



NETHERLANDS

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

TRENDS AND SOURCES OF ZOONOSES AND ZOOBOTIC 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: **Netherlands**

Reporting Year: **2004**

Institutions and laboratories involved in monitoring:

Laboratory name	Description	Contribution
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PREFACE

This report is submitted to the European Commission in accordance with Article 5 of Council Directive 92/117/EEC¹. 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 Netherlands 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.

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.

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		Number of holdings	
			Year*		Year*
Cattle (bovine animals)	dairy cows and heifers			24332	
	in total			38358	
Gallus gallus	broilers			771	
	laying hens (1)			1540	
	in total			2769	
Goats	in total			4532	
Pigs	sows and gilts			4273	
	fattening pigs			8925	
	in total			10038	
Sheep	in total			14396	
Turkeys	in total			92	

(1): > 18 weeks

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)		Number of slaughtered animals	
			Year*		Year*
Cattle (bovine animals)	in total			1960000	
Ducks	in total			6126000	
Gallus gallus	broilers			397046000	
	laying hens			12149000	
	in total			409295000	
Goats	in total			20000	
Pigs	in total			14340000	
Sheep	in total			620000	
Solipeds	horses - in total			2000	
Turkeys	in total			2210000	

2. INFORMATION ON SPECIFIC ZONOSSES AND ZONOTIC 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

Notification system in place

Salmonella is notifiable for human, if the patient is working in the foodindustry or horeca, or is professionally responsible for treatment, nursing or care of other persons and/or belong to a group of two or more persons which eating/dronk the same food within a period of 24 hours.

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

Salmonella	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc	unknown status
	1626	15.1	1433	13.6	293	1.5	1433
S. Bovismorbificans	9	0.1	9	0.1	0	0.0	9
S. Brandenburg	19	0.2	19	0.2	0	0.0	19
S. Derby	10	0.1	8	0.1	2	0.0	8
S. Enteritidis	768	7.5	665	6.5	103	1.0	665
S. Give	17	0.2	17	0.2	0	0.0	17
S. Goldcoast	13	0.1	13	0.1	0	0.0	13
S. Hadar	16	0.2	13	0.1	3	0.0	13
S. Heidelberg	13	0.1	12	0.1	1	0.0	12
S. Infantis	23	0.2	19	0.2	4	0.0	19
S. Kentucky	21	0.2	11	0.1	10	0.1	11
S. London	16	0.2	15	0.1	1	0.1	15
S. Mbandaka	9	0.1	8	0.1	1	0.0	8
S. Newport	13	0.1	9	0.1	4	0.0	9
S. Typhi	17	0.2	11	0.1	6	0.1	11
S. Typhimurium	463	4.5	449	4.4	14	0.1	449
S. Virchow	13	0.1	7	0.1	6	0.1	7
Salmonella spp.	80		46		134		46
DT 104	106	1.0	102	1.0	4	0.0	102

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	45	24	19	61	38	23	143	87	53
1 to 4 years	100	52	48	87	41	44	211	105	103
5 to 14 years	152	67	80	91	50	38	267	132	127
15 to 24 years	122	51	67	58	30	26	246	110	129
25 to 44 years	143	61	81	23	7	15	247	114	129
45 to 64 years	127	56	69	56	34	22	271	138	129
65 years and older	79	26	53	87	44	42	241	98	141
Age unknown									
Total :	768	337	417	463	244	210	1626	784	811

Table 3.4.2 Salmonellosis in man - seasonal distribution

Month	S. Enteritidis		S. Typhimurium		Salmonella spp.	
	Cases	Cases	Cases	Cases	Cases	Cases
January	65		65		111	
February	24		25		85	
March	36		37		93	
April	32		33		91	
May	52		52		106	
June	80		80		148	
July	80		80		133	
August	165		165		270	
September	105		106		255	
October	59		60		129	
November	43		46		130	
December	27		27		75	
not known						
Total :	768		776		1626	

2.1.3. Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At retail

Yearly monitoring programme of the Food Consumer Product Safety Authority (VWA). All samples are taken as individual samples at retail and analysed by the Food Safety Authority standard method.

Frequency of the sampling

At retail

Once a year

Type of specimen taken

At retail

Fresh meat

B. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At retail

Yearly monitoring programme of the Food Consumer Product Safety Authority (VWA). The samples are all individual samples taken at retail. The samples are analysed by the Food Safety Authority standard method.

Frequency of the sampling

At retail

Once a year

Type of specimen taken

At retail

Fresh meat

C. Salmonella spp in bovine meat and products thereof

Monitoring system

Sampling strategy

At retail

Yearly monitoring programme by Food and Consumer Safety Authority. All samples are individual samples taken at retail and analysed by the Food Safety standard method.

Frequency of the sampling

At retail

Once a year

Type of specimen taken

At retail

Fresh meat

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
Bovine meat								
fresh								
- at retail	VWA/KvW			25g	956	10		2
Pig meat								
fresh								
- at retail	VWA/KvW			25g	333	4		2
Broiler meat								
fresh								
- at retail	VWA/KvW			25g	1483	110	6	2
Other meat								
fresh								
- at retail	VWA/KvW			25g	161	0		

2.1.4. Salmonella in animals

A. Salmonella spp in pigs

Monitoring system

Frequency of the sampling

Fattening herds at farm

Sampling distributed evenly throughout the year

Type of specimen taken

Fattening herds at farm

Faeces

Diagnostic/analytical methods used

Fattening herds at farm

Bacteriological method: ISO 6579:2002

Notification system in place

Salmonella is notifiable for pigs

B. Salmonella spp. in bovine animals

Monitoring system

Frequency of the sampling

Animals at farm

Once a year

Type of specimen taken

Animals at farm

Faeces

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							
elite breeding flocks for egg production line (1)	GD/PVE			445	0		
parent breeding flocks for egg production line							
- during production period (2)	GD/PVE			282		1	1
elite breeding flocks for meat production line (3)	GD/PVE			1142	0		
parent breeding flocks for meat production line							
day-old chicks (4)	PVE			28279	1106	24	45
- during rearing period (5)	GD/PVE			2589	1	1	

- (1) : inclusive Elite Layer breeding rearing
 (2) : inclusive rearing period
 (3) : inclusive rearing
 (4) : BO feces
 (5) : inclusive production period

Footnote

GD: Animal Health Service

PVE: Product Boards for Livestock, Meat and Eggs

The following amendments were made :

Date of modification	Species	Column	Old value	New value
2006-01-09	Gallus gallus - parent breeding flocks for meat production line - day-old chicks	Flocks tested		28279
	Gallus gallus - parent breeding flocks for meat production line - day-old chicks	Flocks positive		1106
	Gallus gallus - parent breeding flocks for meat production line - day-old chicks	Source of information		PVE
	Gallus gallus - parent breeding flocks for meat production line - day-old chicks	S. Enteritidis		24
	Gallus gallus - parent breeding flocks for meat production line - day-old chicks	S. Typhimurium		45

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 rearing period (1)	GD/PVE			1648	13		
- during production period (2)	GD/PVE			1500	104		

(1) : at farm, monitoring programme

(2) : at farm, monitoring programme

Footnote

GD: Animal Health service

PVE: Product Boards for Livestock, Meat and Eggs

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. enterica subsp. arizonae	S. group D	S. group C	S. group B
Pigs											
fattening pigs - at farm - surveillance	VWA/RIVM		H	221	65						
Solipeds											
horses	VMDC		A	249	10				1		9
Pet animals											
dogs	VMDC		A	466	8				2		6
cats	VMDC		A	239	2						2
birds	VMDC		A	32	5						5
Reptiles	VMDC		A	2	1			1			

Footnote

ad H: herds

VWA: Food and Consumer Product Safety Authority

RIVM: National Institute of Public Health and the Environment

VMDC: Veterinary Microbiological Diagnostic Centre

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
Feed material of land animal origin								
Meat and bone meal	PDV		A	25g	64	2		
Greaves	PDV		A	25g	29	3		
Poultry offal meal	PDV		A	25g	82	1		
Blood meal	PDV		A	25g	1	0		
Animal fat	PDV		A	25g	2	0		
Feed material of marine animal origin								
Fish meal	PDV		A	25g	821	7		

Footnote

PDV: Product Board Animal Feed

ad A: not applicable; feed and raw feed materials of worldwide origin are investigated. Analysis: NEN-EN-ISO 6579; 2002(E)

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
Feed material of cereal grain origin								
Barley derived	PDV	A		25g	252	0		
Wheat derived	PDV	A		25g	1820	4		
Maize	PDV	A		25g	605	4		
derived	PDV	A		25g	317	1		
Feed material of oil seed or fruit origin								
Rape seed derived	PDV	A		25g	3975	440		
Palm kernel derived	PDV	A		25g	169	0		
Soya (bean) derived	PDV	A		25g	7460	367		
Sunflower seed derived	PDV	A		25g	984	46		
Linseed derived	PDV	A		25g	87	7		

Footnote

PDV: Product Board Animal Feed

ad A: not applicable, Feed and raw materials of feed of worldwide origin are investigated.

Analysis: NEN-EN-ISO 6579 2002(E)

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
Compound feedingstuffs for cattle								
Process control	PDV		A	25g	2188	9		
Compound feedingstuffs for pigs								
Final product	PDV		A	25g	3048	18		2
Compound feedingstuffs for poultry -breeders								
Final product	PDV		A	25g	1238	4	1	
Compound feedingstuffs for poultry - laying hens								
Final product	PDV		A	25g	3037	31	1	
Compound feedingstuffs for poultry - broilers								
Final Product	PDV		A	25g	2753	9		

Footnote

PDV: Product Board Animal Feed

ad A: not applicable. Feed and raw materials of feed of worldwide origin are investigated.

Analysis: NEN-EN-ISO 6579; 2002 (E)

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 (Part A)

Serovars	Sheep		Goats		Pigeons		Ducks		Pet animals - cats		Solipeds - horses		Cattle (bovine animals)		Pigs		Gallus gallus		Other poultry		Poultry		Gallus gallus - broilers	
	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
	8		1		7		5		2		12		187		388						568		355	
Sources of isolates	N=																							
Number of isolates in the laboratory	N=																							
Number of isolates serotyped	N=																							
Number of isolates per type																								
S. Agona															2							16		6
S. Albany																						12		10
S. Anatum													15		30							3		2
S. Blockley																						16		13
S. Bovismorbificans															3							1		1
S. Braenderup																						2		1
S. Brandenburg													5		9							3		1
S. Corvallis																						9		9
S. Derby													4		52							10		8
S. Dublin													84		1									
S. Emek																							26	26
S. Enteritidis												2	1									54		21
S. Goldcoast													2		1							1		
S. Hadar																						11		8
S. Heidelberg																								
S. Indiana																						6		4

Footnote

20

Table 3.3.3 Salmonella serovars in animals (Part B)

Serovars		Gallus gallus - laying hens		
Sources of isolates		M(*)		C(*)
Number of isolates in the laboratory	N=	141		
Number of isolates serotyped	N=			
Number of isolates per type				
S. Agona		7		
S. Albany		2		
S. Anatum				
S. Blockley				
S. Bovismorbificans				
S. Braenderup		1		
S. Brandenburg		2		
S. Corvallis				
S. Derby		1		
S. Dublin				
S. Emek				
S. Enteritidis		31		
S. Goldcoast		1		
S. Hadar		2		
S. Heidelberg				

S. Indiana	1	
S. Infantis	8	
S. Kentucky		
S. Lexington		
S. Livingstone		
S. London		
S. Manhattan	0	
S. Mbandaka	3	
S. Montevideo	1	
S. Newport		
S. Panama	0	
S. Rissen	2	
S. Rubislaw		
S. Senftenberg	36	
S. Thompson	2	
S. Typhimurium	4	
S. Virchow	17	
S. Weltevreden		
S. Paratyphi B var. Java	0	
S. Gallinarum	8	
Total of typed <i>Salmonella</i> isolates		

Footnote

(*) M : Monitor, C : Clinical
 Salmonella in animals serotype distribution of positive isolates (laboratory surveillance RIVM)

Table 3.3.5 S.Enteridis phagetypes in animals

Phagetype	Goats		Cattle (bovine animals)		Pigs		Gallus gallus		Other poultry		Poultry		Gallus gallus - broilers		Gallus gallus - laying hens	
	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
	Sources of isolates															
	Number of isolates in the laboratory															
N=																
Number of isolates serotyped																
N=																
Number of isolates per type																
PT 1											1		1			
PT 4											22		8		12	
PT 6											5				5	
PT 8											2		1		1	
PT 14b											2				2	
PT 21											9		7		2	
PT 1b											2				2	
PT 35											2				2	
PT 7											7		3		4	
Other											2		1		1	
Total of typed Salmonella isolates																

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.9 S. Enteritidis phagetypes in humans

Phagetype		humans	
Sources of isolates		M(*)	C(*)
Number of isolates in the laboratory	N=		
Number of isolates serotyped	N=	768	
Number of isolates per type			
PT 1		85	
PT 4		224	
PT 6		63	
PT 8		101	
PT 14b		15	
PT 21		142	
PT 36		2	
PT 4b		2	
PT 6a		29	
Other		89	
PT 25		14	
PT 28		0	
Total of typed <i>Salmonella</i> isolates			

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.7 Salmonella Typhimurium phage types in animals

Phagetype	Pigeons			Cattle (bovine animals)			Pigs			Gallus gallus			Other poultry			Poultry			Gallus gallus - broilers			Gallus gallus - laying hens					
	M(*)	C(*)		M(*)	C(*)		M(*)	C(*)		M(*)	C(*)		M(*)	C(*)		M(*)	C(*)		M(*)	C(*)		M(*)	C(*)				
Sources of isolates																											
Number of isolates in the laboratory	N=																										
Number of isolates serotyped	N=						28			186									20			14			4		
Number of isolates per type																											
DT 104																											
FT 507						6				48												1		1			
FT 150																						4		4			
other						8				49												4		1			
FT 506						9				35												5		4			
FT 3						1																		1			
FT 560																											
FT 350										6																	
FT 80										0																	
FT 61										1																	
FT 20										1																	
FT 2										1																	
FT 508										9												3		3			
FT 510						1				6																	
FT 301																											

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(*) M : Monitor, C : Clinical

(*) M : Monitor, C : Clinical

Table 3.3.10 S. Typhimurium phagetypes in humans

Phagetype		humans	
Sources of isolates		M(*)	C(*)
Number of isolates in the laboratory	N=		
Number of isolates serotyped	N=	463	
Number of isolates per type			
FT 507		104	
other		146	
FT 506		88	
FT 3		5	
FT 560		2	
FT 350		2	
FT 80		8	
FT 61		2	
FT 20		11	
FT 508		28	
FT 510		23	
FT 301		0	
FT 401		18	
FT 296		0	
FT 353		0	
FT 60		4	
FT 655		17	
FT 90		1	
FT 461		1	
FT 380		0	
FT 204		0	
FT 450		0	
FT 295		3	
FT 656		0	
FT 530		0	
FT 351		0	
Total of typed <i>Salmonella</i> 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.

Table 3.2.5.2 Antimicrobial susceptibility testing of S.Enteritidis in animals

S. Enteritidis										
	Cattle (bovine animals)		Pigs		Gallus gallus		Turkeys		Poultry	
Isolates out of a monitoring program									yes	
Number of isolates available in the laboratory									27	
Antimicrobials:	N	%R	N	%R	N	%R	N	%R	N	%R
Tetracycline										0%
Amphenicols										
Chloramphenicol										0%
Florfenicol										0%
Cephalosporin										
3rd generation cephalosporins										0%
Fluoroquinolones										
Ciprofloxacin										0%
Quinolones										
Nalidixic acid										0%
Trimethoprim										0%
Sulfonamides										
Sulfonamide										3,7%
Aminoglycosides										
Gentamicin										0%
Neomycin										0%
Penicillins										
Ampicillin										11%
Number of multiresistant isolates										
fully sensitives									23	85,0%
resistant to 1 antimicrobial									4	15,0%
resistant to 2 antimicrobials									0	0,0%
resistant to 3 antimicrobials									0	0,0%
resistant to 4 antimicrobials									0	0,0%
resistant to >4 antimicrobials									0	0,0%

Table Antimicrobial susceptibility testing of *S. Enteritidis* in Poultry - 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																						
Isolates out of a monitoring program		yes																				
Number of isolates available in the laboratory		46																				
Antimicrobials:	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	27		0	0	0	0	0	3	24	0	0	0	0	0	0	0	0	0	0			
Amphenicols																						
Chloramphenicol	27		0	0	0	0	0	0	0	2	25	0	0	0	0	0	0	0	0			
Florfenicol	27		0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0			
Cephalosporin																						
Cefotaxim	27		0	0	26	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones																						
Ciprofloxacin	27		0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones																						
Nalidixic acid	27		0	0	0	0	0	0	0	25	2	0	0	0	0	0	0	0	0			
Trimethoprim	27		0	0	0	0	25	2	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides																						
Sulfonamide	27		0	0	0	0	0	0	0	0	5	19	2	0	0	0	0	1				
Aminoglycosides																						
Gentamicin	27		0	0	0	8	18	1	0	0	0	0	0	0	0	0	0	0	0			
Neomycin	27		0	0	0	0	0	26	1	0	0	0	0	0	0	0	0	0	0			
Penicillins																						
Ampicillin	27		0	0	0	0	5	19	0	0	0	0	0	0	3	0	0	0	0			

Footnote

Broth dilution

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	588	
Antimicrobials:	N	%R
Tetracycline		0,4%
Amphenicols		
Chloramphenicol		0,2%
Florfenicol		0%
Cephalosporin		
3rd generation cephalosporins		0%
Fluoroquinolones		
Ciprofloxacin		0%
Quinolones		
Nalidixic acid		12,8%
Trimethoprim		0,3%
Sulfonamides		
Sulfonamide		0,7%
Aminoglycosides		
Gentamicin		0%
Neomycin		0,2%
Penicillins		
Ampicillin		2,7%
Number of multiresistant isolates		
fully sensitives	500	85,0%
resistant to 1 antimicrobial	79	13,0%
resistant to 2 antimicrobials	5	1,0%
resistant to 3 antimicrobials	3	1,0%
resistant to 4 antimicrobials	1	0,0%
resistant to >4 antimicrobials	0	0,0%

Table 3.2.5.3 Antimicrobial susceptibility testing of S.Typhimurium in animals

S. Typhimurium										
	Cattle (bovine animals)		Pigs		Gallus gallus		Turkeys		other	
Isolates out of a monitoring program	no		yes		yes				yes	
Number of isolates available in the laboratory	13		77		9				27	
Antimicrobials:	N	%R	N	%R	N	%R	N	%R	N	%R
Tetracycline		62%		73%		33%				33%
Amphenicols										
Chloramphenicol		38%		32%		22%				7%
Florfenicol		38%		31%		22%				7%
Cephalosporin										
3rd generation cephalosporins		0%		0%		0%				0%
Fluoroquinolones										
Ciprofloxacin		0%		0%		0%				0%
Quinolones										
Nalidixic acid		0%		1%		0%				0%
Trimethoprim		15%		30%		22%				11%
Sulfonamides										
Sulfonamide		69%		68%		44%				19%
Aminoglycosides										
Gentamicin		0%		0%		0%				0%
Neomycin		0%		0%		0%				4%
Penicillins										
Ampicillin		54%		52%		44%				15%
Number of multiresistant isolates										
fully sensitives		31%		37%		40%				67%
resistant to 1 antimicrobial		8%		13%		10%				15%
resistant to 2 antimicrobials		0%		4%		0%				0%
resistant to 3 antimicrobials		15%		12%		20%				4%
resistant to 4 antimicrobials		8%		4%		0%				4%
resistant to >4 antimicrobials		38%		29%		30%				11%
Number of multiresistant DT104										
with penta resistance		80%	24	89%	1	100%			2	100%
resistant to other antimicrobials		0%		4%						0%

Footnote

Other includes pets, food products, animal feeds, rodents, other birds, other mammals

Table Antimicrobial susceptibility testing of *S. Typhimurium* in all animals - 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																							
all animals																							
Isolates out of a monitoring program		yes																					
Number of isolates available in the laboratory		147																					
Antimicrobials:		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		126		0	0	0	0	0	5	39	5	1	0	28	14	34	0	0	0				
Amphenicols																							
Chloramphenicol		126		0	0	0	0	0	0	0	2	85	5	0	0	3	31	0					
Florfenicol		126		0	0	0	0	0	0	2	77	14	0	28	3	2	0	0					
Cephalosporin																							
Cefotaxim		126		0	0	113	10	3	0	0	0	0	0	0	0	0	0	0					
Fluoroquinolones																							
Ciprofloxacin		126		0	124	2	0	0	0	0	0	0	0	0	0	0	0	0					
Quinolones																							
Nalidixic acid		126		0	0	0	0	0	0	3	113	8	1	0	0	0	1	0					
Trimethoprim		126		0	0	0	0	95	1	0	0	0	0	0	0	30	0	0					
Sulfonamides																							
Sulfonamide				0	0	0	0	0	0	0	0	38	17	1	0	0	0	0					
Aminoglycosides																							
Gentamicin		126		0	0	0	23	86	16	1	0	0	0	0	0	0	0	0					
Neomycin		126		0	0	0	0	0	113	12	0	0	0	0	0	0	1	0					
Penicillins																							
Ampicillin		126		0	0	0	0	20	50	1	0	0	0	0	0	55	0	0					

Footnote

Broth dilution

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	334	
Antimicrobials:	N	%R
Tetracycline		54%
Amphenicols		
Chloramphenicol		28%
Florfenicol		21,4%
Cephalosporin		
3rd generation cephalosporins		0%
Fluoroquinolones		
Ciprofloxacin		0%
Quinolones		
Nalidixic acid		4%
Trimethoprim		12%
Sulfonamides		
Sulfonamide		49%
Aminoglycosides		
Gentamicin		0%
Neomycin		1%
Penicillins		
Ampicillin		49%
Number of multiresistant isolates		
fully sensitives		55%
resistant to 1 antimicrobial		10%
resistant to 2 antimicrobials		3%
resistant to 3 antimicrobials		9%
resistant to 4 antimicrobials		3%
resistant to >4 antimicrobials		21%
Number of multiresistant DT104		
with penta resistance	84	89%
resistant to other antimicrobials		8%

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

S. Paratyphi B var. Java		
Poultry		
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	33	
Antimicrobials:	N	%R
Tetracycline		6%
Amphenicols		
Chloramphenicol		0%
Florfenicol		0%
Cephalosporin		
3rd generation cephalosporins		6%
Fluoroquinolones		
Ciprofloxacin		0%
Quinolones		
Nalidixic acid		36%
Trimethoprim		100%
Sulfonamides		
Sulfonamide		73%
Aminoglycosides		
Gentamicin		0%
Neomycin		3%
Penicillins		
Ampicillin		73%

Footnote

Poultry Gallus gallus (broilers and raw meat)

Table 3.2.5.1 Antimicrobial susceptibility testing of Salmonella spp. in animals

Salmonella spp.										
	Cattle (bovine animals)		Pigs		Gallus gallus		Turkeys		other	
Isolates out of a monitoring program	no		yes		yes		no		yes	
Number of isolates available in the laboratory	106		116		226		8		628	
Antimicrobials:	N	%R	N	%R	N	%R	N	%R	N	%R
Tetracycline	11	10,4%	65	56,0%	12	5,3%	1	12,50%	26	4,1%
Amphenicols										
Chloramphenicol	13	12,3%	26	22,4%	2	0,9%	0	0,00%	6	1,1%
Florfenicol	5	4,7%	24	20,7%	2	0,9%	0	0,00%	5	0,8%
Cephalosporin										
3rd generation cephalosporins	0	0,0%	0	0,0%	6	2,7%	0	0,00%	4	0,6%
Fluoroquinolones										
Ciprofloxacin	0	0,0%	0	0,0%	0	0,0%	0	0,00%	0	0,0%
Quinolones										
Nalidixic acid	4	3,8%	1	0,9%	23	10,2%	2	25,00%	25	4,0%
Trimethoprim	5	4,7%	31	26,7%	45	19,9%	1	12,50%	51	8,1%
Sulfonamides										
Sulfonamide	20	18,9%	60	51,7%	48	21,2%	1	12,50%	52	8,2%
Aminoglycosides										
Gentamicin	0	0,0%	0	0,0%	2	1,3%	0	0,00%	1	0,2%
Neomycin	1	0,9%	0	0,0%	1	0,4%	3	37,50%	5	1,0%
Penicillins										
Ampicillin	10	9,4%	44	37,9%	52	23,0%	2	25,00%	56	8,9%
Number of multiresistant isolates										
fully sensitives	82	77,4%	54	42,5%	148	65%	2	25,00%	529	84%
resistant to 1 antimicrobial	5	4,7%	28	22,0%	25	11%	4	50,00%	41	7%
resistant to 2 antimicrobials	8	7,5%	19	15,0%	13	6%	1	12,50%	11	2%
resistant to 3 antimicrobials	2	1,9%	12	9,4%	24	11%	1	12,50%	27	4%
resistant to 4 antimicrobials	3	2,8%	13	10,2%	9	4%	0	0,00%	9	1%
resistant to >4 antimicrobials	6	5,7%	1	0,8%	7	3%	0	0,00%	11	2%

Footnote

Other includes pets, food products, animal feeds, rodents, other birds, other mammals

Table Antimicrobial susceptibility testing of Salmonella spp. in all animals - 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.										
all animals										
Isolates out of a monitoring program	yes									
Number of isolates available in the laboratory	999									
Antimicrobials:	N	%R	↖0.03	0.06	0.12	0.25				
Tetracycline	879		0	0	0	0				
Amphenicols										
Chloramphenicol	879		0	0	0	0				
Florfenicol	879		0	0	0	0				
Cephalosporin										
Cefotaxim	879		0	0	0	787				
Fluoroquinolones										
Ciprofloxacin	879		0	842	9	21				
Quinolones										
Nalidixic acid	879		0	0	0	0				
Sulfonamides										
Trimethoprim	879		0	0	0	0				
Aminoglycosides										
Gentamicin	877		0	0	0	219				
Neomycin	879		0	0	0	0				
Penicillins										
Ampicillin	879		0	0	0	0				

Footnote

999= 127 isolates
Broth dilution

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	999				999		999	
Antimicrobials:	N	%R	N	%R	N	%R	N	%R
Tetracycline	12	11%			2	29%	2	50%
Amphenicols								
Chloramphenicol	2	2%			0	0%	1	25%
Florfenicol	2	2%			0	0%	1	25%
Cephalosporin								
3rd generation cephalosporins	12	11%			0	0%	0	0%
Fluoroquinolones								
Ciprofloxacin	0	0%			0	0%	0	0%
Quinolones								
Nalidixic acid	52	46%			0	0%	0	0%
Trimethoprim	80	72%			0	0%	1	25%
Aminoglycosides								
Gentamicin	0	0%			0	0%	0	0%
Neomycin	0	0%			0	0%	0	0%
Penicillins								
Ampicillin	60	54%			0	0%	3	75%

Footnote

999 = no data isolates available

Table Antimicrobial susceptibility testing of *Salmonella* spp. in Foods not specified - 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.																						
Foods not specified																						
Isolates out of a monitoring program	yes																					
	999																					
Number of isolates available in the laboratory																						
Antimicrobials:	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	112		0	0	0	0	6	71	21	2	0	2	1	0	9	0	0					
Amphenicols																						
Chloramphenicol	112		0	0	0	0	0	0	0	55	43	12	0	0	0	2	0					
Florfenicol	94		0	0	0	0	0	0	0	55	36	1	1	1	0	0	0					
Cephalosporin																						
Cefotaxim	112		0	0	81	13	6	0	1	0	1	7	3	0	0	0	0					
Fluoroquinolones																						
Ciprofloxacin	112		0	70	13	9	20	0	0	0	0	0	0	0	0	0	0					
Quinolones																						
Nalidixic acid	44		0	0	0	0	0	0	0	25	2	0	0	0	0	0	17	0				
Trimethoprim	112		0	0	0	0	29	1	0	1	0	0	0	0	0	81	0	0				
Sulfonamides																						
Sulfonamide	44		0	0	0	0	0	0	0	0	1	6	10	3	1	0	23					
Aminoglycosides																						
Gentamicin	112		0	0	0	89	21	1	0	0	1	0	0	0	0	0	0					
Neomycin	112		0	0	0	0	0	111	0	0	0	1	0	0	0	0	0					
Penicillins																						
Ampicillin	111		0	0	0	0	0	0	38	13	0	0	1	35	24	0	0					

Footnote

999 = data not available

Broth dilution

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

Salmonella spp.		
humans		
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	1316	
Antimicrobials:	N	%R
Tetracycline	239	18,2%
Amphenicols		
Chloramphenicol	113	8,6%
Florfenicol	98	7,4%
Cephalosporin		
3rd generation cephalosporins	1	0,1%
Fluoroquinolones		
Ciprofloxacin	5	0,4%
Quinolones		
Nalidixic acid	145	11,0%
Trimethoprim	75	5,7%
Sulfonamides		
Sulfonamide	218	16,6%
Aminoglycosides		
Gentamicin	7	0,5%
Neomycin	14	1,1%
Penicillins		
Ampicillin	217	16,5%
Number of multiresistant isolates		
fully sensitives	913	69,5%
resistant to 1 antimicrobial	161	12,3%
resistant to 2 antimicrobials	42	3,2%
resistant to 3 antimicrobials	60	4,6%
resistant to 4 antimicrobials	25	1,9%
resistant to >4 antimicrobials	115	8,8%

Table Antimicrobial susceptibility testing of Salmonella spp. in humans - 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. humans																						
Isolates out of a monitoring program	yes																					
Number of isolates available in the laboratory	1337																					
Antimicrobials:	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	1316		0	0	0	0	2	209	833	31	2	4	75	53	107	0	0					
Amphenicols																						
Chloramphenicol	1316		0	0	0	0	0	0	0	106	1055	42	3	3	4	103	0					
Florfenicol	1316		0	0	0	0	0	0	9	1051	143	15	75	13	7	3	0					
Cephalosporin																						
Cefotaxim	1316		0	0	1195	109	11	0	0	0	0	0	1	0	0	0	0					
Fluoroquinolones																						
Ciprofloxacin	1316		0	1164	55	57	27	7	0	0	5	0	0	0	0	0	0					
Quinolones																						
Nalidixic acid	1316		0	0	0	0	0	0	37	1014	112	8	3	0	10	132	0					
Trimethoprim																						
Trimethoprim	1316		0	0	0	0	1173	65	2	0	0	0	0	0	75	0	0					
Sulfonamides																						
Sulfonamide	1316		0	0	0	0	0	0	0	0	379	677	41	1	0	0	218					
Aminoglycosides																						
Gentamicin	1316		0	0	0	485	702	111	9	0	1	5	2	0	0	0	0					
Neomycin	1316		0	0	0	0	0	1199	94	8	0	0	1	3	9	1	0					
Penicillins																						
Ampicillin	1316		0	0	0	0	185	892	22	0	0	0	1	1	215	0	0					

Footnote

Broth dilution

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 microg	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest		Susceptible >=	Intermediate	Resistant <=
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide		256		256						
Aminoglycosides										
Streptomycin		16		16						
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

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 microg	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest		Susceptible >=	Intermediate	Resistant <=
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide		256		256						
Aminoglycosides										
Streptomycin		16		16						
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Trimethoprim + Sulfonamide										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

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 microg	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest		Susceptible >=	Intermediate	Resistant <=
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide		256		256						
Aminoglycosides										
Streptomycin		16		16						
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Trimethoprim + Sulfonamide										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

2.2. CAMPYLOBACTERIOSIS

2.2.1. General evaluation of the national situation

A. Thermophilic Campylobacter General evaluation

Additional information

Campylobacter is notifiable for all animals

2.2.2. Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Notification system in place

Campylobacteriosis is notifiable for humans, if the patient is working in the food industry or horeca, or professionally responsible for treatment, nursing or care of other persons and/or belong to a group of two or more persons which eat or drink the same food within a period of 24 hours.

Results of the investigation

3273 cases covers 52% of all Dutch cases and are reported by weekly frequencies per regional laboratory

Table 6.3.A Campylobacteriosis in man - species/serotype distribution

Campylobacter	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc	unknown status
C. coli	3273	99.9	2973	99.9	300	99.7	2973
C. jejuni	127	4.5	109	4.3	18	7.1	109
C. lari	2657	94.3	2429	94.7	228	89.8	2429
C. upsaliensis	18	0.6	18	0.7	0	0.0	18
C. fetus	8	0.3	3	0.1	5	2.0	3
Campylobacter spp.	5	0.2	3	0.1	2	0.8	3
	458		411		47		411

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	2	0	1	160	88	60	179	96	69
1 to 4 years	6	3	3	147	82	58	174	97	69
5 to 14 years	16	12	4	243	147	88	283	171	101
15 to 24 years	20	2	18	483	208	267	545	235	301
25 to 44 years	32	12	20	744	387	342	839	436	388
45 to 64 years	33	15	18	606	351	239	700	409	275
65 years and older	18	9	9	273	129	139	316	152	159
Age unknown	0	0	0	1	0	1	1	0	1
Total :	127	53	73	2657	1392	1194	3037	1596	1363

Table 6.3.C Campylobacteriosis in man - seasonal distribution

Month	C. coli		C. jejuni		C. upsaliensis		Campylobacter spp.	
	Cases		Cases		Cases		Cases	
January	11		175				195	
February	6		103				189	
March	14		155				149	
April	4		132				141	
May	11		189				264	
June	15		286				295	
July	11		286				357	
August	16		373				486	
September	11		274				380	
October	11		224				335	
November	9		197				225	
December	8		263				257	
not known	0		0				0	
Total :	127		2657		0		3273	

2.2.3. Campylobacter in foodstuffs

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.
Bovine meat										
fresh										
- at retail	VWA/KvW		25g	847	7					7
Pig meat										
fresh										
- at retail	VWA/KvW		25g	287	3					3
Poultry meat										
fresh										
- at retail	VWA/KvW		25g	1477	433					433
Other meat										
fresh										
- at retail	VWA/KvW		25g	138	4					4

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
Gallus gallus									
broilers (1)	PVE			6208	620				
Pet animals									
dogs	VMDC		A	133	49				
cats	VMDC		A	239	4				
birds	VMDC		A	32	0				

(1) : BO feces

Footnote

ad A: animal

VMDC: Veterinary Microbiological Diagnostic Centre

The following amendments were made :

Date of modification	Species	Column	Old value	New value
2006-01-09	Gallus gallus - broilers	Source of information		PVE
	Gallus gallus - broilers	Units tested		6208
	Gallus gallus - broilers	Units positive		620

2.2.5. Antimicrobial resistance in *Campylobacter* isolates

Table Antimicrobial susceptibility testing of C. coli - qualitative data

	C. coli			
	Pigs		Poultry	
Isolates out of a monitoring program	yes		yes	
Number of isolates available in the laboratory	199		21	
Antimicrobials:	N	%R	N	%R
Tetracycline		75%		57%
Fluoroquinolones				
Ciprofloxacin		7%		52%
Quinolones				
Nalidixic acid		8%		52%
Aminoglycosides				
Gentamicin		0%		0%
Macrolides				
Erythromycin		18%		5%
Penicillins				
Ampicillin		22%		5%

Table Antimicrobial susceptibility testing of C. coli - qualitative data

	C. coli	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	3273	
Antimicrobials:	N	%R
Tetracycline	91	22.0%
Fluoroquinolones		
Ciprofloxacin	97	33%
Macrolides		
Erythromycin	94	32%

Table Antimicrobial susceptibility testing of C. jejuni in Poultry - 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																						
Isolates out of a monitoring program	yes																					
Number of isolates available in the laboratory	999																					
Antimicrobials:	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)	57				18	6	2	0	1	4	11	9	6	0	0	0	0					
Fluoroquinolones																						
Ciprofloxacin	57				16	15	1	2	0	0	4	7	12	0	0	0	0					
Quinolones																						
Nalidixic acid	57				0	0	0	3	14	5	11	1	0	0	13	10	0					
Aminoglycosides																						
Gentamicin	57				0	55	1	0	1	0	0	0	0	0	0	0	0					
Macrolides																						
Erythromycin	57				0	0	1	2	22	26	6	0	0	0	0	0	0					
Penicillins																						
Ampicillin	56				0	0	1	2	4	11	9	1	11	17	0	0	0					

(1) : doxycycline

Footnote

999 = 48 isolates

Table Antimicrobial susceptibility testing of *C. jejuni* - qualitative data

	C. jejuni	
	Poultry	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	57	
Antimicrobials:	N	%R
Tetracycline		46%
Fluoroquinolones		
Ciprofloxacin		40%
Quinolones		
Nalidixic acid		40%
Aminoglycosides		
Gentamicin		0%
Macrolides		
Erythromycin		0%
Penicillins		
Ampicillin		50%

Table Antimicrobial susceptibility testing of *C. jejuni* - qualitative data

	C. jejuni	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	3273	
Antimicrobials:	N	%R
Tetracycline		
Tetracyclin	1665	24.2%
Fluoroquinolones		
Ciprofloxacin	2092	33%
Macrolides		
Erythromycin	1848	2%

Table 6.1.4 Antimicrobial susceptibility testing of Campylobacter in food

Campylobacter spp.											
	Broiler meat		Other poultry meat		Pig meat		Bovine meat		Poultry meat - poultry meat Gallus gallus		
Isolates out of a monitoring program (1)	no										
Number of isolates available in the laboratory	157										
Antimicrobials:	N	%R	N	%R	N	%R	N	%R	N	%R	
Tetracycline		40%									
Fluoroquinolones											
Ciprofloxacin		56%									
Quinolones											
Nalidixic acid		50%									
Aminoglycosides											
Gentamicin		1%									
Macrolides											
Erythromycin		3%									
Penicillins											
Ampicillin		20%									
Number of multiresistant isolates											
fully sensitives	15	10%									
resistant to 1 antimicrobial	53	34%									
resistant to 2 antimicrobials	37	24%									
resistant to 3 antimicrobials	29	18%									
resistant to 4 antimicrobials	15	10%									
resistant to >4 antimicrobials	8	5%									

(1) : Not yet available. Monitoring started in 2004

Table 6.1.6 Breakpoints used for antimicrobial susceptibility testing of *Campylobacter* in Animals

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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		4		4						
Fluoroquinolones										
Ciprofloxacin		2		2						
Quinolones										
Nalidixic acid		16		16						
Aminoglycosides										
Gentamicin		8		8						
Macrolides										
Erythromycin		16		16						
Penicillins										
Ampicillin		16		16						

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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		4		4						
Fluoroquinolones										
Ciprofloxacin		2		2						
Quinolones										
Nalidixic acid		16		16						
Aminoglycosides										
Gentamicin		8		8						
Macrolides										
Erythromycin		16		16						
Penicillins										
Ampicillin		16		16						

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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		4		4						
Fluoroquinolones										
Ciprofloxacin		2		2						
Quinolones										
Nalidixic acid		16		16						
Aminoglycosides										
Gentamicin		8		8						
Macrolides										
Erythromycin		16		16						
Penicillins										
Ampicillin		16		16						

2.3. LISTERIOSIS

2.3.1. General evaluation of the national situation

2.3.2. Listeriosis in humans

A. Listeriosis in humans

Notification system in place

Listeria is not notifiable for humans in the Netherlands

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

		Cases	Cases Inc
Listeria	Listeria spp.	55	0.34
	congenital cases	55	0.34
	deaths		

Footnote

Coverage of Dutch patients about 90% (measured in 2003: 91%)

Table 7.2.B Listeriosis in man - age distribution

Age Distribution	L. monocytogenes			Listeria spp.		
	All	M	F	All	M	F
<1 year	1	0	1	1	0	1
1 to 4 years	0	0	0	0	0	0
5 to 14 years	0	0	0	0	0	0
15 to 24 years	0	0	0	0	0	0
25 to 44 years	6	3	3	6	3	3
45 to 64 years	15	8	7	15	8	7
65 years and older	29	16	12	29	16	12
Age unknown	4	3	1	4	3	1
Total :	55	30	24	55	30	24

2.3.3. Listeria in foodstuffs

2.4. VEROCYTOTOXIC ESCHERICHIA COLI

2.4.1. General evaluation of the national situation

2.4.2. Verocytotoxic Escherichia coli in humans

A. Verotoxigenic Escherichia coli infections in humans

Notification system in place

Verocytotoxic Escherichia coli is notifiable for humans by the laboratory

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	5	0,308	4	0,246	1	0,061
- lab. confirmed cases	5	0,308	4	0,246	1	0,061
- caused by O157 (VT+)	5	0,308	4	0,246	1	0,061
- caused by other VTEC	0	0	0	0	0	0
E.coli infect. (except HUS)						
- laboratory confirmed	30	1,845	24	1,476	6	0,369
- caused by O157 (VT+)	30	1,845	24	1,476	6	0,369
- caused by other VTEC	0	0	0	0	0	0
clinical case	30	1,845	24	1,476	6	0,369

Footnote

Inc. is per million

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		1			
1 to 4 years				8	4	1			
5 to 14 years				4	2	2			
15 to 24 years				7	1	6			
25 to 44 years				6	2	4			
45 to 64 years				1	1				
65 years and older				8	2	4			
Age unknown									
Total :	0	0	0	35	12	18	0	0	0

2.4.3. Pathogenic Escherichia coli in foodstuffs

2.4.4. Pathogenic Escherichia coli in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Notification system in place

Verocytotoxic Escherichia coli is not notifiable for bovine animals

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)							
dairy cows							
- at farm - surveillance	VWA/RIVM		H	153	13	13	
veal calves							
- at farm - surveillance	VWA/RIVM		H	171	23	23	

Footnote

adH: herd

RIVM: National Institute of Public Health and the Environment

VWA: Food and Consumer Product Safety Authority

2.5. TUBERCULOSIS

2.5.1. General evaluation of the national situation

2.5.2. Tuberculosis in humans

A. Tuberculosis due to *Mycobacterium bovis* in humans

Notification system in place

Tuberculosis is notifiable for humans in the Netherlands

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

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

Footnote

Data of 2004 is not yet available

2.5.3. Mycobacterium in animals

A. Mycobacterium bovis in Bovine Animals

Status as officially free of bovine tuberculosis during the reporting year

The entire country free

The Dutch cattle population is officially free from tuberculosis. This recognition has been ratified by Decision 99/467/EC from August 1999 and amended by Decision 03/467/EC.

Control program/mechanisms

The control program/strategies in place

All slaughtered animals are subject to ante mortem and post mortem investigation.

Routinely all cattle at AI-station are subject to tuberculation.

Cattle destined for export to some third countries are tuberculated.

Results of the investigation

In 2004, 9 cases of suspected tuberculosis in cattle and other animals have been further investigated. All suspicions were cattle. Six of these were suspicions after tuberculation for export. Two suspicions were notified by the Belgian Chief Veterinary Officer. Import to the Netherlands had taken place from herds which were found positive for tuberculosis in Belgium. The last suspicion was clinical. A bull on a AI-Centre coughed chronically. All suspicions were further investigated. After laboratory investigation and/or PPD tuberculation all cases were found negative.

Table 1.1.3 Tuberculosis in animals

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	M. bovis	M. tuberculosis
Goats	VWA		A	19800	0		
Pigs	VWA		A	14340981	0		
Sheep	VWA		A	620600	0		

Footnote

ad A: animal

VWA: Food and Consumer Product Safety Authority

1.1.1 Bovine tuberculosis

MANDATORY	CATTLE		
Number of herds under official control:	59524	Number of animals under official control:	3766792
	OTF bovine herds	OTF bovine herds with status suspended	Bovine herds infected with tuberculosis
Status of herds at year end (a):	59524	0	0
New cases notified during the year (b):		9	0
	Units tested	Units suspected	Units positive
Routine tuberculin test (c) - data concerning herds:			
Routine tuberculin test (c) - data concerning animals:			
	Animals slaughtered	Animals suspected	Animals positive
Routine post-mortem examination (d):	1960986	7	0
		Herds suspected	Herds confirmed
Follow up of suspected cases in post-mortem examination (e):		7	0
Follow-up investigation of suspected cases: trace, contacts (f):		0	0
	Animals tested	Animals suspected	Animals positive
Other routine investigations: exports (g):		2	0
Other routine investigations: tests at AI stations (h):			
	All animals	Positives	Contacts
Animals destroyed (i):	0	0	0
Animals slaughtered (j):	0	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	M. bovis isolated	
Bacteriological examination (m):			

2.6. BRUCELLOSIS

2.6.1. General evaluation of the national situation

2.6.2. Brucellosis in humans

A. Brucellosis in humans

Notification system in place

Brucella is notifiable for humans by the laboratory

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

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

2.6.3. Brucella in foodstuffs

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

The Dutch cattle has been officially free from bovine brucellosis since 1996. This recognition has been ratified by Decision 99/466/EC from August 1999 and amended by Decision 03/467/EC.

Monitoring system

Sampling strategy

Of 59524 holdings 13095 animals were investigated. This resulted in 11 suspicions. After elaborate investigations of blood samples and bacteriology of suspected cattle all cases were found negative.

Routine sampling at AI-stations.

In 2004 routine bloodsamples at AI-stations revealed no positive results.

Routine bloodsamples of exports.

In 2004 all routine bloodsamples of exports produced 1 non-negative result. After further investigation this suspicion was found negative.

Control program/mechanisms

The control program/strategies in place

Compulsory bloodsamples of abortions. 10340 bloodsamples of abortions were serologically investigated. Of these 50 suspicions were found and after bacteriology and/or serology all cases were found negative.

Notification system in place

Brucellosis is notifiable for bovine animals

B. Brucella melitensis in Sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Brucellosis caused by *Brucella melitensis* has never been diagnosed in the Netherlands in sheep or goats. The Netherlands has the official EU free of *B. melitensis* status which is confirmed in the Order 93/52/EC.

Monitoring system

Sampling strategy

Monitoring brucella melitensis 2004.

On 1657 holdings 15688 bloodsamples were taken. Seven of these samples were initially non-negative. After further investigation these suspicions were found negative.

Notification system in place

Brucellosis is notifiable for sheep

C. Brucella melitensis in Goat

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Brucellosis caused by Brucella melitensis has never been diagnosed in the Netherlands in sheep and goats. The Netherlands has the official EU "free of B. melitensis status" which is confirmed in the Order 93/52/EC.

Notification system in place

Brucellosis is notifiable for goats

2.1.1 Bovine brucellosis

MANDATORY	CATTLE		
Number of herds under official control:	59524	Number of animals under official control:	3766792
	OBF bovine herds	OBF bovine herds with status suspended	Bovine herds infected with brucellosis
Status of herds at year end (a):	59524	0	0
New cases notified during the year (b):	0	0	0
	Animals tested	Animals suspected	Animals positive
Notification of clinical cases, including abortions (c):	10380	50	0
	Units tested	Units suspected	Units positive
Routine testing (d1) - data concerning herds:	7729	4	0
Routine testing (d2) - number of animals tested:	5366	3	0
Routine testing (d3) - number of animals tested individually:	57357	0	0
		Herds suspected	Herds confirmed
Follow-up investigation of suspected cases: trace, contacts (e):		0	0
	Animals tested	Animals suspected	Animals positive
Other routine investigations: exports (f):		1	0
Other routine investigations: tests at AI stations (g):		0	0
	All animals	Positives	Contacts
Animals destroyed (h):	0	0	0
Animals slaughtered (i):	0	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):			

2.1.2 Ovine and caprine brucellosis

MANDATORY	SHEEP AND GOATS		
Number of holdings under official control:	48820	Number of animals under official control:	1235865
	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):	48820	0	0
New cases notified during the year (b):	0	0	0
	Animals tested	Animals suspected	Animals positive
Notification of clinical cases, including abortions (c):	0	0	0
	Units tested	Units suspected	Units positive
Routine testing (d) - data concerning holdings:	1700	0	0
Routine testing (d) - data concerning animals:	16422	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	0	0
Animals slaughtered (h):	0	0	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):			

2.7. YERSINIOSIS

2.7.1. General evaluation of the national situation

2.7.2. Yersiniosis in humans

A. Yersiniosis in humans

Notification system in place

Yersiniosis is not notifiable for humans

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

Yersinia	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	0	0	0	0	0	0
Y. enterocolitica						
Y. enterocolitica O:3						
Y. enterocolitica O:9						

Footnote

The surveillance system has stopped in 1997. There is no data available over 2004.

2.7.3. Yersinia in foodstuffs

2.7.4. Yersinia in animals

2.8. TRICHINELLOSIS

2.8.1. General evaluation of the national situation

2.8.2. Trichinellosis in humans

A. Trichinellosis in humans

Notification system in place

Trichinellosis is notifiable for humans

Table 4.2.A Trichinellosis in man - species/serotype distribution

Trichinella	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	0	0	0	0	0	0
Trichinella spp.	0		0		0	

Table 4.2.B Trichinellosis in man - age distribution

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

2.8.3. Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

In 2004 14340981 pigs were investigated by the digestion method. All samples were negative.

282 wild boars were investigated by the digestion method. All samples were found negative.

252 wild boars were tested serological (ELISA) 17 tested positive.

Notification system in place

Trichinellosis is notifiable for pigs

B. Trichinella in horses

Monitoring system

Sampling strategy

2187 solipeds were investigated by the digestion method. All samples were found negative.

Notification system in place

Trichinellosis is notifiable for solipeds

Table 4.1 Trichinella in animals

	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive	T. pseudospiralis
Pigs (1)	VWA		A	14340981	0	
Solipeds (2)	VWA		A	2187	0	
Wildlife						

(1) : digestion method

(2) : digestion method

(3) : Sero-surveillance ES-ELISA

Footnote

VWA: Product and Consumer Product Safety Authority

RIVM:sero-surveillance ES-ELISA wild life: wild boars: investigated 277; 17 positives

RIVM:Digestion method:

Wild life: wild boars: 134 investigated; 1 positive: T.pseudospiralis

2.9. ECHINOCOCCOSIS

2.9.1. General evaluation of the national situation

2.9.2. Echinococcosis in humans

A. Echinococcus spp in humans

Reporting system in place for the human cases

Serology data from Diagnostic Laboratory for Infectious Diseases & Perinatal Screening (LIS) of the National Institute of Public Health and Environment. This will be representative for approximately 30-50% of patients diagnosed by serology in the Netherlands.

Results of the investigation

Echinococcus cyst fluid investigation: 4 cysts are investigated and 1 found positive. The positive cystfluid was typed as a G5, dutch cattle strain. The patient is a woman, 43 years old. She has not been outside western Europe. She lives in the northern parts of the Netherlands. She was diagnosed at the age of 17 with a pulmonal localisation of Echinococcus. At the time (in 1977) the cystfluid was not typed; she was operated in 1977. Now she was admitted in hospital with a liver localisation of Echinococcus.

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

Most cases are imported cases: patients that origin from the Mediterranean. Of some cases we are not able to determine where the infection was contracted due to missing data.

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

Echinococcus	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	236 34	0	0	0	0	0
E. granulosus						
E. multilocularis						
Echinococcus spp.	202					

Footnote

A total number of 202 persons were investigated.

The following amendments were made :

Date of modification	Species	Column	Old value	New value
2005-10-24	E. granulosus	Cases	193	34

Table 9.2.B Echinococcosis in man - age distribution

Age Distribution	E. granulosus			E. multilocularis			Echinococcus spp.		
	All	M	F	All	M	F	All	M	F
<1 year							0		
1 to 4 years							0		
5 to 14 years							0		
15 to 24 years							2	2	
25 to 44 years							21	10	11
45 to 64 years							7	2	5
65 years and older							3	2	1
Age unknown							1		
Total :	0	0	0	0	0	0	34	16	17

The following amendments were made :

Date of modification	Zoonose	Line	Column	Old value	New value
2005-10-24	Echinococcus spp.	Age unknown	All	1	1

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
Solipeds							
horses							
(post-mortem examination) (1)	FD			1			1

(1) : E. granulosus G4 (horse type)

Footnote

FD: Veterinary Faculty, University Utrecht.

2.10. TOXOPLASMOSIS

2.10.1. General evaluation of the national situation

2.10.2. Toxoplasmosis in humans

A. Toxoplasmosis in humans

Additional information

At this moment, there is no surveillance system for toxoplasmosis in the Netherlands. Tests are done by a lot of laboratories in different places and within different organisations which are not connected by a central database.

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

Rabies is only found in bats (EBL-virus). In the Netherlands a KvW-protocol is used for direct an indirect contact of humans and animals with bats. In these cases bats are euthanised and tested for rabies at the CIDC in Lelystad.

2.11.2. Rabies in humans

A. Rabies in humans

Notification system in place

Rabies is notifiable for humans

2.11.3. Lyssavirus (rabies) in animals

A. Rabies in dogs

Notification system in place

Rabies is notifiable for dogs

Table 5.1 Rabies in animals

	Source of information	Remarks	Animals tested	Animals positive
Wildlife				
bats			91	14
foxes			12	0
squirrel			1	0
Pet animals				
dogs			4	0
cats			2	0

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1. E. COLI INDICATORS

3.1.1. General evaluation of the national situation

3.1.2. Antimicrobial resistance in *Escherichia coli* isolates

Table 13.1 Antimicrobial susceptibility testing of E.coli in animals

	E.coli							
	Cattle (bovine animals)		Pigs		Gallus gallus		Turkeys	
Isolates out of a monitoring program			yes		yes			
Number of isolates available in the laboratory			300		296			
Antimicrobials:	N	%R	N	%R	N	%R	N	%R
Tetracycline				64%		67%		
Amphenicols								
Chloramphenicol				12%		23%		
Florfenicol				1%		2%		
Cephalosporin								
Cefotaxim				0%		10%		
Fluoroquinolones								
Ciprofloxacin				0%		0%		
Quinolones								
Nalidixic acid				0%		46%		
Trimethoprim				43%		63%		
Sulfonamides								
Sulfonamide				53%		73%		
Aminoglycosides								
Gentamicin				0%		4%		
Neomycin				2%		13%		
Penicillins								
Ampicillin				25%		63%		
Number of multiresistant isolates								
fully sensitives			30	10,0%	79	26,7%		
resistant to 1 antimicrobial			28	9,3%	57	19,3%		
resistant to 2 antimicrobials			24	8,0%	41	13,9%		
resistant to 3 antimicrobials			39	13,0%	46	15,5%		
resistant to 4 antimicrobials			65	21,7%	49	16,6%		
resistant to >4 antimicrobials			114	38,0%	24	8,1%		

Table Antimicrobial susceptibility testing of E.coli in Poultry - 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																						
E.coli																						
Poultry																						
Isolates out of a monitoring program		yes																				
Number of isolates available in the laboratory		999																				
Antimicrobials:	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	596		0	0	0	0	3	40	138	23	3	5	2	95	287	0	0					
Amphenicols																						
Chloramphenicol	596		0	0	0	0	0	0	0	19	392	80	13	19	8	65	0					
Florfenicol	596		0	0	0	0	0	0	1	99	431	55	7	2	1	0	0					
Cephalosporin																						
Cefotaxim	596		0	0	555	10	1	0	7	3	4	3	13	0	0	0	0					
Fluoroquinolones																						
Ciprofloxacin	595		0	450	19	80	34	11	0	0	1	0	0	0	0	0	0					
Quinolones																						
Nalidixic acid	596		0	0	0	0	0	0	204	240	8	0	3	4	46	91	0					
Trimethoprim	596		0	0	0	0	230	49	1	1	1	0	0	0	314	0	0					
Sulfonamides																						
Sulfonamide	596		0	0	0	0	0	0	0	0	221	1	0	0	0	0	374					
Aminoglycosides																						
Gentamicin	596		0	0	0	38	357	153	29	2	3	7	4	3	0	0	0					
Neomycin	596		0	0	0	0	0	379	137	33	1	2	15	16	9	4	0					
Penicillins																						
Ampicillin	596		0	0	0	0	0	6	58	167	95	3	0	1	266	0	0					

Footnote

data includes poultry and pigs

999 = all isolates

Broth dilution

Table 13.6 Antimicrobial susceptibility testing of E.coli in food

	E.coli							
	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	144				24		66	
Antimicrobials:	N	%R	N	%R	N	%R	N	%R
Tetracycline		48%				42%		27%
Amphenicols								
Chloramphenicol		9%				8%		5%
Florfenicol		0%				0%		0%
Cephalosporin								
Cefotaxim		2%				0%		2%
Fluoroquinolones								
Ciprofloxacin		4%				0%		0%
Quinolones								
Nalidixic acid		22%				0%		2%
Trimethoprim		47%				21%		12%
Sulfonamides								
Sulfonamide						29%		
Aminoglycosides								
Gentamicin		3%				0%		0%
Neomycin		0%				0%		8%
Trimethoprim + sulfonamides		44%				29%		12%
Penicillins								
Ampicillin		58%				21%		15%

Table 13.7 Breakpoints used for antibiotic resistance testing of E.coli in Animals**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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

Table 13.7 Breakpoints used for antibiotic resistance testing of E.coli in Food**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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

Table 13.7 Breakpoints used for antibiotic resistance testing of E.coli in Humans**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 microg	breakpoint Zone diameter (mm)		
		Susceptible ≤	Intermediate	Resistant >	lowest	highest		Susceptible ≥	Intermediate	Resistant ≤
Tetracycline		8		8						
Amphenicols										
Chloramphenicol		16		16						
Florfenicol		16		16						
Fluoroquinolones										
Ciprofloxacin		2		2						
Enrofloxacin										
Quinolones										
Nalidixic acid		16		16						
Trimethoprim		8		8						
Sulfonamides										
Sulfonamide										
Aminoglycosides										
Streptomycin										
Gentamicin		8		8						
Neomycin		16		16						
Kanamycin										
Trimethoprim + sulfonamides										
Cephalosporin										
Cefotaxim		1		1						
3rd generation cephalosporins										
Penicillins										
Ampicillin		16		16						

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.

Table 12. Foodborne outbreaks in humans

Causative agent	General outbreak	Family outbreak	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
Food borne viruses - calicivirus (including norovirus)	7	0	192	0	1	poultry(2), beef(1), unknown(3), other(1)	lab, epi	4	catering(2), schooltrip(1), restaurant(2), nursing home(2)	
Campylobacter - Campylobacter spp.	4	0	4	0	0	pig(1), unknown(3)	lab, epi	1	unknown(3), camp(1)	
Campylobacter - C. jejuni	1	3	8	0	1	egg(1), poultry(3)	lab, epi	3	household(3), hotel(1)	
Salmonella - Salmonella spp.	1	0	2	0	0	pig(1)	lab	1	restaurant(1)	
Salmonella - S. Enteritidis	4	3	25	0	6	egg(2), poultry(1), mayonaisse(1), pig(1), unknown(1), other(1)	lab, epi	7	household(3), Indonesian shop(1), restaurant(2), nursing home for disabled persons(1)	
Salmonella - S. group B	2	0	6	0	1	poultry(1), fish(1)	lab, epi	2	family(1), restaurant(1)	
Salmonella - S. group C	1	0	30	0	2	lamb and egg(1)	lab	1	party at home(1)	
Bacillus - B. cereus	1	0	10	0	0	Italian food(1)	lab	1	schoolparty(1)	