considered for implementation in some regions among which Belgium.

2.8.2 Trichinellosis in humans

A. Trichinellosis in humans

History of the disease and/or infection in the country

The only human case of Trichinella infection was in 1978. A person who had fattened two wild boars for his own consumption got infected by Trichinella. The two boars captured as wild piglets were enclosed for fattening. This person most probably was infected after consumption of the meat of his wild boars. Epidemiological investigations in this case did not reveal the source of infection. All possible infectious 'sources' were taken into accounts (e.g. rodents etc.).

Description of the positive cases detected during the reporting year

No positive human case was detected during the reporting year.

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

There are no reports of autochthonously acquired Trichinella infections in Belgium

2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy

Permanent surveillance at the slaughterhouses.

Frequency of the sampling

Every slaughtered animal is sampled.

Type of specimen taken

Diaphragm, tongue or masseter muscle.

Methods of sampling (description of sampling techniques)

Horse: 5 gram of diaphragm (or tongue, or masseter) for routine diagnosis, analyses on pooled samples, 10 to 25 gram for examination of individual samples.

Case definition

An animal is considered positive in case of detection and identification of Trichinella larvae in the muscle sample.

Diagnostic/analytical methods used

Artificial digestion method of collective or individual samples. The magnetic stirrer method for digestion of pooled samples as described in Commission Regulation (EC) No 2075/2005 was used on samples of 5 gram of muscles from horses.

Results of the investigation including the origin of the positive animals

No positive animals were detected this year.

Control program/mechanisms

The control program/strategies in place

Commission Regulation (EC) No 2075/2005 imposes systematic Trichinella examination of all slaughtered pigs, horses and wild boar and other wildlife animals by artificial digestion method of muscle before marketing.

Notification system in place

Notification to the Federal Agency for the Safety of the Food Chain is compulsory for any positive test result.

B. Trichinella in pigs

Monitoring system

Sampling strategy

General

Permanent surveillance of all slaughtered pigs at the slaughterhouses in implementation of Commission Regulation (EC) No 2075/2005.

Frequency of the sampling

General

Systematic Trichinella examinations of all slaughtered pigs.

Type of specimen taken

General

Diaphragm muscle, 1 gram for fattening pigs, 2 grams for sows and boars.

Methods of sampling (description of sampling techniques)

General

fattening pigs: 1 gram of diaphragm muscle to be pooled (up to 100 animals in 1 pool)
sows and boars: 2 grams of diaphragm muscle to be pooled (up to 50 animals in 1 pool)

Case definition

General

An animal is considered positive in case of detection and identification of Trichinella larvae in the muscle sample.

Diagnostic/analytical methods used

General

Artificial digestion method of collected samples.
The analysis is done by artificial digestion: the magnetic stirrer method of pooled 100 gram sample as described in Commission Regulation (EC) No 2075/2005, reference method, 1 gram per fattening pig, 2 grams per sow and boar,and 5 grams per horse and wild boar.
Serology may be done in live pigs and for epidemiological studies and monitoring on wildlife.

Measures in case of the positive findings or single cases

Carcasses found positive are declared unfit for human consumption.

Notification system in place

Notification to the Federal Agency for the Safety of the Food chain is compulsory for any positive test result.

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

Since 1992, when the European Union Council Directive requires that wild boars (Sus scrofa) hunted in EU for commercial purpose should be examined for Trichinella, the infection has only been detected twice in wild boars from Belgium.
In November 2004, Trichinella larvae were detected in a wild boar hunted near Mettet, Namur province (Southern Belgium). Larvae were identified as Trichinella britovi by two different polymerase chain reaction methods. This is the first report of the identification of Trichinella larvae from Belgium at the species level. The detection of T. britovi in wildlife in Belgium is consistent with findings of this parasite in other European countries and confirms the need to test game meat for Trichinella to avoid its transmission to humans.

In December 2007 one Trichinella larva was recovered from a pooled sample, originating from 3 hunted wild boars from Alle-sur-Semois (Southern Belgium). Consecutive testing could not reveal the causative animal, and unfortunately PCR failed to identify the species of this larva.
There is serological evidence of the presence of anti-Trichinella antibodies in wildlife.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified
Foxes	FASFC	Animal	142	0	0	0
Pigs - breeding animals - unspecified - sows and boars	FASFC	Animal	170474	0	0	0
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system	FASFC	Animal	11507409	0	0	0
Solipeds, domestic - horses	FASFC	Animal	8711	0	0	0
Wild boars - wild	FASFC	Animal	10744	0	0	0

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

At the slaughterhouses, a small number of carcasses showing lesions of Echinococcus (cysts) are detected and notified to the Federal Agency for the Safety of the Food Chain. In case of positive findings, carcasses are partially or totally rejected and declared unfit for human consumption.

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

Echinococcosis is caused either by Echinococcus granulosus or Echinococcus multilocularis.

Echinococcus granulosus produces unilocular human hydatidosis. It is a small tapeworm (6 mm) that lives in the small intestine of domestic and wild canids. Sheep and cattle serve as intermediate hosts for the infection. Humans acquire infection by ingestion of typical taeniid eggs, which are excreted in the faeces of infected dogs: the oncospheres liberated from the eggs migrate via the bloodstream to the liver, lungs and other tissues to develop in hydatid cysts. Indigenous unilocular hydatidosis in man has been reported in Belgium.

Echinococcus multilocularis causes alveolar (multilocular) echinococcosis in humans.
Foxes and dogs are the definitive hosts of this parasite and small rodents the intermediate hosts. In the liver of rodents the invasive larval stage has a multi-compartimented appearance containing many protoscolices. Ingestion of the eggs by humans can result in the development of invasive cysts in the liver. In Belgium, the percentage of infected foxes varies with the region, with a decreasing rate from the South-East to the North-West: e.g 33% in the Ardennes, 13% in the Condroz region and 2% in Flanders. The endemic region is situated under the river Meuse, on the heights of the Ardennes.

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

Post mortem macroscopic examination is performed at the slaughterhouses in the domestic intermediate hosts: cattle, sheep, horses and pigs . Whole carcasses or parts are rejected in case Echinococcus granulosus cysts are found.

Recent actions taken to control the zoonoses

Consumption of berries is discouraged by warning messages, displayed to visitors of Parks and Woodlands.

2.9.2 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals)	FASFC	Animal	799256	0			

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

The majority of grazing animals seems to be inappearent carriers of tissue cysts.

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

Man is infected with Toxoplasma gondii through ingestion of undercooked infected meat or upon accidental ingestion of sporulated oocysts from the environment. The cat is the final host, man and most warm-blooded animals are intermediate hosts.
Most infections with T.gondii are asymptomatic, however mild (flu-like symptoms), moderate (lymphadenopathy, chronic fatigue) to severe disease (disseminated toxoplasmosis, encephalitis) may occur, the latter mainly in immunocompromized hosts.
Moreover, when infection occurs in pregnant women, toxoplasmosis may cause abortion and congenital disorders. If a woman acquires primary infection during pregnancy, Toxoplasma can be transmitted through the placenta to the foetus and lead to congenital toxoplasmosis.
A percentage of young children (1 to 14-year-old age group) may get post-natal infections with T. gondii and develop symptomatic toxoplasmosis (e.g. ocular disease). A number of cases of the disease in a 15 to 24-year-old age group may be referred to as acquired toxoplasmosis in immunocompetent patients, which may present with a range of signs, from lymphadenopathy to retinitis and uveitis. Immunocompetent individuals may often develop clinical toxoplasmosis. The majority of adult persons have acquired a degree of immunity to re-infection but can remain carrier.

Recent actions taken to control the zoonoses

Screening for toxoplasmosis during pregnancy is common. The seroprevalence in women tested before pregnancy is about 50%.

Prevention of congenital toxoplasmosis by specific hygienic measures seems to have limited impact.

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

Since the last indigenously acquired case of rabies occurred in Belgium in a bovine coming from Bastogne (province of Luxembourg) in July 1999, Belgium obtained the official status of rabies-free country in July 2001 according to the WHO recommendations (1992) and the Office Internationale des Epizooties (OIE) guidelines (1997).

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

In October 2007, Belgium lost temporary its official status of rabies free country due to a positive case of rabies in a dog, illegally imported from Morocco. The clinical diagnosis was confirmed after euthanasia of the dog.

Belgium regained its official free status of rabies on 28 October 2008.

Recent actions taken to control the zoonoses

Surveillance system and methods used.
Domestic animals with nervous symptoms that are suspected of rabies have to be notified to the Federal Agency for the Safety of the Food chain. Wildlife found dead or shot should also be declared for transmission for analysis to the Institute of Public Health, the National Reference laboratory for rabies.
Collection of dead-found bats is recommended for rabies surveillance.
Live suspected animals are killed and their brain is examined by immunofluorescence and virus cultivation in neuroblasts at the Institute of Public Health.
The high percentage of examinations of cattle is in consequence of the surveillance system for TSE in cattle: all suspected BSE cases were first examined for rabies. Rabies must be considered in the differential diagnosis of BSE, although the clinical course of rabies is usually quicker than the evolution of clinical nervous symptoms in case of BSE.

Vaccine baits (Raboral, Rhône Mérieux) were dispersed for the oral vaccination of foxes. During last vaccination campaign in April and October 2003, a zone of approximately 1.800 km2 along the German border was covered by spreading 32 000 baits by means of a helicopter (17.78 baits per km2). Since there were no more cases of rabies for the last years, vaccination of foxes by baits was stopped (end of 2003).
In the southern part of the country, below the rivers Sambre and Meuse, vaccination of dogs and cats is compulsory. In addition, all pets staying on any Belgian public camping must be vaccinated.

Suggestions to the Community for the actions to be taken

It is highly recommended to report on the rabies virus type detected to be able to differentiate between the classical rabies type (genotype 1) and the European bat Lyssa virus types (unspecified or EBL 1 or EBL 2).

Bat rabies is of public health concern. The public should be made aware of the danger of human exposure to bats, especially in case of abnormal behavior of bats. Rabies is transmitted to humans and other animals through saliva, usually in a bite. Any person exposed to bats should be previously vaccinated

against rabies. Nobody should handle diseased or dead bats without protection such as gloves. Any person finding a bat behaving abnormally, in an unusual place, or under unusual circumstances, should not attempt to handle or to move the animal but should contact official authority. Education and recommendations should be given to travelers in order to reduce their risk of infection. Although dogs represent a more serious threat in many countries, yet the risk of rabies infection by bat bites also exists.

Pre-exposure vaccination should be offered to persons at risk, such as laboratory workers, veterinarians, animal handlers, international travelers. Currently available vaccines are safe and effective against both the classical rabies virus and the bat Lyssa viruses.

2.11.2 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

The brain of dogs with nervous symptoms suspected of rabies are examined by direct immunofluorescence test and virus cultivation in neuroblasts at the Institute of Public Health, the National Reference Laboratory for rabies.

Frequency of the sampling

All suspected dogs with clinical nervous symptoms are tested.

Type of specimen taken

brain

Methods of sampling (description of sampling techniques)

Small animals: head / carcass
Huge animals: brain (CNS)

Shipping and packaging conditions:
Brains are transported as soon as possible (refrigerated if possible) in a tightly sealed packet to the National Reference Laboratory. In case of carcass transportation an authorization is required.

The storage period of samples at the National Reference Laboratory for further analysis is one year.

Case definition

An animal is considered positive in case of a positive direct immunofluorescence test (Antigen detection) confirmed by cell cultivation of the virus or detection by RT-PCR or (rarely performed) by mice inoculation test (clinical observation of rabies symptoms).

Diagnostic/analytical methods used

Direct immunofluorescence for the derection of viral antigen, virus isolation in neuroblastoma cell culture, detection by RT-PCR, mouse inoculation test

Vaccination policy

In the Southern part of the country, below the rivers Sambre and Meuse, vaccination of dogs and cats is compulsory. In addition, all pets staying on any Belgian public camping must be vaccinated.

Oral vaccination of foxes by baits started in 1989.
Since there were no more cases of rabies for the last years, oral vaccination of foxes by baits was stopped by the end of 2003.

Measures in case of the positive findings or single cases

In case of positive findings national legislation has to be applied (Royal Decree of 10 February 1967, Royal Decree of 22 May 2005, Ministerial Decree of 23 February 1967, Ministerial Decree of 30 December 1985 and Ministerial Decree of 28 February 2003).

Notification system in place

Royal Decree of 10 February 1967, Animal Health Law of 24 March 1987 Chapter III and Royal Decree of

25 April 1988 (list of all notifiable animal diseases)
Notification of all laboratory confirmed cases to the competent Authority is mandatory.

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

In October 2007, a suspicion of rabies on clinical symptoms in a dog illegally imported from Morocco. The clinical diagnosis was confirmed by laboratory testing after euthanasia of the animal. Finally 32 persons and 18 pet owners with possible contact with the rabic animal were detected. Medical information and follow-up by experts of the Institute of Public Health of all 'contact' persons was realized.
Belgium regained its official free rabies status on 28 October 2008.

Table Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Bats - wild	IPH	Animal	29	0			
Cats	IPH	Animal	13	0			
Cattle (bovine animals)	IPH	Animal	181	0			
Deer - wild - red deer	IPH	Animal	36	0			
Dogs	IPH	Animal	12	0			
Foxes - wild	IPH	Animal	183	0			
Goats	IPH	Animal	29	0			
Marten - wild	IPH	Animal	5	0			
Sheep	IPH	Animal	87	0			
Solipeds, domestic	IPH	Animal	2	0			
Wild animals - Clinical investigations	IPH	Animal	5	0			

2.12 Q-FEVER

2.12.1 General evaluation of the national situation

A. Coxiella general evaluation

History of the disease and/or infection in the country

Only limited testing is performed on individual animal level of genetic selected bulls of Artificial Insemination centers and for confirmation of clinical suspicion in case of an increased number of abortions of ruminants.

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

Q-fever is a zoonotic disease caused by Coxiella burnetii, a stable bacteria that resists to heat, drying and many common disinfectants. This resistance enables the bacteria to survive for a long period in the environment. Cattle, sheep, and goats are the main reservoirs but a wide variety of other animals can be contaminated, including domesticated pets. Coxiella burnetii does not usually cause clinical disease in these animals, although an increased abortion rate and fertility problems in cattle, sheep and goats are observed. The emergence of these common symptoms over a longer period of time leads finally to the diagnosis of Q-fever.

Organisms are excreted in milk, urine, and faeces by infected animals. Animals shed the organisms especially during parturition within the amniotic fluids and the placenta. Airborne transmission can occur in premises contaminated by placental material, birth fluids or excreta from infected animals. Airborne inhalation is the most important transmission route of infection.

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

Only about one-half of all people infected with C. burnetii develop signs of clinical illness. Pneumonia is the most frequent complication of acute Q-fever. Also hepatitis may occur. Chronic forms of the disease are rare but very severe, especially when an endocarditis develops. Q-fever infection results mainly from occupational exposure. Livestock farmers, dairy workers, veterinarians, slaughterhouse and meat processing plant workers, and researchers at laboratories or facilities housing susceptible animals are especially concerned and have to be informed about this disease, the possible transmission of infection and preventive measures to be respected.

Recent actions taken to control the zoonoses

The following measures could be used in the prevention and control of Q-fever:

- public education and information on sources of infection
- giving advice to high risk persons, especially with pre-existing cardiac valvular disease or individuals with vascular grafts and pregnant women
- restrict access to barns and laboratories used in housing potentially infected animals
- quarantine aborted animals
- appropriately disposal of placenta, birth products, foetal membranes, and aborted foetuses
- use only pasteurized milk and milk products
- infected holding facilities should be located away from populated areas. Measures should be implemented to prevent airflow to other occupied areas.

2.12.2 Coxiella (Q-fever) in animals

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)	DGZ/ARSIA	Animal	1676	214	214
Sheep	ARSIA	Animal	1	0	
Cattle (bovine animals) - Unspecified	DGZ/ARSIA	Herd	1407	997	997

Footnote:

Cattle, animal level:
* 680 blood samples, ELISA, after abortion, 58 positive;
* 122 organ samples, PCR, after abortion and ELISA +, 23 positive;
* 871 milk samples, ELISA, objective sampling, 214 positive;
* 3 organ samples, PCR, clinical investigation, 0 positive;
* 16 milk samples, PCR, clinical investigation, 6 positive.

Cattle, herd level:
* 1407 bulk milk samples, ELISA, 997 positive;
* 159 bulk milk samples that are ELISA +, PCR, 37 positive;

sheep, animal level
* 1 organ sample, clinical investigation, PCR, negative

2.13 CYSTICERCOSIS, TAENIOSIS

2.13.1 General evaluation of the national situation

A. Cysticerci general evaluation

History of the disease and/or infection in the country

Cattle

Taenia saginata:

2002 total 3.336 (3.317 lightly, 18 heavily contaminated)
2003 total 3.886 (3.859 lightly, 25 heavily contaminated)
2004 total 3.002 (2.981 lightly, 21 heavily contaminated)
2005 total 2.392 (2.376 lightly, 16 heavily contaminated)
2006 total 1.824 (1.796 lightly, 28 heavily contaminated)
2007 total 1.527 (1.517 lightly, 10 heavily contaminated)
2008 total 2.374 (2.356 lightly, 18 heavily contaminated)
2009: total 1.820 (1.811 lightly, 9 heavily contaminated)

Pigs

The Belgian pig population is free from Cysticercus cellulosae. Taenia solium (and Cysticercus cellulosae) is not autochthonous in Belgium.

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

Cysticercus bovis in muscular tissue of cattle is the larval stage of the tapeworm, Taenia saginata, a parasitic cestode of the human gut (taeniasis). Cattle can become infected by ingestion of vegetation contaminated with T. saginata eggs shed in human faeces. Risk factors are access to streams and flooding of pastures.

Humans contaminate themselves by the ingestion of raw or undercooked beef containing the larval form (cysticerci). Usually the pathogenity for humans is low. The tapeworm eggs contaminate the environment directly or through surface waters. Human carriers should be treated promptly. Strict rules for the hygienic disposal or sanitation of human faeces with a method that inactivates T. saginata eggs should be developed. The spreading of human excrement on land should not be allowed.

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

Post-mortem, macroscopic examination of carcasses of adult cattle as well as calves is routinely done in the slaughterhouse. Serological examination is possible and confirmation of the lesions by PCR or DNA-test can be done.

Lightly contaminated carcasses are treated by freezing at -18°C for 10 days before declared fit for human consumption. Heavily contaminated carcasses are unfit for human consumption and destroyed.

Suggestions to the Community for the actions to be taken

The introduction of serological techniques for the detection of cysticerci antigens in the serum of animals (cattle) should be developed. This would allow the detection of more cases than by only visual inspection of carcasses at the slaughterhouse.

2.14 SARCOCYSTOSIS

2.14.1 General evaluation of the national situation

A. Sarcocystis general evaluation

History of the disease and/or infection in the country

At the slaughterhouses, a small number of carcasses showing myositis eosinophilica (green colouring of the carcass) are detected and notified to the Federal Agency for the Safety of the Food Chain. In 2009 33 cattle were notified. In case of positive findings, carcasses are totally rejected and declared unfit for human consumption.

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

Sarcocystis bovihominis (bovine as intermediate host) and Sarcocystis suihominis (porcine intermediate host) occur. Domestic carnivores are hosts of the adult stage.

Humans can be a definitive host for sarcosporidiosis by ingestion of infected meat or excreted oocysts and develop symptoms like diarrhea, headache, eosinophilia, abortion, congenital disorder.
For human sarcosporidiosis there is no immunity development.
The majority of grazing animals are inappearent carriers of tissue cysts.

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

Carcasses are entirely condemned when myositis eosinophilica lesions are apparent. Myositis eosinophilica is commonly associated with sarcosporidiosis but this is still not proven!

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

Recent actions taken to control the zoonoses

3.1.2 Escherichia coli, non-pathogenic in foodstuffs

A. E. coli in food

Monitoring system

Sampling strategy

The hygiene of slaughtering and cutting process is watched via the evaluation of the contamination of carcasses and cutting meat by indicators of faecal contamination.

Frequency of the sampling

every week

Type of specimen taken

Meat

Methods of sampling (description of sampling techniques)

Broilers and laying hens carcasses are taken at slaughterhouses. At cutting plants about 200g of meat were taken.

Definition of positive finding

Action limits were established for every matrix.

Diagnostic/analytical methods used

ISO method was used to count E. coli in food.

Measures in case of the positive findings or single cases

Monitoring/Not favorable results are sent to the FBO.

Table Escherichia coli, non-pathogenic in Food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Escherichia coli, non-pathogenic
Meat from bovine animals - at cutting plant - Surveillance - official controls - objective sampling [1)]	FASFC TRA305	Single	1g	291	1
Meat from broilers (Gallus gallus) - at cutting plant - Surveillance - official controls - objective sampling [2)]	FASFC TRA200	Single	1g	415	11
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - Surveillance - official controls - objective sampling [3)]	FASFC DPA003	Single	1g	262	21
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - Surveillance - official controls - objective sampling [4)]	FASFC DPA004	Single	1g	320	109
Meat from pig - at cutting plant - Surveillance - official controls - objective sampling [5)]	FASFC TRA306	Single	1g	236	2

Comments:

[1)] action limit > 800 cfu/g
[2)] action limit > 10log5 cfu/g
[3)] action limit > 10log5 cfu/g
[4)] action limit > 150.000 cfu/g
[5)] action limit > 500 cfu/g

3.1.3 Antimicrobial resistance in Escherichia coli, non-pathogenic

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Food

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

Table Cut-off values for antibiotic resistance of Enterococcus, non-pathogenic in Animals

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		512	
	Gentamicin		32	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	

Table Cut-off values for antibiotic resistance of Enterococcus, non-pathogenic in Food

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		512	
	Gentamicin		32	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	

Table Cut-off values for antibiotic resistance of Enterococcus, non-pathogenic in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		512	
	Gentamicin		32	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.1.2 Enterobacter sakazakii in foodstuffs

A. Enterobacter sakazakii in foodstuffs

Monitoring system

Sampling strategy

Tests for Enterobacter sakazakii were performed in 10g sample.

Frequency of the sampling

Samples are taken according to the national control program or in the frame of RASFF, complaints or suspicion.

Type of specimen taken

Foodstuff intended for special nutritional uses, infant formula and other

Methods of sampling (description of sampling techniques)

The samples were taken according to Regulation (EC) No 2073/2005.

Definition of positive finding

To determine the conformity of a sample or a batch, the criteria laid down in the Regulation (EC) No 2073/2005 are applied.

Diagnostic/analytical methods used

The method is used according to Regulation (EC) No 2073/2005.

Measures in case of the positive findings or single cases

Measures to be taken in the case of a non-compliant result:
- Notification of the producer or importer
- Possibility of a counter analysis
- Destruction of the non compliant batch or single sample
- Further investigation: additional sampling, possible recall, RASFF, ...

Table Enterobacter sakazakii in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Enterobacter sakazakii	E. sakazakii
Foodstuffs intended for special nutritional uses - dried dietary foods for special medical purposes intended for infants below 6 months	FASFC DIS862	Batch	10g	66	0	
Infant formula - dried	FASFC TRA127 TRA 510	Batch	10g	5	0	

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.2.2 Histamine in foodstuffs

A. Histamine in foodstuffs

Monitoring system

Sampling strategy

The reported data are test results from official surveillance performed by the Federal Agency for the Safety of the Food Chain. The sampling for histamine in fishery products is part of the risk-based national control program (random sampling) of the Federal Agency for the Safety of the Food Chain which covers the whole Member State. In 2009 a number of samples was taken outside the scope of the control program (targeted sampling): for example in case of suspicion, following complaints, follow-up of RASFF, specific Commission Decision for imported products...

The sampling population represents fishery products from fish species associated with a high amount of histidine. All samples taken in 2009 were not enzyme maturated products of the following species: tuna, mackerel, sardines, anchovy and herring. Fresh, frozen and canned (in water, in brine, in oil) products were sampled.

The samples were taken at retail, wholesale, catering and at the border inspection posts (imported products). None of the canned products are manufactured in Belgium (origin Third countries or other MS).

Frequency of the sampling

Samples are taken according to the national control program or in the frame of RASFF, complaints or suspicion.

Type of specimen taken

Fishery products

Methods of sampling (description of sampling techniques)

The samples were taken according to Regulation (EC) No 2073/2005.

In general nine samples of 150g were taken out of a batch.

In some cases only a single sample of 150g was taken.

In both cases, the same amount of product was taken for a possible counter analysis.

The samples are transported in a sealed plastic bag:
- chilled (fresh products)
- frozen (frozen products)
- at ambient temperature (canned products).

Definition of positive finding

To determine the conformity of a sample or a batch, the criteria laid down in the Regulation (EC)No 2073/2005 are applied.

Diagnostic/analytical methods used

The method used is a accredited quantitative ELISA.

Measures in case of the positive findings or single cases

Measures to be taken in the case of a non-compliant result:
- Notification of the producer or importer
- Possibility of a counter analysis
- Destruction of the non compliant batch or single sample
- Further investigation: additional sampling, possible recall, RASFF, ...

Table Histamine in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units in non-conformity	<= 100 mg/kg	>100 - <= 200 mg/kg	>200 - <= 400 mg/kg	> 400 mg/kg
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated	FASFC DIS661	Batch	1g	50	16	34	0	16	0

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

4.3.2 Staphylococcal enterotoxins in foodstuffs

A. Staphylococcal enterotoxins in foodstuffs

Monitoring system

Sampling strategy

Tests Staphylococcal enterotoxins were performed in 1g of sample.

Frequency of the sampling

Samples are taken according to the national control program or in the frame of RASFF, complaints or suspicion.

Type of specimen taken

Yoghurt, cheeses, soft-ice, ice cream, milk powder and other

Methods of sampling (description of sampling techniques)

The samples were taken according to Regulation (EC) No 2073/2005.

Definition of positive finding

To determine the conformity of a sample or a batch, the criteria laid down in the Regulation (EC)No 2073/2005 are applied.

Table Staphylococcal enterotoxins in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Staphylococcal enterotoxins
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk	FASFC TRA134 DIS818	Batch	1g	89	0
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk	FASFC DIS818	Batch	1g	38	1
Dairy products (excluding cheeses)	FASFC TRA142 DIS804 DIS887	Batch	1g	71	0
Dairy products (excluding cheeses) - milk powder and whey powder	FASFC TRA123	Batch	1g	31	0

5. FOODBORNE

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

A. Foodborne outbreaks

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

In Belgium different authorities are dealing with food-borne outbreaks:
-The Federal Agency for the Safety of the Food chain FASFC deals with safety of foodstuffs, epidemiological investigation on foodstuffs and animal health issues in case of a food-borne outbreak.
-The Communities (Flemisch, French and German speaking Community) are dealing with person related matters as human health and can start an epidemiological investigation by Public health medical inspectors in case of a food-borne outbreak.
-The Scientific Institute of Public Health IPH (National Reference Laboratory on Food-borne Outbreaks) analyses all suspected food samples, collects all data on food-borne outbreaks and gives scientific support to the FASFC officers and the Public Health Inspectors.

A national "Platform Food-borne outbreaks", approved by the National Conference of Ministers of Public Health, brings together the different competent authorities on food safety, animal health and public health. Furthermore in 2007, for a better communication, a protected web application was made available to exchange outbreak data and laboratory results in â€œreal timeâ€ between the different authorities dealing with FBO. In this web-application a common file is created for each individual outbreak, and the data and laboratory results are shared between food inspectors and human health inspectors.

Data in this report came from the Federal Agency for the Safety of the Food Chain, the Flemish Community , the sentinel laboratories network for human microbiology, and the Federal Reference Centres for Food borne outbreaks, for Clostridium botulinum, for Salmonella and Shigella and for Listeria.

Description of the types of outbreaks covered by the reporting:

A food -borne outbreak is defined as an incidence, observed under given circumstances, of two or more human cases of the same disease and/or infection, or a situation in which the observed number of human cases exceeds the expected number and where the cases are linked, or are probably linked, to the same food source (Directive 2003/99/EC, Article 2(d)). Data are collected from FASFC, the Flemish Community, the French community, the Brussels Common Community Committee, the sentinel laboratories network for human clinical microbiology, and the Federal Reference Centers for Food-borne outbreaks, Salmonella and Shigella, Listeria and C. botulinum.
The reporting includes both general and household outbreaks.
The causative agents covered are Salmonella spp., Shigella spp., Campylobacter spp., Verotoxigenic E.coli, Listeria monocytogenes, Clostridium botulinum, Staphylococcus aureus, Bacillus cereus, Clostridium perfringens, Giardia, Norovirus, enterotoxins of Staphylococcus aureus and Bacillus cereus and histamine

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

During 2009, a total of 105 outbreaks of food-borne infections and intoxications were recorded in Belgium. More than 912 people were ill and at least 20 persons were hospitalized and one death due to a Listeria monocytogenes infection. The numbers of people involved are almost the same as in previous years but the number of people hospitalized due to a collective food borne outbreak decreased during the last years. This is maybe due to the rather milder infections for example of food-borne viruses. But also a lot of outbreaks were reported by people who became sick after a restaurant visit and the infections were also

rather mild.

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

In 2009 in total 14 verified outbreaks were reported. In these outbreaks the causative agent was found in the implicated food and or it was clear by analytical epidemiology. All other outbreaks were classified as possible outbreaks were the agent was unknown or the agent could be only detected at human level. Food borne viruses especially Foodborne viruses became the most frequently detected food-borne pathogen in food-borne outbreaks: 9 outbreaks were reported in total. In total 98 persons became ill without any hospitalizations. For Norovirus 7 outbreaks were reported two of them were verified by detecting the virus in the food. For Hepatitis A 2 outbreaks were reported. Hepatitis A was detected in the human samples taken. In one case the sandwich bare was closed to prevent further spread of the infection by the food handler.

The second most reported agent was Salmonella (in 5 outbreaks). Only in one large outbreak with different sporadic cases the origin of infection could be detected. Pork carcasses coming form one slaughterhouse were contaminated with Salmonella Ohio due to a contamination of the carcass splitter. In the other outbreaks Salmonella was detected in the human samples and no relevant food samples were taken because of the late reporting of the outbreak. Thermotolerant Campylobacter were responsible for 3.8 % of the outbreaks but the food origin was unknown

Coagulase positive Staphylococcus spp caused 2 of the outbreaks in 2009. Toxine A was detected in the spaghetti. In the other Coagulase positive Staphylococcus spp were detected in the beans of a same production date

B. cereus was the causative agent in 4 outbreaks and 53 persons became ill. In one case an enterotoxin producing strain could be confirmed in the food in the other cases the emetic producing strains could be isolated and this corresponded with the rapid onset of the vomiting symptoms observed in the patients.
In one outbreak histamine was the reason for the outbreak after eating tuna fish.
In 64% of the outbreaks no causative agent could be identified. An important reason for this is the absence of leftovers of the suspected meal in most of those outbreaks.

Most food-borne outbreaks (19%) were due to the consumption of meals composed of different ingredients. Meat and meat based products were responsible for 20 % of the outbreaks. In 19% of the outbreaks the suspected food was unknown.

Relevance of the different type of places of food production and preparation in outbreaks

In most food-borne outbreaks (93%) the setting was known. Restaurants were the most important location of exposure, being the setting of 37 % of food-borne outbreaks in Belgium in 2009. Catering at work or institutional catering are reported in respectively 5% and 11 % of the food-borne outbreaks. 20% of the outbreaks happened at home.

Control measures or other actions taken to improve the situation

Logistic slaughtering is applied for poultry which means that poultry with a Salmonella-free certificate are slaughtered before other poultry. The vaccination of laying hens against salmonellosis, that started in 2003 is complete.

Table Foodborne Outbreaks: summarised data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	4	0	unknown	unknown	unknown	4
Campylobacter	4	4	8	unknown	unknown	0
Clostridium	4	1	19	0	0	3
Escherichia coli, pathogenic	1	1	4	4	0	0
Foodborne viruses	9	7	69	0	0	2
Listeria	2	2	4	2	1	0
Other agents	3	1	2	unknown	0	2
Parasites	3	3	6	unknown	0	0
Salmonella	5	4	29	2	0	1
Staphylococcus	2	0	unknown	unknown	unknown	2
Unknown	68	68	533	7	0	0
Yersinia	0	0	unknown	unknown	unknown	0

Table Verified Foodborne Outbreaks: detailed data for Bacillus

Please use CTRL for multiple selection fields

B. cereus

	Value
Code	
Outbreaks	1
Human cases	40
Hospitalized	0
Deaths	0
Foodstuff implicated	Mixed or buffet meals
More Foodstuff information	cold dish
Type of evidence	Laboratory detection in implicated food
Outbreak type	Household
Setting	Household
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	strain positive for cereulide gene

B. cereus

	Value
Code	
Outbreaks	1
Human cases	7
Hospitalized	0
Deaths	0
Foodstuff implicated	Herbs and spices
More Foodstuff information	curry
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Residential institution (nursing home, prison, boarding school)
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	enterotoxin positive strain

B. cereus

	Value
Code	
Outbreaks	1
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Other or unspecified poultry meat and products thereof
More Foodstuff information	bami goreng
Type of evidence	Laboratory detection in implicated food
Outbreak type	Household
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	strain positive for cereulide gene

B. cereus

	Value
Code	
Outbreaks	1
Human cases	4
Hospitalized	0
Deaths	0
Foodstuff implicated	Other foods
More Foodstuff information	tartare sauce
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	strain positive for cereulide

Table Verified Foodborne Outbreaks: detailed data for Clostridium

Please use CTRL for multiple selection fields

C. perfringens

	Value
Code	
Outbreaks	1
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Other or unspecified poultry meat and products thereof
More Foodstuff information	vol au vent
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	Inadequate chilling
Other Agent (Mixed Outbreaks)	
Comment	

C. perfringens

	Value
Code	
Outbreaks	1
Human cases	19
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	soup with créme
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	Inadequate chilling
Other Agent (Mixed Outbreaks)	
Comment	

C. perfringens

	Value
Code	
Outbreaks	1
Human cases	3
Hospitalized	1
Deaths	0
Foodstuff implicated	Other or unspecified poultry meat and products thereof
More Foodstuff information	vol au vent
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	Inadequate chilling
Other Agent (Mixed Outbreaks)	
Comment	10^5 cfu/g

Table Verified Foodborne Outbreaks: detailed data for Foodborne viruses

Please use CTRL for multiple selection fields

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	
Outbreaks	1
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	carrots
Type of evidence	Laboratory detection in implicated food
Outbreak type	Household
Setting	Residential institution (nursing home, prison, boarding school)
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	Norovirus GI

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	
Outbreaks	1
Human cases	27
Hospitalized	0
Deaths	0
Foodstuff implicated	Pig meat and products thereof
More Foodstuff information	
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Residential institution (nursing home, prison, boarding school)
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	Norovirus GII

Table Verified Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

Shigella - S. sonnei

	Value
Code	
Outbreaks	1
Human cases	58
Hospitalized	1
Deaths	0
Foodstuff implicated	unknown
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Histamine

	Value
Code	
Outbreaks	1
Human cases	11
Hospitalized	2
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	tuna
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Salmonella

Please use CTRL for multiple selection fields

S. Ohio

	Value
Code	
Outbreaks	1
Human cases	39
Hospitalized	39
Deaths	0
Foodstuff implicated	Pig meat and products thereof
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	unknown
Place of origin of problem	Slaughterhouse
Origin of foodstuff	Domestic
Contributory factors	Cross-contamination
Other Agent (Mixed Outbreaks)	
Comment	carcass splitter contaminated

Table Verified Foodborne Outbreaks: detailed data for Staphylococcus

Please use CTRL for multiple selection fields

S. enterotoxins

	Value
Code	
Outbreaks	1
Human cases	10
Hospitalized	0
Deaths	0
Foodstuff implicated	Mixed or buffet meals
More Foodstuff information	spaghetti
Type of evidence	Laboratory detection in implicated food
Outbreak type	Household
Setting	Aircraft, ship, train
Place of origin of problem	Same as setting
Origin of foodstuff	unknown
Contributory factors	Inadequate heat treatment
Other Agent (Mixed Outbreaks)	
Comment	enterotoxin A

S. aureus

	Value
Code	
Outbreaks	1
Human cases	14
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	frozen beans
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Same as setting
Origin of foodstuff	unknown
Contributory factors	Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	