ZOONOSES MONITORING

BELGIUM

The Report referred to in Article 5 of Directive 92/117/EEC

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

including information on foodborne outbreaks and antimicrobial resistance in zoonotic agents

IN 2004

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **Belgium**

Reporting Year: **2004**

Institutions and laboratories involved in monitoring:

Laboratory name	Description	Contribution

PREFACE

This report is submitted to the European Commission in accordance with Article 5 of Council Directive 92/117/EEC[1]. The information has also been forwarded to the European Food Safety Authority (EFSA).

The report contains information on trends and sources of zoonoses and zoonotic agents in Belgium during the year 2004. The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal bacteria as well as information on epidemiological investigations of foodborne outbreaks. Complementary data on susceptible animal populations in the country is also given.

The information given covers both zoonoses that are important for the public health in the whole European Community as well as zoonoses, which are relevant on the basis of the national epidemiological situation.

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

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

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

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1 Council Directive 92/117/ECC of 17 December 1992 concerning measures for protection against specified zoonoses and specified zoonotic agents in animals and products of animal origin in order to prevent outbreaks of foodborne infections and intoxications, OJ L 62, 15.3.1993, p. 38

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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 database of the FASFC, a computerised identification and registration system for farm animals.

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

Number of animals = number of animals at a certain time point (January - February - March) of the year.
Number of slaughtered animals = total number of slaughtered animals in the year.

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

Holding: total stock of an animal species hold on a defined geographical entity and forming a clear epidemiological unit, determined by the Competent Authority.
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.

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

For the last years, there's a significant decrease in total number of holdings for swine and bovines. On the other hand, the total number of animals of these species is 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 that is situated in the North of the country and the Walloon region that is 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 distributed all over the region. The number of swine and poultry holdings in this region is limited.

Table 14.1 Susceptible animal populations: number of herds and holdings rearing animals

* Only if different than current reporting year

Animal species	Category of animals	Number of herds or flocks	Year*	Number of holdings	Year*
Cattle (bovine animals)	dairy cows and heifers			14257	
	in total			44555	
Ducks	parent birds			5	
	meat production animals			26	
	in total			31	
Gallus gallus	breeding animals - in total			250	
	parent birds - in total			239	
	broilers			1097	
	laying hens			529	
	parent birds for meat production line			149	
	parent birds for egg production line			9	
	elite birds - in total			11	
	in total			2284	
Geese	elite birds			1	
	parent birds			3	
	meat production animals			4	
	in total			8	
Goats	in total			13736	
Guinea fowl	Parent birds			4	
	Meat production flocks			23	
Partridges	meat production flocks			2	
Pheasants	parent birds			4	
	meat production flocks			10	
Pigeons	parent birds			1	
	elite birds			1	
	meat production flocks			2	
Pigs	in total			10614	
Quails	parent birds			2	
	meat production flocks			4	
	laying hens			1	
Sheep	in total			31405	
Turkeys	parent birds			2	
	meat production animals			56	
	laying hens			5	
	in total			63	
Farmed deer	in total			2965	

Table 14.2 Susceptible animal populations: number of animals

* Only if different than current reporting year

Animal species	Category of animals	Livestock numbers (live animals)	Year*	Number of slaughtered animals	Year*
Cattle (bovine animals)	calves (under 1 year)			317269	
	meat production animals			564266	
	in total	2781676		881535	
Ducks	parent birds	8050			
	meat production animals	25899			
	in total	33949		116150	
Gallus gallus	breeding animals - in total	3279907			
	elite birds - in total	106090			
	parent birds - in total	3173817			
	breeding animals for egg production line - in total			28577238	
	broilers	27873988		244064267	
	laying hens	14364922		1140024	
	parent birds for meat production line	2007605			
	parent birds for egg production line	141390			
	in total	50947719			
Geese	elite birds	1200			
	parent birds	1600			
	meat production animals	2034			
	in total	4834		3403	
Goats	in total	37666		3814	
Guinea fowl	Meat production animals	68140			
	Parent birds	19300			
	in total	87440		240715	
Partridges	parent birds	19200			
	Meat production animals	104000			
	in total	123200		1733	
Pheasants	parent birds	12599			
	Meat production animals	134050			
	Laying hens	60000			
	in total	206649		11384	
Pigeons	parent birds	300			
	Meat production animals	1120			
	elite birds	100			
	in total			283244	
Pigs	sows and gilts	664316			
	fattening pigs	4998124			
	in total	5662440		11229149	
Quails	parent birds	4020			
	Meat production animals	42000			
	laying hens	10000			
	in total	56020		427887	
Sheep	in total	214612		87119	
Solipeds	horses - in total			11655	
Turkeys	parent birds	100			
	meat production animals (1)	423086		673606	
	in total	498146			
Farmed deer	in total	13427			
Ostriches	in total			746	
Rabbits	in total			2214242	

(1): Turkeys > 5 kg

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

A. Salmonellosis in humans

Reporting system in place for the human cases

Data are obtained by a weekly updated surveillance system. the National Reference Centre for Salmonella and Shigella received the human Salmonella isolates from 182 peripheral clinical laboratories.

Diagnostic/analytical methods used

All isolates are serotyped by slide agglutination with commercial antisera following the Kauffmann-White scheme. When necessary, additional biochemical tests were realized to confirm the identification or to differentiate between the subspecies.
Phage typing (Institute Pasteur of Brussels) and antimicrobial susceptibility testing (AST) were realised on isolates randomly sampled from the four serotypes Enteritidis, Typhimurium, Hadar and Virchow. Two additional serotypes (Brandenburg and Derby) were also randomly sampled and only tested for their antimicrobial susceptibility.
For AST, a total of 520 human Salmonella isolates, randomly collected in 2004 from the most important serotypes, were examined for their resistance by disk diffusion to fourteen antibiotics which are of therapeutic or epidemiological interest. Antimicrobial susceptibility was determined by the disk diffusion method according to the NCCLS recommendations. The following antibiotics were tested: ampicillin (AMP), amoxicillin + clavulanic acid (AMX), cefotaxime (CTX), chloramphenicol (CHL), ciprofloxacin (CIP), gentamicin (GEN), kanamycin (KAN), nalidixic acid (NAL), streptomycin (STR), sulfonamides (SUL), tetracycline (TET), trimethoprim (TMP), trimethoprim + sulfamethoxazole (SXT).

Notification system in place

Notification of laboratory confirmed cases / National Surveillance Program

History of the disease and/or infection in the country

Since 1987 a remarkable increase in the number of registered human salmonellosis was monitored by the National Reference Centre, with a peak of 15.774 cases in 1999. This situation was chiefly linked to the increase of Salmonella enteritidis, the most important serotype in Belgium. From 1987 to 1999, the incidence of laboratory-confirmed cases doubled to reach a value of 160/100.000 inhabitants in 1999.
Since then the total number of laboratory-confirmed cases fell to 14.088, 10.783, 10.075, 12.894 and 9.545 reports in 2000, 2001, 2002, 2003 and 2004 respectively. In 2003, an increase in the total number of human salmonellosis was again recorded (28% more than in 2002). This resulted from the spectacular increase of the serotype Enteritidis in 2003 which exceeded for the first time 70% of the total representativeness.
Salmonella typhimurium, the second serotype in importance, declined from 1999 until 2001 and

then remained stable in 'number of isolates'.
Other important Salmonella serotypes were Virchow, Derby, Brandenburg and Hadar.
It is noteworthy that the number of S. Virchow isolates increased from 1999 and then remained stable until 2003 to decrease in 2004. This serotype represents the third serotype in importance.
A significant drop of S. hadar (459 in 1998 vs. 50 last years)and S. brandenburg (322 in 2000 vs 32 in 2004) cases was also noted over the last years.

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

The aim of the National surveillance program is to document the occurence and trends of serovars, to detect local, regional, national or even international outbreaks, to find and eliminate the source and to suggest preventive actions to the Belgian Food Agency (FASFC). This national salmonella surveillance is also intended to rapidly interact at the international level via electronic communication (with the Enter-net international surveillance network) and will help to detect outbreaks and target future prevention strategies.

Table 3.4.1.A Salmonellosis in man - species/serotype distribution

	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc	unknown status
Salmonella	9545	91.8	0	0	0	0	0
S. Enteritidis	6076	58.44					
S. Typhimurium(1)	2459	23.65					
S. Virchow	0	0					
Salmonella spp.	1010	9.71					

(1) : Of these 23.70% are S. typhimurium DT 104

Table 3.4.1.B Salmonellosis in man - age distribution

Age Distribution	S. Enteritidis			S. Typhimurium			Salmonella spp.		
	All	M	F	All	M	F	All	M	F
<1 year	334	178	150	179	79	96	638	323	300
1 to 4 years	1843	926	903	1229	589	635	3305	1627	1655
5 to 14 years	1141	588	538	375	192	179	1600	823	757
15 to 24 years	357	170	185	64	27	37	493	224	265
25 to 44 years	732	323	402	115	57	56	982	447	525
45 to 64 years	541	245	295	110	52	57	797	375	418
65 years and older	674	291	380	187	91	95	1010	435	571
Age unknown	454	181	182	200	71	69	720	272	288
Total :	6076	2902	3035	2459	1158	1224	9545	4526	4779

Table 3.4.2 Salmonellosis in man - seasonal distribution

Month	S. Enteritidis	S. Typhimurium	Salmonella spp.
	Cases	Cases	Cases
January	378	185	643
February	278	185	519
March	345	142	559
April	334	185	583
May	448	189	708
June	619	361	1059
July	676	257	1019
August	840	218	1182
September	865	230	1209
October	576	178	848
November	374	173	622
December	217	120	404
not known	126	36	189
Total :	6076	2459	9544

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 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, meat preparation and fillets of broilers. The carcass samples of broiler and fowl consisted of 10g with neck skin. The following contamination levels were analysed: 25g cutting or minced meat of chicken and 1g of chicken carcasses.
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.
The contamination of broiler carcasses is decreasing from 12,1% in 2003 to 7,9% in 2004. The contamination of broiler fillets and minced meat with neckskin comes up to 19,9%. The increase from 12% in 2003 to 19,9% in 2004 is probably caused by the new sampling method where the impact of the presence of neck skin in the analysed samples becomes more important on the contamination percentage.

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. 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 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). 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.
The contamination of pig carcasses is slightly decreasing since 2002 from 15% tot 12%. The contamination of cutting and minced meat remains unchanged for some years (between 6 and 12%).

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.
The contamination of minced meat of beef is limited to the small degree of 3%.

D. Salmonella spp. in food

Monitoring system

Sampling strategy

A monitoring programme was done in 2004 (January to December) by the Federal Agency for the Safety of the Food Chain. Data processing and reporting have been done by the National Reference Laboratory for Food Microbiology, Prof. G. Daube. 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 for this study. The samples assayed were carcasses, cuts and minced meat from pork, carcasses, cuts and meat preparation from chicken, layer carcasses and beef minced meat. 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. All 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 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 (CSS-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 positive sample.

Notification system in place

See control program.

Table 3.3.1 Salmonella sp. in meat and meat products

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Agona	S. Derby	S. Infantis	S. Ohio	S. Rissen	S. Paratyphi B	S. Bredeney	S. Indiana	S. Virchow	S. Typhimurium var. Copenhagen	other
Bovine meat																			
minced meat																			
- at processing plant	natl random survey		sample	25g	230	7	1	1	1									2	1
- at retail	natl random survey		sample	25g	98	0													
meat products																			
ready-to-eat		carpaccio (at retail)		25g	95	0													
- at retail		steak tartare		25g	111	2													
Pig meat																			
fresh																			
- at slaughter	natl random survey	carcasse	sample	600cm2	374	46		15		9	1	4	1					10	1
- at processing plant	natl random survey	cuts	sample	25g	241	25		8		8		1						4	3

minced meat																			
- at processing plant	natl random survey		sample	25g	271	20		8		3		3		1				4	1
- at retail	natl random survey		sample	25g	166	21	4	15		1		6	1					10	2
meat products																			
ready-to-eat																			
- at retail	natl random survey	raw ham	sample	25g	114	0													
Broiler meat																			
fresh	natl random survey	cuts (at processing plant	sample	1g	156	41	16	4	2		1			4	4	1	2		7
- at processing plant	natl random survey	carcasse	sample	1g	183	16			2		1			1	4	2	3		3
- at retail	natl random survey	cuts	sample	1g	126	17	1	1	11		5			1		5	2		
minced meat																			
- at retail	natl random survey		sample	1g	335	62	12	10		1				2				2	16
carcasse	natl random survey	fresh broiler carcasse at retail	sample	1g	83	5			3				1	1					
Other meat																			
fresh																			
- at slaughter	natl random survey	layer carcasse	sample	0.1g	35	9	9												
- at retail	natl random survey	layer carcasse	sample	0.1g	16	1	1												
Mixed meat																			

minced meat																			
- at retail	natl random survey	various meat salad (tuna, surimi, shrimps	sample	25g	149	0													
Other animals or mixed meat																			
meat products																			
ready-to-eat																			
- at retail	natl random survey	prepare dishes at retail	sample	25g	121	0													

Footnote

Belgium often analyses different type of samples from the same meat, but the tables do not allow to have twice the same type of sample. So these results are inserted in another table (e.g. for bovine meat, Belgium analyses minced meat at processing plant, minced meat at retail, steak tartare at retail, carpaccio at retail, and for pork meat, Belgium analyses carcasses, cuts at processing plant, minced meat at processing plant, minced meat at retail, raw hamb at retail and it is difficult to find enough categories to put all these results!). The resulting tables are then not homogenous.

Table 3.3.2 Salmonella sp. in other food

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium
Dairy products								
ready-to-eat	natl random survey	raw milk cheese	sample	25g	147	0		
Fishery products	natl random survey	cooked molluscs	sample	25g	38	0		
Live bivalve molluscs	natl random survey	at retail	sample	25g	139	0		

2.1.4. Salmonella in animals

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

Monitoring system

Sampling strategy

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

All breeding flocks are sampled every six weeks, as part of a National Salmonella control programme in breeding flocks. The sampling is performed by technicians of DGZ and ARSIA, the regional animal health associations. A specific Salmonella control is performed 4 times a year in the hatcheries by the owner.

Laying hens flocks

There is no official surveillance programme for layers. The farmer is responsible for a voluntary sampling at entrance. Sampling of flocks from farms with more than 5000 birds is required within 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): Rearing period

At the age of 16 weeks

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

Every 6 weeks

Laying hens: Day-old chicks

Other: not compulsory

Laying hens: Before slaughter at farm

Other: every flock on farms > 5000 birds

Type of specimen taken

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

necessary): Day-old chicks

Other: inner linings of boxes and blood

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

Faeces

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

Faeces

Laying hens: Day-old chicks

Internal linings of delivery boxes

Laying hens: Production period

Faeces

Laying hens: 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.
In addition, 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

A pooled faeces sample of 60 X 1g is taken at the age of 16 weeks by technicians of DGZ and ARSIA. The sample is analyzed in the laboratories of DGZ and ARSIA.

Breeding flocks: Production period

Every six weeks, a pooled faeces sample of 60 X 1g is taken of every flock in production by technicians of DGZ and ARSIA. The sample is immediately analyzed in the laboratories of DGZ and ARSIA.

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: Production period

Faeces samples are taken by the owner from the delivery boxes on a voluntary basis. A sample made of 60 x 1g 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.

Laying hens: 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 (separate elite, grand parent and parent flocks when necessary): 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.

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

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

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

A sample is considered positive if Salmonella enteritidis 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 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

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

Laying hens: Day-old chicks

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

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

Strongly recommended for parent and grand parent flocks

Laying hens flocks

Strongly recommended.

Other preventive measures than vaccination in place

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

Health qualification system (e.g. infrastructure).

Laying hens flocks

None.

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 Directive 92/117/EEC.

Laying hens flocks

There is no national or regional control programme for Salmonella in laying hens. The sanitary qualification for farms with more than 5000 birds requires an exit sampling for Salmonella in general, within 3 weeks of slaughter.

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.
4) Positive breeding flock is slaughtered.
5) Cleaning and desinfection of housing after removal of the breeding flock.

Laying hens flocks

1) Pasteurization of eggs
2) Cleaning and desinfection of housing after removal of the positive flock.

Notification system in place

Zoonotic Salmonella is notifiable since the first of Januari 2004. Notification is done by phone, fax or electronic.

Results of the investigation

In the parent flocks, 13 flocks of day-old chicks were tested of which none were positive for Salmonella. Of the 13 flocks tested during rearing, 1 was positive for Salmonella infantis. 56 flocks were tested during production, 3 were Salmonella positive of which 1 for Salmonella infantis.

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

Layer breeders were free of S. enteritidis and S. typhimurium in 2004, as was the case in 2003.

In day-old chicks, no Salmonella was found. During production, 5% of flocks was positive, but only a limited number of serotypes, including S. infantis, was detected.
Laboratory findings of the NRL show that almost 68% of commercial layer isolates were sertoype enteritidis, while only one typhimurium strain was found.

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

Monitoring system

Sampling strategy

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

All breeding flocks are sampled as part of a National Salmonella control programme in breeding flocks.The sampling is performed by technicians of DGZ and ARSIA, the regional animal health associations. A specific Salmonella control is performed 4 times a year in the hatcheries by the owner.

Broiler flocks

There is no official surveillance programme for broilers. It is compulsory to sample, for Salmonella in general, all flocks from farms with more than 5000 birds in the last three weeks before slaughter. Flocks from farms with less than 5000 birds are sampled voluntarily.

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 16 weeks

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

Every 6 weeks

Broiler flocks: Day-old chicks

Other: not compulsory

Broiler flocks: Before slaughter at farm

Every hatch is sampled from farm with > 5000 birds

Type of specimen taken

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

Other: inner linings of boxes and blood

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

Faeces

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

Faeces

Broiler flocks: Day-old chicks

Internal linings of delivery boxes

Broiler 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.
In addition, 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

A pooled faeces sample of 60 X 1g is taken at the age of 16 weeks by technicians of DGZ and ARSIA. The sample is analyzed in the laboratories of DGZ and ARSIA.

Breeding flocks: Production period

Every six weeks, a pooled faeces sample of 60 X 1g is taken of every flock in

production by technicians of DGZ and ARSIA. The sample is immediately analyzed in the laboratories of DGZ and ARSIA.

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

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

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

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

Broiler flocks: Day-old chicks

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

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

Broiler flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

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

Strongly recommended for parent and grand parent flocks.

Broiler flocks

Health qualification system (e.g. infrastructure).

Other preventive measures than vaccination in place

Broiler flocks

None.

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 Directive 92/117/EEC.

Broiler flocks

There is no national or regional control programme for Salmonella in broiler flocks. The sanitairy qualification for farms with more than 5000 birds requires an exit sampling for Salmonella in general, within 3 weeks of slaughter.

Measures in case of the positive findings or single cases

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

Positive flocks are destroyed.

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

Positive flocks are destroyed or slaughtered.

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

1) Incubation of hatching eggs is prohibited.
2) Incubated hatching eggs are removed and destroyed.
3) Not yet incubated hatching eggs may be pasteurized.
4) Positive breeding flock is slaughtered.
5) Cleaning and desinfection of housing after removal of the breeding flock.

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.

Broiler flocks: At slaughter (flock based approach)

If a flock is Salmonella positive, it is slaughtered at the end of the day.

Notification system in place

A notification system is in place since the first of Januari 2004.

Results of the investigation

For the meat production line, 2 grandparent flocks were tested, both of them negative for Salmonella. 13 flocks of day-old chicks (parents) were tested, all negative for Salmonella. 203 rearing flocks were tested, 8 were positive for salmonella of which 2 for S. typhimurium and 2 for S. infantis. Of the 549 flocks tested during production, 27 were positive for Salmonella, of which 1 for S. enteritidis, 2 for S. typhimurium, 1 for S. hadar, 1 for S. virchow and 5 for S. infantis.

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

As for broiler breeders, no Salmonella was detected in one-day-old chicks. During rearing and production, both S. enteritidis (1 flock in production) and S. typhimurium (2 flocks of rearing birds and 2 flocks with animals in production) were found. In broiler breeders, the Salmonella isolates belonged to a much wider range of serotypes (including S. hadar, S. infantis and S.

vichow) than in layer breeders.
The NRL registerd that Salmonella isolates from commercial broilers mainly belonged to serotypes Paratyphi B var. Java and typhimurium (both about 20%). Also S. enteritidis (9.7%) and S. infantis (7.5%) represented a relative large number of isolates.

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

Monitoring system

Sampling strategy

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

There is no official surveillance programme for zoonotic Salmonella in turkeys.

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

Monitoring system

Sampling strategy

Breeding flocks

There is no official surveillance programme for zoonotic Salmonella in geese.

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

Monitoring system

Sampling strategy

Breeding flocks

There is no official surveillance programme for zoonotic Salmonella in ducks.

F. Salmonella spp in pigs

Monitoring system

Sampling strategy

Fattening herds

There was no official monitoring of pigs for Salmonella in 2004. However, several samples were taken for research activities.

Vaccination policy

Breeding herds

In 2004, no vaccine was authorized in Belgium for the vaccination of pigs against

salmonellosis.

Multiplying herds

In 2004, no vaccine was authorized in Belgium for the vaccination of pigs against salmonellosis.

Fattening herds

In 2004, no vaccine was authorized in Belgium for the vaccination of pigs against salmonellosis.

Results of the investigation

Laboratory findings of the NRL Salmonella, animal health.
Significantly less pig isolates were sent to the reference laboratory in 2004, i.e. n=407. Among these, serotype Typhimurium (46.4%) [54.0% belong to Classic variant O5+] was the most prominent one. In addition, S. Derby (14.7%), S. Infantis (8.6%) and S. Brandenburg (6.1%) were identified.

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

Almost half of the Salmonella strains from pigs belonged to serotype Typhimurium, whereas the number of S. Derby remain between 10 and 20% of the pig isolates since 1997. Other seroypes may become more predominant, i.e. Infantis or Brandenburg.

G. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

There was no official monitoring of cattle in 2004 in Belgium. Isolates were diagnostic samples sent to the NRL Salmonella, animal health, for serotyping.

Vaccination policy

In 2004, no vaccine was authorized for the vaccination of cattle against salmonellosis.

Results of the investigation

Laboratory findings of the NRL Salmonella, animal health.
The number of cattle Salmonella isolates analysed was similar as each year (n=92). Most frequently found serotypes were Dublin (39.1%) and Typhimurium (34.8%), which is similar to 2003. Classic type S. Typhimurium (O5+, 65.6%) outnumbered Copenhagen type O5â”€. Four S. Enteritidis were detected in cattle in 2004, which is two more than in 2003.

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

The predominant serotype found among cattle continued to be S. Dublin, as in 2002 and 2003. Serotype Typhimurium remained at about the same level as in 2002 and 2003.

Table 3.2.1 Salmonella sp. in Poultry breeding flocks (Gallus gallus)

	Source of information	Remarks	Epidemiological unit	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium
Gallus gallus							
parent breeding flocks for egg production line							
day-old chicks	FASFC		flock	13	0	0	0
- during production period	FASFC		flock	56	3	0	0
- during rearing period	FASFC		flock	13	1	0	0
grandparent breeding flocks for meat production line	FASFC		flock	2	0	0	0
parent breeding flocks for meat production line							
day-old chicks	FASFC		flock	129	0	0	0
- during rearing period	FASFC		flock	203	8	0	2
- during production period	FASFC		flock	549	27	1	2

Table 3.2.2 Salmonella sp. in other commercial poultry

	Source of information	Remarks	Epidemiological unit	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium
Gallus gallus							
laying hens							
- during production period	FASFC		flock	265	72		
broilers							
- during rearing period	FASFC		flock	5381	387		
Ducks							
- during production period	FASFC		flock	2	1	1	
Geese							
- during production period	FASFC		flock	4	0		
Turkeys							
- during production period	FASFC		flock	4	0		

Table 3.2.3 Salmonella sp. in non-commercial poultry and birds

	Source of information	Remarks	Epidemiological unit	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium
Guinea fowl	FASFC		flock	3	2	0	0
Quails	FASFC		flock	1	0	0	0
Pheasants	FASFC		flock	5	1	0	1
Partridges	FASFC		flock	2	0	0	0
Ostriches	FASFC		flock	8	0	0	0

Footnote

All the flocks tested are breeding flocks.

Table 3.2.4 Salmonella sp. in animals (non poultry)

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Dublin	S. Derby
Cattle (bovine animals)	Lab findings		Isolates	92		4	32		
Pigs									
breeding animals			farm	156	28				
fattening pigs (1)			age group	544	73				
unspecified			age group and farm				36		13

(1) : age group:
162:

2.1.5. Salmonella in feedstuffs

Table 3.1.1 Salmonella sp. in feed material of animal origin

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Braenderup
Feed material of land animal origin									
Meat and bone meal	FASFC			25g	8	0			
Greaves	FASFC			25g	1	0			
Poultry offal meal	FASFC			25g	1	0			
Feed material of marine animal origin									
Fish meal	FASFC			25g	29	1			1
other fish products	FASFC			25g	1	0			

Table 3.1.2 Salmonella sp. in feed of vegetable origin

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Montevideo	S. Livingstone	S. Mbandaka
Feed material of cereal grain origin											
Barley derived	FASFC			25g	7	0					
Wheat derived	FASFC			25g	28	0					
Maize derived	FASFC			25g	10	0					
	FASFC			25g	20	0					
other cereal grain derived	FASFC			25g	16	0					
Feed material of oil seed or fruit origin											
Rape seed derived	FASFC			25g	2	0					
Palm kernel derived	FASFC			25g	3	0					
Soya (bean) derived	FASFC			25g	97	0					
Cotton seed derived	FASFC			25g	2	0					
Sunflower seed derived	FASFC			25g	6	0					
Linseed derived	FASFC			25g	25	1			1		
other oil seeds derived	FASFC			25g	21	0					
other feed material											
Legume seeds and similar products	FASFC			25g	1	0					
Tubers, roots and similar products	FASFC			25g	11	1				1	
Other seeds and fruits	FASFC			25g	1	0					
Forages and roughages	FASFC			25g	19	0					
Other plants	FASFC			25g	1	0					
minerals	FASFC			25g	1	0					
Miscellaneous	FASFC			25g	10	1					

Table 3.1.3 Salmonella sp. in compound feedingstuff

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Livingstone	S. Agona	S. Yoruba	S. Senftenberg	S. Lexington	S. Mbandaka	S. Rissen	S. Braenderup	S. Montevideo
Compound feedingstuffs for cattle																	
Process control	FASFC			25g	2	0											
Compound feedingstuffs for pigs																	
Process control	FASFC			25g	198	5	1	1				1	1				
Compound feedingstuffs for poultry (non specified)																	
Process control	FASFC			25g	5	0											
Compound feedingstuffs for poultry -breeders																	
Process control	FASFC			25g	5	0											
Compound feedingstuffs for poultry - laying hens																	
Process control	FASFC			25g	43	3											
Compund feedingstuffs for poultry - broilers																	
Process control	FASFC			25g	60	1											
Compound feedingstuffs for rabbits	FASFC			25g	5	0											
Compound feedingstuffs for fish	FASFC			25g	5	0											
Complementary feedingstuffs	FASFC			25g	92	2					1				1		

Premixtures	FASFC			25g	13	0												

Footnote

An official monitoring for the detection of Salmonella in compound feedingstuffs and in raw materials was organised by the Federal Agency for the Security of the Food Chain. The microbiological testing on 25g of sample was done at the CODA-VAR and the laboratory of FASFC Gembloux. In case of isolation of Salmonella in official samples no certification was provided by the FASFC.
A total of 751 raw feed materials and compound feedingstuffs were analysed. 15 of these samples were found positive: 4 raw materials, 5 compound feedingstuffs for poultry and 6 compound feedingstuffs for pigs.

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 3.3.3 Salmonella serovars in animals

Serovars	Cattle (bovine animals)		Pigs		Gallus gallus		Other poultry	
Sources of isolates	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory N=								
Number of isolates serotyped N=		92		407		688		
Number of isolates per type								
S. Agona		4		6		43		
S. Derby		1		60		2		
S. Dublin		36		0		2		
S. Enteritidis		4		4		154		
S. Infantis		0		35		86		
S. Typhimurium		32		189		47		
S. Virchow		0		1		56		
S. Paratyphi B var. Java		0		0		49		
Total of typed *Salmonella*isolates								

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.5 S.Enteridis phagetypes in animals

Phagetype		Cattle (bovine animals)		Pigs		Gallus gallus		Other poultry	
Sources of isolates		M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory	N=								
Number of isolates serotyped	N=								

Footnote

(*) M : Monitor, C : Clinical
Salmonella enteritidis phagetyping in animals is not performed in the National Reference Laboratory

Table 3.3.9 S. Enteritidis phagetypes in humans

Phagetype		humans	
Sources of isolates		M(*)	C(*)
Number of isolates in the laboratory	N=	479	
Number of isolates serotyped	N=	479	
Number of isolates per type			
PT 1		11	
PT 4		210	
PT 6		5	
PT 8		36	
PT 14b		45	
PT 21		118	
Not typable		4	
PT 35		2	
PT 6a		9	
PT 12		2	
PT 23		1	
PT 7		3	
Other (1)		25	
1a (2)		2	
PT 28		5	
PT 29		1	
Total of typed *Salmonella*isolates			

(1) : not determined 18
PT 7a : 1
PT 12w : 1
PT 15 : 1
PT 18 : 2
PT 39 : 1
PT 146 : 1
(2) : PT1a

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.7 Salmonella Typhimurium phagetypes in animals

Phagetype		Cattle (bovine animals)		Pigs		Gallus gallus		Other poultry	
Sources of isolates		M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory	N=								
Number of isolates serotyped	N=								

Footnote

(*) M : Monitor, C : Clinical
Salmonella typhimurium phagetyping is not performed in the National Reference Laboratory.

Table 3.3.10 S. Typhimurium phagetypes in humans

Phagetype		humans	
Sources of isolates		M(*)	C(*)
Number of isolates in the laboratory	N=	308	
Number of isolates serotyped	N=	308	
Number of isolates per type			
DT 12		20	
DT 104		73	
DT 120		65	
DT 193		33	
DT 208		5	
U 302		14	
Not typable		13	
DT 194		5	
DT 195		6	
DT 186		10	
other		64	
Total of typed *Salmonella*isolates			

Footnote

(*) M : Monitor, C : Clinical

2.1.7. Antimicrobial resistance in *Salmonella* isolates

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

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Type of specimen taken

Laboratory findings of the NRL Salmonella, animal health.

Methods of sampling (description of sampling techniques)

Diagnostic samples sent to NRL.

Procedures for the selection of isolates for antimicrobial testing

On basis of serotype.
S. Agona 4
S. Cerro 4
S. Dublin 35
S. Enteritidis 4
S. Havana 1
S. Lagos 1
S. O4 2
S. O4,5 1
S. Typhimurium O5- 11
S. Typhimurium O5+ 20
Auto agglutinating 2
Total 85

Methods used for collecting data

All requests to the CODA - CERVA for isolation of Salmonella and for typing of Salmonella strains were routinely encoded in the Laboratory Management Information System (LIMS). The analytical results were introduced in the same database. The data on Salmonella isolation, serotyping and on antibiotic resistance are based on the results registered in the LIMS files that were created in 2004.

Laboratory methodology used for identification of the microbial isolates

Isolation of Salmonella was done based on ISO6579. The Salmonella isolates were serotyped following the Kauffmann-White scheme. In case no unequivocal type was identified, strains were sent to the Scientific Institute for Public Health - Louis Pasteur (IPH) in Brussels for serotyping. Both isolation and serotyping at the CODA - CERVA was done under Beltest accreditation conditions (EN 17025).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables
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 NCCLS (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.

Control program/mechanisms

The control program/strategies in place

There was no monitoring programme for Salmonella in cattle in 2004.

Results of the investigation

Obviously, the resistance of Salmonella strains isolated from a certain origin is reflected by the resistance of the serotypes most prevalent in the corresponding samples. Therefore, Salmonella from cattle are relatively less susceptible (37.6%) in comparison with those from other animal origin.

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.

Procedures for the selection of isolates for antimicrobial testing

Based on serotype.
S. Agona 6
S. Bovismorbificans 1
S. Brandenburg 4
S. Enteritidis 4
S. Hadar 1
S. Havana 1
S. Infantis 2
S. Livingstone 1
S. London 1
S. O4 8
S. Panama 2
S. Rissen 9

S. Typhimurium O5- 81
S. Typhimurium O5+ 94
S. Virchow 1
Total 216

Methods used for collecting data

All requests to the CODA - CERVA for isolation of Salmonella and for typing of Salmonella strains were routinely encoded in the Laboratory Management Information System (LIMS). The analytical results were introduced in the same database. The data on Salmonella isolation, serotyping and on antibiotic resistance are based on the results registered in the LIMS files that were created in 2004.

Laboratory methodology used for identification of the microbial isolates

Isolation of Salmonella was done based on ISO6579. The Salmonella isolates were serotyped following the Kauffmann-White scheme. In case no unequivocal type was identified, strains were sent to the Scientific Institute for Public Health - Louis Pasteur (IPH) in Brussels for serotyping. Both isolation and serotyping at the CODA - CERVA was done under Beltest accreditation conditions (EN 17025).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables.
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 NCCLS (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.

Control program/mechanisms

The control program/strategies in place

There was no monitoring programme for Salmonella in pigs in 2004.

Results of the investigation

Obviously, the resistance of Salmonella strains isolated from a certain origin is reflected by the resistance of the serotypes most prevalent in the corresponding samples. Therefore, Salmonella from pigs are relatively less susceptible (32.9%) in comparison with those from other origin.

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

See 2003

Type of specimen taken

See 2003

Methods of sampling (description of sampling techniques)

See 2003

Procedures for the selection of isolates for antimicrobial testing

Based on serotype:
S. Agona 43
S. Altona 1
S. Anatum 1
S. Braenderup 1
S. Dublin 2
S. Duisburg 8
S. Enteritidis 144
S. Hadar 16
S. Havana 1
S. Indiana 2
S. Infantis 20
S. Kottbus 6
S. Lexington 1
S. Livingstone 6
S. Montevideo 4
S. Newport 2
S. O3,10 1
S. O3,19 3
S. O4 4
S. O6,7 1
S. Paratyphi B Var. Java 37
S. Paratyphi B, Tartraat Neg 3
S. Rissen 21
S. Schwartzengrund 7
S. Typhimurium O5- 13
S. Typhimurium O5+ 30
S. Virchow 52
Auto agglutinating 4
Total 434

Methods used for collecting data

All requests to the CODA - CERVA for isolation of Salmonella and for typing of Salmonella strains were routinely encoded in the Laboratory Management Information System (LIMS). The analytical results were introduced in the same database. The data on Salmonella isolation, serotyping and on antibiotic resistance are based on the results registered in the LIMS files that were created in 2004.

Laboratory methodology used for identification of the microbial isolates

Isolation of Salmonella was done based on ISO6579. The Salmonella isolates were serotyped following the Kauffmann-White scheme. In case no unequivocal type was identified, strains were sent to the Scientific Institute for Public Health - Louis Pasteur (IPH) in Brussels for serotyping. Both isolation and serotyping at the CODA - CERVA was done under Beltest accreditation conditions (EN 17025).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables
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 NCCLS (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.

Results of the investigation

Laboratory findings of the NRL Salmonella, animal health.
A total of 688 Salmonella strains from poultry origin were analysed in 2004, which is 18.7% less than in 2003, similar than in 2002 (n=682) and 22.7% less than in 2001 (n=890). Especially the increase in S. Infantis (about 3 times), in S. Paratyphi var. Java (plus 73.2%) and S. Enteritidis (plus 43.6%) are noteworthy. On the contrary, the number of S. Virchow isolates has fallen with about 73%.
From 296 isolates (43.0%) the production level was registered. Among the breeder isolates (n=68) five S. Enteritidis (7.4% of breeder strains) and 1 S. Typhimurium isolates were detected. Strikingly, 39.7% were serotype Infantis. Six isolates from hatcheries were analysed, i.e. 3 S. Enteritidis and 3 S. Infantis strains. Almost 68% of layer isolates were serotype Enteritidis, while only one Typhimurium strain was found. As for broilers, especially serotypes Paratyphi B var. Java and Typhimurium (both about 20%), but also Enteritids (9.7%) and Infantis (7.5%) represented a relative large number of isolates.

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

Evolution concerning serotype distribution in poultry.
The evolution of serotypes among poultry isolates probably correctly reflects the incidence of Salmonella infections in the sector due to the official monitoring programmes. Remarkable is the rise of serotype Enteritidis that increased to more than 20% of the poultry strains typed, which is comparable to the period 1995 - 2001. The number of S. Infantis strains in 2004 was similar to that of 1993 (about 12%), and serotype S. Paratyphi B var. Java was identified as often as S. Typhimurium. On the other hand, S. Virchow isolates decreased surprisingly to less than 10% of the poultry isolates.

Table Antimicrobial susceptibility testing of S. Brandenburg - qualitative data

	S. Brandenburg	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	32	
Antimicrobials:	**N**	**%R**
Tetracycline		9.4%
Amphenicols		
Chloramphenicol		0.0%
Cephalosporin		
Cefotaxim		0.0%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		0.0%
Trimethoprim		6.3%
Sulfonamides		
Sulfonamide		6.3%
Sulfamethoxazol		6.3%
Aminoglycosides		
Streptomycin		0.0%
Gentamicin		0.0%
Kanamycin		0.0%
Penicillins		
Amoxicillin		0.0%
Ampicillin		3.1%

Footnote

The vast majority of S. Brandenburg (n=32; 87.5% fully sensitive) isolates remained sensitive to all tested antibiotics.

Table Antimicrobial susceptibility testing of S. Derby - qualitative data

	S. Derby	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	41	
Antimicrobials:	**N**	**%R**
Tetracycline		24.4%
Amphenicols		
Chloramphenicol		0.0%
Cephalosporin		
Cefotaxim		0.0%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		2.4%
Trimethoprim		2.4%
Sulfonamides		
Sulfonamide		17.1%
Sulfamethoxazol		2.4%
Aminoglycosides		
Streptomycin		12.2%
Gentamicin		0.0%
Kanamycin		0.0%
Penicillins		
Amoxicillin		0.0%
Ampicillin		0.0%

Footnote

The vast majority of S. Derby (n=41; 73.1% fully sensitive) isolates remained sensitive to all tested antibiotics.

Table 3.2.5.2 Antimicrobial susceptibility testing of S.Enteritidis in animals

	S. Enteritidis							
	Cattle (bovine animals)		**Pigs**		**Gallus gallus**		**Turkeys**	
Isolates out of a monitoring program	no		no		no			
Number of isolates available in the laboratory (1)	4		4		144			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline	1	25%	0	0%	0	0%		
Amphenicols								
Chloramphenicol	1	25%	0	0%	0	0%		
Florfenicol	0	0%	0	0%	0	0%		
Cephalosporin								
Ceftiofur	0	0%	0	0%	0	0%		
Fluoroquinolones								
Enrofloxacin	0	0%	0	0%	0	0%		
Quinolones								
Nalidixic acid	0	0%	0	0%	3	2,1%		
Sulfonamides								
Sulfonamide	1	25%	0	0%	0	0%		
Aminoglycosides								
Streptomycin	1	25%	0	0%	0	0%		
Gentamicin	0	0%	0	0%	0	0%		
Neomycin	0	0%	0	0%	0	0%		
Trimethoprim + sulfonamides	1	25%	0	0%	0	0%		
Penicillins								
Ampicillin	1	25%	0	0%	3	2,1%		
Number of multiresistant isolates								
fully sensitives	3	75%	4	100%	138	95,8%		

(1) : Number of isolates tested

Table Antimicrobial susceptibility testing of S. Enteritidis in Poultry meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

S. Enteritidis

Poultry meat - monitoring programme

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

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline	1	2%						1	39	9	1					1						
Amphenicols																						
Chloramphenico	1	2						2	6	42						1						
Fluoroquinolones																						
Ciprofloxacin	0	0	49	2																		
Quinolones																						
Nalidixic acid	2	4							2	46		1				2						
Trimethoprim	2	4%		1		15	33	1					1									
Sulfonamides																						
Sulfonamide	9	18								1				3	16	22	9					
Aminoglycosides																						
Streptomycin	1	2							19	28	1	2			1							
Kanamycin	0	0							11	36	4											
Trimethoprim + sulfonamides	1	2%	1	9	38	2							1									
Cephalosporin																						
Ceftriaxon	0	0	1	9	37	3	1															
Penicillins																						
Ampicillin	1	2				2	1	26	21							1						

Table 3.2.7.6 Antimicrobial susceptibility testing of S. Enteritidis in humans - qualitative data

	S. Enteritidis	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	58	
Antimicrobials:	**N**	**%R**
Tetracycline		0.0%
Amphenicols		
Chloramphenicol		0.0%
Cephalosporin		
Cefotaxim		0.0%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		3.4%
Trimethoprim		0.0%
Sulfonamides		
Sulfonamide		0.0%
Sulfamethoxazol		0.0%
Aminoglycosides		
Streptomycin		0.0%
Gentamicin		0.0%
Kanamycin		0.0%
Penicillins		
Amoxicillin		0.0%
Ampicillin		3.4%

Footnote

The vast majority of S. Enteritidis (n=58; 93.1% fully sensitive) isolates remained sensitive to all tested antibiotics.

Table Antimicrobial susceptibility testing of S. Hadar - qualitative data

	S. Hadar	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	38	
Antimicrobials:	**N**	**%R**
Tetracycline		97.4%
Amphenicols		
Chloramphenicol		0.0%
Cephalosporin		
Cefotaxim		0.0%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		94.7%
Trimethoprim		0.0%
Sulfonamides		
Sulfonamide		2.6%
Sulfamethoxazol		0.0%
Aminoglycosides		
Streptomycin		81.6%
Gentamicin		0.0%
Kanamycin		5.3%
Penicillins		
Amoxicillin		10.5%
Ampicillin		78.9%

Footnote

All S. Hadar isolates (n=38) were resistant to at least two antibiotics. The highest antibiotic resistance levels were observed for this serotype. Resistance to tetracycline, nalidixic acid, ampicillin and streptomycin reached values from 78.9 up to 97.4 %. Simultaneous resistance to these four antibiotics was observed in 47.3% of these isolates. However, isolates from this serotype remained fully sensitive to cefotaxime, ciprofloxacin, chloramphenicol, trimethoprim, sulfonamide and gentamicin.

Table 3.2.5.3 Antimicrobial susceptibility testing of S.Typhimurium in animals

	S. Typhimurium							
	Cattle (bovine animals)		**Pigs**		**Gallus gallus**		**Turkeys**	
Isolates out of a monitoring program	no		no		no			
Number of isolates available in the laboratory (1)	31		175		43			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline	22	71%	113	64,6%	17	39,5%		
Amphenicols								
Chloramphenicol	20	64,5%	75	42,9%	11	25,6%		
Florfenicol	18	58,1%	62	35,4%	9	20,9%		
Cephalosporin								
Ceftiofur	0	0%	2	1,1%	0	0%		
Fluoroquinolones								
Enrofloxacin	0	0%	0	0%	0	0%		
Quinolones								
Nalidixic acid	6	19,4%	4	2,3%	3	7%		
Sulfonamides								
Sulfonamide	28	90,3%	112	64%	18	41,9%		
Aminoglycosides								
Streptomycin	24	77,4%	88	50,3%	11	25,6%		
Gentamicin	0	0%	0	0%	0	0%		
Neomycin	0		0		1	2,3%		
Trimethoprim + sulfonamides	2	6,5%	49	28%	11	25,6%		
Penicillins								
Ampicillin	26	83,9%	103	58,9%	18	41,9%		
Number of multiresistant isolates								
fully sensitives	3	9,7%	44	25%	23	53,5%		

(1) : Number of isolates tested

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

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

S. Typhimurium

Pig meat

Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	60

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline	32	53%						1	8	19		1	6	11	1	13						
Amphenicols																						
Chloramphenico	11	18							1	47		1				11						
Fluoroquinolones																						
Ciprofloxacin	0	0	60																			
Quinolones																						
Nalidixic acid	0	0							3	45	9	3										
Trimethoprim	11	18%				37	11	1					11									
Sulfonamides																						
Sulfonamide	32	53											1	5	12	10	32					
Aminoglycosides																						
Streptomycin	23	38								1	3	33		4	4	15						
Kanamycin	2	3								41	16		1			2						
Trimethoprim + sulfonamides	11	18%	1	18	19	9	2						11									
Cephalosporin																						
Ceftriaxon	0	0		28	28	4																
Penicillins																						
Ampicillin	26	43						25	8	1						26						

Table 3.2.7.7 Antimicrobial susceptibility testing of S. Typhimurium in humans - qualitative data

	S. Typhimurium	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	308	
Antimicrobials:	**N**	**%R**
Tetracycline		57.1%
Amphenicols		
Chloramphenicol		36.0%
Cephalosporin		
Cefotaxim		0.0%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		3.6%
Trimethoprim		21.8%
Sulfonamides		
Sulfonamide		58.1%
Sulfamethoxazol		21.4%
Aminoglycosides		
Streptomycin		51.9%
Gentamicin		0.0%
Kanamycin		1.6%
Penicillins		
Amoxicillin		2.9%
Ampicillin		61.0%

Footnote

S. Typhimurium (n=308) showed a high level of antibiotic resistance with 52.3% of isolates resistant to four or more antimicrobial agents (defined as multiresistance). Almost twenty percent of the isolates were shown resistant to ampicillin, chloramphenicol, streptomycin, sulfonamides and tetracycline (R-type ACSSuT with or without additional resistances), of which 80% were of definitive phage type (DT)104.

Table Antimicrobial susceptibility testing of S. Virchow - qualitative data

	S. Virchow	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	43	
Antimicrobials:	**N**	**%R**
Tetracycline		20.9%
Amphenicols		
Chloramphenicol		2.3%
Cephalosporin		
Cefotaxim		4.7%
Fluoroquinolones		
Ciprofloxacin		0.0%
Quinolones		
Nalidixic acid		53.5%
Trimethoprim		20.9%
Sulfonamides		
Sulfonamide		23.3%
Sulfamethoxazol		20.9%
Aminoglycosides		
Streptomycin		9.3%
Gentamicin		0.0%
Kanamycin		2.3%
Penicillins		
Amoxicillin		0.0%
Ampicillin		25.6%

Footnote

In S. Virchow (n=43), multiresistance was less common than in 2003 (20.9% of the strains in 2004 in place of 60% of the isolates in 2003). The highest incidence of resistance was observed for nalidixic acid (53,5%). Resistances to ampicillin, tetracycline and to trimethoprim + sulfamethoxazole were common (> 20%). 2 strains of S. Virchow shown a resistance to cefotaxime.

Table 3.2.5.1 Antimicrobial susceptibility testing of Salmonella spp. in animals

	Salmonella spp.							
	Cattle (bovine animals)		**Pigs**		**Gallus gallus**		**Turkeys**	
Isolates out of a monitoring program	no		no		no			
Number of isolates available in the laboratory	85		216		434			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline	32	37,6%	123	56,9%	77	17,7%		
Amphenicols								
Chloramphenicol	42	49,4%	82	38,0%	25	5,8%		
Florfenicol	22	25,9%	67	31,0%	22	5,1%		
Cephalosporin								
Ceftiofur	0	0%	2	,9%	29	6,7%		
Fluoroquinolones								
Enrofloxacin	0	0%	0	0%	0	0%		
Quinolones								
Nalidixic acid	13	15,3%	6	2,8%	112	25,8%		
Sulfonamides								
Sulfonamide	51	60%	121	56%	98	22,6%		
Aminoglycosides								
Streptomycin	38	44,7%	93	43,1%	45	10,4%		
Gentamicin	0	0%	0	0%	0	0%		
Neomycin	0	0%	0	0%	1	,2%		
Trimethoprim + sulfonamides	6	7,1%	54	25%	85	19,6%		
Penicillins								
Ampicillin	33	38,8%	111	51,4%	127	29,3%		
Number of multiresistant isolates								
fully sensitives	32	37,6%	71	32,9%	247	56,9%		

Table 3.2.5.5 Antimicrobial susceptibility testing of Salmonella spp. in food

	Salmonella spp.							
	Broiler meat		**Other poultry meat**		**Pig meat**		**Bovine meat**	
Isolates out of a monitoring program	yes				yes		yes	
Number of isolates available in the laboratory	172				128		7	
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline	35	20%			42	33%	3	43%
Amphenicols								
Chloramphenicol	20	12%			13	10%	0	0%
Cephalosporin								
Ceftriaxon	3	2%			0	0%	0	0%
Fluoroquinolones								
Ciprofloxacin	0	0%			0	0%	0	0%
Quinolones								
Nalidixic acid	47	27%			5	4%	1	14%
Trimethoprim	54	31%			28	22%	2	29%
Sulfonamides								
Sulfonamide	94	55%			64	50%	4	57%
Aminoglycosides								
Streptomycin	80	46%			44	34%	3	43%
Kanamycin	0	0%			2	2%	0	0%
Trimethoprim + sulfonamides	54	31%			27	21%	2	29%
Penicillins								
Ampicillin	70	41%			34	27%	2	29%
Number of multiresistant isolates								
fully sensitives	53	31%			46	36%	2	29%
resistant to 1 antimicrobial	31	18%			32	25%	1	14%
resistant to 2 antimicrobials	10	6%			8	6%	2	29%
resistant to 3 antimicrobials	17	10%			11	9%	0	0%
resistant to 4 antimicrobials	27	16%			16	12%	0	0%
resistant to >4 antimicrobials	34	20%			15	12%	2	29%

Footnote

Broiler meat includes broiler carcasses, parts of broiler carcasses, broiler fillets, minced broiler meat and carcasses of spent laying hens.

Table Antimicrobial susceptibility testing of Salmonella spp. in Pig meat - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

	Salmonella spp.
	Pig meat
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	128

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline	42	33%						1	45	40		1	7	12	1	21						
Amphenicols																						
Chloramphenico	13	10	1						3	94	16	1				13						
Fluoroquinolones																						
Ciprofloxacin	0	0	123		1	3	1															
Quinolones																						
Nalidixic acid	5	4							3	106	11	3				5						
Trimethoprim	28	22%				46	49	5					28									
Sulfonamides																						
Sulfonamide	64	50											2	6	25	31	64					
Aminoglycosides																						
Streptomycin	44	34							4	7	14	59	5	6	6	27						
Kanamycin	2	2							2	81	39	1	3			2						
Trimethoprim + sulfonamides	27	21%	1	33	53	11	2	1					27									
Cephalosporin																						
Ceftriaxon	0	0	1	29	78	20																
Penicillins																						
Ampicillin	34	27						77	16	1						34						

Table Antimicrobial susceptibility testing of Salmonella spp. in Poultry meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

	Salmonella spp.
	Poultry meat - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	172

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline	35	20%						9	94	33	1		7	10	2	16						
Amphenicols																						
Chloramphenico	21	12						2	10	129	9	1			1	20						
Cephalosporin																						
Ceftriaxon	3	2	2	25	110	26			6				3									
Fluoroquinolones																						
Ciprofloxacin	0	0	123	1	10	32	5	1														
Quinolones																						
Nalidixic acid	47	27							10	104	10	1				47						
Trimethoprim	54	31%		1	2	62	50	3					54									
Sulfonamides																						
Sulfonamide	94	55								1			1	8	31	37	94					
Aminoglycosides																						
Streptomycin	80	46							19	29	8	36	13	6	21	40						
Kanamycin	0	0							18	116	37	1										
Trimethoprim + sulfonamides	0	0%	1	29	69	18		1					54									
Penicillins																						
Ampicillin	70	41				2	2	68	28	2						70						

Table 3.2.7.5 Antimicrobial susceptibility testing of Salmonella spp. in humans - qualitative data

	Salmonella spp.	
	humans	
Isolates out of a monitoring program	no	
Number of isolates available in the laboratory	520	
Antimicrobials:	**N**	**%R**
Tetracycline	235	45,2%
Amphenicols		
Chloramphenicol	112	21,5%
Cephalosporin		
3rd generation cephalosporins	2	0,4%
Fluoroquinolones		
Ciprofloxacin	0	0%
Quinolones		
Nalidixic acid	73	14,0%
Trimethoprim	79	15,2%
Sulfonamides		
Sulfonamide	199	38,3%
Aminoglycosides		
Streptomycin	200	38,5%
Gentamicin	0	0%
Neomycin	9	1,7%
Kanamycin	9	1,7%
Trimethoprim + sulfonamides	78	15%
Penicillins		
Ampicillin	232	44,6%
Number of multiresistant isolates		
fully sensitives	207	39,8%
resistant to 1 antimicrobial	70	13,5%
resistant to 2 antimicrobials	15	2,9%
resistant to 3 antimicrobials	30	5,8%
resistant to 4 antimicrobials	49	9,4%
resistant to >4 antimicrobials	149	28,7%

Footnote

A total of 520 human Salmonella isolates randomly collected in 2004 among the six most important serovars were examined for their resistance by disk diffusion to fourteen antibiotics which are of therapeutic or epidemiological interest.
Resistance was mostly found against tetracycline (45.2%), ampicillin (44.6%), streptomycin (38.5%), and to a lesser extent against sulphonamides (38.3%), chloramphenicol (21.5%) and trimethoprim (15.2%).
The vast majority of S. Enteritidis (n=58; 93.1% fully sensitive), S. Brandenburg (n= 32; 87.5% fully sensitive) and S. Derby (n=41; 73.1% fully sensitive) isolates remained sensitive to all tested antibiotics.

Resistance patterns and levels in 2004 were generally the same than those in 2003 and 2002, except for the serotype Virchow for which a significant decrease of multiresistance phenotype was observed in comparison with the situation in 2003.

Table 3.2.6 Breakpoints for antibiotic resistance of Salmonella in Animals

Test Method Used

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

Standards used for testing

- NCCLS
- CASFM

Subject to quality control

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	NCCLS	4	8	16	0.016	256				
Amphenicols										
Chloramphenicol	NCCLS	8	16	32	0.016	256				
Florfenicol										
Fluoroquinolones										
Ciprofloxacin	NCCLS	1	2	4	.002	32				
Enrofloxacin										
Quinolones										
Nalidixic acid	NCCLS	16		32	0.016	32				
Trimethoprim	NCCLS	8		16	0.002	32				
Sulfonamides										
Sulfonamide	NCCLS	256		512	0.064	1024				
Aminoglycosides										
Streptomycin		8	16	32	0.016	256				
Gentamicin										
Neomycin										
Kanamycin	NCCLS	16	32	64	0.016	256				
Trimethoprim + sulfonamides(1)	NCCLS	2		4	0.002	32				
Cephalosporin										
Ceftiofur										
Ceftriaxon	NCCLS	8	16	32	0.02	32				
3rd generation cephalosporins										
Penicillins										
Amoxicillin/clavula acid										
Ampicillin	NCCLS	8	16	32	0.016	256				

(1) : 5,2 + 240

Table 3.2.6 Breakpoints for antibiotic resistance of Salmonella in Food

Test Method Used

Disc diffusion
Agar dilution
Broth dilution
E-test

Standards used for testing

NCCLS
CASFM

Subject to quality control

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	NCCLS	4	8	16	0.016	256				
Amphenicols										
Chloramphenicol	NCCLS	8	16	32	0.016	256				
Florfenicol										
Fluoroquinolones										
Ciprofloxacin	NCCLS	1	2	4	.002	32				
Enrofloxacin										
Quinolones										
Nalidixic acid	NCCLS	16		32	0.016	32				
Trimethoprim	NCCLS	8		16	0.002	32				
Sulfonamides										
Sulfonamide	NCCLS	256		512	0.064	1024				
Aminoglycosides										
Streptomycin		8	16	32	0.016	256				
Gentamicin										
Neomycin										
Kanamycin	NCCLS	16	32	64	0.016	256				
Trimethoprim + sulfonamides	NCCLS	2		4	0.002	32				
Cephalosporin										
Ceftiofur										
Ceftriaxon	NCCLS	8	16	32	0.02	32				
3rd generation cephalosporins										
Penicillins										
Amoxicillin/clavula acid										
Ampicillin	NCCLS	8	16	32	0.016	256				

Table 3.2.6 Breakpoints for antibiotic resistance of Salmonella in Feedingstuff

Test Method Used

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

Standards used for testing

- NCCLS
- CASFM

Subject to quality control

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline										
Amphenicols										
Chloramphenicol										
Florfenicol										
Fluoroquinolones										
Ciprofloxacin										
Enrofloxacin										
Quinolones										
Nalidixic acid										
Trimethoprim										
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin										
Neomycin										
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporin										
Ceftiofur										
Ceftriaxon										
3rd generation cephalosporins										
Penicillins										
Amoxicillin/clavula acid										
Ampicillin										

Footnote

Breakpoints for antibiotic resistance of Salmonella in feedingstuff is not performed.

Table 3.2.6 Breakpoints for antibiotic resistance of Salmonella in Humans

Test Method Used

Disc diffusion
Agar dilution
Broth dilution
E-test

Standards used for testing

NCCLS
CASFM

Subject to quality control

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	NCCLS						30	19	15.18	14
Amphenicols										
Chloramphenicol	NCCLS						30	18	13.17	12
Florfenicol										
Fluoroquinolones										
Ciprofloxacin	NCCLS						5	21	16.20	15
Enrofloxacin										
Quinolones										
Nalidixic acid	NCCLS						30	19	14.18	13
Trimethoprim	NCCLS						5	16	15.11	10
Sulfonamides										
Sulfonamide	NCCLS						300	17	16.13	12
Aminoglycosides										
Streptomycin	NCCLS						10	15	12.14	11
Gentamicin	NCCLS						10	15	13.14	12
Neomycin	NCCLS						30	18	15.17	14
Kanamycin	NCCLS						10	15	12.14	11
Trimethoprim + sulfonamides	NCCLS						1.25...23.75	16	11.15	10
Cephalosporin										
Ceftiofur										
Ceftriaxon										
3rd generation cephalosporins(1)	NCCLS						30	23	15.22	14
Penicillins										
Amoxicillin/clavula acid	NCCLS						20..10	18	14.17	13
Ampicillin	NCCLS						10	17	14.16	13

(1) : Cefotaxime

Footnote

Subject to quality control
Quality control strain: Escherichia coli ATCC strain 25922
Proficiency testing: The Community Reference Laboratory (CRL) - Salmonella organised the tenth interlaboratory comparison study (2005) on the typing of Salmonella strains amongst the National Reference Laboratories for Salmonella (NRLs-Salmonella) and EnterNet laboratories (ENLs).
The main objective of this typing study was to compare the test results of sero- and phage typing and antimicrobial susceptibility testing of the participating laboratories with the results obtained by the CRL-Salmonella.

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-Barré 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

Table 6.3.B Campylobacteriosis in man - age distribution

Age Distribution	C. coli			C. jejuni			Campylobacter spp.		
	All	M	F	All	M	F	All	M	F
<1 year							407	234	173
1 to 4 years							1450	844	606
5 to 14 years							932	522	410
15 to 24 years							745	331	414
25 to 44 years							1355	616	739
45 to 64 years							951	539	412
65 years and older							782	353	429
Age unknown							94		
Total :	0	0	0	0	0	0	6716	3439	3183

Table 6.3.C Campylobacteriosis in man - seasonal distribution

Month	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp.
	Cases	Cases	Cases	Cases
January				460
February				433
March				305
April				437
May				477
June				609
July				707
August				726
September				747
October				668
November				541
December				606
not known				0
Total :	0	0	0	6716

2.2.3. Campylobacter in foodstuffs

A. C.,thermophilic in food

Monitoring system

Sampling strategy

A monitoring programme was done in 2004 (January to December) by the Federal Agency for the Safety of the Food Chain. Data processing and reporting have been done by the National Reference Laboratory for Food Microbiology, Prof. G. Daube. 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 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 samples were putted in a cool box and transported to the laboratory within 24h. They were analysed within 24h after reception. In November and December, the samples were transferred to a dispatching centre of the Federal Agency for the Safety of the Food Chain and the laboratory take them at the dispatching centre. The time before analysis was then 1 to 2 days longer in general.
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 following was used:
- 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 6.2 Thermophilic Campylobacter spp. in food

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	C. coli	C. lari	C. upsaliensis	C. jejuni	Campylobacter spp.
Pig meat										
fresh										
- at slaughter	natl random survey	carcasse	sample 600cm2		344	14			1	2
- at processing plant	natl random survey	minced meat	sample 25g		266	1			3	
- at retail	natl random survey	minced meat	sample 25g		161	4			3	1
Poultry meat										
fresh										
- at slaughter	natl random survey	broiler carcasse	sample 0.01g		197	3			44	8
- at processing plant	natl random survey	broiler cuts	sample 1g		131	12			21	1
- at retail	natl random survey	broiler carcasse	sample 0.01g		77	4			18	5
meat products										
- at retail	natl random survey	broiler cuts	sample 25g		106	12			45	7
Other meat										
fresh										
- at slaughter	natl random survey	layer carcasse	sample 0.01g		35				12	
- at retail	natl random survey	layer carcasse	sample 0.01g		16					0
Dairy products										
ready-to-eat	natl random survey	raw milk cheese	sample 25g		147					2
Live bivalve molluscs	natl random survey	at retail	sample 25g		90					15
Broiler meat										
minced meat	natl random survey	at retail	sample 0.01g		336	1			10	

Footnote

The Sample weight column does not allow to be completed with other characters than numbers. The sample

weight used has then been completed in the epidemiological unit column for Campylobacter food table.
Belgium often analyses different products from a same type of meat, but the tables do not allow to have twice the same type of sample. So the results are added to another table(e.g. for broiler meat, Belgium analyses carcasses at slaughter, carcasses at retail, cuts at processing plant, cuts at retail, and minced meat at retail and it is difficult to find enough categories to put all these results!). The resulting tables are then not homogenous.

2.2.4. Campylobacter in animals

Table 6.1.1 Thermophilic Campylobacter spp. in animals

		Source of information	Remarks	Epidemiological unit	Units tested	Units positive	C. jejuni	C. coli	C. lari	C. upsaliensis

Footnote

These analyses are not performed in the National Reference Laboratory

2.2.5. Antimicrobial resistance in *Campylobacter* isolates

Table Antimicrobial susceptibility testing of C. coli in Poultry meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

	C. coli
	Poultry meat - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	34

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline		71%	1		2	3	1		1		1	1	2	1	6	15						
Fluoroquinolones																						
Ciprofloxacin		62	2	2	5	2	2				3		17			1						
Quinolones																						
Nalidixic acid		59							1	5	6	1	1		2	18						
Aminoglycosides																						
Gentamicin		0				2	16	14	2													
Macrolides																						
Erythromycin		12				3	10	9	7	1			1			3						
Penicillins																						
Ampicillin		27					3	3	6	7	2	4				9						

Table Antimicrobial susceptibility testing of C. coli in Pig meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

	C. coli
	Pig meat - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	22

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline		86%										4	1	2	5	10						
Fluoroquinolones																						
Ciprofloxacin		41		8	3	1	1						9									
Quinolones																						
Nalidixic acid		41						2	7	2	2				1	8						
Aminoglycosides																						
Gentamicin		0			1		4	17														
Macrolides																						
Erythromycin		27					3	6	4	3	1					5						
Penicillins																						
Ampicillin		14				1		6	6	3	2	1	1			2						

Table Antimicrobial susceptibility testing of C. jejuni in Poultry meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

C. jejuni

Poultry meat - monitoring programme

Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	163

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline		34%	3	34	42	19	4	2	1		1	4	9	10	4	30						
Fluoroquinolones																						
Ciprofloxacin		33	17	59	26	3	2	1		2	3	2	48									
Quinolones																						
Nalidixic acid		34				1	2	25	55	20	3	1		2	3	51						
Aminoglycosides																						
Gentamicin		0			3	31	92	33	3	1												
Macrolides																						
Erythromycin		1		1	2	28	73	48	7	1	2											
Penicillins																						
Ampicillin		26			2	5	10	19	35	26	5	8	22	10	4	17						

Table Antimicrobial susceptibility testing of C. jejuni in Pig meat - monitoring programme - quantitative data [Dilution method]

Percentage of resistant isolates (R%) and percentage of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

C. jejuni

Pig meat - monitoring programme

Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	7

Antimicrobia	**N**	**%R**	**<=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**
Tetracycline		43%		2	2								1		1	1						
Fluoroquinolones																						
Ciprofloxacin		29		4	1								2									
Quinolones																						
Nalidixic acid		29				1			4					1		1						
Aminoglycosides																						
Gentamicin		0					5	2														
Macrolides																						
Erythromycin		0				3	3	1														
Penicillins																						
Ampicillin		29						1	2			2		2								

Table 6.1.2 Antimicrobial susceptibility testing of Campylobacter in animals

	Campylobacter spp.					
	Cattle (bovine animals)		**Pigs**		**Poultry**	
Isolates out of a monitoring program						
Number of isolates available in the laboratory						
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**

Footnote

These analyses are not performed in the National Reference Laboratory

Table 6.1.4 Antimicrobial susceptibility testing of Campylobacter in food

	Campylobacter spp.							
	Broiler meat		**Other poultry meat**		**Pig meat**		**Bovine meat**	
Isolates out of a monitoring program	yes				yes			
Number of isolates available in the laboratory	197				29			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline	79	40%			22	76%		
Fluoroquinolones								
Ciprofloxacin	75	38%			11	38%		
Quinolones								
Nalidixic acid	76	39%			11	38%		
Aminoglycosides								
Gentamicin	0	0%			0	0%		
Macrolides								
Erythromycin	6	3%			6	21%		
Penicillins								
Ampicillin	51	26%			5	17%		
Number of multiresistant isolates								
fully sensitives	71	36%			4	14%		
resistant to 1 antimicrobial	42	21%			8	27%		
resistant to 2 antimicrobials	30	15%			6	21%		
resistant to 3 antimicrobials	31	16%			9	31%		
resistant to 4 antimicrobials	23	12%			2	7%		
resistant to >4 antimicrobials	0	0%			0	0%		

Footnote

Broiler meat includes broiler carcasses, parts of broiler carcasses, broiler fillets, minced broiler meat and carcasses of spent laying hens.

Table 6.1.3 Antimicrobial susceptibility testing of Campylobacter in humans

	Campylobacter spp.	
	humans	
Isolates out of a monitoring program	no	
Number of isolates available in the laboratory	121	
Antimicrobials:	**N**	**%R**
Fluoroquinolones		
Ciprofloxacin	121	33%
Macrolides		
Erythromycin	121	7%

Footnote

Partial data from the reference laboratory

Table 6.1.6 Breakpoints used for antimicrobial susceptibility testing of Campylobacter in Food

Test Method Used

Disc diffusion
Agar dilution
Broth dilution
E-test

Standards used for testing

NCCLS
CASFM

Subject to quality control

Campylobacter	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	NCCLS	4	8	16	0.016	256				
Fluoroquinolones										
Ciprofloxacin	NCCLS	1	2	4	0.002	32				
Quinolones										
Nalidixic acid	NCCLS	16		32	0.016	256				
Aminoglycosides										
Gentamicin	NCCLS	4	8	16	0.016	256				
Macrolides										
Erythromycin	NCCLS	0.5		8	0.016	256				
Penicillins										
Ampicillin	NCCLS	8	16	32	0.016	256				

Table 6.1.6 Breakpoints used for antimicrobial susceptibility testing of Campylobacter in Humans

Test Method Used

Disc diffusion
Agar dilution
Broth dilution
E-test

Standards used for testing

NCCLS
CASFM

Subject to quality control

Campylobacter	Standard for breakpoint	Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		disk content	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline										
Fluoroquinolones										
Ciprofloxacin							5	22		19
Quinolones										
Nalidixic acid										
Aminoglycosides										
Gentamicin										
Macrolides										
Erythromycin							15	22		17
Penicillins										
Ampicillin										

Footnote

Partial data from the reference laboratory

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-enteritidis. Although the incidence of listeriosis is low, the high mortality rate, which often reaches as high as 30-40%, requires early diagnosis and appropriate antimicrobial therapy.
Listeriosis is transmitted to humans via contact with animals, cross-infection of foetus or newborn babies and foodborne infection . Listeria is ubiquitous and widely distributed in the environment (soil, vegetables, meat, milk, fish). All food associated with Listeria monocytogenes outbreaks were consumed without further processing or after minimal heat treatment, and many of them had a suitable environment for growth

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

In 2004, the zoonosis monitoring programme was putted in place 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, pâté, 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, pâté, 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

Data were obtained from passive surveillance through sentinel laboratory results and from the National Reference Laboratory. All cases are updated weekly.
Listeria monocytogenes in humans since 1997:
1997 : 45
1998 : 60
1999 : 64
2000 : 48
2001 : 57
2002 : 44
2003 : 76

Table 7.2.A Listeriosis in man - species/serotype distribution

Listeria	Cases	Cases Inc
	70	0
Listeria spp.	70	
congenital cases	6	
deaths	3	

Table 7.2.B Listeriosis in man - age distribution

Age Distribution	L. monocytogenes			Listeria spp.		
	All	M	F	All	M	F
<1 year	7	1	2			
1 to 4 years						
5 to 14 years	2	1	1			
15 to 24 years	1	1				
25 to 44 years	7	2	5			
45 to 64 years	18	13	4			
65 years and older	35	22	13			
Age unknown						
Total :	70	40	25	0	0	0

Footnote

unknown gender for 5 cases

2.3.3. Listeria in foodstuffs

A. L. monocytogenes in food

Monitoring system

Sampling strategy

A monitoring programme was done in 2004 (January to December) by the Federal Agency for the Safety of the Food Chain. Data processing and reporting have been done by the National Reference Laboratory for Food Microbiology, Prof. G. Daube. More than 100 meat cutting plants and more than 200 retail trades representative of the Belgian production of carcasses and meat, were selected for this study. The samples assayed were minced meat from beef and pork, chicken meat preparation, cooked ham, paté, salami and smoked salmon. 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

At retail

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

Methods of sampling (description of sampling techniques)

At the production plant

The samples were putted in a cool box and transported to the laboratory within 24h. They were analysed within 24h after reception. In November and December, the samples were transferred to a dispatching centre of the Federal Agency for the Safety of the Food Chain and the laboratory take them at the dispatching centre. The time before analysis was then 1 to 2 days longer in general.
The samples were about 200g of meat. The detection of Listeria monocytogenes has been assessed in 1g for beef and pork minced meat and for salami, in 25g for ham, pate and smoked salmon.

At retail

The samples were putted in a cool box and transported to the laboratory within 24h. They were analysed within 24h after reception. In November and December, the samples were transferred to a dispatching centre of the Federal Agency for the Safety of the Food Chain and the laboratory take them at the dispatching centre. The time before analysis was then 1 to 2 days longer in general.
The samples were about 200g of meat.
The detection of Listeria monocytogenes has been assessed in 0,01g for all samples.

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, absence in 0,01g in ready-to-eat food putted on the market is mandatory. Laboratories have to inform the Federal Agency in case of positive sample.

Table 7.1 Listeria monocytogenes in food

	Source of information	Remarks	Epidemiological unit	Sample weight	Definition used	Units tested	<100 cfu/g	>100 cfu/g	L. monocytogenes
Bovine meat	natl random survey	carpaccio at retail	sample	0.01g		95			0
meat products									
ready-to-eat									
- at processing plant	natl random survey	minced meat	sample	1g		236			32
- at retail	natl random survey	minced meat	sample	0.01g		98			2
meat preparation	natl random survey	steak tartare at retail	sample	0.01g		110			0
Pig meat	natl random survey	fermented sausages at retail	sample	0.01g		78			1
meat products	natl random survey	raw ham	sample	0.01g		114			0
ready-to-eat	natl random survey	cooked ham at retail	sample	0.01g		350			1
- at processing plant	natl random survey	minced meat	sample	1g		262			46
- at processing plant - environmental sample	natl random survey	patÃ©	sample	25g		243			3
- at retail	natl random survey	minced meat	sample	0.01g		152			8
cooked ham	natl random survey	at processing plant	sample	25g		266			10
fermented sausages	natl random survey	at processing plant	sample	1g		224			18
meat preparation	natl random survey	patÃ© at retail	sample	0.01g		326			3
Other meat									
meat products									
ready-to-eat									
- at retail	natl random survey	various meat salads (tuna, surimi, shrimps)	sample	0.01g		149			0
Cheeses									

- at retail		natl random survey	raw milk cheese	sample	0.01g		147			0
Fishery products										
fish										
smoked										
- at processing plant		natl random survey	smoked salmon	sample	25g		63			5
- at retail		natl random survey	smoked salmon at end of shelflife	sample	0.01g		59			2
other										
- at retail		natl random survey	prepared dishes	sample	0.01g		121			2
Broiler meat										
minced meat		natl random survey	at retail	sample	0.01g		330			26

Footnote

Belgium often realize analyses in different dilution or quantity of sample (25g, 1g, 0.1g and or 0.01g) on the same type of sample (e.g. minced meat from pork, but the tables does not allow to have twice the same type of sample. So the results are added to another table(e.g. for bovine minced meat or meat preparation based on mince meat, Belgium analyses minced meat at processing plant in 1g, at retail in 0.01g, steak tartare in 0.01g, and also carpaccio in 0.01g and it is difficult to find enough categories to put all these results!). The resulting tables are then not homogenous.

2.4. VEROCYTOTOXIC ESCHERICHIA COLI

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 (as a source of infection)

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. Verocytotoxic Escherichia coli in humans

A. Verotoxigenic Escherichia coli infections in humans

Relevance as zoonotic disease

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.

Table 11.3.A Verocytotoxic Escherichia coli infections in man - species/serotype distribution

Pathogenic Escherichia coli	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
HUS						
- clinical cases						
- lab. confirmed cases	9		9		0	
- caused by O157 (VT+)	9		9		0	
- caused by other VTEC	0		0		0	
E.coli infect. (except HUS)						
- laboratory confirmed	36		35		1	
- caused by 0157 (VT+)	20		20		0	
- caused by other VTEC	16		15		1	

Table 11.3.B Verocytotoxic Escherichia coli infections in man - age distribution

Age Distribution	Verotoxigenic E. coli (VTEC)			VTEC O 157:H7			VTEC non-O 157		
	All	M	F	All	M	F	All	M	F
<1 year	1	0	1	0	0	0	1	0	1
1 to 4 years	15	10	5	9	4	5	6	6	0
5 to 14 years	10	3	7	10	3	7	0	0	0
15 to 24 years	2	1	1	1	0	1	1	0	1
25 to 44 years	1	0	1	1	1	0	2	1	1
45 to 64 years	7	4	3	4	2	2	3	2	1
65 years and older	4	2	2	3	1	2	1	1	0
Age unknown	3	0	3	1	0	1	2	0	2
Total :	43	20	23	29	11	18	16	10	6

2.4.3. Pathogenic Escherichia coli in foodstuffs

A. Verotoxigenic E. coli (VTEC) in food

Monitoring system

Sampling strategy

A monitoring programme was done in 2004 (January to December) by the Federal Agency for the Safety of the Food Chain. Data processing and reporting have been done by the National Reference Laboratory for Food Microbiology, Prof. G. Daube. 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, cuts and minced meat from beef. 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 the laboratory within 24h. They were analysed within 24h after reception. In November and December, the samples were transferred to a dispatching centre of the Federal Agency for the Safety of the Food Chain and the laboratory take them at the dispatching centre. The time before analysis was then 1 to 2 days longer in general.
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 42°C for 7 hours,

- enrichment in CT-Mac Conkey at 37°C for 16-18 hours;
- immunoassay O157 (VIDAS ECO, bioMérieux),
- selective immunomagnetic enrichment (Dynabeads, Dynal or VIDAS ICE, bioMérieux),
- isolation on sorbitol-Mac Conkey and incubation at 42°C for 18 h,
- isolation and confirmation (agglutination of latex particles, Oxoid),
- search for genes encoding for virulence factors in national reference laboratory.

Preventive measures in place

Controls are 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.

Notification system in place

See control program.

Table 11.2 Verocytotoxic Escherchia coli in food

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	VTEC O 157	VTEC O 157:H7
Bovine meat	natl random survey	minced meat at retail	sample	25g	98	1		
fresh								
- at slaughter	natl random survey	carcasses	sample	1600cm2	1319	18		18
- at processing plant	natl random survey	cuts	sample	25g	244	2		2
minced meat	natl random survey	at processing plant	sample	25g	234	0		
meat preparation	natl random survey	steak tartare at retail	sample	25g	109	1		
Dairy products	natl random survey	raw milk cheese at retail	sample	25g	147	0		

Footnote

Belgium often analyses different types of sample on the same type of meat, but the tables does not allow to have twice the same type of sample. So the results are added to another table (e.g. for bovine meat Belgium analyses carcasses at slaughter, cuts at processing plant, minced meat at processing plant, minced meat at retail, and also steak tartare at retail, and it is difficult to find enough categories to put all these results!). The resulting tables are then not homogenous.

2.4.4. Pathogenic Escherichia coli in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

In case E. coli O157 is isolated from a carcass at the slaughterhouse (official zoonosis programme), the farm of origin is traced back. Faecal samples are taken by the competent authority from 10 percent of the animals aged between 6 months and 2 years, with a maximum of 20 animals. In addition, samples of the available feed and of dust are collected. If one of the faeces samples is positive for E. Coli O157, new faeces samples are taken from 10% of the animals aged between 6 months and 2 years, with a maximum of 20 samples. Of these new samples, all animals which had positive faecal samples the first time, are resampled.

Diagnostic/analytical methods used

Animals at farm

Bacteriological method: ISO 16654:2001

Animals at slaughter (herd based approach)

Bacteriological method: ISO 16654:2001

Measures in case of the positive findings or single cases

Hygienic and management measures are imposed on these farms during the period that the samples are analysed in the laboratory. The sale of not heat-treated milk or milk products is prohibited and animals can not be sold.
If results are positive, the animals with positive faeces samples are isolated and can only leave the farm, with permission of the competent authority, to be slaughtered. The sale of not heat-treated milk is prohibited. A resampling takes place after 6 weeks.

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

The faecal, feed and dust samples were enriched in mTSB and treated by immunomagnetic separation. Subsequently, the suspected colonies on CT-SMAC were latex agglutinated for the detection of E. coli O157. Confirmation of serotype (O group) was done by means of slow tube agglutination after heating of the bacterial cultures. Virulence factors were determined by PCR for toxin genes vt1 and vt2, and for eae (intimin) specific sequences.
A typical E. coli O157 isolate is defined as a strain isolated by immunomagnetic separation and O157 specific agglutination and confirmed by PCR as vt2 and eae positive. An atypical E. coli O157 had either no eae or vt gene.
Laboratory findings are available on clinical E. coli strains sent to the National Reference Laboratory for VTEC, animal health for analysis. A VTEC strain was identified as a VT1 or VT2 positive E. coli strain.
In 2003 only 4 herds were sampled following identification of E. coli O157 on carcasses in the

slaughterhouse. On three herds E. coli O157 VT2 eae was isolated and on one herd E. coli O157 without vt (atypical EHEC).
Of the 184 bovine E. coli strains from clinical cases analysed in 2003 at the National Reference Laboratory, only 6 were VTEC. Of these, 5 were of pathotype VT1 eae (known to be associated with diarrhea), and 1 was VT1.
In 2004 a total of 11 herds were monitored, after E. coli O157 was isolated at the surface of a carcass that was delivered at the slautherhouse. A total of 102 samples were taken from faeces, dust and feed (occasionally from water). From these, two herds were found positive (E. coli O157, VT2 EAE) and samples were taken a second time approximately six weeks later.
Finally, only on one herd E. coli O157 VT2 EAE was detected.

Table 11.1 Verocytotoxic Escherchia coli in animals

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	VTEC O 157	VTEC O 157:H7
Cattle (bovine animals)							
unspecified			animal	59	2		2

2.5. TUBERCULOSIS

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 drinking of milk from infected cattle. Industrial heat treating production methods or pasteurisation of 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 on going in order to evaluate the presence of similar strains in both species.
Also in 2004, 5 human cases of bovine tuberculosis were diagnosed.

Recent actions taken to control the zoonoses

The control of tuberculosis is based on European Directive 64/432/EEC, which is implemented and adapted in the national legislation since 1963 and last adapted by Royal Degree of 17th of 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 suspicion case (tracing-on and tracing-back of all contact animals).
Systematic post mortem examinations at the slaughterhouse are performed as well.
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) the animals or to kill them (test slaughter). In case a suspected lesion is identified, a sample is sent to the National Reference Laboratory for analysis. Consequently, if Mycobacterium bovis is isolated, all animals in the herd of origin are skin tested and a complete epidemiological investigation is made. The 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 and molecular typing by means of RFLP, spoligotyping or 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 of a positive TB case in a holding of a MS and this holding of origin did export bovines to other MS during the last two years, the exporting MS informs all MS who bought the animals to perform tests on these imported bovines and 'contact' bovines to eventually realise an early TB case detection. If necessary, sanitary measures can be taken by the competent authority.

2.5.2. Tuberculosis in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

National notification system by the National Reference Laboratory.

Case definition

Person from whom M. bovis has been isolated

Diagnostic/analytical methods used

Human tuberculin skin test
RX of lungs
Isolation by culture

Notification system in place

National notification system / Notification of laboratory confirmed cases

History of the disease and/or infection in the country

In 2002, 4 cases of M. bovis infection were detected in humans. Two of those patients were farmers and in both farms M. bovis was isolated from their cattle. Strains isolated from one patient and from his cattle were compared by means of RFLP and spoligotyping. Both strains had the same pattern, suggesting that bovine tuberculosis is still an occupational zoonosis in Belgium.
In 2003, 5 human cases of bovine tuberculosis were identified. Molecular typing of strains isolated from cattle and human cases was performed in order to evaluate the presence of similar strains in both species.
In 2004, 5 human cases of bovine tuberculosis were identified.
The number of human cases is underestimated because the specific identification of M. bovis of the Mycobacterium spp. group is only realised on special demand of the medical attendant. The identification method of Mycobacterium spp. is based on PCR of the 16SrRNA gene.

Results of the investigation

The incidence of tuberculosis shows little variation over the last years (10 to 13 per 100.000 inhabitants).
Number of cases of human tuberculosis: in 2001, 2002, 2003 and 2004 respectively 1321, 1309, 1128 and 1244 new notified cases of active tuberculosis. Over 60% of the detected cases were male patients. The general age distribution pattern is 30-35% between 15-24 years, 35-40% between 25-34 years, 10% between 35-44 years and 15% between 45-54 years of age.
More then 50% of the TB cases are foreigners. The autochtonous TB cases are detected mostly in elderly persons.
Groups at risk are marginals, asylum seekers, refugees and special risk factors are alcoholism and a co-infection with HIV.
Human TB cases are mainly concentrated in urban populations.

Relevance as zoonotic disease

Mycobacterium bovis still remains an important possible source of infection in case of bovine tuberculosis in cattle.

Additional information

Source of information on human TB cases: Vlaamse Vereniging voor Respiratoire Gezondheidszorg en Tuberculose bestrijding (VRGT) en het Fonds des Affections Respiratoires (FARES) on webpage www.vrgt.be

Table 1.2.A Tuberculosis in man - species/serotype distribution

Mycobacterium	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	1249	0	0	0	0	0
M. bovis	5					
M. tuberculosis reactivation of previous cases	1244					

Table 1.2.B Tuberculosis in man - age distribution

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

Footnote

The age distribution for human tuberculosis is yet not available.
The general age distribution pattern is 30-35% between 15-24 years, 35-40% between 25-34 years, 10% between 35-44 years and 15% between 45-54 years of age.
More then 50% of the TB cases are foreigners. The autochtonous TB cases are detected mostly in elderly persons.
Groups at risk are marginals, asylum seekers, refugees and special risk factors are alcoholism and a co-infection with HIV.
Human TB cases are mainly concentrated in urban populations.

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 (Decision 2003/467/EC)

Monitoring system

Sampling strategy

Surveillance system.
The control of tuberculosis is based on European Directive 64/432/EEC, which is implemented and adapted in the national legislation since 1963 and last adapted by Royal Decree of 17th of October 2002.
The control implies:
- skin testing of animals at the occasion of trade (purchase) by the veterinary practician responsible for the epidemiological surveillance on the holding (contract between farmer and veterinarian);
- intensive skin testing in case of an infected bovine on the holding and intensive testing of all 'contact' animals (tracing on and tracing back);
- systematic post mortem examinations at the slaughterhouse;
- transmission to the National Reference Laboratory of all of TB suspected lesions for analysis.
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) the animals or to kill them (test slaughter) for additional analysis. In case a suspected lesion is identified, a sample is sent to the reference laboratory for analysis. Consequently, if Mycobacterium bovis is isolated, all animals in the herd of origin are skin tested, and a complete epidemiological investigation is made.
Isolation of M. bovis and biochemical testing is exclusively performed in the National Reference Laboratory where also IFN-gamma and molecular typing by means of RFLP, spoligotyping and MIRU-VNTR are done.

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.
A holding is defined as infected if Mycobacterium bovis was isolated from an animal of the holding.

Diagnostic/analytical methods used

- simple skin testing with bovine tuberculin;
- comparative skin testing with bovine and avian tuberculin;
- Ziehl-Neelsen coloration

- Culture for isolation
- Interferon-gamma
- PCR on lesions
- PCR on culture
- RFLP typing
- Spoligotyping
- MIRU-VNTR

Vaccination policy

No vaccination is allowed in Belgium.

Control program/mechanisms

The control program/strategies in place

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

Measures in case of the positive findings or single cases

If M. bovis is isolated, all animals in the herd of origin are skin tested, the herd is considered as the epidemiological unit. A complete epidemiological investigation is made. By tracing-back and tracing-on all animals of 'contact' farms are examined by skin testing. If any doubtful or positive result of the skin test, the FASFC may decide to re-examine (additional tests e.g. comparative skin testing with avian and bovine tuberculin and/or Interferon-gamma testing) the animals or to kill them (test slaughter) for additional analysis. In case a suspected lesion is identified, 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 compulsory slaughtered. After stamping out, new restocked animals are followed up during 5 years with an annual skin testing programme.

Notification system in place

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

Results of the investigation

In 2001, 20 outbreaks were notified. In total 792 reactors corresponded to the intensive testing of infected and contact farms.
In 2002, 10 infected herds were notified. A total of 799 animals reacted after tuberculination. Stamping out was performed in 6 herds.
In 2003, a total of 7 infected herds 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 herds were detected.

Additional information

In 2004, 142 tissue samples from 44 herds were submitted to the Belgian Reference Laboratory for Bovine Tuberculosis (Veterinary and Agrochemical Research Center). These samples (taken at the slaughter houses) originated from animals suspected of being infected with M. bovis, i.e. skin test reactors, animals in contact with M. bovis infected animals, or showing suspect lesions at meat inspection. M. bovis was isolated by culture from 8 herds. PCR tests were applied on tissue samples originating from 6 of these 8 herds, allowing rapid confirmation of their status.
The Veterinary and Agrochemical Research center performs routine IS6110 RFLP typing and spoligotyping of M. bovis field isolates in Belgium. Since 1995, 96% of the outbreak herds had their isolates typed by both methods. More recently, MIRU-VNTR typing has also been performed in collaboration with Pasteur Institute Brussels. All isolates typed by RFLP and spoligotyping were further analysed by MIRU-VNTR, resulting in a comprehensive database of the vast majority of M. bovis types circulating in Belgium since 1995.
For 2004, the Mycobacterium bovis isolates originating from 5 out of the 8 outbreak herds belonged to lineages already known to circulate in Belgium since 1995: in a first group of 3 epidemiologically related herds, one common molecular type of strains isolate has been identified (1 band profile in IS-6110 RFLP, Spoligotype SB0991) and in two other herds two other distinct types were isolated (9 bands profile in IS-6110 RFLP, Spoligotype SB0162, 1 band profile in IS-6110 RFLP, Spoligotype SB1086). In the three remaining herds, 2 types of strains isolates that did not belong to known circulating lineages have been isolated: one type was isolated and shared by two epidemiologically related herds (8 bands profile in IS-6110 RFLP, Spoligotype SB0134, exotic MIRU-VNTR profile) and an other unknown second type was identified in the last herd (no band in IS-6110 RFLP, Spoligotype SB1085, exotic MIRU-VNTR profile).
No case of bovine tuberculosis was found in the Belgian wildlife in 2004.

Table 1.1.3 Tuberculosis in animals

		Source of information	Remarks	Epidemiological unit	Units tested	Units positive	M. bovis	M. tuberculosis

Footnote

No cases of tuberculosis of these animal species were diagnosed after post mortem examinations or analyses of suspected lesions .

1.1.1 Bovine tuberculosis

MANDATORY	**CATTLE**		
Number of herds under official control:(7)	42553	Number of animals under official control:	280915
	OTF bovine herds	**OTF bovine herds with status suspended**	**Bovine herds infected with tuberculosis**
Status of herds at year end (a):(1)	42549	4	4
New cases notified during the year (b):(2)		8	8
	Units tested	**Units suspected**	**Units positive**
Routine tuberculin test (c) - data concerning herds:(3)	3371	8	8
Routine tuberculin test (c) - data concerning animals:	294871	580	93
	Animals slaughtered	**Animals suspected**	**Animals positive**
Routine post-mortem examination (d):(4)	881535	42	42
		Herds suspected	**Herds confirmed**
Follow up of suspected cases in post-mortem examination (e):		5	5
Follow-up investigation of suspected cases: trace, contacts (f):(5)		3	3
	Animals tested	**Animals suspected**	**Animals positive**
Other routine investigations: exports (g):			
Other routine investigations: tests at AI stations (h):			
	All animals	**Positives**	**Contacts**
Animals destroyed (i):	2	0	0
Animals slaughtered (j):(6)	447	42	0

VOLUNTARY	**CATTLE**		
	Animals tested	**Animals suspected**	**Animals positive**
Other investigations: imports (k):			
	Herds tested	**Herds suspected**	**Herds positive**
Other investigations: farms at risk (l):			
	Samples tested	***M. bovis*isolated**	
Bacteriological examination (m):	142	46	

(1) : Situation at the end of the year
(2) : Cumulative incidence over the year
(3) : Intensive testing by tracing- back and tracing-on in case of an infected herd.
(4) : Post-mortem examination of healthy slaughtered bovines and compulsory slaughtered bovines in case of a partial or a total stamping out of an infected holding.
Post-mortem examination of carcasses: 39 with generalised and 3 with localised TB lesions
(5) : 3 TB herds were detected by tracing-back of 2 earlier detected TB herds
(province of "Oost-Vlaanderen").
(6) : partial or total compulsory slaughtered bovines of infected holdings
(7) : Situation at the end of the year

2.6. BRUCELLOSIS

2.6.1. General evaluation of the national situation

2.6.2. Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

Notification of laboratory confirmed cases.

Notification system in place

National reference laboratory

History of the disease and/or infection in the country

Zoonotic brucellosis (Brucella melitensis, Brucella abortus, Brucella suis) Bacteria of the genus Brucella may infect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals, where they cause disease. Humans become infected by coming in contact with infected animals or with contaminated animal products. Brucella infections in humans may cause a range of symptoms that are similar to that of flu and may include fever, sweats, headaches, back pains, and physical weakness. Several infections of the central nervous systems or lining of the heart may occur.
The majority of brucellosis cases are imported and are caused by B. melitensis. The consumption of raw milk or raw cheese from sheep and goats is thought to be the major source of contamination.

Table 2.3.A Brucellosis in man - species/serotype distribution

Brucella	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	8	0	0	0	2	0
B. abortus						
B. melitensis	8				2	
B. suis						
occupational cases						

Table 2.3.B Brucellosis in man - age distribution

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

2.6.3. Brucella in foodstuffs

Table 2.2 Brucella sp. in food

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	B. melitensis	B. abortus	B. suis
cow milk								
raw (1)			farm	14270	0			

(1) : National Surveillance programme: examination of 102.267 pools of bulk milk samples of 14.270 dairy cattle holdings.

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 (Decision 2003/467/EC)

Monitoring system

Sampling strategy

Since Belgium is officially free from bovine tuberculosis, 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.
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.

Type of specimen taken

Blood

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 tank milk
- micro agglutination test
- indirect Elisa
- culture for isolation
- skin testing with brucellin

Vaccination policy

Vaccination has been 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 older than 2 years of the holding are serologically tested.
Beef cattle and dairy cattle: in case of a positive micro-agglutination test the same blood sample is tested with an indirect Elisa. If this last test is positive, the animal is considered to be infected and is compulsary slaughtered for additional analysis to isolate Brucella.
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

The 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.
The annual herd prevalence notified at the year end was 1,13% in 1988 and has fallen below 0.01% since 1998. In March 2000, the last case of bovine brucellosis was identified. No infected herd was recognised in Belgium since then.

The Federal Agency for the Safety of the Food Chain instructed the test slaughter of 58 animals during 2003, 85 animals in 2002, 239 animals in 2001 and the 436 in 2000 for additional analysis. These analysis could not confirm brucellosis. All these animals were false positive serological reactors (FPSR) to the micro-agglutination tests. To reduce the number of FPSR to be slaughtered, the micro-agglutination test has been used as for routine testing whereas the indirect Elisa is accepted as the confirmatory test.

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.
Decision 2001/292/CE.

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.
7136 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 iELISA 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 again. All 16 re-tested animals presented a negative test result in CFT. All brucellosis tests performed at VAR are officially accredited (ISO 17025).
In case of positive test results, a skin test should be performed on the seropositive animals and the congeneers. A positive skin test leads to the bacteriological investigation of the animal.
In 2001, 2002, 2003 and 2004 about 7 000 serum samples were tested at the National Reference Laboratory. In addition, serum samples from sheep for export were analysed. The results confirmed those of previous years, i.e. the absence of any epidemiological or bacteriological evidence of ovine brucellosis in Belgium.

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
- Skin test with brucellin

C. Brucella melitensis in Goat

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Belgium is officially free of B. melitensis.
Decision 2001/292/CE

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.
7136 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 iELISA were than 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 again. All 16 re-tested animals presented a negative test result in CFT. All brucellosis tests performed at VAR are officially accredited (ISO 17025)
In case of positive test results, a skin test should be performed on the seropositive animals and the congeneers. A positive skin test leads to the bacteriological investigation of the animal.
In 2001, 2002, 2003 and 2004 about 1500 caprine serum samples were tested at the National Reference Laboratory. The results confirmed those of previous years, i.e. the absence of any epidemiological or bacteriological evidence of caprine brucellosis in Belgium.

Case definition

A goat 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

Complement Fixation Test CFT
Rose Bengal Test RBT
Indirect ELISA
Skin testing with brucellin
Culture for isolation

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.

Control program/mechanisms

The control program/strategies in place

Regional control 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 identified bacteriological isolates of Brucella in these species.

Table 2.1.3 Brucellosis in animals

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	B. melitensis	B. abortus	B. suis
Pigs (1)				57				1
Wildlife								
hares (2)				15				0

(1) : Bacteriological tests of tonsils of hunted wild boar:
1 positif for Brucella suis biovar 2
(2) : Bacteriological control and PCR assays of the spleens of 10 hares and 5 wild rabbits

2.1.1 Bovine brucellosis

MANDATORY	CATTLE		
Number of herds under official control:(7)	42553	Number of animals under official control:	2807915
	OBF bovine herds	**OBF bovine herds with status suspended**	**Bovine herds infected with brucellosis**
Status of herds at year end (a):	42553	0	0
New cases notified during the year (b):(6)	0	2	0
	Animals tested	**Animals suspected**	**Animals positive**
Notification of clinical cases, including abortions (c):(4)	4240		0
	Units tested	**Units suspected**	**Units positive**
Routine testing (d1) - data concerning herds:(1)	22762	2	0
Routine testing (d2) - number of animals tested:(2)	225669	0	0
Routine testing (d3) - number of animals tested individually:(3)	262879	0	0
		Herds suspected	**Herds confirmed**
Follow-up investigation of suspected cases: trace, contacts (e):			
	Animals tested	**Animals suspected**	**Animals positive**
Other routine investigations: exports (f):			
Other routine investigations: tests at AI stations (g):			
	All animals	**Positives**	**Contacts**
Animals destroyed (h):			
Animals slaughtered (i):(5)	2	0	0

VOLUNTARY	CATTLE		
	Animals tested	**Animals suspected**	**Animals positive**
Other investigations: imports (k):			
	Herds tested	**Herds suspected**	**Herds positive**
Other investigations: farms at risk (l):			
	Samples tested	**Brucella isolated**	
Bacteriological examination (m):	25	0	

(1) : routine testing of holdings by serological tests and examination of bulk milk samples
(2) : Surveillance programme:
- 225669 serological tests
- 102267 pools of bulk milk samples
(3) : 262879 serological tests of animals before introduction into a holding.
(4) : Abortions
(5) : Test slaughter of two serological false positive reacting bovines for additional examinations.
(6) : The OBF status of two holdings was temporary suspended due to false positive serologic reacting of two bovines. The results of the additional examinations after test slaughter of the false positive reactors was finally negative.
(7) : at year end

Footnote

Serological false positive testing animals by agglutination (4.617) were finally negative by repeated serological analysis with agglutination and Elisa tests. Microbiological examination was negative for 2 compulsory slaughtered animals with permanent positive serological test results.

2.1.2 Ovine and caprine brucellosis

MANDATORY	SHEEP AND GOATS		
Number of holdings under official control:(1)	45141	Number of animals under official control:	252278
	OBF ovine and caprine holdings	**OBF ovine and caprine holdings with status suspended**	**OBF ovine and caprine holdings infected with brucellosis**
Status of herds at year end (a):	45141		
New cases notified during the year (b):	0		
	Animals tested	**Animals suspected**	**Animals positive**
Notification of clinical cases, including abortions (c):	0		
	Units tested	**Units suspected**	**Units positive**
Routine testing (d) - data concerning holdings:			
Routine testing (d) - data concerning animals:	7136	0	0
		Holdings suspected	**Holdings confirmed**
Follow-up investigation of suspected cases: trace, contacts (e):			
	Animals tested	**Animals suspected**	**Animals positive**
Other routine investigations: exports (f):			
	All animals	**Positives**	**Contacts**
Animals destroyed (g):	0		
Animals slaughtered (h):	0		
VOLUNTARY	**SHEEP AND GOATS**		
	Animals tested	**Animals suspected**	**Animals positive**
Other investigations: imports (i):			
	Holdings tested	**Holdings suspected**	**Holdings positive**
Other investigations: farms at risk (j):			
	Samples tested	**Brucella isolated**	
Bacteriological examination (k):			

(1) : sheep holdings 31405
goat holdings 13736
sheep 214612
goat 37666

2.7. YERSINIOSIS

2.7.1. General evaluation of the national situation

A. Yersinia entercolitica general evaluation

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

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.

2.7.2. 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.

History of the disease and/or infection in the country

The number of cases reported for human yersiniosis since 2000:
2000 : 507
2001 : 375
2002 : 330
2003 : 338
There is a clear stabilization in the number of infections reported in man in Belgium.

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.

Table 8.3.A Yersiniosis in man - species/serotype distribution

Yersinia	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	494	0	0	0	0	0
Y. enterocolitica	137					
Y. enterocolitica O:3	337					
Y. enterocolitica O:9	20					

Table 8.3.B Yersiniosis in man - age distribution

Age Distribution	Y. enterocolitica			Yersinia spp.		
	All	M	F	All	M	F
<1 year	7	1	6			
1 to 4 years	125	69	56			
5 to 14 years	91	57	34			
15 to 24 years	16	9	7			
25 to 44 years	30	14	16			
45 to 64 years	25	10	15			
65 years and older	26	7	19			
Age unknown	6					
Total :	326	167	153	0	0	0

Table 8.3.C Yersiniosis in man - seasonal distribution

Month	Y. enterocolitica	Yersinia spp.
	Cases	Cases
January	50	
February	33	
March	24	
April	33	
May	23	
June	17	
July	21	
August	27	
September	20	
October	32	
November	20	
December	26	
not known		
Total :	326	0

2.7.3. Yersinia in foodstuffs

Table 8.2 Yersinia enterocolitica in food

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	Y. enterocolitica	Y. enterocolitica O:3	Y. enterocolitica O:9
Pig meat									
fresh									
- at processing plant	natl random survey	minced meat	sample	1g	198	0			
- at retail	natl random survey	minced meat	sample	1g	103	0			

2.7.4. Yersinia in animals

Table 8.1 Yersinia enterocolitica in animals

		Source of information	Remarks	Epidemiological unit	Units tested	Y. enterocolitica	Y. enterocolitica O:3	Y. enterocolitica O:9

Footnote

These analyses are not performed in the National Reference Laboratory

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 of pigs at the slaughterhouse level. 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, caused by a home raised wild boar, occured in 1978.

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

A hunted wild boar was detected positive after systematic sampling in 2004.

Suggestions to the Community for the actions to be taken

Considering the lasting negative results in pigs originating from industrial holdings, the creation of the Status Trichinella free Pigfarm could be studied.

2.8.2. Trichinellosis in humans

A. Trichinellosis in humans

History of the disease and/or infection in the country

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

2.8.3. Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

Permanent surveillance at the slaughter-houses.

Frequency of the sampling

Every slaughtered animal is sampled

Type of specimen taken

Diaphragm muscle

Methods of sampling (description of sampling techniques)

Pig: 1 gramme of diaphragm for pooled samples
Wildboar: 5 gramme of tongue / diaphragm for pooled samples, 10 to 25 gramme for individual analysis

Diagnostic/analytical methods used

Artificial digestion method of collective samples

Control program/mechanisms

The control program/strategies in place

Ministerial Order of 18 November 1991 imposes systematic Trichinella examination of all pig carcasses intended for export, and all horses, wild boar and other susceptible wildlife animals. The analysis is done by artificial digestion: the magnetic stirrer method of pooled 100 gram sample as described in Directive 77/96/CEE, 1 g per pig and 5 g per horse and wild boar.
Serology may be done in live pigs and for epidemiological studies on wildlife.

Recent actions taken to control the zoonoses

It is recommended to travellers not to import raw meats of unknown origin and of susceptible animals, e.g. home made sausages, bear; and not to consume meats of unknown quality abroad.

Measures in case of the positive findings or single cases

Carcasses found positive are declared unfit for consumption.

Notification system in place

Notification to the Federal Agency for the Safety of the Food Chain is compulsory.

B. Trichinella in horses

Monitoring system

Sampling strategy

Permanent surveillance at the slaughter houses.

Frequency of the sampling

Every slaughtered animal is sampled

Type of specimen taken

Musculus masseter

Methods of sampling (description of sampling techniques)

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

Diagnostic/analytical methods used

Artificial digestion method of collective samples

Control program/mechanisms

The control program/strategies in place

Ministrial Degree of 18 November 1991 imposes systematic Trichinella examination of all slaughtered pigs, horses and wild boar and other wildlife animals by artificial digestion method of muscle before marketing.
The magnetic stirrer method for pooled sample digestion as described in Directive 77/96/CEE was used: 1g per pig and 5 g per horse and wild boar.
Serology may be done for specific studies.

Notification system in place

Notification to the Federal Agency for the Safety of the Food Chain is compulsory.

Table 4.1 Trichinella in animals

	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive
Pigs	FASFC - ITG		individual animal	10284186	0
Solipeds	FASFC - ITG		individual animal	11416	0
Wildlife					
wild boars (1)	FASFC - ITG		individual animal	8167	1
foxes	ITG		individual animal	91	1
badgers	ITG		individual animal	30	0
marten	ITG		individual animal	42	0
polecat	ITG		individual animal	52	0
rat	ITG		individual animal	92	0

(1) : Trichinella britovi positive

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

The following partial rejections were noted by the Federal Agency for the Safety of the Food Chain in 2003: 200 cases of adult cattle and 3 of sheep. Echinococcus granulosus was not detected in calves, pigs, goats or wild boars.

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

Echinococcosis is caused either by Echinococcus granulosus or Echinococcus multilocularis.
Echinococcus granulosus produces unilocular human hydatidosis. It is a small tapeworm (6 mm) that lives in the small intestine of domestic and wild canids. Sheep and cattle serve as intermediate hosts for the infection. Humans acquire infection by ingestion of typical taeniid eggs, which are excreted in the faeces of infected dogs: the oncospheres liberated from the eggs migrate via the bloodstream to the liver, lungs and other tissues to develop in hydatid cysts. Indigenous unilocular hydatidosis in man has been reported in Belgium.
Echinococcus multilocularis causes alveolar (multilocular) echinococcosis in humans.
Foxes and dogs are the definitive hosts of this parasite and small rodents the intermediate hosts. In the liver of rodents the invasive larval stage has a multi-compartimented appearance containing many protoscolices. Ingestion of the eggs by humans can result in the development of invasive cysts in the liver.In Belgium, the percentage of infected foxes varies with the region, with a decreasing rate from the South-East to the North-West: e.g 33% in the Ardennes, 13% in the Condroz region and 2% in Flanders. The endemic region is situated under the river Meuse, on the heights of the Ardennes.

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

Post mortem macroscopic examination is performed at the slaughterhouse 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

A. Echinococcus spp in humans

History of the disease and/or infection in the country

Only six human cases of alveolar echinococcosis have been detected in Belgium since 1999, thanks to an efficient information campaign in wooded areas.

Table 9.2.A Echinococcosis in man - species/serotype distribution

	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
Echinococcus	1	0	0	0	0	0
E. granulosus						
E. multilocularis	1					
Echinococcus spp.						

2.9.3. Echinococcus in animals

Table 9.1 Echinococcus sp. in animals

	Source of information	Remarks	Epidemiological unit	Units tested	Echinococcus spp.	E. multilocularis	E. granulosus
Cattle (bovine animals)				881535	48		
Sheep				87119	2		
Goats				3814	0		
Pigs				11229149	0		
Solipeds				11655	0		

Footnote

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

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 (as a source of infection)

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

2.10.2. Toxoplasmosis in humans

A. Toxoplasmosis in humans

History of the disease and/or infection in the country

Toxoplasmosis during pregnancy can cause fetal infection. Manifestations of congenital toxoplasmosis in the fetus and newborn are unpredictable, they range from inta-uterine death, hydrocephalus and severe mental retardations to less severe lesions as ocular disorders. As the disease is generally asymptomatic, diagnosis relies on serological tests. Primary prevention intends to prevent the infection of the fetus, while secondary prevention aims at reducing the severity of sequelae. Although cats play a role in the epidemiology of the disease, there is no statistical correlation between toxoplasmosis infection and cat ownership.

The life cycle of this protozoan is fully known and theoretically prevention of the infection is possible. Humans are mostly infected by the oral route: by either ingestion of oocytes excreted by cats or by ingestion of cysts present in adequately cooked meat. If seronegative pregnant women adopt measures aimed at avoiding the ingestion of potencially infectious items, the risk of infection can be reduced.

Prevention of congenital toxoplasmosis is most often based on the results of a serological screening program in pregnant women followed by prenatal and postnatal treatment of women and their newborns when infection is already established during pregnancy (secondary prevention).

Efforts are made for primary prevention of toxoplasmosis during pregnancy. Primary prevention is based on education by physicians about preventive measures and distribution of leaflets containing written recommendations on the nature of the disease and its avoidance.

The mode of acquiring toxoplasmosis from meat, cat faeces and contaminated soil is so circomscribed that simple measures are mostly preventive. It is realistic to ask pregnant women to apply simple hygienic measures over a short period. It is not difficult to persuade pregnant women to wash their hands after contact with cats, meat, soil and water. Heating meat until the color changes is the only other measure.

Prevention is better than cure. A primary prevention campaign can help to reduce the costs for screening and treatment of established toxoplasmosis during pregnancy.

2.10.3. Toxoplasma in animals

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 in July 1999, Belgium obtained the official status of rabies-free country in July 2001 according to the WHO recommendations.

Recent actions taken to control the zoonoses

Surveillance system and methods used.
Food animals with nervous symptoms are suspect for rabies and therefore these cases have to be notified to the veterinary officer. Wildlife found dead or shot should also be transferred to the Federal Agency for the Safety of the Food Chain.
Affected animals are killed and their brain is examined by immunofluorescence and virus cultivation in neuroblasts at the National Reference Laboratory. The high percentage of examinations for cattle is the consequence of the surveillance system for TSE in cattle: all suspected cases were first examined for rabies. Rabies must be considered in the differential diagnosis of BSE, although the course of the disease is usually shorter.
Vaccine baits (Raboral, Rhône-Mérieux) were dispersed for the vaccination of foxes. 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.

2.11.2. Rabies in humans

A. Rabies in humans

History of the disease and/or infection in the country

No indigenous cases of human rabies have been reported since 1923 although cases imported from Africa are diagnosed from time to time.

2.11.3. Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

The brain of animals with nervous symptoms suspect for rabies is examined by immunofluorescence and virus cultivation in neuroblasts at the National Reference Laboratory.

Type of specimen taken

Organs/ tissues: brain

Diagnostic/analytical methods used

Fluorescent Antibody Test (FAT) on smears from hippocampus or medulla oblongata

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.
Vaccine baits (Raboral, Rhône-Mérieux) were dispersed for the vaccination of foxes. 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.

Table 5.1 Rabies in animals

	Source of information	Remarks	Animals tested	Animals positive
Cattle (bovine animals)	Pasteur ISP		274	0
Sheep (1)	Pasteur ISP		67	0
Wildlife				
bats	Pasteur ISP		31	0
foxes	Pasteur ISP		211	0
wild boars	Pasteur ISP		1	0
deer	Pasteur ISP		1	0
badgers	Pasteur ISP		2	0
ferret	Pasteur ISP		2	0
squirrel	Pasteur ISP		1	0
Pet animals				
dogs	Pasteur ISP		10	0
cats	Pasteur ISP		10	0
Stray cats	Pasteur ISP		7	0

(1) : sheep and goats

Footnote

National Reference Laboratory for Rabies, Pasteur Institute Department of the Scientific Institute of Public Health

2.12. CYSTICERCI

2.12.1. General evaluation of the national situation

A. Cysticerci General evaluation

History of the disease and/or infection in the country

Taenia saginata:
2004 total 3.002 (2.981 lightly, 21 heavily contaminated)
2003 total 3.886 (3.859 lightly, 25 heavily contaminated)
2002 total 3.336 (3.317 lightly, 18 heavily contaminated)
Taenia solium (and Cysticercus cellulosae) is not autochtonous in Belgium.

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

Beside the visual inspection of the lesions, confirmation by PCR and serological examination is possible.
Usually the pathogenicity for humans is low.

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

Post-mortem, macroscopic examination of carcasses is routinely done in the slaughterhouse.
Lightly contaminated carcasses are treated by freezing at -10°C for 10 days before human consumption.

2.12.2. Cysticerci in animals

Table Cysticerci in animal

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	Cysticerci of Taenia saginata
Cattle (bovine animals) (1)	FASFC		carcass		881535	3002	3002

(1) : 2981 lightly contaminated and 22 heavily contaminated carcasses

2.13. SARCOCYSTIS

2.13.1. General evaluation of the national situation

A. Sarcocystis General evaluation

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

Sarcocystis hominis (bovine as intermediate host) and Sarcocystis suihominis (porcine intermediate host) occur. Domestic carnivores are hosts of the adult stage.
Humans can be a definitive host for sarcosporidiosis by ingestion of infected meat or excreted oocysts and develop symptoms like diarrhoea, headache, eosinophilia, abortion, congenital disorder.
For human sarcosporidiosis there is no immunity development.
The majority of grazing animals are inapparent carriers of tissue cysts.

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

Carcasses are enterily condemned when lesions of sarcosporidiosis are apparent.
Number of total rejections of cattle in 2003: 14, in 2002 the number was 5.

2.13.2. Sarcocystis in animals

Table Sarcocystis in animal

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	Sarcocystis spp.
Cattle (bovine animals)	FASFC		carcass		881535	19	19

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1. E. COLI INDICATORS

3.1.1. General evaluation of the national situation

A. E. coli general evaluation

History of the disease and/or infection in the country

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, though contact with contaminated water or by direct transmission of VTEC from infected humans or animals. Therefore, prevention mainly relies on hygienic measures.

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

A total of 11 herds were monitored after E. coli O157 was isolated at the surface of a carcass that was delivered at the slaughterhouse. A total of 102 samples were taken from faeces, dust and feed (occasionally from water). From these, two herds were found positive (E. coli O157, VT2 EAE) and samples were taken a second time approximately six weeks later. Finally, only on one herd E. coli O157 VT2 EAE was detected.

Recent actions taken to control the zoonoses

Surveillance system: in case E.coli O157 was isolated from a carcass at the slaughterhouse (official zoonosis programme), the farm of origin was traced back.
Recommendations to control the zoonoses:
At the herd:
- testing of animals for E. coli O157 prior to transport and slaughter
- hygiene and management measures at the farm, cleaning and desinfection
- faecal sampling repeatedly in the epidemiological unit from a representative number of animals of different age.

At the slaughterhouse:
- logistic slaughtering of positive animals
- positive carcasses will be destinated for heat-treated products
- hygiene measures during slaughter of positive animals
- cleaning and desinfection after such slaughter

3.1.2. Antimicrobial resistance in *Escherichia coli* isolates

Table 13.7 Breakpoints used for antibiotic resistance testing of E.coli in Feedingstuff

Test Method Used

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

Standards used for testing

- NCCLS
- CASFM

Subject to quality control

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

4. FOODBORNE OUTBREAKS

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

A. Foodborne outbreaks

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

Data 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. More than 531 people were ill, at least 74 persons were hospitalised and 1 baby died. However not all outbreaks were notified and for many outbreaks data are incomplete.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

During 2004, a total of 57 outbreaks of food borne infections and intoxications were recorded in Belgium. This is about half the number that was recorded in 2003(n=101). More than 531 people were ill, at least 74 persons were hospitalised and 1 baby died.

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

53 % of the outbreaks were due to Salmonella(n=30), with Enteritidis as predominant serovar (55%). The serovars Typhimurium, Paratyphi B var Java and Bovismorbificans were also isolated. Not in every outbreak of Salmonella the serovar was recorded. Thermotolerant campylobacters were responsible for 5% of the outbreaks with a 90% hospitalisation rate in the 3 recorded outbreaks.
B. cereus was the causative agent in 2% of the cases and Staphylococcus aureus was the cause in 4% of the cases. Other agents were C. botulinum(n=1), Hepatitis A(n=2), Norovirus (n=2) and histamine(n=2). Listeria monocytogenes (n=1) was responsible for the stillbirth of one baby.
In 21% of the outbreaks no causative agent could be identified.

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

In 36 % of the outbreaks, preparations with raw eggs (eggs, chocolate mousse, mashed potatoes prepared with raw eggs, mayonnaise, pastry) were identified as the source of the illness. Meat or meat based products were responsible for 16% of the cases. (Beef, poultry, minced meat) Home-made ham caused an intoxication of 2 persons of the same family with C. Botulinum type B toxins. The 2 outbreaks of histamine poisoning were

associated with the consumption of tuna. (fresh tuna and tuna salad)

Control measures or other actions taken to improve the situation

A National Platform, approved by the national conference of the Ministers of Public Health, was created to advance data exchange between officials of the different competent public health authorities (federal, community and regional), the FASFC and the reference labs. The FASFC designated a NRL, that will centralise all analyses in case of food born outbreak and can give scientific support to its officers on their demand.
During the summer of 2004 a TV spot by the FASFC stressed the importance of adequate refrigeration of food containing fresh eggs. For 2004 the media campaign to prevent food poisoning is focussed on youth summer camps.
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 now almost complete.

Table 12. Foodborne outbreaks in humans

Causative agent	Gener outbre	Family outbre	Total Number in persons			Source			Type of evidence	Location of exposure	Contributing factors
			ill	died	in hospital		Suspected	Confirmed			
1	2	3	4	5	6	7			8	9	10
Salmonella	12	17	197		25	mostly preparations with raw eggs	17	6			
Campylobacter	1	2	42	0	38	chicken stew	2	1			
Histamine	2		5	0	2	tuna		2			
Unknown/ spoilage	10	2	165		2		11	1			
Bacillus - B. cereus	1		50	0	0	pasta	1				
Staphylococcus - S. aureus	2		15	0	0	sea food	1	1			
Pathogenic Escherichia coli - Verotoxigenic E. coli (VTEC)	1		3	0	3	meat	1				
Food borne viruses - calicivirus (including norovirus)	2		33	0	0		2				
Food borne viruses - hepatitis A virus	2		19	0	3		1	1			
Listeria - L. monocytogenes		1	1	1		cheese	1				
Clostridium - C. botulinum		1	1	0	1	home-made ham		1	C.botulinum type B isolated from ham	at home	