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 2008

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 2008 .

The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal bacteria as well as information on epidemiological investigations of foodborne outbreaks. Complementary data on susceptible animal populations in the country is also given. The information given covers both zoonoses that are important for the public health in the whole European Community as well as zoonoses, which are relevant on the basis of the national epidemiological situation.

The report describes the monitoring systems in place and the prevention and control strategies applied in the country. For some zoonoses this monitoring is based on legal requirements laid down by the Community Legislation, while for the other zoonoses national approaches are applied.

The report presents the results of the examinations carried out in the reporting year. A national evaluation of the epidemiological situation, with special reference to trends and sources of zoonotic infections, is given. Whenever possible, the relevance of findings in foodstuffs and animals to zoonoses cases in humans is evaluated.

The information covered by this report is used in the annual Community Summary Report on zoonoses that is published each year by EFSA.

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

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1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information:

Sanitel 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

Holding: any establishment, construction or, in the case of an open-air farm, any place in which animals are held, kept or handled.
The localisation 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

For the last years, there's a significant decrease in total number of holdings for bovines. On the other hand, the total number of animals of these species is only slightly decreasing what means that the total number of animals per premise is increasing. This is due to the take over of livestock animals from small holdings who are ceasing breeding activity by large farms.

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

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Cattle (bovine animals)	**calves (under 1 year)**			301102					
	in total			823659		2618040		36423	
	meat production animals			522557					
Deer	**farmed - in total**			635		10834		2825	
	wild - at game handling establishment			6222					
Ducks	**breeding flocks, unspecified - in total**					23750		5	
	meat production flocks					63845		23	
Gallus gallus (fowl)	**broilers**			242231046		25700000		911	
	grandparent breeding flocks, unspecified - in total					24240		2	
	in total			274427724		3509618		233	
	laying hens					9841759		334	
	parent breeding flocks, unspecified - in total					3485378		231	
Geese	**in total**					91238		12	

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Geese	**meat production flocks**					10800		5	
	parent breeding flocks					80438		7	
Goats	**in total**			6363		48379		12692	
Pigs	**breeding animals**					615298			
	fattening pigs					5123189			
	in total			11588072		5738487		9419	
Sheep	**in total**			133192		205624		31037	
Solipeds, domestic	**horses - in total**			9173		60000			
Turkeys	**in total**					533151		251	
	meat production flocks					533151		57	
Wild boars	**wild - at game handling establishment**			15177					

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 Salmonellosis in humans

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring programme in Belgian slaughterhouses and cutting plants was organised by the FASFC.
The matrixes 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

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The matrixes 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.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: ISO 6579:2002

B. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring programme was organised by the FASFC in slaughterhouses and cutting plants.
Sampling was done by a specially trained staff. For most matrixes, approximatively 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

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

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

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

C. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

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

D. Salmonella spp. in food

Monitoring system

Sampling strategy

A monitoring programme was organised 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 matrixes, 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 spp.	S. Agona	S. Bareilly	S. Blockley	S. Braenderup	S. Bredeney	S. Enteritidis
Meat from broilers (Gallus gallus) - carcass - at retail - Monitoring - official sampling	DIS 820	single	25g	88	10						
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Surveillance	DPA 019	batch	25g	193	19						
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - Monitoring	DPA 004	single	1g	128	30		1		3		18
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - caecum - Surveillance	DPA 020	batch	25g	200	91						
Meat from broilers (Gallus gallus) - fresh - at processing plant - Monitoring - official sampling	TRA 200	single	25g	568	40	1		1		1	2
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Monitoring - official sampling	DPA 003	single	1g	157	11						
Meat from poultry, unspecified - fresh - skinned - at retail - Monitoring - official sampling	DIS 822	single	25g	82	2						
Meat from poultry, unspecified - fresh - with skin - at retail - Monitoring - official sampling	DIS 821	single	25g	92	1						
Meat from poultry, unspecified - meat preparation - intended to be eaten cooked - at processing plant - Monitoring - official sampling	TRA 202	single	10g	61	13						
Meat from poultry, unspecified - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling	DIS 826	single	10g	88	6						
Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - at processing plant - Monitoring - official sampling	TRA 208	single	10g	36	1						
Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - at retail - Monitoring - official sampling	DIS 876	single	10g	65	2						

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Bareilly	S. Blockley	S. Braenderup	S. Bredeney	S. Enteritidis
Meat from poultry, unspecified - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling	DIS 880	single	10g	118	15						

	S. Infantis	S. Livingstone	S. Mbandaka	S. Montevideo	S. Paratyphi B	S. Saintpaul	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - carcass - at retail - Monitoring - official sampling									10
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Surveillance									19
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - Monitoring	1				1		1		5
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - animal sample - caecum - Surveillance									91
Meat from broilers (Gallus gallus) - fresh - at processing plant - Monitoring - official sampling	2	1	2	1	10	1	4	1	13
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Monitoring - official sampling	1				2		3	2	3
Meat from poultry, unspecified - fresh - skinned - at retail - Monitoring - official sampling									2
Meat from poultry, unspecified - fresh - with skin - at retail - Monitoring - official sampling									1
Meat from poultry, unspecified - meat preparation - intended to be eaten cooked - at processing plant - Monitoring - official sampling									13

Table Salmonella in poultry meat and products thereof

	S. Infantis	S. Livingstone	S. Mbandaka	S. Montevideo	S. Paratyphi B	S. Saintpaul	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Meat from poultry, unspecified - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling									6
Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - at processing plant - Monitoring - official sampling									1
Meat from poultry, unspecified - meat products - raw but intended to be eaten cooked - at retail - Monitoring - official sampling									2
Meat from poultry, unspecified - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling									15

Table Salmonella in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Cheeses made from goats' milk - soft and semi-soft - made from pasteurised milk - at retail - Monitoring - official sampling	DIS 878	single	25g	19	0			
Cheeses made from goats' milk - soft and semi-soft - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 851	single	25g	10	0			
Cheeses made from goats' milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 023	single	25g	9	0			
Cheeses made from sheep's milk - soft and semi -soft - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 879	single	25g	18	0			
Cheeses made from sheep's milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 024	single	25g	9	0			
Cheeses, made from unspecified milk or other animal milk - curd - at farm - Monitoring - official sampling	DPA	single	25g	11	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from pasteurised milk - at processing plant - Monitoring - official sampling	TRA 134	single	25g	105	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from pasteurised milk - at retail - Monitoring - official sampling	DIS 818	single	25g	114	2			2
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 008	single	25g	74	0			0

Table Salmonella in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling	TRA 133	single	25g	48	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 849	single	25g	78	0			
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 009	single	25g	46	0			
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 858	single	25g	20	0			
Dairy products (excluding cheeses) - cream - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 025	single	25g	20	0			
Dairy products (excluding cheeses) - ice-cream - at farm - Monitoring - official sampling	DPZ 010	single	25g	28	0			
Dairy products (excluding cheeses) - ice-cream - at retail - Monitoring - official sampling	DIS 887	single	25g	62	0			
Dairy products (excluding cheeses) - milk powder and whey powder - at processing plant - Monitoring - official sampling	TRA 123	single	25g	19	0			

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Brandenburg	S. Derby	S. Enteritidis	S. Infantis	S. Livingstone	S. Ohio
Meat from bovine animals - meat preparation - intended to be eaten raw - at retail - Monitoring (steak tartare with sauce)	DIS 815	single	25g	120	1						
Meat from bovine animals - minced meat - intended to be eaten raw - at retail - Monitoring (steak tartare)	DIS 816	single	25g	111	1						
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling	DIS 875	single	10g	42	1						
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at retail - Monitoring - official sampling	DIS 873	single	25g	39	1						
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling	DIS 888	single	10g	114	2						
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling	DIS 823	single	25g	116	3						
Meat from pig - fresh - at processing plant - Monitoring - official sampling	TRA 306	single	25g	122	7						
Meat from pig - fresh - at slaughterhouse - Monitoring - official sampling	DPA 002	single	600cm2	281	41	5	5		1	3	1
Meat from pig - meat products - raw ham - at retail - Monitoring [1)]	DIS 817	single	25g	31	0						
Other products of animal origin - gelatin and collagen - at processing plant - Monitoring - official sampling (only gelatin)	TRA 357	single	25g	10	0						

Table Salmonella in red meat and products thereof

	S. Paratyphi B	S. Rissen	S. Typhimurium	Salmonella spp., unspecified
Meat from bovine animals - meat preparation - intended to be eaten raw - at retail - Monitoring (steak tartare with sauce)				1
Meat from bovine animals - minced meat - intended to be eaten raw - at retail - Monitoring (steak tartare)				1
Meat from bovine animals and pig - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling				1
Meat from bovine animals and pig - meat preparation - intended to be eaten raw - at retail - Monitoring - official sampling				1
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling				2
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling				3
Meat from pig - fresh - at processing plant - Monitoring - official sampling			5	2
Meat from pig - fresh - at slaughterhouse - Monitoring - official sampling	1	2	20	3
Meat from pig - meat products - raw ham - at retail - Monitoring [1)]				
Other products of animal origin - gelatin and collagen - at processing plant - Monitoring - official sampling (only gelatin)				

Comments:

[1)] 31

Table Salmonella in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Crustaceans - unspecified - cooked - at retail - Monitoring - official sampling	DIS 852	single	25g	29	0			
Crustaceans - unspecified - raw - at processing plant - Monitoring - official sampling	TRA 403	single	10g	29	0			
Crustaceans - unspecified - raw - at retail - Monitoring - official sampling	DIS 889	single	10g	28	4			4
Egg products - at processing plant - Monitoring - official sampling	TRA 105	single	25g	110	1			1
Egg products - at retail - Monitoring - official sampling (liquid egg products)	DIS 885	single	25g	46	0			
Eggs - table eggs - at retail - Monitoring - official sampling	DIS 868	single	25g	109	0			
Foodstuffs intended for special nutritional uses - dried dietary foods for special medical purposes intended for infants below 6 months - at hospital or care home - Monitoring - official sampling	DIS 862	single	25g	80	0			
Fruits and vegetables - precut - ready-to-eat - at processing plant - Monitoring - official sampling	TRA 502	single	25g	12	1			1
Fruits and vegetables - precut - ready-to-eat - at retail - Monitoring - official sampling	DIS 813	single	25g	20	0			
Juice - fruit juice - unpasteurised - at processing plant - Monitoring - official sampling	TRA 517	single	25g	10	0			
Juice - fruit juice - unpasteurised - at retail - Monitoring - official sampling	DIS 872	single	25g	20	0			
Live bivalve molluscs - at retail - Monitoring	DIS 806	single	25g	58	0			

2.1.4 Salmonella in animals

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

Monitoring system

Sampling strategy

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

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

At the age of 26 weeks

Meat production flocks: Day-old chicks

Entry control 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 deliveryboxes 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

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 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. 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 overboots, 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 programme.
167 meat production flocks were tested in 2008. 4 flocks were positive for Salmonella.

B. 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

Entry control is not mandatory

Meat production flocks: Before slaughter at farm

Other: ____winthin 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 overboots, 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 psitive, 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.

C. 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

entry control 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 deliveryboxes 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 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 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 (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 overboots, 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 2008.

D. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

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

Multiplying herds

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

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 projets, pigs are sampled and isolates are sent to the NRL Salmonella, AH for serotyping and resistance anaysis.

Frequency of the sampling

Fattening herds at farm

Every 4 months

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 equal or higher than 0.6 for 3 consecutive sampling rounds.

Diagnostic/analytical methods used

Fattening herds at farm

Serological method: 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 biosecurity 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

6658 herds with fattening pigs were sampled in 2008. 2679 farms had at least once a mean S/P ratio of more than 0.6. Since the start of the programme in July of 2007, 693 fattening pig herds were classified as salmonella risk herds.

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 2007 are available. As compared to 2007, the number of pig strains more than doubled in 2008 (n=481 in 2007 and n=1 017 in 2008). Significantly less S. Typhimurium isolates were found (48.5%; 65.2% in 2007), but considerably more Derby (15.6%;7.2% in 2007).

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 15% of the strains. A relatively large number of S. Rissen (3.7%) has been identified.

E. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

There was no official monitoring of cattle in 2008 in Belgium. Isolates were diagnostic samples sent to the NRL Salmonella, animal health, for serotyping.

Vaccination policy

In 2008, no vaccine was authorized for the vaccination of cattle against salmonellosis.

Results of the investigation

The number of Salmonella isolates from cattle (n=112) has increased as compared to 2007 (n=80 in 2007). Most frequently found serotype is Dublin (59.8%), followed by serotype Typhimurium (33.0%).

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 serotype.

F. 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 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 Salmonelle 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 224 flocks, 1 flock was positive for Salmonella Typhimurium and 1 flock for Salmonella Infantis.
During production, of the 550 flocks (elite and parent flocks) 3 flocks were positive for Salmonella Enteritidis and 2 flocks for Salmonella Typhimurium. 40 flocks were positive for other than the 5 serotypes for which a target is set. In addition, 3 flocks were considered negative for Salmonella Typhimurium after confirmation sampling and 1 flock for Salmonella Infantis.

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

During rearing, the number of positive flocks raised from 2 in 2007 to 6 in 2008. The total number of rearing flocks was also higher in 2008 compared to 2006.
During production, the number of positive flocks for Salmonella serotypes for which a target is set remains about the same. The number of positive flocks of other serotypes has increased considerably compared to 2007 (from 15 to 40).

G. 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 programme. 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) Nr. 1168/2006.

Laying hens: Production period

Samples are taken in accordance with Regulation (EC) Nr. 1168/2006.

Laying hens: Before slaughter at farm

Samples are taken in accordance with Regulation (EC) Nr. 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 biosecurity issues are laid down under health qualification B.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

The national control programme for Salmonella in laying hens is based on Regulations (EC) Nrs. 2160/2003, 1177/2006 and 1168/2006.

Measures in case of the positive findings or single cases

Laying hens flocks

1) Pasteurisation 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 293 batches of day old chicks, none were found positive for Salmonella.
During rearing, 293 flocks were samples of which 1 was positive for Salmonella Enteritidis, 3 for Salmonella Jerusalem and 1 for Salmonella Lexington.
During production, 649 flocks were sampled by the owner of which 45 were positive for Salmonella (16 for S. Enteritidis). 283 flocks were sampled by the competent authority. 31 were positive for Salmonella, of which 1 for S. Typhimurium and 7 for S. Enteritidis.

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

It is difficult to make a comparison with 2007 seen the programme changed July of 2007.

H. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

There is no official surveillance programme for broilers. It is compulsory to sample, for Salmonella in general, all flocks on farms with more than 5000 birds in the last three weeks before slaughter. Flocks from farms with less than 5000 birds are sampled on a voluntary basis.
There is also a voluntary sampling of day-old chicks (health qualification A).

Frequency of the sampling

Broiler flocks: Day-old chicks

Other: not compulsory

Broiler flocks: Before slaughter at farm

Every hatch is sampled on farm with > 5000 birds

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

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 overboots, pooled. The 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 biosecurity issues.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

There is no national or regional control programme for Salmonella in broiler flocks. The sanitary qualification for farms with more than 5000 birds requires an exit sampling for Salmonella in general, within 3 weeks of slaughter. There is a mandatory cleaning and disinfection of the house before a new flock is introduced.

Measures in case of the positive findings or single cases

Broiler flocks: Day-old chicks

No measures apply for positive flocks.

Broiler flocks: Before slaughter at farm

If a flock is Salmonella positive, it is slaughtered at the end of the day (logistic slaughter).

Notification system in place

Zoonotic Salmonella is notifiable since the first of Januari 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

5074 flocks of broilers were sampled as day old chicks of which 4 were positive for Salmonella spp. Serotyping was not performed. This is a reduction compared to 2007 (14/5212 flocks were positive).

7755 flocks of broilers were sampled in the last 3 weeks of production. 234 were positive for Salmonella. This is also a reduction compared to 2007 (275/8809 were positive).

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Anatum	S. Cubana	S. Enteritidis	S. Hadar	S. Infantis
Gallus gallus (fowl) - elite breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling	3	laboratory	flock	3	0						
Gallus gallus (fowl) - parent breeding flocks, unspecified - day-old chicks - - faeces - Control and eradication programmes - official and industry sampling	224	laboratory	batch	224	0						
Gallus gallus (fowl) - parent breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling	547	laboratory	flock	547	45	8	2	1	3		
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period - - faeces - Control and eradication programmes - official and industry sampling	224	laboratory	flock	224	6						1

	S. Lexington	S. Livingstone	S. Mbandaka	S. Montevideo	S. Muenchen	S. Orion	S. Rissen	S. Ruiru	S. Senftenberg	S. Tennessee	S. Typhimurium
Gallus gallus (fowl) - elite breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling											
Gallus gallus (fowl) - parent breeding flocks, unspecified - day-old chicks - - faeces - Control and eradication programmes - official and industry sampling											
Gallus gallus (fowl) - parent breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling	2	1	3	3	1	1	2	1	9	1	2

Table Salmonella in breeding flocks of Gallus gallus

	S. Lexington	S. Livingstone	S. Mbandaka	S. Montevideo	S. Muenchen	S. Orion	S. Rissen	S. Ruiru	S. Senftenberg	S. Tennessee	S. Typhimurium
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period - - faeces - Control and eradication programmes - official and industry sampling			1	1					1		1

	S. Virchow	S. group O:4	Salmonella spp., unspecified	S. 3,19:-:-	S. Cochise
Gallus gallus (fowl) - elite breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling					
Gallus gallus (fowl) - parent breeding flocks, unspecified - day-old chicks - - faeces - Control and eradication programmes - official and industry sampling					
Gallus gallus (fowl) - parent breeding flocks, unspecified - during production period - - faeces - Control and eradication programmes - official and industry sampling		1		1	3
Gallus gallus (fowl) - parent breeding flocks, unspecified - during rearing period - - faeces - Control and eradication programmes - official and industry sampling		1			

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Banana	S. Blegdam	S. Braenderup	S. Derby	S. Dublin	S. Enteritidis
Gallus gallus (fowl) - broilers - day-old chicks - - faeces - Surveillance - HACCP and own checks		laboratories	flock	5074	4						
Gallus gallus (fowl) - broilers - during rearing period - - faeces - Monitoring - industry sampling			flock	7755	234						
Gallus gallus (fowl) - laying hens - day-old chicks - - faeces - Control and eradication programmes - industry sampling	293	laboratory	batch	254	0						
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - industry sampling - census sampling	649	laboratory	flock	649	42		1			1	13
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official and industry sampling (Total)	649	laboratory/FA	flock	649	76	1	1	1	1	1	23
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - objective sampling (2.1. a))	649	FASFC	flock	277	23	1		1	1		2
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. b))	649	FASFC	flock	6	5						2
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. e) confirmation sampling: 5 feces samples and 2 dust samples) [1)]	649	FASFC	flock	13	6						6
Gallus gallus (fowl) - laying hens - during rearing period - - faeces - Control and eradication programmes - industry sampling	293	laboratory	flock	293	5						1

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Banana	S. Blegdam	S. Braenderup	S. Derby	S. Dublin	S. Enteritidis
Turkeys - meat production flocks - - faeces - Surveillance - HACCP and own checks		laboratories	flock	167	6						

	S. Gateshead	S. Grumpensis	S. Hillingdon	S. Infantis	S. Jerusalem	S. Lexington	S. Livingstone	S. Mbandaka	S. Orion	S. Rissen	S. Senftenberg
Gallus gallus (fowl) - broilers - day-old chicks - - faeces - Surveillance - HACCP and own checks											
Gallus gallus (fowl) - broilers - during rearing period - - faeces - Monitoring - industry sampling											
Gallus gallus (fowl) - laying hens - day-old chicks - - faeces - Control and eradication programmes - industry sampling											
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - industry sampling - census sampling			1	3		2	4	5		1	3
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official and industry sampling (Total)	1	1	2	4	1	2	6	7	1	4	4
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - objective sampling (2.1. a))	1	1	1	1	1		2	1	1	3	1
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. b))								1			

Table Salmonella in other poultry

	S. Gateshead	S. Grumpensis	S. Hillingdon	S. Infantis	S. Jerusalem	S. Lexington	S. Livingstone	S. Mbandaka	S. Orion	S. Rissen	S. Senftenberg
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. e) confirmation sampling: 5 feces samples and 2 dust samples) [1)]											
Gallus gallus (fowl) - laying hens - during rearing period - - faeces - Control and eradication programmes - industry sampling					3	1					
Turkeys - meat production flocks - - faeces - Surveillance - HACCP and own checks											

	S. Typhimurium	S. Virchow	S. 6,7:-:-	S. 6,7:-:l,w	S. Paratyphi B var. Java	S. group O:4	Not typeable	Salmonella spp., unspecified	S. 9:-:-	S. 6,7:e,h:-	S. 9,46:b:-
Gallus gallus (fowl) - broilers - day-old chicks - - faeces - Surveillance - HACCP and own checks								4			
Gallus gallus (fowl) - broilers - during rearing period - - faeces - Monitoring - industry sampling								234			
Gallus gallus (fowl) - laying hens - day-old chicks - - faeces - Control and eradication programmes - industry sampling											
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - industry sampling - census sampling		1			1	3			1	1	1
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official and industry sampling (Total)	1	2	1	1	1	3	3		1	1	1

Table Salmonella in other poultry

	S. Typhimurium	S. Virchow	S. 6,7:-:-	S. 6,7:-:l,w	S. Paratyphi B var. Java	S. group O:4	Not typeable	Salmonella spp., unspecified	S. 9:-:-	S. 6,7:e,h:-	S. 9,46:b:-
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - objective sampling (2.1. a))	1	1		1			2				
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. b))			1				1				
Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official sampling - suspect sampling (2.1. e) confirmation sampling: 5 feces samples and 2 dust samples) [1)]											
Gallus gallus (fowl) - laying hens - during rearing period - - faeces - Control and eradication programmes - industry sampling											
Turkeys - meat production flocks - - faeces - Surveillance - HACCP and own checks								6			

Comments:

[1)] confirmation sampling

Table Salmonella in other birds

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Guinea fowl - - faeces - Surveillance - HACCP and own checks	laboratories	flock	2	0			

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Pigs - fattening pigs - - blood - Control and eradication programmes (12 blood samples every 4 months)	laboratories	holding	6658	2679			2679

Footnote:

In fattening pigs, a result is considered positive if the mean S/P ratio > 0,6. Measures are taken if 3 consecutive mean S/P ratio's are > 0,6.

2.1.5 Salmonella in feedingstuffs

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Infantis	S. Jerusalem	S. Livingstone	S. Ohio	S. Senftenberg
Feed material of land animal origin - Monitoring - official sampling [1)]	FASFC	batch	25g	58	6		2	1	2		1
Feed material of marine animal origin - other fish products - Monitoring - official sampling	FASFC	batch	25g	45	1					1	

	S. Typhimurium	S. Yoruba	S. 6,7:-:-	S. 6,7:z10:-	S. Paratyphi B var. Java	Salmonella spp., unspecified
Feed material of land animal origin - Monitoring - official sampling [1)]		1	1	1	1	
Feed material of marine animal origin - other fish products - Monitoring - official sampling						

Comments:

[1)] Results with multiple serovars: 1 with serovars Jerusalem and Livingstone; 1 with serovars S6,-7 and 6,7z10; 1 with serovars Infantis and Yoruba; 1 with serovars Infantis and Senftenberg

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Banana	S. Cubana	S. Enteritidis	S. Kentucky	S. Lexington	S. Mbandaka
Feed material of cereal grain origin - Monitoring - official sampling	FASFC	batch	25g	1	0						
Feed material of oil seed or fruit origin - Monitoring - official sampling [1)]	FASFC	batch	25g	100	10	2	2		1	1	1

	S. Rissen	S. Senftenberg	S. Typhimurium	S. Worthington	S. Yoruba	S. 3,10:-:1,5	Salmonella spp., unspecified	S. 3,19:-:-
Feed material of cereal grain origin - Monitoring - official sampling								
Feed material of oil seed or fruit origin - Monitoring - official sampling [1)]	1	1		1	1	1	1	1

Comments:

[1)] Results with multiple serovars: 1 with serovars Cubana and Kentucky; 1 with serovars Rissen and Senftenberg; 1 with serovars Worthington and Yoruba; 1 with serovars Banana and Lexington

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Brandenburg	S. Enteritidis	S. Havana	S. Jerusalem	S. Lexington	S. Livingstone
Compound feedingstuffs for cattle - final product - Monitoring - official sampling	FASFC	batch	25g	55	2		1		1		
Compound feedingstuffs for pigs - final product - Monitoring - official sampling	FASFC	batch	25g	56	2					1	
Compound feedingstuffs for poultry (non specified) - final product - Monitoring - official sampling	FASFC	batch	25g	4	0						
Compound feedingstuffs for poultry - laying hens - final product - Monitoring - official sampling	FASFC	batch	25g	113	4						
Compound feedingstuffs for poultry -breeders - final product - Monitoring - official sampling	FASFC	batch	25g	169	1	1					
Compound feedingstuffs for sheep - Monitoring - official sampling	FASFC	batch	25g	6	0						
Compound feedingstuffs for turkeys - Monitoring - official sampling	FASFC	batch	25g	1	0						
Compound feedingstuffs, not specified - Monitoring - official sampling	FASFC	batch	25g	15	2						1
Compund feedingstuffs for poultry - broilers - final product - Monitoring - official sampling	FASFC	batch	25g	47	2			1			
Pet food - Monitoring - official sampling	FASFC	batch	25g	19	0						
Pet food - dog snacks (pig ears, chewing bones) - Monitoring - official sampling [1)]	FASFC	batch	25g	20	4			1			1

Table Salmonella in compound feedingstuffs

	S. Minnesota	S. Orion	S. Senftenberg	S. Typhimurium	S. Worthington	S. 6,7:-:-	Salmonella spp., unspecified	S. 3,19:-:-
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 - laying hens - final product - Monitoring - official sampling		1	1			1		1
Compound feedingstuffs for poultry -breeders - final product - Monitoring - official sampling								
Compound feedingstuffs for sheep - Monitoring - official sampling								
Compound feedingstuffs for turkeys - Monitoring - official sampling								
Compound feedingstuffs, not specified - Monitoring - official sampling						1		
Compund feedingstuffs for poultry - broilers - final product - Monitoring - official sampling	1							
Pet food - Monitoring - official sampling								
Pet food - dog snacks (pig ears, chewing bones) [1)] - Monitoring - official sampling					1	2		

Comments:

[1)] one result with 2 serovars: S6,7 and Worthington

2.1.6 Salmonella serovars and phagetype distribution

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

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**112**		**1017**		**951**		
Number of isolates serotyped	**0**	**112**	**0**	**1010**	**0**	**941**	**0**	**0**
Number of isolates per serovar								
S. Agona		0		5		26		
S. Anatum		1		22		3		
S. Banana		0		0		2		
S. Bareilly		0		0		5		
S. Blegdam		0		0		2		
S. Blockley		1		0		22		
S. Bovismorbificans		0		6		0		

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**112**		**1017**		**951**		
Number of isolates serotyped	**0**	**112**	**0**	**1010**	**0**	**941**	**0**	**0**
Number of isolates per serovar								
S. Braenderup		0		3		13		
S. Brandenburg		0		28		2		
S. Bredeney		0		5		0		
S. Cannstatt		0		2		0		
S. Cubana		0		1		1		
S. Derby		0		159		8		
S. Dublin		67		0		1		
S. Enteritidis		1		4		342		
S. Goldcoast		0		8		0		
S. Hadar		0		0		4		
S. Havana		0		0		2		
S. Hillingdon		0		0		14		

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**112**		**1017**		**951**		
Number of isolates serotyped	**0**	**112**	**0**	**1010**	**0**	**941**	**0**	**0**
Number of isolates per serovar								
S. Idikan		0		0		3		
S. Indiana		0		0		8		
S. Infantis		2		30		46		
S. Jerusalem		0		0		6		
S. Lexington		0		0		7		
S. Livingstone		0		34		23		
S. Llandoff		0		2		0		
S. London		0		8		2		
S. Manhattan		0		2		0		
S. Mbandaka		0		1		23		
S. Minnesota		0		0		9		
S. Montevideo		0		1		8		

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**112**		**1017**		**951**		
Number of isolates serotyped	**0**	**112**	**0**	**1010**	**0**	**941**	**0**	**0**
Number of isolates per serovar								
S. Muenchen		0		0		4		
S. Newport		0		1		4		
S. Oakland		0		0		3		
S. Ohio		0		13		1		
S. Orion		0		0		3		
S. Panama		0		13		5		
S. Paratyphi B		1		0		84		
S. Rissen		0		38		10		
S. Saintpaul		0		0		3		
S. Schwarzengrund		0		3		0		
S. Senftenberg		0		0		24		
S. Tennessee		0		0		2		

Table Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**112**		**1017**		**951**		
Number of isolates serotyped	**0**	**112**	**0**	**1010**	**0**	**941**	**0**	**0**
Number of isolates per serovar								
S. Typhimurium		37		493		88		
S. Virchow		0		4		25		
S. Wien		0		5		0		
S. Worthington		0		2		2		
S. group B		2		74		19		
S. group E		0		8		1		
S. group D1		0		0		4		
S. group C1		0		9		17		
Not typeable		0		26		60		

2.1.7 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 2008.

Results of the investigation

A total of 43 Salmonella isolates were tested for their susceptibility. Twenty-three were S. Typhimurium and 13 S. Dublin, and in addition one strain each of serotype Anatum, Blockley, Enteritidis, Infantis, Paratyphi B and 2 belonging to group B (O:4).

Ten strains were fully susceptible, which represents 23,3%. Most resistance was found against sulfonamides (60,5%), ampicillin (53,5%), streptomycin (46,5%), tetracyclin (44,2%) and chloramphenicol (41,9%).

Noteworthy is the resistance against nalidixic acid (23,3%; 10 strains)and against florfenicol (14%; 6 isolates).

B. 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 354 Salmonella isolates were tested for their susceptibility. Most of the strain tested were S. Typhimurium (n=186), S. Derby (n=42), S. Livingstone (n=15) and S. Rissen (n=14).

One hundred thirty-two strains were fully susceptible, which represents 37,3%. Most resistance was found against sulfonamides (51,7%), tetracyclin (48,0%), ampicillin (46,0%) and streptomycin (43,8%).

C. 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.

Methods used for collecting data

.

Results of the investigation

Fife hundred poultry Salmonella isolates were tested for their susceptibility. Of these, 180 were S. Enteritidis, 29 S. Typhimurium,
28 Paratyphi B, 24 S. Infantis and 21 S. Virchow.

Three hundred seventy-eight strains were fully susceptible, which represents 75,6%. Most resistance was found against ampicillin (18,4%), sulfonamides (14,2%) and streptomycin (12,4%) in addition to tetracyclin (10,8%) and trimethoprim-sulfonamides (10,4%).

Noteworthy is the resistance against cepalosporins (6,2%; 31 strains)and against nalidixic acid (11,2%; 56 isolates).

D. 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.

Antimicrobial	Breakpoints (Âµg / 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, 159 Salmonella strains from pork were tested for their antibiotic susceptibility. This included strains from carcasses and cut meats. High resistance was observed to ampicillin (53%) and tetracyclin (52%), followed by Sulphamethoxizole (49%) and streptomycine (46%). Resistance to four or more antibiotics (= multiresistance) was observed in 4.% of the tested isolates. In total, 44 strains were sensitive to all antibiotics tested (28%). All strains were sensitive to colistin and gentamycin. Low resistance was observed for cefotaxime (2%), ceftazidim (1%), kanamycin (2.5%), nalidixic acid (3%), ciprofloxacin (4%) and florfenicol (7%).

Salmonella Typhimurium was the most dominantly isolated serotype (70) from pork. The observed trends are similar as descirbed above, with high resistance to sulphamethoxizole and ampiciline (both 70%), tetracycline (63%)and streptomycin (59%). However, only 9% of all typhimurium strains were senstitive to all antibiotics. It is clear that Tymphimurium strains are more resistant than other Salmonella strains found on pork.

Compared to previous years ampicillin and tetracyclin resistance has increased. This can be explained by the lowering of the breakpoint values used to assess resistance.

E. 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 (Âµg / 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 2008, 496 Salmonella isolates from poultry meats were tested for their antimicrobial susceptibility. A total of 41% were sensitive to all tested antibiotics. Resistance to trimethoprim (47%), ampicillin (46%) and streptomycin (44%) were most prevalent. Multiresistance (resistance to more than four antibiotics) were observed in 38% of all isolates. Little or no resistance was found for colistin (0%), gentamycin (0.6%), florfenicol (2%) and kanamycin (3%).

Compared to these general results, higher resistances were observed in chicken meat for cooked consumption and chicken parts (no carcasses), with 78% and

63% of the isolates resistant to trimethoprim, 62% and 58% to Sulphamethoxizole, and 70% and 59% to ampicillin, respectively. Also, 68% and 65% of the isolates showed multiresistance. On the other hand, Salmonella isolates from spent hens showed little antibiotic resistance, with only 6% showing multiresistance.

Compared to previous years, the resistance to ciprofloxacin was increased drastically, to 33%. Also, resistance to trimethoprim has increased. Both can be attributed to a serious lowering of the breakpoint values.

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

Breakpoints 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.

Antimicrobial Breakpoints(microg / ml)
Ampicillin 8 â€“ 32
Ceftriaxon 8 â€“ 64
Streptomycin 8 â€“ 32
Kanamycin 16 â€“ 64
Tetracycline 4 â€“ 16
Sulfamethoxazole 256 â€“ 512
Trimethoprim 8 â€“ 16
Trimethoprim - sulfonamides 2 â€“ 4
Nalidixic acid 16 â€“ 32
Ciprofloxacin 1 â€“ 4

Chloramphenicol 8 â€“ 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 2008.

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/sante/clre/cadrecnr/salmoms/WKLM_2007.pdf 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 centre 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 conditions (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.

Breakpoints used in testing

Agar diffudion 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 1 125 Salmonella isolates was tested in 2008. Within the same LIMS dossier only one isolate belonging to the same serotype was selected for susceptibility testing, and therefore strains were likely to be independent from each other.

A total of 706 Salmonella isolates (62.6%) were fully susceptible to all antimicrobial drugs tested. Most resistance was found against Ap (28.0%), Su (26.8%), Tc (23.5%), St (23.2%), but also against TSu (14.9%) and Nal (8.7%). Eighty-four strains, mainly from cattle and pigs, were found resistant against Cm (7.5%); about 47% of these isolates were also resistant against Ff. Moreover, 34 isolates were found Cef resistant (3.0%), of which 31 originated from poultry. The serotypes most involved in cef resistance in poultry were: 11 S. Paratyphi B, 10 S. Virchow, 3 S. Infantis. In addition, fife Enr resistant strains (0.4%) (two S. Hadar from poultry and one S. Derby from pigs) were detected. Finally, eleven strains were resistant to neomycin (4 S. Typhimurium from pigs and 2 S. Paratyphi B and 1 S. Typimurium from poultry) and one to gentamicin.

Most (92,9%) S. Agona isolates (n=42) were fully susceptible for all antimicrobials tested.

A limited number of S. Blockley isolates were tested (n=11), but all were resistant to Ap, Su and Nal, and 90.9% resistance against TSu and 81.8% against Tc was recorded. Most of S. Derby strains (n=50) were sensitive (60.0%), although some resistance against Tc (34.0%), Su (28.0%), St and TSu (both 16.0%) was noticed.

As for S. Dublin isolates (n=14; most from cattle), 28.6% were found completely susceptible. Resistance against Cm (57.13%), Su and Nal (both 50.0%) and St (14.3%) was noticed.
Most S. Enteritidis isolates (n=185) were susceptible (94.6%). Resistance was only found against Ap (4.9%; 9 isolates) and against Su (1 isolate).
Only four S. Hadar (n=4) strains were tested and all were found resistant against St Tc Nal (100%). Two strains were Enr resistant.
All the S. Indiana strains (n=16) were multi-resistant and showed profile Ap St Su TSu. In addition, 93.8% were resistant against Tc.
Most of the S. Infantis strains (n=42) were susceptible (81%). Three strains originating from poultry showed Cef resistance.
Almost all S. Paratyphi B (n=31) strains were tartrate positive (i.e. var. Java; n=21), and only among this variant sensitive strains were found. Resistance was mainly observed against St (74.2%), Ap and Nal (both 54.8%) and against Su (48.4%) and Nal (66.7%). Also resistance against Cef was frequently observed (38.7%), and all these strains originated from poultry. All four S. Paratyphi B, tartrate negative isolates (3 from poultry) were multi-resistant.
A limited number of S. Regent strains were tested (n=15), and all originated from ducks. All but one isolate was resistant, and most resistance was found against Ap (73.3%) and Nal (86.7%).
Only 22.6% of S. Typhimurium isolates (n=252) were found susceptible (44% in 2007); classic variant (O5+) strains were found slightly less susceptible (20.2%) than Copenhagen variant (O5-) isolates (25.8%). Pentaresistance Ap St Tc Su Cm was encountered in 19.0% and 27.0% of O5+ and O5- isolates, respectively. Of these multi-resistant strains, 48.4% and 75.0% of Classic and Copenhagen variants were Ff resistant, respectively.
In 2008, 22 S. Virchow isolates were tested, and 27.3% was found susceptible to the antimicrobials used. Like last year, most resistance was found against Ap and Nal (both 68.2%). Cef resistance is remarkable: 45.5%.

Table Antimicrobial susceptibility testing of S.Enteritidis in animals

S. Enteritidis		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)		no				yes				yes		yes	
Number of isolates available in the laboratory		1		4		342				92		372	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	1	0	1	0	180	0			18	0	115	0
	Neomycin	1	0	1	0	180	0			18	0	115	0
	Streptomycin	1	0	1	0	180	0			18	0	115	0
Amphenicols	Chloramphenicol	1	0	1	0	180	0			18	0	115	0
	Florfenicol	1	0	1	0	180	0			18	0	115	0
Cephalosporins	3rd generation cephalosporins	1	0	1	0	180	0			18	0	115	0
Fluoroquinolones	Enrofloxacin	1	0	1	0	180	0			18	0	115	0
Fully sensitive	Fully sensitive	1	1	1	0	180	171			18	18	115	107
Penicillins	Ampicillin	1	0	1	0	180	9			18	0	115	8
Quinolones	Nalidixic acid	1	0	1	0	180	0			18	0	115	0
Sulfonamides	Sulfonamide	1	0	1	1	180	0			18	0	115	0
Tetracyclines	Tetracyclin	1	0	1	1	180	0			18	0	115	0
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	1	0	1	0	180	0			18	0	115	0

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

S. Enteritidis		Gallus gallus (fowl) - laying hens																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		37																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	*2*	37	0						3	29	5													0.25	1
	Kanamycin	*8*	37	0										35	2										4	8
	Neomycin		0	0																						
	Streptomycin	*32*	37	0									2	27	7	1									2	16
Amphenicols	Chloramphenicol	*16*	37	0									1	34	2										2	8
	Florfenicol	*16*	37	0									4	33											2	4
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	*0.5*	37	0				29	8																0.06	0.12
	Ceftazidim	*2*	37	0						37															0.25	0.25
Fluoroquinolones	Ciprofloxacin	*0.06*	37	0		13	24																		0.015	0.03
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	*4*	37	1							11	25					1								0.5	32
Quinolones	Nalidixic acid	*16*	37	0										37												
Sulfonamides	Sulfamethoxazol	*256*	37	0												1	15	20	1						16	128
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	*8*	37	0								37													1	1
Trimethoprim	Trimethoprim	*2*	37	0							37															
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Footnote:

Antimicrobial susceptibility testing of Salmonella enteritidis in Laying hens was performed with the dilution method (MIC) (cfr Decision 2007/407/EC). The breakpoints and ranges used are the same as for food.

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

S. Enteritidis		Meat from broilers (Gallus gallus) - carcass - spent hens																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		74																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	74	0						10	52	11	1												0.25	2
	Kanamycin	8	74	0										70	4										4	8
	Neomycin		0	0																						
	Streptomycin	32	74	0									8	57	6	2	1								2	32
Amphenicols	Chloramphenicol	16	74	0									5	63	6										2	8
	Florfenicol	16	74	0									6	67	1										2	8
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	74	1				60	11	1	1	1													0.06	1
	Ceftazidim	2	74	0						68	5	1													0.25	1
Fluoroquinolones	Ciprofloxacin	0.06	74	0		20	53	1																	0.015	0.06
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	74	2							19	50	2	1			2								0.5	32
Polymyxins	Colistin	16	74	0											74										8	8
Quinolones	Nalidixic acid	16	74	0										74											4	4
Sulfonamides	Sulfamethoxazol	256	74	0											1		6	60	7						8	128
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	74	0								58	16												1	2
Trimethoprim	Trimethoprim	2	74	0							74														0.5	0.5
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

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

Table Antimicrobial susceptibility testing of S. Enteritidis - qualitative data

S. Enteritidis		Meat from broilers (Gallus gallus) - carcass - spent hens	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		74	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	74	0
	Kanamycin	74	0
	Streptomycin	74	0
Amphenicols	Chloramphenicol	74	0
	Florfenicol	74	0
Cephalosporins	Cefotaxim	74	1
	Ceftazidim	74	0
Fluoroquinolones	Ciprofloxacin	74	0
Penicillins	Ampicillin	74	2
Polymyxins	Colistin	74	0
Quinolones	Nalidixic acid	74	0
Sulfonamides	Sulfamethoxazol	74	0
Tetracyclines	Tetracyclin	74	0
Trimethoprim	Trimethoprim	74	0

Table Antimicrobial susceptibility testing of S. Paratyphi B - qualitative data

S. Paratyphi B		Meat from broilers (Gallus gallus) - carcass	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		53	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	53	1
	Kanamycin	53	3
	Streptomycin	53	47
Amphenicols	Chloramphenicol	53	0
	Florfenicol	53	0
Cephalosporins	Cefotaxim	53	27
	Ceftazidim	53	25
Fluoroquinolones	Ciprofloxacin	53	41
Penicillins	Ampicillin	53	47
Polymyxins	Colistin	53	0
Quinolones	Nalidixic acid	53	37
Sulfonamides	Sulfamethoxazol	53	29
Tetracyclines	Tetracyclin	53	7
Trimethoprim	Trimethoprim	53	52

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

S. Paratyphi B		Meat from broilers (Gallus gallus) - carcass																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		53																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	53	1	0	0	0	0	0	7	41	4	0	1	0	0	0	0	0	0	0	0	0	0	0.25	4
	Kanamycin	8	53	3	0	0	0	0	0	0	0	0	0	50	0	0	1	0	2	0	0	0	0	0	4	128
	Neomycin		0	0																						
	Streptomycin	32	53	47	0	0	0	0	0	0	0	0	1	0	0	0	5	37	10	0	0	0	0	0	2	128
Amphenicols	Chloramphenicol	16	53	0	0	0	0	0	0	0	0	0	3	36	13	1	0	0	0	0	0	0	0	0	2	16
	Florfenicol	16	53	0	0	0	0	0	0	0	0	0	6	35	12	0	0	0	0	0	0	0	0	0	2	8
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	53	27	0	0	0	11	7	8	0	0	1	26	0	0	0	0	0	0	0	0	0	0	0.06	4
	Ceftazidim	2	53	25	0	0	0	0	0	10	15	1	2	11	1	13	0	0	0	0	0	0	0	0	0.25	16
Fluoroquinolones	Ciprofloxacin	0.06	53	41	0	0	7	5	3	8	28	2	0	0	0	0	0	0	0	0	0	0	0	0	0.02	1
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	53	47	0	0	0	0	0	0	1	2	2	1	0	0	47	0	0	0	0	0	0	0	0.5	32
Polymyxins	Colistin	16	53	0		0	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	0	8	8
Quinolones	Nalidixic acid	16	53	37	0	0	0	0	0	0	0	0	0	10	5	1	0	37	0	0	0	0	0	0	4	64
Sulfonamides	Sulfamethoxazol	256	53	29	0	0	0	0	0	0	0	0	0	0	0	0	7	16	1	0	0	29	0	0	32	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	53	52		0	0	0	0	0	1	0	0	0	0	0	52	0	0	0	0	0	0	0	0.5	32
Trimethoprim	Trimethoprim	2	53	52	0	0	0	0	0	1	0	0	0	0	0	0	52	0	0	0	0	0	0	0	0.5	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

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

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

S. Typhimurium		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)		no		no		yes				yes		yes	
Number of isolates available in the laboratory		37		493		88				92		372	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	23	0	186	0	29	0			5	0	6	0
	Neomycin	23	0	186	4	29	1			5	0	6	0
	Streptomycin	23	16	186	108	29	19			5	1	6	4
Amphenicols	Chloramphenicol	23	10	186	47	29	5			5	1	6	1
	Florfenicol	23	5	186	27	29	2			5	0	6	0
Cephalosporins	3rd generation cephalosporins	23	0	186	0	29	1			5	0	6	0
Fluoroquinolones	Enrofloxacin	23	0	186	0	29	0			5	0	6	0
Fully sensitive	Fully sensitive	23	3	186	34	29	9			5	4	6	0
Number of multiresistant S. Typhimurium	with penta resistance	23	10	186	40	29	6			5	1	6	2
Penicillins	Ampicillin	23	19	186	120	29	17			5	1	6	4
Quinolones	Nalidixic acid	23	2	186	126	29	1			5	0	6	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	23	2	186	21	29	0			5	0	6	0
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	23	3	186	17	29	3			5	0	6	2
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	23	1	186	8	29	4			5	0	6	2
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	23	2	186	34	29	1			5	0	6	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	23	12	186	71	29	12			5	0	6	2
Sulfonamides	Sulfonamide	23	16	186	126	29	19			5	1	6	6
Tetracyclines	Tetracyclin	23	16	186	122	29	14			5	1	6	3
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	23	2	186	54	29	9			5	0	6	2

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

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

S. Typhimurium		Meat from broilers (Gallus gallus) - carcass																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		29																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	29	0	0	0	0	0	0	0	11	18	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
	Kanamycin	8	29	0	0	0	0	0	0	0	0	0	0	28	1	0	0	0	0	0	0	0	0	0	4	8
	Neomycin		0	0																						
	Streptomycin	32	29	1	0	0	0	0	0	0	0	0	0	0	1	27	0	0	1	0	0	0	0	0	8	128
Amphenicols	Chloramphenicol	16	29	0	0	0	0	0	0	0	0	0	0	25	4	0	0	0	0	0	0	0	0	0	4	8
	Florfenicol	16	29	0	0	0	0	0	0	0	0	0	8	20	1	0	0	0	0	0	0	0	0	0	2	8
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	29	0	0	0	0	28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0.12
	Ceftazidim	2	29	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0.25
Fluoroquinolones	Ciprofloxacin	0.06	29	0	0	7	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.015	0.03
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	29	1	0	0	0	0	0	0	11	17	0	0	0	0	1	0	0	0	0	0	0	0	0.5	32
Polymyxins	Colistin	16	29	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	8	8
Quinolones	Nalidixic acid	16	29	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	4	4
Sulfonamides	Sulfamethoxazol	256	29	1	0	0	0	0	0	0	0	0	0	00	0	0	4	23	0	1	0	1	0	0	32	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	29	1	0	0	0	0	0	0	0	28	0	0	0	0	0	1	0	0	0	0	0	0	1	64
Trimethoprim	Trimethoprim	2	29	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

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

Table Antimicrobial susceptibility testing of S. Typhimurium - qualitative data

S. Typhimurium		Meat from broilers (Gallus gallus) - carcass		Meat from pig	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		29		70	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	29	0	70	0
	Kanamycin	29	0	70	3
	Streptomycin	29	1	70	41
Amphenicols	Chloramphenicol	29	0	70	14
	Florfenicol	29	0	70	10
Cephalosporins	Cefotaxim	29	0	70	0
	Ceftazidim	29	0	70	0
Fluoroquinolones	Ciprofloxacin	29	0	70	1
Penicillins	Ampicillin	29	1	70	49
Polymyxins	Colistin	29	0	70	0
Quinolones	Nalidixic acid	29	0	70	1
Sulfonamides	Sulfamethoxazol	29	1	70	49
Tetracyclines	Tetracyclin	29	1	70	44
Trimethoprim	Trimethoprim	29	0	70	20

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

S. Typhimurium		Meat from pig - carcass																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		70																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	70	0						1	29	39	1												0.25	2
	Kanamycin	8	70	3										61	6				3						4	128
	Neomycin		0	0																						
	Streptomycin	32	70	41											7	16	6	4	37						8	128
Amphenicols	Chloramphenicol	16	70	14										48	8		1	13							4	64
	Florfenicol	16	70	10									1	56	1	2	6	4							2	64
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	70	0				58	11	1															0.06	0.25
	Ceftazidim	2	70	0						65	5														0.25	0.5
Fluoroquinolones	Ciprofloxacin	0.06	70	1		24	43	2		1															0.015	0.25
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	70	49							8	11	2				49								0.5	32
Polymyxins	Colistin	16	70	0											70										8	8
Quinolones	Nalidixic acid	16	70	1										66	3			1							4	64
Sulfonamides	Sulfamethoxazol	256	70	49												2	13	6				49			16	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	70	44								23	3			3	9	32							1	64
Trimethoprim	Trimethoprim	2	70	20							46	4					20								0.5	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

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

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

Salmonella spp.		Gallus gallus (fowl) - laying hens																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		111																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	*2*	50	2						8	6	31	3				2								0.25	32
	Kanamycin	*8*	111	0										95	16										4	8
	Neomycin		0	0																						
	Streptomycin	*32*	111	9									3	38	15	35	11	3	6						2	128
Amphenicols	Chloramphenicol	*16*	111	3									5	77	26			3							2	64
	Florfenicol	*16*	111	2									15	89	5		1	1							2	64
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	*0.5*	111	1				81	27	2				1											0.06	4
	Ceftazidim	*2*	111	1						94	16			1											0.25	4
Fluoroquinolones	Ciprofloxacin	*0.06*	111	1		51	59			1															0.015	0.25
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	*4*	111	8							50	52	1				8								0.5	32
Quinolones	Nalidixic acid	*16*	111	1										109	1			1							4	64
Sulfonamides	Sulfamethoxazol	*256*	111	8											1	3	50	45	3	1		8			8	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	*8*	111	5								105	1				1	4							1	64
Trimethoprim	Trimethoprim	*2*	111	2							106	3					2								0.5	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Footnote:

Antimicrobial susceptibility testing of Salmonella spp in Laying hens was performed with the dilution method (MIC) (cfr Decision 2007/407/EC). The breakpoints and ranges used are the same as for food.

Table Antimicrobial susceptibility testing of Salmonella in animals

Salmonella spp.		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)				no		yes				yes		yes	
Number of isolates available in the laboratory		112		1017		951				111		372	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	43	0	354	1	500	0			50	0	208	0
	Neomycin	43	1	354	5	500	4			50	0	208	0
	Streptomycin	43	20	354	155	500	62			50	1	208	18
Amphenicols	Chloramphenicol	43	18	354	56	500	8			50	2	208	3
	Florfenicol	43	6	354	32	500	3			50	0	208	1
Cephalosporins	3rd generation cephalosporins	43	1	354	0	500	31			50	0	208	14
Fluoroquinolones	Enrofloxacin	43	0	354	1	500	2			50	0	208	2
Fully sensitive	Fully sensitive	43	10	354	132	500	378			50	48	208	158
Penicillins	Ampicillin	43	23	354	163	500	92			50	1	208	34
Quinolones	Nalidixic acid	43	10	354	6	500	56			50	0	208	22
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	43	5	354	31					50	1	208	15
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	43	3	354	27					50	0	208	4
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	43	8	354	24					50	0	208	15
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	43	3	354	40					50	0	208	4
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	43	15	354	100					50	1	208	5
Sulfonamides	Sulfonamide	43	26	354	183	500	71			50	1	208	22
Tetracyclines	Tetracyclin	43	19	354	170	500	54			50	1	208	18
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	43	4	354	94	500	52			50	0	208	16

Footnote:

Antimicribial susceptibility testing of Salmonella spp in laying hens was performed with dilution method (MIC plates)(cfr Decision 2007/407/EC). Breakpoints used are the same as for Salmonella in food.

Table Antimicrobial susceptibility testing of Salmonella spp. in food

Salmonella spp.		Meat from poultry, unspecified - meat preparation		Meat from broilers (Gallus gallus) - meat products - cooked, ready -to-eat		Meat from other animal species or not specified - mechanically separated meat (MSM)		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Meat from other poultry species		Meat from broilers (Gallus gallus) - carcass - spent hens	
Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes		yes		yes				yes	
Number of isolates available in the laboratory		48		59		23		41		7		159		218				130	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	48	1	59	0	23	1	41	0	7	0	159	0	218	2			130	0
	Kanamycin	48	1	59	4	23	0	41	2	7	0	159	4	218	8			130	1
	Streptomycin	48	38	59	39	23	7	41	24	7	4	159	73	218	102			130	14
Amphenicols	Chloramphenicol	48	8	59	2	23	0	41	1	7	0	159	19	218	12			130	3
	Florfenicol	48	6	59	2	23	0	41	1	7	0	159	11	218	0			130	2
Cephalosporins	Cefotaxim	48	20	59	22	23	3	41	10	7	0	159	3	218	47			130	4
	Ceftazidim	48	20	59	21	23	3	41	10	7	0	159	2	218	45			130	3
Fluoroquinolones	Ciprofloxacin	48	29	59	28	23	9	41	14	7	1	159	6	218	85			130	6
Fully sensitive	Fully sensitive	48	2	59	8	23	8	41	8	7	1	159	44	218	79			130	108
Penicillins	Ampicillin	48	39	59	41	23	11	41	24	7	5	159	84	218	106			130	18
Polymyxins	Colistin	48	0	59	0	23	0	41	0	7	0	159	0	218	0			130	0
Quinolones	Nalidixic acid	48	29	59	27	23	8	41	13	7	1	159	5	218	80			130	6
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	48	1	59	1	23	1	41	0	7	1	159	24	218	11			130	5
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	48	3	59	3	23	1	41	5	7	1	159	14	218	10			130	6
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	48	2	59	2	23	2	41	3	7	4	159	12	218	7			130	0
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	48	9	59	5	23	2	41	6	7	0	159	24	218	19			130	3
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	48	31	59	40	23	9	41	19	7	0	159	41	218	92			130	8
Sulfonamides	Sulfamethoxazol	48	34	59	37	23	11	41	24	7	4	159	78	218	82			130	8

Table Antimicrobial susceptibility testing of Salmonella spp. in food

Salmonella spp.		Meat from poultry, unspecified - meat preparation		Meat from broilers (Gallus gallus) - meat products - cooked, ready -to-eat		Meat from other animal species or not specified - mechanically separated meat (MSM)		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Meat from other poultry species		Meat from broilers (Gallus gallus) - carcass - spent hens	
Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes		yes		yes				yes	
Number of isolates available in the laboratory		48		59		23		41		7		159		218				130	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Tetracyclines	Tetracyclin	48	16	59	10	23	3	41	14	7	0	159	82	218	47			130	5
Trimethoprim	Trimethoprim	48	38	59	46	23	13	41	26	7	0	159	45	218	116			130	7

Table Antimicrobial susceptibility testing of Not typeable - qualitative data

Not typeable		Meat from broilers (Gallus gallus) - carcass		Meat from broilers (Gallus gallus) - meat products - cooked, ready -to-eat		Meat from other poultry species - meat preparation	
Isolates out of a monitoring program (yes/no)		yes		yes		yes	
Number of isolates available in the laboratory		44		26		20	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin	44	0	26	0	20	0
	Kanamycin	44	0	26	2	20	0
	Streptomycin	44	34	26	22	20	15
Amphenicols	Chloramphenicol	44	0	26	0	20	1
	Florfenicol	44	0	26	0	20	0
Cephalosporins	Cefotaxim	44	17	26	14	20	9
	Ceftazidim	44	17	26	14	20	9
Fluoroquinolones	Ciprofloxacin	44	33	26	14	20	17
Penicillins	Ampicillin	44	36	26	21	20	18
Polymyxins	Colistin	44	0	26	0	20	0
Quinolones	Nalidixic acid	44	31	26	13	20	17
Sulfonamides	Sulfamethoxazol	44	30	26	23	20	13
Tetracyclines	Tetracyclin	44	7	26	3	20	5
Trimethoprim	Trimethoprim	44	43	26	26	20	20

Table Antimicrobial susceptibility testing of Not typeable in Meat from broilers (Gallus gallus) - carcass - quantitative data [Dilution method]

Not typeable		Meat from broilers (Gallus gallus) - carcass																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		44																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	44	0	0	0	0	0	0	14	27	3	0	0	0	0	0	0	0	0	0	0	0	0	14	3
	Kanamycin	8	44	0	0	0	0	0	0	0	0	0	0	43	1	0	0	0	0	0	0	0	0	0	4	1
	Neomycin		0	0																						
	Streptomycin	32	44	34	0	0	0	0	0	0	0	0	0	0	0	1	9	27	7	0	0	0	0	0	16	128
Amphenicols	Chloramphenicol	16	44	0	0	0	0	0	0	0	0	0	0	29	12	3	0	0	0	0	0	0	0	0	4	16
	Florfenicol	16	44	0	0	0	0	0	0	0	0	0	2	30	12	0	0	0	0	0	0	0	0	0	2	8
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	44	17	0	0	0	13	5	8	1	0	0	17	0	0	0	0	0	0	0	0	0	0	0.06	4
	Ceftazidim	2	44	17	0	0	0	0	0	15	10	2	0	6	3	8	0	0	0	0	0	0	0	0	0.25	16
Fluoroquinolones	Ciprofloxacin	0.06	44	33	0	0	9	2	2	6	19	4	2	0	0	0	0	0	0	0	0	0	0	0	0.02	2
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	44	36	0	0	0	0	0	0	1	3	4	0	0	0	36	0	0	0	0	0	0	0	0.5	32
Polymyxins	Colistin	16	44	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	0	8	8
Quinolones	Nalidixic acid	16	44	31	0	0	0	0	0	0	0	0	0	10	3	0	5	26	0	0	0	0	0	0	4	64
Sulfonamides	Sulfamethoxazol	256	44	30	0	0	0	0	0	0	0	0	0	0	0	3	5	6	0	0	0	30	0	0	16	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	44	7	0	0	0	0	0	0	0	24	10	3	0	0	0	7	0	0	0	0	0	0	1	64
Trimethoprim	Trimethoprim	2	44	43	0	0	0	0	0	0	1	0	0	0	0	1	42	0	0	0	0	0	0	0	0.5	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of Not typeable in Meat from broilers (Gallus gallus) - carcass - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of Not typeable in meat products - Meat from broilers (Gallus gallus) - cooked, ready-to-eat - quantitative data [Dilution method]

Not typeable		Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		26																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	26	0						9	16	1													0.25	1
	Kanamycin	8	26	2										24					2						4	128
	Neomycin		0	0																						
	Streptomycin	32	26	22													4	20	2						32	128
Amphenicols	Chloramphenicol	16	26	0									1	12	13										2	8
	Florfenicol	16	26	0									1	15	10										2	8
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	26	14				4	3	5				14											0.06	4
	Ceftazidim	2	26	14						5	7			5		9									0.25	16
Fluoroquinolones	Ciprofloxacin	0.06	26	14		1	4	7	1	5	7	1													0.015	1
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	26	21								3	2				21								1	32
Polymyxins	Colistin	16	26	0											26										8	8
Quinolones	Nalidixic acid	16	26	13										7	6		1	12							4	64
Sulfonamides	Sulfamethoxazol	256	26	23													2	1				23			32	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	26	3								13	7	3				3							1	64
Trimethoprim	Trimethoprim	2	26	26													26								32	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of Not typeable in meat products - Meat from broilers (Gallus gallus) - cooked, ready-to-eat - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of Not typeable in Meat from poultry, unspecified - meat preparation - quantitative data [Dilution method]

Not typeable		Meat from poultry, unspecified - meat preparation																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		20																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	20	0						8	12														0.25	0.5
	Kanamycin	8	20	0										19	1										4	8
	Neomycin		0	0																						
	Streptomycin	32	20	15									1				4	15							2	64
Amphenicols	Chloramphenicol	16	20	1										15	4		1								4	32
	Florfenicol	16	20	0										15	5											
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	0.5	20	9				5	5	1				9											0.06	4
	Ceftazidim	2	20	9						3	8				1	8									0.25	16
Fluoroquinolones	Ciprofloxacin	0.06	20	17				3		4	13														0.06	0.5
	Enrofloxacin		0	0																						
Penicillins	Ampicillin	4	20	18									2				18								2	32
Polymyxins	Colistin	16	20	0											20										8	8
Quinolones	Nalidixic acid	16	20	17										3				17							4	64
Sulfonamides	Sulfamethoxazol	256	20	13													5	2				13			32	1024
	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	8	20	5							1	8	6					5							0.5	64
Trimethoprim	Trimethoprim	2	20	20													20								32	32
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of Not typeable in Meat from poultry, unspecified - meat preparation - quantitative data [Dilution method]

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**							40	22		20
	Neomycin							120	22		20
	Streptomycin							100	25		23
Amphenicols	**Chloramphenicol**							60	24		21
	Florfenicol							30	18		15
Cephalosporins	**3rd generation cephalosporins**							30	22		20
Fluoroquinolones	**Enrofloxacin**							10	22		20
Penicillins	**Ampicillin**							33	19		17
Quinolones	**Nalidixic acid**							130	24		21
Sulfonamides	**Sulfonamide**							240	20		22
Tetracyclines	**Tetracyclin**							80	22		20

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	CLSI			2	0.5	32				
	Kanamycin				8	4	128				
	Streptomycin	CLSI			32	2	128				
Amphenicols	**Chloramphenicol**	CLSI			16	2	64				
	Florfenicol	epi cutoff eucast			16	2	64				
Cephalosporins	**Cefotaxim**	CLSI			0.5	0.06	4				
	Ceftazidim	CLSI			2	0.25	12				
Fluoroquinolones	**Ciprofloxacin**	CLSI			0.06	0.008	8				
Penicillins	**Ampicillin**	CLSI			4	0.5	32				
Polymyxins	**Colistin**	epi cutoff eucast			16	8	16				
Quinolones	**Nalidixic acid**	CLSI			16	4	64				
Sulfonamides	**Sulfamethoxazol**	CLSI			256	8	1024				
Tetracyclines	**Tetracyclin**	CLSI			8	1	64				
Trimethoprim	**Trimethoprim**	CLSI			2	0.5	32				

Table Breakpoints for antibiotic resistance testing

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Campylobacter is a leading source of bacterial foodborne gastrointestinal diseases in humans in all parts of the world. It can also cause postinfectious complications as Guillain-BarrÃ© syndrome.

In 80% of the cases, the infection route of campylobacteriosis is food, but domestic animals including pets are also 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 main causes of enteritis in humans .

The contamination of poultry carcasses and meat with Campylobacter are 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 Campylobacteriosis in humans

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A monitoring programme was organised 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

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

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

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 programme was organised 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, layer carcasses, and 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 thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - Survey - EU baseline survey		single	25g	415	65	14	49	1		1
Meat from broilers (Gallus gallus) - carcass - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey		batch	25g	426	169	44	111			14
Meat from broilers (Gallus gallus) - carcass - spent hens - at slaughterhouse - Monitoring	DPA 004	single	1g	37	10					10
Meat from broilers (Gallus gallus) - fresh - at processing plant - Monitoring - official sampling	TRA 200	single	1g	523	38					38
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Monitoring - official sampling	DPA 003	single	1g	185	61					61
Meat from poultry, unspecified - meat preparation - intended to be eaten cooked - at processing plant - Monitoring - official sampling [1)]	TRA 202	single	1g	61	2					2
Meat from turkey - fresh - at slaughterhouse - Monitoring - official sampling	DPA 005	single	1g	166	13					13

Comments:

[1)] enumeration with limit M = 100 cfu/g

Table Campylobacter in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from pig - fresh - at slaughterhouse - Monitoring - official sampling	DPA 002	single	600cm2	500	83					83

2.2.4 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

Organs: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.

2.2.5 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.

Antimicrobial Breakpoints (g / ml)

	Jejuni	coli
Ampicillin	16	16
Tetracycline	2	2
Nalidixic acid	16	32
Ciprofloxacin	1	1
Erytromycin	4	16
Gentamicin	1	2

Minimum Inhibitory Concentrations were determined following the NCCLS standards.

Results of the investigation

In total 78 campylobacter isolates were analysed, of which 70 belonged to C. coli and 5 to C. jejuni.
In total, 11 isolates were sensitive to all tested antibiotics (8 from coli and 2 from jejuni).
Resistence occured for each antibiotic; complete resistence was not observed.

The resistance against tetracyclin (82%) was high followed by ciprofloxacin and nalidixic acid (29.5%).
Compared to 2007, a general increase is observed due to a lowering of the breakpoint concentration (cfr CLSI standards).

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.

Antimicrobial Breakpoints (µg / ml)

	Jejuni	coli
Ampicillin	16	16
Tetracycline	2	2
Nalidixic acid	16	32
Ciprofloxacin	1	1
Erytromycin	4	16
Gentamicin	1	2

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 C. coli in Gallus gallus (fowl) - quantitative data [Dilution method]

C. coli		Gallus gallus (fowl)																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		43																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	*2*	43	8	0	0	0	0	0	5	17	8	5	3	4	0	0	1	0	0	0	0	0	0	0.25	64
Fluoroquinolones	**Ciprofloxacin**	1	43	32	0	0	0	5	3	2	1	0	0	0	0	0	32	0	0	0	0	0	0	0	0.06	32
Macrolides	**Erythromycin**	*16*	43	15	0	0	0	0	1	0	9	8	3	6	1	0	1	2	0	12	0	0	0	0	0.12	256
Penicillins	**Ampicillin**	16	43	6	0	0	0	0	0	2	8	8	11	6	1	1	1	0	0	5	0	0	0	0	0.25	256
Quinolones	**Nalidixic acid**	*32*	43	32	0	0	0	0	0	0	0	0	0	9	1	1	0	0	0	32	0	0	0	0	4	32
Tetracyclines	**Tetracyclin**	2	43	41	0	0	0	0	0	0	1	1	0	1	1	2	1	0	1	35	0	0	0	0	0.5	256

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		Gallus gallus (fowl)	
Isolates out of a monitoring program (yes/no)			
Number of isolates available in the laboratory		43	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	43	8
Fluoroquinolones	Ciprofloxacin	43	32
Macrolides	Erythromycin	43	15
Penicillins	Ampicillin	43	6
Quinolones	Nalidixic acid	43	31
Tetracyclines	Tetracyclin	43	41

Footnote:

cfr Decision 2007/407/EC

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)		Meat from broilers (Gallus gallus) - carcass		Meat from broilers (Gallus gallus) - carcass - spent hens		Meat from pig - carcass	
Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes	
Number of isolates available in the laboratory		28		31		14		70	
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	28	3	31	5	14	1	70	16
Fluoroquinolones	Ciprofloxacin	28	22	31	27	14	10	70	22
Macrolides	Erythromycin	28	6	31	4	14	1	70	15
Penicillins	Ampicillin	28	9	31	10	14	1	70	9
Quinolones	Nalidixic acid	28	23	31	29	14	10	70	22
Tetracyclines	Tetracyclin	28	23	31	28	14	13	70	60

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

C. coli		Meat from pig - carcass - Monitoring																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		70																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	*2*	70	16	0	0	0	0	1	2	10	35	6	7	5	2	1	1	0	0	0	0	0	0	0.25	64
Fluoroquinolones	**Ciprofloxacin**	1	70	22	0	0	2	10	24	11	1	0	0	0	0	0	22	0	0	0	0	0	0	0	0.016	32
Macrolides	**Erythromycin**	*16*	70	15	0	0	0	0	0	2	5	19	19	6	2	2	0	1	1	13	0	0	0	0	0.25	256
Penicillins	**Ampicillin**	16	70	9	0	0	0	0	0	6	7	29	10	7	2	0	0	0	0	9	0	0	0	0	0.25	256
Quinolones	**Nalidixic acid**	*32*	70	22	0	0	0	0	0	0	0	0	9	21	10	7	1	1	0	21	0	0	0	0	2	256
Tetracyclines	**Tetracyclin**	2	70	60	0	0	0	0	2	2	2	2	2	1	0	4	1	2	0	52	0	0	0	0	0.25	256

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

C. coli		Meat from broilers (Gallus gallus)																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		31																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	*2*	31	5	0	0	0	0	0	2	20	3	1	4	0	1	0	0	0	0	0	0	0	0	0.25	16
Fluoroquinolones	**Ciprofloxacin**	1	31	27	0	0	0	0	2	1	1	0	0	0	0	0	27	0	0	0	0	0	0	0	0.12	32
Macrolides	**Erythromycin**	*16*	31	4	0	0	0	0	0	1	5	7	7	4	0	3	0	0	1	3	0	0	0	0	0.25	256
Penicillins	**Ampicillin**	16	31	10	0	0	0	0	0	0	4	8	6	3	0	0	2	0	2	6	0	0	0	0	0.5	256
Quinolones	**Nalidixic acid**	*32*	31	29	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	28	0	0	0	0	0.25	256
Tetracyclines	**Tetracyclin**	2	31	28	0	0	0	0	1	2	0	0	0	2	0	0	2	1	0	23	0	0	0	0	0.12	256

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

C. coli		Meat from broilers (Gallus gallus) - carcass - spent hens																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		14																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	*2*	14	1	0	0	0	0	0	4	0	9	0	1	0	0	0	0	0	0	0	0	0	0	0.25	4
Fluoroquinolones	**Ciprofloxacin**	1	14	10	0	0	0	1	1	2	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0.06	32
Macrolides	**Erythromycin**	*16*	14	1	0	0	0	0	0	1	0	6	6	0	0	0	0	0	0	1	0	0	0	0	0.25	256
Penicillins	**Ampicillin**	16	14	1	0	0	0	0	0	1	0	6	3	2	0	1	1	0	0	0	0	0	0	0	0.25	32
Quinolones	**Nalidixic acid**	*32*	14	10	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	10	0	0	0	0	2	256
Tetracyclines	**Tetracyclin**	2	14	13	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	13	0	0	0	0	1	13

Table Antimicrobial susceptibility testing of C. coli in Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - quantitative data [Dilution method]

C. coli		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		28																								
Antimicrobials:		**break points**	**N**	**n**	**<=0.008**	**0.015**	**0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides	**Gentamicin**	*2*	28	3	0	0	0	0	0	1	12	11	1	1	2	0	0	0	0	0	0	0	0	0	0.25	8
Fluoroquinolones	**Ciprofloxacin**	1	28	22	0	0	0	4	1	1	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0.06	32
Macrolides	**Erythromycin**	*16*	28	6	0	0	0	0	0	2	2	10	3	4	1	0	0	0	0	6	0	0	0	0	0.25	256
Penicillins	**Ampicillin**	16	28	9	0	0	0	0	0	0	3	6	5	5	0	0	2	0	0	7	0	0	0	0	0.5	256
Quinolones	**Nalidixic acid**	*32*	28	23	0	0	0	0	0	0	0	0	1	3	0	1	0	0	0	23	0	0	0	0	2	256
Tetracyclines	**Tetracyclin**	2	28	23	0	0	0	0	0	3	1	0	1	0	0	0	0	0	1	22	0	0	0	0	0.25	256

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - quantitative data [Dilution method]

C. jejuni		Gallus gallus (fowl)																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		111																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	1	111	26	0	0	0	4	4	21	38	18	9	9	4	2	2	0	0	0	0	0	0	0	0.06	32
Fluoroquinolones	Ciprofloxacin	1	111	52	1	1	3	14	21	14	4	1	1	0	0	0	51	0	0	0	0	0	0	0	0.003	32
Macrolides	Erythromycin	4	111	9	0	0	0	2	1	10	35	31	17	6	3	0	2	0	0	4	0	0	0	0	0.06	256
Penicillins	Ampicillin	16	111	35	0	0	0	0	1	6	9	11	33	7	4	5	4	10	0	21	0	0	0	0	0.12	256
Quinolones	Nalidixic acid	16	111	55	0	0	1	0	0	1	2	4	25	16	2	5	0	1	0	54	0	0	0	0	0.016	256
Tetracyclines	Tetracyclin	2	111	47	0	0	0	6	27	26	4	1	0	1	1	1	4	6	1	33	0	0	0	0	0.06	256

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Gallus gallus (fowl)	
Isolates out of a monitoring program (yes/no)			
Number of isolates available in the laboratory		111	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	111	26
Fluoroquinolones	Ciprofloxacin	111	52
Macrolides	Erythromycin	111	9
Penicillins	Ampicillin	111	35
Quinolones	Nalidixic acid	111	55
Tetracyclines	Tetracyclin	111	47

Footnote:

cfr decision 2007/407/EC

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)		Meat from broilers (Gallus gallus) - carcass		Meat from pig - carcass		Meat from turkey		Meat from broilers (Gallus gallus) - carcass - spent hens	
Isolates out of a monitoring program (yes/no)		yes		yes		yes		yes		yes	
Number of isolates available in the laboratory		92		118		5		26		64	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	92	22	118	20	5	0	26	4	64	14
Fluoroquinolones	Ciprofloxacin	92	48	118	55	5	0	26	11	64	16
Macrolides	Erythromycin	92	8	118	8	5	0	26	1	64	6
Penicillins	Ampicillin	92	32	118	37	5	0	26	5	64	10
Quinolones	Nalidixic acid	92	50	118	57	5	0	26	11	64	19
Tetracyclines	Tetracyclin	92	49	118	55	5	3	26	11	64	15

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

C. jejuni		Meat from broilers (Gallus gallus) - carcass																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		118																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	1	118	20	0	0	0	3	1	33	40	21	9	6	2	1	1	1	0	0	0	0	0	0	0.06	64
Fluoroquinolones	**Ciprofloxacin**	1	118	55	0	1	3	22	18	12	6	1	0	0	0	0	55	0	0	0	0	0	0	0	0.012	32
Macrolides	**Erythromycin**	4	118	8	0	0	0	0	1	15	38	41	12	3	2	1	1	1	0	3	0	0	0	0	0.12	256
Penicillins	**Ampicillin**	16	118	37	0	0	0	0	1	5	12	25	22	5	4	7	14	4	1	18	0	0	0	0	0.12	256
Quinolones	**Nalidixic acid**	16	118	57	0	0	0	0	1	1	1	7	17	21	6	7	0	1	0	56	0	0	0	0	0.12	256
Tetracyclines	**Tetracyclin**	2	118	55	0	0	1	3	21	28	7	3	0	0	2	5	4	8	2	34	0	0	0	0	0.023	256

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

C. jejuni		Meat from broilers (Gallus gallus) - carcass - spent hens																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		64																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	1	64	14	0	0	0	0	1	21	22	6	5	4	4	1	0	0	0	0	0	0	0	0	0.12	16
Fluoroquinolones	**Ciprofloxacin**	1	64	16	0	0	3	13	15	16	0	1	0	0	0	0	16	0	0	0	0	0	0	0	0.016	32
Macrolides	**Erythromycin**	4	64	6	0	0	0	0	0	9	26	15	7	1	1	0	3	0	0	2	0	0	0	0	0.25	256
Penicillins	**Ampicillin**	16	64	10	0	0	0	0	0	4	6	23	14	4	1	2	4	2	0	4	0	0	0	0	0.25	256
Quinolones	**Nalidixic acid**	16	64	19	0	0	0	0	0	1	2	4	26	8	3	1	1	0	0	18	0	0	0	0	0.25	256
Tetracyclines	**Tetracyclin**	2	64	15	0	0	0	1	17	25	2	3	1	1	0	1	2	2	0	9	0	0	0	0	0.06	256

Table Antimicrobial susceptibility testing of C. jejuni in Meat from turkey - quantitative data [Dilution method]

C. jejuni		Meat from turkey																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		26																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	1	26	4	0	0	0	1	1	12	5	3	4	0	0	0	0	0	0	0	0	0	0	0	0.06	2
Fluoroquinolones	**Ciprofloxacin**	1	26	11	0	1	2	5	5	1	0	1	0	0	0	0	11	0	0	0	0	0	0	0	0.016	32
Macrolides	**Erythromycin**	4	26	1	0	0	0	0	1	4	10	5	3	2	0	0	0	0	0	1	0	0	0	0	0.12	256
Penicillins	**Ampicillin**	16	26	3	0	0	0	0	0	0	3	10	6	2	0	02	0	0	3	0	0	0	0	0	0.5	256
Quinolones	**Nalidixic acid**	16	26	11	0	0	0	0	0	0	1	2	10	0	2	0	0	0	0	11	0	0	0	0	0.5	256
Tetracyclines	**Tetracyclin**	2	26	11	0	0	0	2	4	7	1	1	0	0	0	0	0	0	1	10	0	0	0	0	0.06	256

Table Antimicrobial susceptibility testing of C. jejuni in Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - quantitative data [Dilution method]

C. jejuni		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		92																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	**Gentamicin**	1	92	22	0	0	0	3	2	30	26	9	9	7	0	4	0	1	1	0	0	0	0	0	0.06	128
Fluoroquinolones	**Ciprofloxacin**	1	92	48	0	0	3	11	12	10	4	4	0	0	0	1	47	0	0	0	0	0	0	0	0.023	32
Macrolides	**Erythromycin**	4	92	8	0	0	1	0	0	6	31	25	15	6	1	3	0	1	0	3	0	0	0	0	0.019	256
Penicillins	**Ampicillin**	16	92	32	0	0	0	0	0	7	9	13	12	7	6	6	8	1	3	20	0	0	0	0	0.25	256
Quinolones	**Nalidixic acid**	16	92	50	0	0	0	0	0	0	1	4	17	13	3	4	2	0	0	48	0	0	0	0	0.5	256
Tetracyclines	**Tetracyclin**	2	92	49	0	0	0	6	10	18	4	3	2	2	2	2	8	4	0	31	0	0	0	0	0.06	256

Table Antimicrobial susceptibility testing of Campylobacter in animals

Campylobacter spp., unspecified		**Gallus gallus (fowl)**		**Cattle (bovine animals)**		**Pigs**	
Isolates out of a monitoring program (yes/no)		no					
Number of isolates available in the laboratory		155					
Antimicrobials:		**N**	**n**	**N**	**n**	**N**	**n**
Aminoglycosides	**Gentamicin**	155	34				
Fluoroquinolones	**Ciprofloxacin**	155	85				
Fully sensitive	**Fully sensitive**	155	30				
Macrolides	**Erythromycin**	155	24				
Penicillins	**Ampicillin**	155	42				
Quinolones	**Nalidixic acid**	155	87				
Resistant to 1 antimicrobial	**Resistant to 1 antimicrobial**	155	25				
Resistant to 2 antimicrobials	**Resistant to 2 antimicrobials**	155	26				
Resistant to 3 antimicrobials	**Resistant to 3 antimicrobials**	155	31				
Resistant to 4 antimicrobials	**Resistant to 4 antimicrobials**	155	27				
Resistant to >4 antimicrobials	**Resistant to >4 antimicrobials**	155	16				
Tetracyclines	**Tetracyclin**	155	88				

Footnote:

cfr Decision 2007/407/EC

Table Antimicrobial susceptibility testing of Campylobacter in food

Campylobacter spp., unspecified		Meat from turkey - carcass		Meat from broilers (Gallus gallus) - mechanically separated meat (MSM)		Meat from other poultry species		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Meat from poultry, unspecified - minced meat		Meat from poultry, unspecified - meat preparation		Meat from broilers (Gallus gallus) - carcass - spent hens	
Isolates out of a monitoring program (yes/no)		yes		yes						yes		yes		yes		yes		yes	
Number of isolates available in the laboratory		31		121						78		151		8		13		79	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin	31	4	121	25					78	16	151	25	8	0	13	2	79	15
Fluoroquinolones	Ciprofloxacin	31	15	121	70					78	23	151	83	8	3	13	10	79	27
Fully sensitive	Fully sensitive	31	11	121	18					78	8	151	24	8	1	13	0	79	27
Macrolides	Erythromycin	31	2	121	14					78	15	151	13	8	0	13	2	79	7
Penicillins	Ampicillin	31	5	121	41					78	10	151	48	8	5	13	6	79	12
Quinolones	Nalidixic acid	31	15	121	73					78	23	151	88	8	4	13	10	79	30
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	31	4	121	21					78	24	151	29	8	2	13	2	79	16
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	31	3	120	15					78	18	151	22	8	2	13	2	79	13
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	31	8	120	33					78	18	151	41	8	2	13	2	79	17
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	31	3	120	26					78	8	151	28	8	1	13	5	79	5
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	26	2	120	8					78	2	151	7	8	0	13	2	79	1
Tetracyclines	Tetracyclin	31	15	121	72					78	64	151	85	8	4	13	12	79	29

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	CLSI			1	0.016	256				
Fluoroquinolones	**Ciprofloxacin**	CLSI			1	0.016	256				
Macrolides	**Erythromycin**	CLSI			4	0.016	256				
Penicillins	**Ampicillin**	CLSI			16	0.016	256				
Quinolones	**Nalidixic acid**	CSLI			16	0.016	256				
Tetracyclines	**Tetracyclin**	CLSI			2	0.016	256				

Footnote:

breakpoints given are those for C. jejuni. For C. coli, the following breakpoints are used: nalidixic acid, 32; erythromycin, 16; gentamycin 2

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	CLSI			1	0.016	256				
Fluoroquinolones	**Ciprofloxacin**	CLSI			1	0.016	256				
Macrolides	**Erythromycin**	CLSI			4	0.016	256				
Penicillins	**Ampicillin**	CLSI			16	0.016	256				
Quinolones	**Nalidixic acid**	CLSI			16	0.016	256				
Tetracyclines	**Tetracyclin**	CLSI			2	0.016	256				

Footnote:

BREAKPOINTS FOR CAMPYLOBACTER JEJUNI

Breakpoints for C. coli
Nalidixic acid R>32
Erythromycine R>16
Gentamycin R>2

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 for 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

A monitoring programme was organised 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 matrixes were minced meat of pork, beef and poultry, cooked ham, pÃ¢tÃ©, salami and smoked salmon.

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, pÃ¢tÃ©, 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 programme was organised 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, cooked ham, paté, salami, 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 1 weeks

At retail

Every 1 weeks

Type of specimen taken

At the production plant

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

At retail

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

Methods of sampling (description of sampling techniques)

At the production plant

The samples were about 200g of meat. The detection of Listeria monocytogenes has been assessed in 1g for beef and pork minced meat and in 25g for ready to eat foods.

At retail

Listeria monocytogenes was quantified in ready to eat foods at retail level through enumeration of colony forming units (except for infant formula and foodstuffs intended for special nutritional uses).

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

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

At retail

Other: 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 made in place 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 in case of a positive sample.

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from goats' milk - unspecified - made from pasteurised milk - at retail - Monitoring - official sampling	DIS 878	single	1g	19	0	0		19	0	0
Cheeses made from goats' milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 023	single	1g	10	0	0		10	0	0
Cheeses made from goats' milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 851	single	1g	25	0	0		25	0	0
Cheeses made from sheep's milk - unspecified - made from pasteurised milk - at retail - Monitoring - official sampling	DIS 879	single	1g	18	0	0		18	0	0
Cheeses made from sheep's milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 024	single	1g	9	0	0		9	0	0
Cheeses made from sheep's milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 850	single	1g	21	0	0		21	0	0
Cheeses, made from unspecified milk or other animal milk - curd - at farm - Monitoring - official sampling (from raw milk)	DPA 026	single	1g	11	0	0		11	0	0
Cheeses, made from unspecified milk or other animal milk - unspecified - made from pasteurised milk - at processing plant - Monitoring - official sampling [1)]	TRA 134	single		214	2	125	2	89	0	0
Cheeses, made from unspecified milk or other animal milk - unspecified - made from pasteurised milk - at retail - Monitoring - official sampling	DIS 818	single	1g	110	0	0		110	0	0
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 008	single	1g	19	0	0		19	0	0

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling [2)]	TRA 133	single		47	2	32	2	15	0	0
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 849	single	1g	80	0	0		80	0	0
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 009	single	1g	142	0	0		142	0	0
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 858	single	1g	51	0	0		51	0	0
Dairy products (excluding cheeses) - cream - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 025	single	1g	20	0	0		20	0	0
Dairy products (excluding cheeses) - ice-cream - at farm - Monitoring - official sampling	DPA 010	single	1g	45	0	0		45	0	0
Dairy products (excluding cheeses) - ice-cream - at retail - Monitoring - official sampling	DIS 887	single	1g	81	0	0		81	0	0

Comments:

[1)] detection method in 25g, enumeration method in 1g

[2)] detection method in 25g, enumeration in 1g

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - smoked - at processing plant - Monitoring - official sampling [1)]	TRA 400	single		100	7	90	7	10	0	0
Fish - smoked - at retail - Monitoring - official sampling	DIS 847	single	1g	198	3	0		198	2	1
Foodstuffs intended for special nutritional uses - dried dietary foods for special medical purposes intended for infants below 6 months - at hospital or care home - Monitoring - official sampling	DIS 862	single	1g	99	0	99	0	0		
Fruits and vegetables - precut - ready-to-eat - at processing plant - Monitoring - official sampling [2)]	TRA 502	single		22	0	16	0	6	0	0
Meat from bovine animals - meat preparation - intended to be eaten raw - at retail - Monitoring - official sampling (steak tartare with sauce)	DIS 815	single	1g	150	1	0		150	0	1
Meat from bovine animals - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling (steak tartare)	DIS 816	single	1g	139	2	0		139	2	0
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling	DIS 823	single	1g	146	1	0		146	1	0
Meat from other animal species or not specified - meat products - pâté - at processing plant - Monitoring - official sampling	TRA 301	single	25g	58	1	58	1	0		
Meat from other animal species or not specified - meat products - unspecified, ready-to-eat - at retail - Monitoring - official sampling	DIS 825	single	1g	56	0	0		56	0	0
Meat from pig - meat products - cooked ham - at processing plant - Monitoring - official sampling	TRA 300	single	25g	57	4	57	4	0		
Meat from pig - meat products - cooked ham - at retail - Monitoring - official sampling	DIS 824	single	1g	45	0	0		45	0	0

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Meat from pig - meat products - raw ham - at retail - Monitoring - official sampling	DIS 817	single	1g	31	0	0		31	0	0

Comments:

[1)] detection in 25g, enumeration in 1g
[2)] detection in 25g, enumeration in 1g

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

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

Zoonotic verotoxin producing E. coli may cause life-threatening diseases in young children or in immunocompromised 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 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 E. coli infections in humans

2.4.3 Escherichia coli, pathogenic in foodstuffs

A. Verotoxigenic E. coli (VTEC) in food

Monitoring system

Sampling strategy

A monitoring programme was organised 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 centre of the Federal Agency for the Safety of the Food Chain and the laboratory take them at the dispatching centre for analyse.
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 to be positive after genetic confirmation of the pathogenicity of the 0157 E. coli 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 42Â°C for 7 hours,
- enrichment in CT-Mac Conkey at 37Â°C for 16-18 hours;
- immunoassay O157 (VIDAS ECO, bioMÃ©rieux),
- selective immunomagnetic enrichment (Dynabeads, Dynal or VIDAS ICE,

bioMÃ©rieux),
- isolation on sorbitol-Mac Conkey and incubation at 42Â°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 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 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.

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
Cheeses made from goats' milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 851	single	25g	0				
Cheeses made from sheep's milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 850	single	25g	21	0			
Cheeses, made from unspecified milk or other animal milk - curd - at farm - Monitoring - official sampling (made from raw milk)	DPA 026	single	25g	10	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 008	single	25g	19	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling	TRA 133	single	25g	28	0			
Cheeses, made from unspecified milk or other animal milk - unspecified - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 849	single	25g	80	0			
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 009	single	25g	112	0			
Dairy products (excluding cheeses) - butter - made from raw or low heat-treated milk - at retail - Monitoring - official sampling	DIS 858	single	25g	48	0			
Dairy products (excluding cheeses) - cream - made from raw or low heat-treated milk - at farm - Monitoring - official sampling	DPA 025	single	25g	50	0			
Meat from bovine animals - fresh - at processing plant - Monitoring - official sampling	TRA 305	single	25g	766	0			

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 - Monitoring - official sampling	DPA 001	single	1600cm2	1353	12	12		
Meat from bovine animals - meat preparation - intended to be eaten raw - at retail - Monitoring - official sampling (steak tartare with sauce)	DIS 815	single	25g	147	0			
Meat from bovine animals - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling (steak tartare)	DIS 816	single	25g	138	0			

2.4.4 Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Type of specimen taken

Animals at slaughter (herd based approach)

Surface of carcasses

Diagnostic/analytical methods used

Animals at farm

Bacteriological method: ISO 16654:2001

Animals at slaughter (herd based approach)

Bacteriological method: ISO 16654:2001

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 treating production methods or pasteurisation of raw milk did stop this way of transmission.
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 lymphadenopathie, intestinal lesions, chronic skin tuberculosis (lupus vulgaris) and other nonpulmonary 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 realised 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 programme of tuberculosis is based on European 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 and may decide to re-examine (additional tests e.g. comparative tuberculine tests, interferon-gamma test) the animals or to kill them for additional analyses(test slaughter). In case a "TB suspecious" lesion is detected, a tissue sample is sent to the National Reference Laboratory for analysis. Consequently, if Mycobacterium bovis suspicion is confirmed by analyses, 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 impact on the understanding of the spread of new 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 the 17th of October 2002.

The surveillance programme implies:
- skin testing of animals at purchase by the veterinary practician 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 tuberculine 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 or comparative tests
Blood sampling: interferon-gamma tests
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 the 17th of October 2002.

Control program/mechanisms

The control program/strategies in place

National surveillance program by the Competent Authority (FASFC) on compulsary 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 of any lesion that could be 'suspected' 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 MS 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 them (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 compulsary 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 tuberculination.
In 2002, a total of 13 infected holdings were notified. A total of 799 animals reacted after tuberculination. 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 tuberculination. 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 generalised 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.

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

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

Organs/tissues: 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 examinations at the slaughterhouses/game handling establishment
- post-mortem examination at autopsy of hunted or accidentally killed "wild" deer in the Universitary Centre of LiÃ¨ge, Veterinary Medecine Faculty.

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

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

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

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium spp.	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Dogs - Clinical investigations (Suspect lesions)	VAR	animal	2	0			
Gallus gallus (fowl) - laying hens - Clinical investigations (Suspect lesions)	VAR	animal	1	0			
Pigs - - organ/tissue - Clinical investigations	VAR	animal	2	0			
Rabbits - Clinical investigations (Suspect lesions)	VAR	animal	2	0			
Solipeds, domestic - horses - Clinical investigations (Suspect lesions)	VAR	animal	2	0			
Turkeys - Clinical investigations (Suspect lesions)	VAR	animal	1	0			
Wild boars - at game handling establishment - Clinical investigations (Suspect lesions)	VAR	animal	1	0			
Zoo animals, all - at zoo - Clinical investigations	VAR	animal	39	4	4		

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
BELGIQUE/BELGIE	36423	2618040	36411	99.97	12	.03	5	295000	395000	812	66
Total	36423	2618040	36411	99.97	12	0.03	5	295000	395000	812	66
Total - 1											

Footnote:

(5) Official free status: no routine tests, intensive tuberculin testing in case of an infected herd by tracing-back and tracing-on or follow-up testing of infected herds or of herds after stamping-out and restocking.

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/BELGIE	2825	10834	2825	100	0	0	0	0	0	2	0
Total	2825	10834	2825	100.0	0	0.0	0	0	0	2	0

Footnote:

Surveillance by post-mortem examination at slaughterhouse (farmed deer).

2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

2.6.2 Brucellosis in humans

2.6.3 Brucella in foodstuffs

Table Brucella in food

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Milk, cows' - raw milk for manufacture - intended for manufacture of pasteurised/UHT products - at processing plant - Surveillance - official controls - objective sampling	FASFC	batch	65572	0				

Footnote:

Dairy cattle examination of bulk raw milk samples before processing, in total 65572 pools were tested.

2.6.4 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

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

Free regions

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

Monitoring system

Sampling strategy

Since Belgium is officially free from bovine brucellosis, the eradication programme has been changed in a surveillance programme. 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 localisation. Dairy cattle are checked at least 4 times a year via tank milk (milk ring test).
Furthermore, all animals are serologically 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 investigation exclude Brucella infections.
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 are done (at least 4 ring tests a year).
Bacteriological examination is done when serological and/or epidemiological suspicion is present.
Allergic (brucellin) test may be carried out if serological cross-reactions are suspected. These tests are performed by the Federal Agency for the Safety of the Food Chain in collaboration with the National Reference Laboratory.
An animal is legally suspected of brucellosis in case of a positive ELISA. If, according to the epidemiology and the results of the skin 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 its animals is bacteriologically positive for brucellosis.

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 localisation.
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 bacteriollogically positive 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 compulsory surveillance programme organised by the Competent Authority

Recent actions taken to control the zoonoses

Annual serological follow-up of 'imported' bovines.

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 to be infected and is compulsory slaughtered (test slaughter) for additional analyses to detect a Brucella infection.
Brucellin skin testing is sometimes performed as a confirmatory test before to decide test slaughter for further examinations.

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 programme 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 the confirmatory test. This approach avoids the undeserved test slaughter of false positive reacting animals.

Additional information

B. 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 national monitoring for Visna-Maedi/CAE and at export were examined for Brucella melitensis specific antibodies by means of 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 analysed 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.

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 NRL, 3.375 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 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 national monitoring for Visna-Maedi/CAE and at export were examined for Brucella melitensis specific antibodies by means of 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 analysed 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.

Diagnostic/analytical methods used

Complement Fixation Test CFT
Rose Bengal Test RBT
Indirect ELISA
Skin testing with brucellin
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 NRL, 3.375 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 centres 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 human, 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 analyses.

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 programme.
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 analyse 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 spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Lamas - Surveillance	VAR	animal	39	0				
Other animals - unspecified - Surveillance [1)]	VAR	animal	294	0				
Pigs - in total - Surveillance	VAR	animal	243	0				

Comments:

[1)] Exotic mammals

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 serologic al blood tests	Number of suspende d herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
BELGIQUE/BELGIE	36423	2618040	36423	100	0	0	8786	544135	0	10063	65572	0	4184	0	0	642	0	207	0	39	0
Total	36423	2618040	36423	100.0	0	0.0	8786	544135	0	10063	65572	0	4184	0	0	642	0	207	0	39	0
Total - 1																					

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/BELGIE	43729	254003	43729	100	0	0		3375	0	76	0	0	0	0
Total	43729	254003	43729	100.0	0	0.0	0	3375	0	76	0	0	0	0
Total - 1														

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

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

Reporting system in place for the human cases

Data were obtained from passive surveillance through sentinel laboratory findings. All cases were updated on a weekly base.

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 spp.	Y. enterocolitica	Yersinia spp., unspecified	Y. enterocolitica-O:3	Y. enterocolitica-O:9	Y. enterocolitica-unspecified
Meat from bovine animals and pig - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling (minced meat containing pig meat)	DIS 888	single	1g	114	0					
Meat from bovine animals and pig - minced meat - intended to be eaten raw - at retail - Monitoring - official sampling	DIS 823	single	1g	115	0					

2.7.4 Yersinia in animals

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 organise analysis for Trichinella in pigs at the slaughterhouses. The analysis is generalised since 1991. Trichinella has not been detected in carcasses of pigs and horses produced for human consumption in Belgium. One autochtonous human case, probably caused by a home raised wild boar occured 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 occured 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

The last outbreak in humans in Belgium occured 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 destinated 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 "Trichinella free Pig farm" could be implemented in some Member states among which Belgium.

2.8.2 Trichinellosis in humans

A. Trichinellosis in humans

History of the disease and/or infection in the country

2005

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.

2.8.3 Trichinella in animals

A. 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 gramme for fattening pigs, 2 grammes for sows and boars.

Methods of sampling (description of sampling techniques)

General

Pigs: 1 gramme of diaphragm muscle to be pooled

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 collective samples.
The analysis is done by artificial digestion: the magnetic stirrer method of pooled 100 gramme sample as described in Commission Regulation (EC) No 2075/2005, 1 gramme per pig and 5 grammes 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.

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.

B. 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 gramme of diaphragm (or tongue, or masseter) for routine diagnosis, analyses on pooled samples, 10 to 25 gramme 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 pooled sample digestion as described in Commision Regulation (EC) No 2075/2005 was used on samples of 5 gramme of muscle for horses.

Results of the investigation including the origin of the positive animals

No positive animals were detected

Control program/mechanisms

The control program/strategies in place

Commision 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.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella spp.	T. spiralis	Trichinella spp., unspecified
Foxes - from hunting - Monitoring	FASFC	animal	61	0		
Pigs - breeding animals - unspecified - sows and boars - at slaughterhouse - animal sample - Surveillance - official controls	FASFC	animal	323057	0		
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - - meat - Surveillance - official controls	FASFC	animal	11224663	0		
Solipeds, domestic - horses - at slaughterhouse - animal sample - Surveillance - official controls	FASFC	animal	9173	0		
Wild boars - wild - at game handling establishment - Surveillance	FASFC	animal	15177	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

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 were 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 Echinococcosis in humans

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus spp.	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Foxes - from hunting - Surveillance	IPH	animal	117	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 inapparent carriers of tissue cysts.

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

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 immunocompromised 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.

2.10.2 Toxoplasmosis in humans

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 Luxemburg) 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 Pasteur Institute, 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 Pasteur Institute.
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 south 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 Lyssavirus types (unspecified or EBL 1 or EBL 2).

Bat rabies is a public health concern. The public should be made aware of the danger of human exposure to bats, especially in case of abnormal behaviour of bats. Rabies is transmitted to humans and other animals through saliva, usually in a bite. Any person exposed to bats should be vaccinated preventively against rabies. No one should handle diseased or dead bats without protection such as gloves. Any one finding a bat behaving abnormally, in an unusual place, or under unusual circumstances, should not attempt te handle or move the animal but should contact official authority. Education and recommendations should be given to travellers 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 travellers. Currently available vaccines are safe and effective against both the classic rabies virus and the bat lyssa viruses.

2.11.2 Rabies in humans

2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

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

Frequency of the sampling

All suspected animals with clinical nervous symptoms are tested.

Type of specimen taken

Organs/tissues: 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 tightly sealed packet to the Reference laboratory. In case of carcass transportation authorisation is required.

Samples storage period at the Reference lab 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

Other: 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 South 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 fo 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 Pasteur Institute of all 'contact' persons was realised.
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)	Unspecified Lyssavirus	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Bats - wild - from hunting - Surveillance	IPH Pasteur	animal	25	0			
Cats - at hospital or care home - Clinical investigations	IPH Pasteur	animal	24	0			
Cattle (bovine animals) - at slaughterhouse - animal sample - Clinical investigations	IPH Pasteur	animal	214	0			
Deer - wild - fallow deer - from hunting - Clinical investigations	IPH Pasteur	animal	53	0			
Dogs - at hospital or care home - Clinical investigations	IPH Pasteur	animal	12	0			
Foxes - wild - from hunting - Surveillance - official controls	IPH Pasteur	animal	245	0			
Goats - at slaughterhouse - animal sample - Clinical investigations	IPH Pasteur	animal	37	0			
Other animals - unspecified - at hospital or care home - Clinical investigations	IPH Pasteur	animal	3	0			
Other mustelides - from hunting - Clinical investigations	IPH Pasteur	animal	14	0			
Sheep - at slaughterhouse - animal sample - Clinical investigations	IPH Pasteur	animal	71	0			
Solipeds, domestic - at slaughterhouse - animal sample - Clinical investigations	IPH Pasteur	animal	6	0			
Wild animals - from hunting - Clinical investigations	IPH Pasteur	animal	9	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

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, weterinarians, 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 pasteurised 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) - - blood - Clinical investigations	VAR	animal	314	25	25
Goats - - blood - Clinical investigations	VAR	animal	2	0	
Sheep - - blood - Clinical investigations	VAR	animal	2	0	

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)

Pigs
The Belgian pig population is free from Cysticercus cellulosae. Taenia solium (and Cysticercus cellulosae) is not autochtonous 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). The risk factor for bovine cysticercosis infection in cattle is the ingestion of vegetation contaminated with T. saginata eggs shed in human faeces. Cattle can become infected when grazing contaminated vegetation in or around the farm or close to railway or camping sites where human carriers of T. saginata have defecated, or grazing pastures where contaminated urban sewage sludge have been applied for fertilization. Accidental overflow of sewage polluted rivers onto pastures has also been identified as a risk factor for the transmission of bovine cysticercosis.
Humans contaminate themselves by the ingestion of raw or undercooked beef containing the larval form (cysticerci). Usually the pathogenicity for humans is low. However, it should be noted that T. saginata may cause reactive arthritis (enteropathic arthropathy) as a secondary disease state. 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 excrement on land should only be allowed after proper sanitation.

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

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 -18Â°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, pigs) should be developed. This would allow the detection of more cases than visual inspection of carcasses at the slaughterhouse.

2.13.2 Cysticerci in animals

Table Cysticerci in animal

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Cysticerci	Cysticerci of Taenia saginata
Cattle (bovine animals) - at slaughterhouse - Surveillance - official controls	FASFC	animal		823659	2374	2374

Footnote:

In total 2.374 cases detected at post-mortem examination at the slaughterhouses (2.356 lightly and 18 heavily contaminated bovine carcases)

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ENTEROCOCCUS, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.2 ESCHERICHIA COLI, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

A. Escherichia coli general evaluation

Recent actions taken to control the zoonoses

3.2.2 Escherichia coli, non-pathogenic in foodstuffs

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 HISTAMINE

4.1.1 General evaluation of the national situation

4.1.2 Histamine in foodstuffs

A. Histamine in foodstuffs

Monitoring system

Sampling strategy

The reported data are test results from official surveillance performed by the Belgian competent authority (FASFC). The sampling for histamine in fishery products is part of the risk based national control programme (random sampling) of the Federal Agency for the Safety of the Food Chain (FASFC) which covers the whole Member State. In 2008 a number of samples was taken outside the scope of the control programme (targeted sampling): for example in the 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 2008 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 by the CA (FASFC) at retail, wholesale, catering and at the border inspection posts (imported products). None of the canned products were manufactured in Belgium (origin 3rd countries or other MS).

Frequency of the sampling

Samples are taken according to the national control programme or in the frame of RASFF, complaints or suspicion. In total 86 sampling units were tested in 2008:
- catering 7,
- fish auction 1,
- retail and wholesale 30,
- border inspection post 48.

Type of specimen taken

Other: Fishery products

Methods of sampling (description of sampling techniques)

The samples were taken according to the Regulation 2073/2005.

In general nine sample of 150g were taken out of a batch (79 batch samples).

In some cases only a single sample of 150g was taken (7 single samples).

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 2073/2005 are followed.

Diagnostic/analytical methods used

The method used is a quantitative ELISA method (accredited).

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 - Surveillance - official controls - objective sampling (Stage: Border Inspection Post)	FASFC IEC	batch	9 x 150g	36	0	36	0	0	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - Surveillance - official controls - objective sampling (Stage: fish auction)	FASFC DPA	batch	9 x 150g	1	1	0	0	1	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - Surveillance - official controls - objective sampling (Stage: wholesale)	FASFC TRA	batch	9 x 150g	16	1	15	0	1	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - Surveillance - official controls - suspect sampling (Stage: Border Inspection Post) [1)]	FASFC IEC	batch	9 x 150g	12	0	12	0	0	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - at catering - Surveillance - official controls - suspect sampling [2)]		single	150 g	7	0	7	0	0	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - at retail - Surveillance - official controls - objective sampling (Stage: wholesale) [3)]	FASFC DIS	batch	9 x 150g	11	0	11	0	0	0
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated - at retail - Surveillance - official controls - objective sampling (Stage: wholesale) [4)]	FASFC DIS	batch	9 x 150g	3	1	2	0	0	1

Comments:

Table Histamine in food

[1)] Context: RASFF
[2)] Context: foordborne illnes
[3)] Sample: canned fish
[4)] Sample: fresh tuna

4.2 ENTEROBACTER SAKAZAKII

4.2.1 General evaluation of the national situation

4.2.2 Enterobacter sakazakii in foodstuffs

A. Enterobacter sakazakii in foodstuffs

Monitoring system

Sampling strategy

Tests for Enterobacter sakazakii were only performed after a positive sample for Enterobacteriaceae (presence in 10g).

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 - at hospital or care home - Monitoring - official sampling	DIS 862	single	10g	65	0	

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

4.3.2 Staphylococcal enterotoxins in foodstuffs

5. FOODBORNE

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

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of

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) that deal with person related matters as human health, can start an epidemiological investigation by its 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 Centres 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 2008, a total of 104 outbreaks of food-borne infections and intoxications were recorded in Belgium. More than 841 people were ill and at least 35 persons were hospitalized. No deaths were observed. 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 the last year. In 2007 the numbers of persons hospitalized calculated for one outbreak was 0.9 in comparison with 2008 were the number was 0.3. 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 2008 in total 15 verified outbreaks were reported. In these outbreaks the causative agent was found in the implicated food and or it was clear by analytical epidemiology. In some outbreaks the agent was also found in the human samples taken. 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 Norovirus became the most frequently detected food-borne pathogen in food-borne outbreaks: 7 outbreaks were reported for Norovirus and one for Hepatitis A. In total 488 persons became ill without any hospitalizations. The virus was detected both in the food and human samples (n=1) or only in the human samples (n=7). The detection and extraction methods for food samples are not easy to perform and are not yet standardized for al food matrices.
Thermotolerant Campylobacter were responsible for 6 % of the outbreaks and became the second most detected agent. In total 31 persons were affected and 6 hospitalized. In one outbreak it was very clear that undercooked stuffed quail was the origin of the infection.
In 3% of the total number of outbreaks, Salmonella was the causative agent (n=3), 39 persons were affected and 3 hospitalized. This confirms the decrease in importance of Salmonella as causative agent noticed in 2004 (53%), 2005 (20%), 2006 (12%) and 2007 (11%). Salmonella Enteritidis was still the most dominant serotype and was detected in 2 of the 3 outbreaks and could be linked to the consumption of fine bakery products made from raw eggs (Tiramisu).
The only other serovar isolated in a food-borne outbreak was Brandenburg but

the origin of the infection could not be detected.
Coagulase positive Staphylococcus spp caused 2% of the outbreaks in 2008(n=2). Toxine A was produced by the strains.

B. cereus was the causative agent in 2 outbreaks and 10 persons became ill. Only the enterotoxin producing strains could be confirmed in the food and this corresponded also with the symptoms observed in the patients.
Verotoxinogenic E.coli O157 were detected in 3 outbreaks. In one outbreak E. coli O 157:H7 urease positive strains are detected in the raw minced meat that was served to the psychiatric patients. In 4 outbreaks other agents were detected in the food like histamine, Streptococcus spp. and two mycotoxines : from Rhizopus oryzae and Mucor plumbeus.
In 70% 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 (42%) were due to the consumption of meals composed of different ingredients. Meat and meat based products were responsible for 22 % of the outbreaks. Bakery products, including preparations with raw eggs such as tiramisu were responsible for 5% of the outbreaks. These preparations were the only egg related outbreaks in 2008, all with S. Enteritidis, and count for 2 % of the total outbreaks. This shows that the decrease in egg-related illness is maintained.

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

In most food-borne outbreaks (94%) the setting was known. Restaurants were the most important location of exposure, being the setting of 37 % of food-borne outbreaks in Belgium in 2008. Catering at work or institutional catering are reported in respectively 6% and 13 % of the food-borne outbreaks. 18% of the outbreaks happened at home.

Descriptions of single outbreaks of special interest

In the summer of 2008 in total 4 patients of a psychiatric institution are hospitalized with the symptoms of bloody diarrhea. Two of them developed haemolytic uraemic syndrome (HUS) and the situation of one person was really critic during a whole time. E. coli O157:H7 was isolated in the humans. The witness meals were send for analysis and the raw minced meat was found positive for the same strain. After further characterization the strains were positieve for stx2, eae and enterohemolysine. As specific biochemical characteristic the strains were all urease positive. PFGE revealed that the minced meat was the origin of the outbreak. During the same period a sharp increase in human pathogenic E. coli infections were noticed but no link could be made with the outbreak in the psychiatric institution or the consumption of the same batch of contaminated minced meat.

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.

Foodborne Outbreaks: summarized data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	2	0	unknown	unknown	unknown	2
Campylobacter	6	5	25	6	0	1
Clostridium	1	0	unknown	unknown	unknown	1
Escherichia coli, pathogenic	3	2	5	2	0	1
Foodborne viruses	8	6	424	0	0	2
Listeria	1	1	2	1	0	0
Other agents	4	0	unknown	unknown	unknown	4
Parasites	1	1	10	0	0	0
Salmonella	3	1	4	1	0	2
Staphylococcus	2	0	unknown	unknown	unknown	2
Unknown	73	73	268	5	0	0
Yersinia	0	0	unknown	unknown	unknown	0

Verified Foodborne Outbreaks: detailed data

S. Enteritidis

	Value
Code	
Subagent Choice	Salmonella; S. Enteritidis; PT 21
Outbreak type	General
Human cases	22
Hospitalized	0
Deaths	0
Foodstuff implicated	Bakery products
More Foodstuff	Tiramisu made with raw eggs
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases, Laboratory characterization of food and human isolates
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	

S. Enteritidis

	Value
Code	
Subagent Choice	
Outbreak type	Household
Human cases	13
Hospitalized	2
Deaths	0
Foodstuff implicated	Bakery products
More Foodstuff	Tiramisu made with raw eggs
Type of evidence	Laboratory detection in implicated food, Laboratory characterization of food and human isolates, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Inadequate chilling
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

C. jejuni

	Value
Code	
Subagent Choice	Campylobacter; C. jejuni
Outbreak type	General
Human cases	6
Hospitalized	0
Deaths	0
Foodstuff implicated	Other or unspecified poultry meat and products thereof
More Foodstuff	Quail filled with minced poulty meat
Type of evidence	Analytical epidemiological evidence, Laboratory detection in human cases
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Inadequate heat treatment
Outbreaks	1
Comment	One group recieved good cooked meat and do not becom ill the other group recieved not good heat treated meat and all six members that consumed it became ill

Verified Foodborne Outbreaks: detailed data

Verotoxigenic E. coli (VTEC)

	Value
Code	
Subagent Choice	Escherichia coli, pathogenic; Verotoxigenic E. coli (VTEC); VTEC O157:H7
Outbreak type	General
Human cases	6
Hospitalized	4
Deaths	0
Foodstuff implicated	Bovine meat and products thereof
More Foodstuff	Minced raw beef meat also mixed with raw pork meat
Type of evidence	Laboratory characterization of food and human isolates, Analytical epidemiological evidence, Laboratory detection in human cases, Laboratory detection in implicated food
Setting	Residential institution (nursing home, prison, boarding school)
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	The E. coli O157:H7 strains were all urease positive. The genes present are vt2, eaeA and hly. During the same period an increase in the human cases were obeserved but could not be linked to the outbreak in the psychiatric institution

Verified Foodborne Outbreaks: detailed data

B. cereus

	Value
Code	
Subagent Choice	Bacillus; B. cereus
Outbreak type	Household
Human cases	8
Hospitalized	3
Deaths	0
Foodstuff implicated	Sheep meat and products thereof
More Foodstuff	pita
Type of evidence	Laboratory detection in implicated food, Analytical epidemiological evidence
Setting	Unknown
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

B. cereus

	Value
Code	
Subagent Choice	Bacillus; B. cereus
Outbreak type	Household
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Cheese
More Foodstuff	
Type of evidence	Laboratory detection in implicated food, Analytical epidemiological evidence
Setting	Take-away or fast-food outlet
Place of origin of problem	Take-away
Origin of foodstuff	Unknown
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

C. perfringens

	Value
Code	
Subagent Choice	Clostridium; C. perfringens
Outbreak type	General
Human cases	100
Hospitalized	0
Deaths	0
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	Tajine
Type of evidence	Analytical epidemiological evidence, Laboratory detection in implicated food
Setting	School, kindergarten
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	All teachers in the school became ill after eating of the tajine that was not kept one the correct temperature. Clostridium perfringens was toxin A positeive by PCR

Verified Foodborne Outbreaks: detailed data

S. enterotoxins

	Value
Code	
Subagent Choice	Staphylococcus; S. aureus; S. aureus enterotoxins
Outbreak type	General
Human cases	30
Hospitalized	8
Deaths	0
Foodstuff implicated	Other foods
More Foodstuff	pasta with ham
Type of evidence	Laboratory detection in implicated food, Analytical epidemiological evidence
Setting	School, kindergarten
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	Toxins were detected in the whitness meal and also the strain produced toxine A no other toxin genes are detected. In the withness meal 4.8 10^4 cfu/g CPS was detected

Staphylococcus spp., unspecified

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	2
Hospitalized	2
Deaths	0
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	viandelle
Type of evidence	Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

Calicivirus (including norovirus)

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	15
Hospitalized	0
Deaths	0
Foodstuff implicated	Other foods
More Foodstuff	Filled sandwiches with cheese and chicken curry
Type of evidence	Laboratory detection in implicated food, Laboratory characterization of food and human isolates, Laboratory detection in human cases
Setting	Canteen or workplace catering
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Infected food handler
Outbreaks	1
Comment	Norovirus Genotype II was detected in the food and in the faeces of the food handler

Hepatitis A virus

	Value
Code	
Subagent Choice	Foodborne viruses; Hepatitis A virus
Outbreak type	General
Human cases	49
Hospitalized	0
Deaths	0
Foodstuff implicated	Other foods
More Foodstuff	Sandwiches
Type of evidence	Laboratory detection in human cases, Analytical epidemiological evidence
Setting	Take-away or fast-food outlet
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Infected food handler
Outbreaks	1
Comment	The sandwich bar was closed from the moment the foodhandler was found positive. At that moment, about 49 people were already infected.

Verified Foodborne Outbreaks: detailed data

Histamine

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	2
Hospitalized	2
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff	Salade nise
Type of evidence	Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	in the salade 2.4 10^5 cfu/g Enterobacteriaceaea present and 1056 mg/kg histamine

Mycotoxins

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff	Frites
Type of evidence	Laboratory detection in implicated food
Setting	Take-away or fast-food outlet
Place of origin of problem	Take-away
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	Rhizopus oryzae was detected on the frites

Mycotoxins

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Cheese
More Foodstuff	fresh cheese
Type of evidence	Laboratory detection in implicated food
Setting	Other setting
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	Mucor plumbeus

Other

	Value
Code	
Subagent Choice	
Outbreak type	Unknown
Human cases	2
Hospitalized	0
Deaths	0
Foodstuff implicated	Sheep meat and products thereof
More Foodstuff	pita meat
Type of evidence	Laboratory detection in implicated food
Setting	Take-away or fast-food outlet
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	The frozen meat used to prepare the pita was contaminated with a Streptococcus spp.