ZOONOSES MONITORING

DENMARK

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: **Denmark**

Reporting Year: **2004**

Institutions and laboratories involved in monitoring:

Laboratory name	Description	Contribution
The Danish Plant Directorate (PD)	The Danish Plant Directorate is part of The Danish Ministry of Food, Agriculture and Fisheries. The Danish Plant Directorate lays down regulations, performs administrative functions, carries out inspections, prepares legislation, provides service to the authorities and prepares policies in its fields of competence.	Data
Danish Institute for Food and Veterinary Research (DFVF)	Danish Institute for Food and Veterinary Research (DFVF) is a governmental research institution under the Ministry for Family and Consumer Affairs. DFVF was established on 1 January 2004 by merging Institute of Food Safety and Nutrition and Danish Veterinary Institute. The objectives are - based on research: · To promote safe and healthy food · To promote healthy food habits and prevent food related diseases in humans · To prevent and control infectious diseases in livestock, and promote animal health and welfare · To maintain a laboratory preparedness ensuring immediate and effective actions on animal health and food safety issues.	The reporting officer is employed at the Danish Zoonosis Centre at DFVF. Contributing with data and text.

The Danish Veterinary and Food administration (DVFA)	The Danish Veterinary and Food Administration (DVFA) is part of the Ministry of Family and Consumer Affairs. Development, co-ordination and the formation of rules and regulations take place in the head office and are organized in three units: The Food Department, the Veterinary Service and the Administration Department. Food control and veterinary inspection are handled by ten regional veterinary and food control centres. The regional veterinary and food control authorities function as local knowledge centres and provide direct information and consultancy to consumers, livestock owners, enterprises and practising veterinarians.	Contributing with data
Danish Poultry Council (DPC)	Danish Poultry Council (DPC) is an umbrella organisation for the Danish poultry industry and DPC coordinates the veterinary conditions for the table egg production and the broiler production. DCP is responsible for the contact with the authorities.	Data
Statens Serum Institut (SSI)	Statens Serum Institut is an enterprise under the Danish Ministry for Interior and Health and the Institute's duties partly integrated in the national Danish health services. Statens Serum Institut prevents and controls infectious diseases and congenital disorders.	Data

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 Denmark 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:

Data source: The Central husbandry Register, administered under the ministry of Family and Consumer Affairs. All farmers in Demnark are obliged to report changes in production type and herds size to this database.

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

Average number of livestock and herds in 2004.

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

Not all farmers remember to report changes in production type and herds size, even though they are obliged to. So the database is in need of an update.

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)	in total	32412			
Gallus gallus	breeding animals - in total			56	
	parent birds - in total			49	
	broilers	385		310	
	laying hens (1)	334		276	
	parent birds for meat production line			49	
	parent birds for egg production line			7	
	breeding animals for egg production line - in total			396	
	in total	719		783	
Goats	in total	2632			
Pigs	in total	18483			
Sheep	in total (2)	10617			
Turkeys	in total	50			

(1): excluding barnyard
(2): Includes lambs

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)	in total	1734501		592305	
Gallus gallus	broilers	21927907		130521865	
	laying hens	4032492		872634	
	in total	25960399		131394499	
Goats	in total	19598		2620	
Pigs	in total	13251064		25197000	
Sheep	in total	200762		82051	
Solipeds	horses - in total			2268	
Turkeys	in total	490930		52126	

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

A. General evaluation

History of the disease and/or infection in the country

In Denmark, the incidence in human salmonellosis increased rapidly in the second half of the 1980s because of the spread of Salmonella in broiler chickens. This increase led to the initiation of a targeted national control program. Subsequent spread of Salmonella in swine and layer hens has also led to increases in human disease incidence and subsequently to the development and implementation of targeted control efforts.
To obtain a better understanding of the dynamics of the occurrence of human Salmonella infections, a mathematical model to estimate the contribution of major animal and food sources to human infections with Salmonella has been applied. This model is based on a comparison of the number of human cases caused by different Salmonella sero- and phage types with the prevalence of Salmonella types isolated from the various animal-food sources.

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

The observed prevalence of Salmonella in beef and pork were similar to previous years, where as the prevalence in broiler meat decreased compared to 2003. The Salmonella prevalence decreased in meat producing flocks of ducks and breeding flocks for egg production compared to 2003, where as the prevalence in broiler flocks remained at the same level. The serological surveillance of pig herds showed that the increase in herds, with medium to high numbers of seropositve samples (level 2 and 3), observed in 2003 continued in 2004. This is in contrast with the general decrease in number of level 2 and 3 herds observed the previous years.
The level of antimicrobial resistance in Salmonella from the tested animal population and meat products, were similar to previous years.
In 2004, the reduction in number of human cases continued where a total of 1,538 laboratory-confirmed episodes of salmonellosis were reported corresponding to 28.4 cases per 100,000 inhabitants. This represents a decrease of 11% compared to 2003 and a three-fold decrease relative to 1997.
In 2004, the estimated mean number of human cases (per 100,000 inhabitants) that could be attributed to various sources of Salmonella, was as follows: table eggs (1.9), broilers (0.8) pork (1.9), turkeys (0), ducks (0.2), beef (0.6), imported poultry products (4.5) imported beef (0.2) imported pork (0.12); outbreak related cases (0.9), travel (7.7) (see comment below) and unknown source (8.5). Compared to 2003, the number of egg-associated cases continued to decline, which is believed to be a result of the surveillance and control programme implemented for table-egg production. Cases related to domestically produced pork also decreased from 3.8 cases per 100,000 inhabitants in 2003 to 1.8 in 2004. Since 2000,the estimated number of domestically produced pork related cases have varied between 1.1 and 3.8 cases per 100,000 inhabitants. This is a significant decreased from 22.0 cases per 100,000 inhabitants estimated in 1993 and approximately the same level found before 1990. The number of broiler-associated cases remained stable since 2002, at approximately 0.7-0.8 per 100,000.

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

a source of infection)

The Salmonella surveillance programmes for poultry, swine and cattle have clearly showed that there is a strong correlation between the number of human cases and infection level in the herds.

2.1.2. Salmonellosis in humans

A. Salmonellosis in humans

Reporting system in place for the human cases

Salmonella spp. is notifiable through the laboratory surveillance system. Cases diagnosed by a clinical microbiological laboratory are reported to the Unit of Gastrointestinal Infections at Statens Serum Institut (SSI).

Case definition

A case is concidered Salmonella-positive when Salmonella has been isolated in samples from this person, or a clinical case with an epidemiological link to a culture confirmed case.

Diagnostic/analytical methods used

Bacteriology followed by serotyping and sometimes genotyping

Notification system in place

Cases of notifiable zoonotic enteric pathogens diagnosed by a clinical microbiological laboratory are reported through the laboratory surveillance system to the Unit of Gastrointestinal Infections at SSI. The laboratories must report positive results to the SSI within one week. Further, all Salmonella isolates are send to the reference laboratory at SSI for further typing. The results are recorded in the National Register of Enteric Pathogens (NREP) maintained by SSI. Positive cases are recorded as episodes, i.e. each person-infectious agent combination is only registered once in a six-month period.

History of the disease and/or infection in the country

In Denmark, the incidence in human salmonellosis increased rapidly in the second half of the 1980s because of the spread of Salmonella in broiler chickens. This increase led to the initiation of a targeted national control program. Subsequent spread of Salmonella in swine and layer hens has also led to increases in human disease incidence and subsequently to the development and implementation of targeted control efforts

Results of the investigation

In 2004, 1,538 laboratory-confirmed episodes of salmonellosis were reported, 28 cases per 100,000 inhabitants. This represents a decrease of 11% compared to 2003 and a three-fold decrease relative to the 1997 peak year. The reduction in the incidence of human cases may to a large extent be attributed to the large-scale national efforts to reduce the occurrence of Salmonella in broilers, table-eggs and pigs raised in Denmark.
In 2004, the number of episodes of S. Enteritidis was 546 (10.1 per 100,000), a 26% decline compared to 2003 and 85% compared to the 1997 peak year. The most common phage types were PT4 (23.4%), PT8 (20.9%), PT1 (13.7%), PT21 (11.4%) and PT6 (6.2%).

There were 467 episodes of S. Typhimurium corresponding to an incidence of 8.6 per 100,000 inhabitants, a 4% increase compared to 2003. The most common types were DT12 (17.8%), DT120 (16.1%) and DT104 (9.9%) Unspecified types accounted for 10% of isolates. Multi-drug resistance (i.e. resistance to four or more different classes of drugs) was observed in 27% of isolates, whereas 43% were susceptible to all drugs tested. In 2004, 49 human cases of DT104 and DT104b were registered and 31 (63%) of these were caused by multi-drug resistant strains. Thirty-three cases were acquired domestically and five abroad; four of the latter five cases were multi-drug resistant.
Other Salmonella serotypes account for 525 episodes with an incidence of 9.7 per 100,000 inhabitants, almost the same rate of incidence as seen in 2003. Of the 101 other serotypes, isolated, those most commonly encountered were S. Virchow (38 cases), S. Newport (36 cases), S. Stanley (35 cases), S. Infantis (32 cases), S. Dublin (27 cases), S. Uganda (25 cases), S. Kentucky (18 cases) and S. Saintpaul (18 cases)

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

In 2004, the estimated mean number of human cases (per 100,000 inhabitants) that could be attributed to various sources of Salmonella, was as follows: table eggs (1.9), broilers (0.8) pork (1.9), turkeys (0), ducks (0.2), beef (0.6), imported poultry products (4.5) imported beef (0.2) imported pork (0.12); outbreak related cases (0.9), travel (7.7) (see comment below) and unknown source (8.5). Compared to 2003, the number of egg-associated cases continued to decline, which is believed to be a result of the surveillance and control programme implemented for table-egg production. Cases related to domestically produced pork also decreased from 3.8 cases per 100,000 inhabitants in 2003 to 1.8 in 2004. Since 2000,the estimated number of domestically produced pork related cases have varied between 1.1 and 3.8 cases per 100,000 inhabitants. This is a significant decreased from 22.0 cases per 100,000 inhabitants estimated in 1993 and approximately the same level found before 1990. The number of broiler-associated cases remained stable since 2002, at approximately 0.7-0.8 per 100,000.

Relevance as zoonotic disease

The Salmonella surveillance programmes for poultry, swine and cattle have clearly showed that there is a strong correlation between the number of human cases and infection level in the herds.

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
	1538	0	0	0	0	0	0
S. Agona	16						
S. Anatum	7						
S. Blockley	5						
S. Bredeney	5						
S. Derby	16						
S. Dublin	27						
S. Enteritidis	546						
S. Give	5						
S. Hadar	16						
S. Heidelberg	8						
S. Indiana	4						
S. Infantis	32						
S. Kentucky	18						
S. Newport	36						
S. Panama	6						
S. Saintpaul	18						
S. Stanley	35						
S. Typhimurium	467						
other serovars	271						

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	8	2	6	19	11	8	62	34	28
1 to 4 years	62	33	29	51	22	29	163	88	75
5 to 14 years	62	33	29	49	26	23	150	82	68
15 to 24 years	65	30	35	44	19	25	171	68	103
25 to 44 years	111	57	54	122	58	64	381	197	184
45 to 64 years	161	87	74	113	51	62	408	204	204
65 years and older	77	42	35	69	26	43	203	102	101
Age unknown									
Total :	546	284	262	467	213	254	1538	775	763

Table 3.4.2 Salmonellosis in man - seasonal distribution

Month	S. Enteritidis	S. Typhimurium	Salmonella spp.
	Cases	Cases	Cases
January	21	28	81
February	27	16	80
March	26	38	100
April	31	28	98
May	28	22	74
June	53	41	137
July	84	63	193
August	81	87	248
September	55	58	176
October	59	21	126
November	43	30	112
December	38	35	113
not known			
Total :	546	467	1538

2.1.3. Salmonella in foodstuffs

A. Salmonella spp in eggs and egg products

Monitoring system

Sampling strategy

The national Salmonella controlprogramme for eggs was implementeted in 1996-1997. Eggs are only tested at the producer level.

Preventive measures in place

All shell eggs are distributed in a cold chain (not exceeding 12°C) and kept refrigerated at retail; eggs are generally refrigerated in private homes.

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

The level of Salmonella-contaminated shell eggs has not been measured from the initiation of the control program. However, a year before the program began, a study of 13,000 eggs from different types of production determined the level to be 1 per 1,000 eggs (20% of the contaminated eggs harbored S. Enteritidis)

B. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The mandatory examination of end-products was carried out through random sampling of batches of chicken cuts shortly prior to packaging. A batch is defined as the amount of meat from animals slaughtered between two cleanings and disinfections of the processing equipment.

At meat processing plant

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each RVFCA is responsible for the control carried out in its own region, and the DVFA is responsible for the regulation, control strategy and the surveillance at the overall national level.

At retail

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each RVFCA is responsible for the control carried out in its own region, and the DVFA is responsible for the regulation, control strategy and the surveillance at the overall national level.

Frequency of the sampling

At slaughterhouse and cutting plant

Every batch is sampled

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

At meat processing plant

Other: depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Different types of meat cuts are randomly selected from each bach.

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated

At meat processing plant

A sample is considered positive when Salmonella has been isolated

At retail

A sample is considered positive when Salmonella has been isolated

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

The national Salmonella control programme for poultry implemented in 1988 and adjusted in 1996 and 2000.The Salmonella surveillance programme is mandatory.

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.
The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella sp. is notifiable to the DFVA

Results of the investigation

Salmonella was detected in 1.6% of the 1472 batches examined.
A batch is defined as the amount of meat from animals slaughtered between two cleanings and disinfections of the processing equipment

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

Since 2001, the proportion of salmonella positive broiler meat batches has reduced from 4.1% in 2001 and 5% in 2003 to 1.6% in 2004.
Between 1.7-4.6% of the human cases are estimated to originate from Danish produced broiler meat. Between 6.9-12% of the human cases are estimated to originate from imported broiler meat.

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

Between 1.7-4.6% of the human cases are estimated to originate from Danish produced broiler meat.

C. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The mandatory examination of end-products was carried out through randome sampling of batches of Turkey cuts shortly prior to packaging. A batch is defined as the amount of meat from animals slaughtered between two cleanings and disinfections of the processing equipment.
Since March 1st 2004 turkeys were no longer slaughtered in Denmark, as the only major turkey slaughterhouse closed. Turkeys raised in Denmark were hereafter transported abroad for slaughter.

At meat processing plant

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

At retail

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

Frequency of the sampling

At slaughterhouse and cutting plant

Every batch is sampled

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

randome sampling of batches of Turkey cuts shortly prior to packaging.

At meat processing plant

Depend on survey

At retail

Depend on survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated.

At meat processing plant

Depend on survey.

At retail

depend on survey

Diagnostic/analytical methods used

At meat processing plant

Other: Depend on survey

At retail

Other: Depend on survey

Control program/mechanisms

The control program/strategies in place

mandatory PM examination.

Recent actions taken to control the zoonoses

Prior to january 2003, PM testing for salmonella in turkeys was carried out by testing pools of 10 neck-skin samples per flock. In 2003 and 2004, testing af meat cuttings has occured.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

Since March 1st 2004 turkeys were no longer slaughtered in Denmark, as the only major turkey slaughterhouse closed. Turkeys raised in Denmark were hereafter transported abroad for slaughter. Therefore, only 16 batches were monitored by mandatory end-products examination at the slaughterhouse. One batch was positive with S. Typhimurium and one batch with S. Hadar and S. Saintpaul

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

The level of salmonella in Danish turkey meat cannto be compared with previous years, as only 16 batches was tested.
Between 1.4 and 3.5% of the human cases are estimated to originate from imported turkey. A part of the Danish produced turkey meat is re-imported.

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

Between 1.4 and 3.5% of the human cases are estimated to originate from imported turkey. A part of the Danish produced turkey meat is re-imported.

D. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Monitoring is based on swab samples taken from three designated areas of chilled half-carcasses. The numbers of swabs collected depend on the slaughterhouse capacity. If > 200 pigs are slaughtered per day 5 swabs are collected (pooled). If > 200 pigs are slaughtered per month 5 swabs (pooled) are collected per 200 slaughtered pigs. If 50-200 pigs are slaughtered per month 5 swabs (pooled) are collected per quarter. If < 50 pigs are slaughtered per month one swab is collected per quarter.

At meat processing plant

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the

regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

At retail

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: Depend on the slaughterhouse capacity

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The carcass are swabed in three designated areas, the jaw, breast and ham using a 16-layers sterile 10x10 cm gauze. Each area covering 10x10cm.

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated

At meat processing plant

A sample is considered positive when Salmonella has been isolated

At retail

A sample is considered positive when Salmonella has been isolated

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration.

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.
The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is

detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration.

Results of the investigation

33.890 samples were pooled and the prevalence of Salmonella was 1.3%. An additional 148 samples collected from smaller slaughterhouses, were analyzed individually. Only two of these samples were found positive for Salmonella. The most common serotypes observed were S. Typhimurium, S. Derby and S. Infantis, similar to the serotype profile detected from previous years.
Imported pork: 228 batches examined and 28.5% was positive for Salmonella.

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

The estimated prevalence of Salmonella in 2004 (1.3%)was similar to the the previous three years (1.3 to 1.4%). Between 5 and 8.2% of the human cases are estimated to originate from danish produced pork. Between 3 and 5.5% of the human cases are estimated to originate from imported beef.

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

Between 5 and 8.2% of the human cases are estimated to originate from danish produced pork. Between 3 and 5.5% of the human cases are estimated to originate from imported beef.

Additional information

When determining the prevalence of pooled samples, the loss of sensitivity and the probability of more than one sample being positive in each pool are taken into consideration when estimating the animal prevalens.

E. Salmonella spp in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Monitoring is based on swab samples taken from three designated areas of chilled half-carcasses.

At meat processing plant

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and

Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

At retail

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each RVFCA is responsible for the control carried out in its own region, and the DVFA is responsible for the regulation, control strategy and the surveillance at the overall national level.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: >200 animals/day = 5 swaps/day. 50<animals<200/day = 5 swaps/200 animal. 50<animal<200/month = 5 samples/quarter. 50>animals/month= 1 sample/month

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend of the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The carcass are swabed in three designated areas (the rump, breast and flank) using a 16-layers sterile 10x10 cm gauze. Each area covering 10x10cm.

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated

At meat processing plant

A sample is considered positive when Salmonella has been isolated

At retail

A sample is considered positive when Salmonella has been isolated

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the DFVA.

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.
The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is

detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the DFVA.

Results of the investigation

In 2004, 10,695 samples were pooled into 2,139 pools, which were then analysed. Salmonella was found in 30 of these. Furthermore, 845 samples were collected and analysed individually, and Salmonella was found in 5 of these samples. Using the 3 as a pooling correction factor, the overall sample prevalence for 2004 was estimated to be 0.5%. In total, 65.7% of the positive samples tested positive for S. Dublin.
Imported beef: Of the 230 examined batches, 1.3% tested positive for Salmonella.

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

Compared to 2003, the overall salmonella prevalence increased from 0.4% to 0.5%.
Between 1.4 and 2.7% of the human cases are estimated to originate from Danish produced beef. Between 0.5 and 1.3% of the human cases are estimated to originate from imported beef.

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

Between 1.4 and 2.7% of the human cases are estimated to originate from Danish produced beef. Between 0.5 and 1.3% of the human cases are estimated to originate from imported beef.

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. Dublin	S. Derby	S. Infantis
Bovine meat											
fresh											
- at slaughter	DVFA		animal		11579	35		4	23		
Pig meat											
fresh											
- at slaughter	DFVA		animal		34213	274	1	96		62	16
Broiler meat											
fresh											
- at slaughter	DFVA/DPC		batch		1472	24					
Turkey meat											
fresh											
- at slaughter	DVFA		batch		16	2					

Footnote

DVFA: The Danish Veterinary and Food administration. DPC: The Danish Poultry Council.
A batch is the amount of meat from animals slaughtered between two cleanings and disinfections at the slaughterhouse.

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
cow milk								
raw (1)	DVFA				9	0		

(1) : A centrally co-ordinated project. Part of a large EU-control programme

Footnote

DVFA: The Danish Veterinary and Food Administration

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)

The program is based on the principle of top-down eradication, ensuring freedom from Salmonella from the top of the broiler-breeding pyramid down. Randomly collected dead day-old chicks, blood and faecal samples (primarily sock/boot samples) are collected in each flock. The control of breeding flocks is identical to the control program for broiler breeders.

Laying hens flocks

At the hatchery, wet dust are collected from each hatch. Randomly collected dead day-old chicks, blood and faecal samples (primarily sock/boot samples)are collected in each flock.

Frequency of the sampling

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

Other: Per delivery

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

Other: Per house: test week: 1,2,4,8 and 2 weeks prior to moving

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

Other: Every 2. week per flock and every week per house

Laying hens: Day-old chicks

Other: Per delivery

Laying hens: Rearing period

Every flock is sampled

Laying hens: Production period

Every flock is sampled

Type of specimen taken

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

Other: Dead chicks and fluff

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

Other: Sock/boot swabs, faeces and blood.

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

Other: Dead chicks or meconium

Laying hens: Day-old chicks

Other: Dead chicks and fluff

Laying hens: Rearing period

Other: Sock/boot swabs, faeces and blood.

Laying hens: Production period

Organs:Sock/boot swabs, faeces and eggs

Laying hens: At slaughter

Other: Meat cuttings

Methods of sampling (description of sampling techniques)

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

Per delivery: 10 samples of crate material and 20 dead chicks

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

1st week (Per house): 40 chicks (Parents flocks only)
2nd week (Per house): 2 pairs of sock samples (Parents flocks only)
4th week (Per house): 60 faecal samples (pooled into one sample)
8th week (Per house): 2 pairs of sock samples
2 weeks before moving (Per house): 60 faecal samples (pooled into one sample, Grandparents flocks only), 2 pairs of sock samples and 60 blood samples (Parents flocks only).

Breeding flocks: Production period

Every two weeks (Per flock): 250 meconium samples or 50 dead chickens collected at the hatchery.
Every week (Per house): 2 pairs of sock samples (Parents flocks only).

Laying hens: Day-old chicks

Hatchery: At least 25 grams of wet dust per hatch, 1-4 hatches may be pooled.
Day-old (Per delivery): 10 samples of crate material and 20 dead chicks.

Laying hens: Rearing period

Week 3 (Per flock): 5 pairs of sock samples or 300 faecal samples (five pools), if sock samples cannot be collected. Flocks of less than 200 birds: 2 pairs of sock samples or 60 faecal samples (one pool).
Week 12 (Per flock): 60 blood samples and 5 pairs of sock samples or 300 faecal samples (five pool). Flocks with 200 to 500 birds collect 55 blood samples and 5 pairs of sock samples or 300 faecal samples (five pool). Flocks of less than 200 birds: 20-50 blood samples and 2 pairs of sock samples or 60 faecal samples (one pool).

Laying hens: Production period

Every 9 weeks (Per flock): 60 egg sampled and 2 pairs of sock samples or faecal samples, equal to the number of eggs, if sock samples cannot be collected (one pool). Flocks with 200 to 500 birds collect 55 egg samples and 2 pairs of sock samples, and flocks of less than 200 birds collect 20-50 blood samples and 2 pairs of sock samples.
Eggs from barnyards and hobby flocks are tested 3 times a year per flock

Laying hens: At slaughter

Different types of meat cuts from each batch are tested.

Case definition

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

A sample is considered positive when Salmonella has been isolated.
When Salmonella are isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation and the flock is considered positive if two or more these samples have OD-values over 40 or Salmonella is isolated.

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

A sample is considered positive when Salmonella has been isolated or when the Salmonella OD-value is over 40.
When two or more samples have OD-values over 40 or Salmonella has been

isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation. The flock is considered positive if two or more these samples have OD-values over 40 or if Salmonella is isolated.

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

A sample is considered positive when Salmonella has been isolated.
When Salmonella are isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation and the flock is considered positive if two or more these samples have OD-values over 40 or Salmonella is isolated.

Laying hens: Day-old chicks

A sample is considered positive when Salmonella has been isolated.
When Salmonella are isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation and the flock is considered positive if two or more these samples have OD-values over 40 or Salmonella is isolated.

Laying hens: Rearing period

A sample is considered positive when Salmonella has been isolated or when the Salmonella OD-value is over 40.
When two or more samples have OD-values over 40 or Salmonella has been isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation. The flock is considered positive if two or more these samples have OD-values over 40 or if Salmonella is isolated.

Laying hens: Production period

A sample is considered positive when Salmonella has been isolated or when the Salmonella OD-value is over 40.
When two or more samples have OD-values over 40 or Salmonella has been isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation. The flock is considered positive if two or more these samples have OD-values over 40 or if Salmonella is isolated.

Laying hens: At slaughter

A sample is considered positive when Salmonella has been isolated.
When Salmonella are isolated from the samples taken during the routine sampling of a flock, the flock is put under suspicion. Thereafter, 60 eggs and 60 chickens are collected for further investigation and the flock is considered

positive if two or more these samples have OD-values over 40 or Salmonella is isolated.

Diagnostic/analytical methods used

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

Other: Bacteriological and serological method

Laying hens: Rearing period

Other: Bacteriological and serological method

Laying hens: Production period

Other: Bacteriological and serological method

Vaccination policy

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

No salmonella vaccinations occur.

Laying hens flocks

No salmonella vaccinations occur.

Control program/mechanisms

The control program/strategies in place

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

The national salmonella control programme for egg production was implemented in 1996-1997. The programme is mandatory.

Laying hens flocks

The national salmonella control programme for egg production was implemented in 1996-1997. The programme is mandatory.

Measures in case of the positive findings or single cases

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

Confirmed-positive flocks are destroyed.

Laying hens flocks

All eggs from suspect or confirmed-positive layer flocks are pasteurized and infected

flocks are destroyed.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

On separate occasions two central rearing flocks from the same herd were positive for S. Typhimurium and one pullet-rearing flock was positive for S. Enteritidis.
In flocks producing eggs for egg-packing stations, Salmonella was found in 0.8% in the total number of flocks examined, compared to 2.3% and 2.6% in 2003 and 2002, respectively.A total of 5 flocks were found positive; 2 out of 177 battery flocks, 2 out of 72 deep-litter flocks and 1 out of 175 organically grown flocks. A total of 493 barnyard flocks were examined and 1.2% found to be infected with Salmonella.

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

The proportion of layer flocks infected with Salmonella, notably S. Enteritidis, has been markedly reduced since the initiation of the control program in 1997. More than 7% of layer flocks tested positive for Salmonella in the first year of the program, (1998) versus <2.3% in 2003 and 0.8% in 2004.
Between 5.0 and 8.2% of the human cases are estimated to originate from Danish eggs in 2004.

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

Between 5.0 and 8.2% of the human cases are estimated to originate from Danish eggs in 2004.

Additional information

One house can contain more than one flock depending on the size.
Barnyard and hobby flocks are tested three times a year. Legislation demands that eggs from the barnyard flocks may be sold directly from the premises only. Testing of flocks producing eggs for consumption within the household of the flock owner is not required as part of the Salmonella control programme, but may be done voluntarily.

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)

The program is based on the principle of top-down eradication, ensuring freedom from Salmonella from the top of the broiler-breeding pyramid down. Randomly collected dead day-old chicks, meconium, blood and faecal samples (primarily

sock/boot samples) are collected at the farm in each breeding flock.

Broiler flocks

Randomly collected faecal samples (primarily sock/boot samples) are collected at the farm in each broiler flock nefore slaughter.

Frequency of the sampling

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

Other: Per delivery

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

Other: Per house: test week 1, 2, 4, 8 and two weeks prior to moving

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

Other: Every 2. week per flock, every week per house

Broiler flocks: Day-old chicks

Other: Per hatch and per delivery

Broiler flocks: Before slaughter at farm

2-3 weeks prior to slaughter

Type of specimen taken

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

Other: Dead chicks and fluff

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

Other: sock/swabs, feaces and blood

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

Other: Dead chicks or meconium

Broiler flocks: Day-old chicks

Dust

Broiler flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

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

Per delivery: 10 samples of crate material and 20 dead chicks

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

1st week (Per house): 40 chicks (Parents flocks only)
2nd week (Per house): 2 pairs of sock samples (Parents flocks only)
4th week (Per house): 60 faecal samples (pooled into one sample)
8th week (Per house): 2 pairs of sock/boot samples
2 weeks before moving (Per house): 60 faecal samples (pooled into one sample, Grandparents flocks only), 2 pairs of sock/boot samples and 60 blood samples (Parents flocks only).

Breeding flocks: Production period

Every two weeks (Per flock): 250 meconium samples or 50 dead chickens collected at the hatchery
Every week (Per house): 2 pairs of sock/boot samples (Parents flocks only).

Broiler flocks: Day-old chicks

Hatchery: At least 25 grams of wet dust per hatch, 1-4 hatchers may be pooled.
Day-old (Per delivery): 10 samples of crate material and 20 dead chicks.

Broiler flocks: Before slaughter at farm

2-3 weeks before slaughter: 5 pairs of sock/boot swabs

Case definition

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

A sample is considered positive when Salmonella has been isolated.

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

A sample is considered positive when Salmonella has been isolated or when the Salmonella OD-value is over 40.

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

A sample is considered positive when Salmonella has been isolated.

Broiler flocks: Day-old chicks

A sample is considered positive when Salmonella has been isolated.

Broiler flocks: Before slaughter at farm

A sample is considered positive when Salmonella has been isolated.

Diagnostic/analytical methods used

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

Bacteriological method:

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

Other: Bacteriological and serological methods

Vaccination policy

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

No salmonella vaccinations occur

Broiler flocks

No salmonella vaccinations occur

Control program/mechanisms

The control program/strategies in place

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

The national salmonella control programme for broiler production was implemented in 1988 and adjusted in 1996. The programme is mandatory.

Broiler flocks

The national salmonella control programme for broiler production was implemented in 1988 and adjusted in 1996. The programme is mandatory.

Measures in case of the positive findings or single cases

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

Infected flocks of breeding animals are destroyed.

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

Infected flocks of breeding animals are destroyed.

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

Infected flocks of breeding animals are destroyed, and infected birds are processed for slaughter.

Broiler flocks: Before slaughter at farm

Infected birds are processed for slaughter.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

In total, 283 central rearing flocks were examined and only 1 found to be infected with Salmonella. Of the 155 adult breeder flocks examined, 6 flocks from 2 herds were found positive for Salmonella. One herd was infected with S. Typhimurium and the other herd had an unspecified Salmonella infection. In both cases, 3 flocks from the same farm were found infected simultaneously.
In 2004, the number of positive flocks ranged from 0.8% to 2.7% with a mean of 1.5%. S. Infantis was found in 27.3% and S. Typhimurium in 19.7% of the positive flocks.

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

The proportion of Salmonella-infected broiler flocks has been markedly reduced since the initiation of the control program. In During the first year of the programme (1988-1989) more than 65% of broiler flocks tested positive for Salmonella 88-89, versus les than 5% in 2000 and less than 3% in 2005.
The proportion of salmonella infected flocks in 2004 is equivalent to that observed in previous years
Between 1.7 and 4.6% of the human cases are estimated to originate from Danish produced broiler. Between 6.9 and 12.0% of the human cases are estimated to originate from imported broilers.

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

Between 1.7 and 4.6% of the human cases are estimated to originate from Danish produced broiler. Between 6.9 and 12.0% of the human cases are estimated to originate from imported broilers.

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

Monitoring system

Sampling strategy

Meat production flocks

Since March 1st 2004 turkeys were no longer slaughtered in Denmark, as the only major turkey slaughterhouse closed. Turkeys raised in Denmark were hereafter transported abroad for slaughter. Therefore, only 16 flocks were monitored for Salmonella by mandatory AM examination and all were negative.

Frequency of the sampling

Meat production flocks: Before slaughter at farm

2-4 weeks prior to slaughter

Type of specimen taken

Meat production flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

Meat production flocks: Before slaughter at farm

5 sock/boot swabs per flock

Case definition

Meat production flocks: Before slaughter at farm

A sample is considered positive when Salmonella has been isolated.

Control program/mechanisms

The control program/strategies in place

Meat production flocks

Mandatory AM examination

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.
The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

Since March 1st 2004 turkeys were no longer slaughtered in Denmark, as the only major turkey slaughterhouse closed. Turkeys raised in Denmark were hereafter transported abroad for slaughter. Therefore, only 16 flocks were monitored for Salmonella by mandatory AM examination and all were negative.

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

Since 2000, there has been a reduction in the proportion of turkey flocks testing positive at the AM examination. In 2000, 12.8% tested positive, in 2003 5.7% tested positive and in 2004 none of the flocks tested positive. As only 16 flocks were tested in Denmark 2004, compared to 200-300 flocks the previous years these results cannot be directly compared.
Between 1.4 and 3.5% of the human cases are estimated to originate from imported turkey. A part of the Danish produced turkey meat is re-imported.

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

Between 1.4 and 3.5% of the human cases are estimated to originate from imported turkey. A part of the Danish produced turkey meat is reimported.

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

Monitoring system

Sampling strategy

Breeding flocks

No monitoring.

Additional information

The production of geese in Denmark is limited.

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

Monitoring system

Sampling strategy

Breeding flocks

No monitoring.

Meat production flocks

Feceal samples (primarily as sock/boot swabs) are collected at the farm prior to slaughter.

Frequency of the sampling

Meat production flocks: Before slaughter at farm

2-3 weeks prior to slaughter

Type of specimen taken

Meat production flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

Meat production flocks: Before slaughter at farm

Five pairs of sock/boot swabs are collected from each flock. The samples are pooled prior to bacterial analysis.

Case definition

Meat production flocks: Before slaughter at farm

A sample is considered positive when Salmonella has been isolated.

Diagnostic/analytical methods used

Meat production flocks: Before slaughter at farm

Other: Depend on the laboratory

Vaccination policy

Breeding flocks

No Salmonella vaccinations occur.

Meat production flocks

No Salmonella vaccinations occur.

Control program/mechanisms

The control program/strategies in place

Meat production flocks

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Veterinary and Food Administration (DFVA).

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.
The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the DFVA.

Results of the investigation

In 2004, 201 flocks were examined. Salmonella was isolated from 115 (57,2%) of the flocks. In several cases, more than one serotype was isolated from each flock. S. Anatum was the most frequently isolated serotype.

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

In 2004, Salmonella was isolated from more than half of the tested flocks (57.2 %), this prevalence represents a decrease compared to 2003 where 73.3% of the flocks were positive, but is similar to the level observed in 2002.

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

Between 0.2 and 1.5% of the human cases are estimated to originate from Danish produced duck. Between 3.0 and 5.2% of the human cases are estimated to originate from imported duck.

F. Salmonella spp in pigs

Monitoring system

Sampling strategy

Breeding herds

Every month, blood samples from ten randomly selected young females (4-7 months old)are serologically tested. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous)are >= 5, bacteriologic confirmatory testing is carried out at the farm.
In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.
The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Multiplying herds

Every month, blood samples from ten randomly selected young females (4-7 months old)are serologically tested. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous)are >= 5, bacteriologic confirmatory testing is carried out at the farm.
In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.
The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Fattening herds

Slaughter pig herds are monitored continuously by serologic testing of meat juice at the slaughter house. Random meat samples for testing are collected at the slaughter line, where the number of samples and frequency of sampling per farm are determined by the size of the herd.
A Salmonella index is calculated for each finisher herd based on the weighted average Salmonella values (SV = OD% minus 10) from the previous 3 months, where results from the current month weigh three times as much as the two previous ones.
Every month, finisher herds are assigned to one of three levels according to their Salmonella index: Level 1: no action required; Level 2: herd intervention necessary; Level 3: herd intervention and increased hygienic precautions during slaughter are implemented. Herds with 40 <=index <70 are assigned to Level 2; herds with index >= 70 are assigned to Level 3.
Herds placed in Level 2 or Level 3 will have bacteriologic confirmatory testing carried out. Herds supplying pigs to finisher herds in Levels 2 or 3 will also have bacteriologic confirmatory testing carried out.
In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.
The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Frequency of the sampling

Breeding herds

Other: Once a month, and when needed

Multiplying herds

Other: Once a month, and when needed

Fattening herds at farm

Other: When needed

Fattening herds at slaughterhouse (herd based approach)

Depend on herd size percent of slaughtered animals are sampled

Type of specimen taken

Breeding herds

Other: Blood and faeces

Multiplying herds

Other: Blood and faeces

Fattening herds at farm

Faeces

Fattening herds at slaughterhouse (herd based approach)

Meat juice

Methods of sampling (description of sampling techniques)

Breeding herds

Every month, blood samples from ten randomly selected young females 4-7 months are collected. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous)are >= 5, faecal samples are requested.
The number of faecal samples depend on the herds size. Herds with > 400 animals collect 20 samples (5 pools) and herds with 100-400 animals collect 4-16 samples (1-4 pools).

Multiplying herds

Every month, blood samples from ten randomly selected young females 4-7 months are collected. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous)are >= 5, faecal samples are requested.
The number of faecal samples depend on the herds size. Herds with > 400 animals collect 20 samples (5 pools) and herds with 100-400 animals collect 4-16 samples (1-4 pools).

Fattening herds at farm

Herds placed in Level 2 or Level 3 must collect faecal samples at the farm. The number of samples depend on the herds size. Herds with > 400 animals collect 20 samples (5 pools) and herds with 100-400 animals collect 4-16 samples (1-4 pools).

Fattening herds at slaughterhouse (herd based approach)

Random meat samples are collected in meat juice containers at the slaughter line. Depending on the herd size, 60-100 random samples will be collected from each herd. Herds producing less than 200 slaughter pigs per year are not tested.

Case definition

Breeding herds

A herd is considered positive when Salmonella has been isolated from faecal samples.

Multiplying herds

A herd is considered positive when Salmonella has been isolated from faecal samples.

Fattening herds at farm

A herd is considered positive when Salmonella has been isolated from faecal samples.

Fattening herds at slaughterhouse (herd based approach)

An individual sample is considered seropositive if OD% >20.

Diagnostic/analytical methods used

Breeding herds

Other: Bacteriological and serological

Multiplying herds

Other: Bacteriological and serological

Vaccination policy

Breeding herds

No salmonella vaccination occur

Multiplying herds

No salmonella vaccination occur

Fattening herds

No salmonella vaccination occur

Other preventive measures than vaccination in place

Breeding herds

Control program/mechanisms

The control program/strategies in place

Breeding herds

In 1995, a serological surveillance programme for detection of Salmonella infection in slaughter-pig herds was implemented. The programme has been

adjusted over the years. Originally, the Danish Food and Veterinary Administration (DFVA) was responsible for the administration of the programme. However, since May 2002, the Danish Bacon and Meat Council has carried out the daily administration supervised by the DFVA.

Multiplying herds

In 1995, a serological surveillance programme for detection of Salmonella infection in slaughter-pig herds was implemented. The programme has been adjusted over the years. Originally, the Danish Food and Veterinary Administration (DFVA) was responsible for the administration of the programme. However, since May 2002, the Danish Bacon and Meat Council has carried out the daily administration supervised by the DFVA.

Fattening herds

In 1995, a serological surveillance programme for detection of Salmonella infection in slaughter-pig herds was implemented. The programme has been adjusted over the years. Originally, the Danish Food and Veterinary Administration (DFVA) was responsible for the administration of the programme. However, since May 2002, the Danish Bacon and Meat Council has carried out the daily administration supervised by the DFVA.

Measures in case of the positive findings or single cases

If the salmonella index(three-months average OD-values)in breeder and multiplier herds is >= 5, the owners must inform all buyers before the animals are transported.
Herds in Levels 2 and 3 will get a 2% and 4% reduction in payment for finishers sent for slaughter, covering the costs of special hygienic slaughtering procedures.
Finishers from herds infected with Multi-resistant Salmonella Typhimurium DT104 will also be slaughtered under special hygienic conditions.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

Salmonella was verified in 519 (3.8%) of the pig herds included in the surveillance. The most common serotypes were S. Typhimurium (70%) and S. Darby (18.4%). It must be noted that the bacterial testing of herds are not random, but based on the serological surveillance system, and therefore not a true prevalence estimate.
In the serological surveillance of fattening herds, the numbers of level 2 and 3 herds rose during 2004, and by the end of the year, 3.5 % of herds fell within level 2 and 1.1 % in level 3.
An increase in the number of breeding and multiplying herds reaching the serological threshold level was observed in 2003, peaked during the 2004 and was followed by a minor decline. This in combination with the rise in number of herds assigned to level 2 and 3 indicated a general increase in the prevalence of Salmonella in pig herds, which instigated an investigation. The investigation did not identify a single cause for the increase.

Clinical disease in combination with finding of Salmonella was recorded in 45 herds, and eight herds were placed under official veterinary supervision due to salmonellosis.

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

During the period 2000 to 2002, the proportion of pig herds, where salmonella bacteria was detected at the farm, reduced from 4.1% of the surveyed herds to 2,5% of the herds. In 2003, this proportion increased to 3.8% and this incease continued in 2004. This increase reflect that more herd were assigned to salmonella level 2 and 3, where bacterial testing is requested.
The level of clinical salmonellosis in 2004 (45 herds) was similar to the previous three years (39-60 herds per year).
Between 5.0 and 8.2% of the human cases are estimated to originate from Danish produced pork. Between 3.0 and 5.5% of the human cases are estimated to originate from imported pork.

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

Between 5.0 and 8.2% of the human cases are estimated to originate from Danish produced pork. Between 3.0 and 5.5% of the human cases are estimated to originate from imported pork.

Additional information

Herds with clinical disease, represents the number of herds submitting material from clinically affected animals to the laboratory with findings of Salmonella.

G. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

A voluntary national programme for surveillance of S. Dublin was established in 2002.
The herds are assigned to one of three levels based on serological results from tank milk samples taken by the dairy and blood samples from randomly selected animals taken at the slaughterhouse. Bloodsamples can also be requested on account of contact with a herd assigned to a more infectious level.
Bacteriological testing of herds in level 2 and 3 is voluntary, but in case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.
The programme is based on serological testing of blood and milk samples collected for the BVD and IBR surveillance programmes.

Frequency of the sampling

Animals at farm

Other: when requested by the farmer

Animals at slaughter (herd based approach)

Other: milk producing herds: every 3. month, non-milk producing herds: 21 days to 5 months

Type of specimen taken

Animals at farm

Faeces

Animals at slaughter (herd based approach)

Other: Milk and blood

Methods of sampling (description of sampling techniques)

Animals at farm

Faecal samples from calves or sick animals.

Animals at slaughter (herd based approach)

Milk producing herds:
one tank milk sample taken by the dairy every 3. month.
Non-milk producing herds:
Blood samples from animals collected at the slaughterhouse. Herds with less than 25 animals: one samples three times a year. Herds with more than 24 animals: three samples three times a year.

Case definition

Animals at farm

A sample is considered positive when Salmonella has been isolated.

Animals at slaughter (herd based approach)

Dairy herds are classified most likely S. Dublin free (level 1) if: 1) The results of the latest four bulk-milk test may not exceed an average antibody level of 25 OD%, 2) the latest bulk-milk sample may not exceed the average of the three previous samples with more than 20 OD%, 3) S. Dublin has not been isolated from any samples collected from the farm within the previous three months.
Not dairy farms must meet the same obligations, but instead of bulk milk samples all blood samples must be beneath 50 OD%.

Diagnostic/analytical methods used

Animals at slaughter (herd based approach)

Serological method: Mix-ELISA

Vaccination policy

Many S. Dublin infected milk-producing herds give S. Dublin serum to new born calves and at day 17.

Control program/mechanisms

The control program/strategies in place

This programme divides the cattle herds into three levels. Level 1: Most likely S. Dublin free, level 2: S. Dublin is most likely present, or the herd has unknown status, and finally, level 3: S. Dublin has been isolated from the herd, or the herd owner has purchased animals from a known level 3 herd.
This is a voluntary programme, but herds not included cannot sell animals to other herds. It is recommended that herds only purchase animals from level 1.
All trade of live cattle is recorded in a national database. After trade or other contact between cattle herds with different S. Dublin levels, the receiving herds will be placed in the highest level for three months.
Detection of multi-resistant Salmonella Typhimurium DT104 (MRDT104) in Cattle herds is notifiable. Animals are slaughtered under special hygienic precautions and an epidemiological investigation of the herd and its trade contacts are performed.

Recent actions taken to control the zoonoses

In February 2004, the validity period for blood samples in non-milk producing herds with more than 24 animals was changed from 12 to 4 month. However, this was not implemented until mid-2004 and many herds did not have valid tests results for the second half of 2004. Due to missing samples, a large increase in the number of herds in level 2 (herds with unknown S. Dublin status) was recorded by December 2004.

Measures in case of the positive findings or single cases

Animals from herds with a confirmed infections of S. Dublin will be subject to hygienic slaughter, and farmers in level 3 will recive voluntary recommendations on how to reduce the salmonella problem and detect latent carriers.
Detection of multi-resistant Salmonella Typhimurium DT104 (MRDT104) in Cattle herds is notifiable. Animals are slaughtered under special hygienic precautions and an epidemiological investigation of the herd and its trade contacts are performed.

Notification system in place

The Salmonella surveillance programme is mandatory and detection of Salmonella spp. is notifiable to the Danish Food and Veterinary Administration (DFVA).

Results of the investigation

By December 2004, 19.5% of milk-producing herds was classified as level 2 (herds with unknown S. Dublin status). Due to the reduced validity period for blood samples in non-milk producing herds, a large increase in the number of herds in level 2 was recorded by December 2004. In total, 44.3% of the herds were assigned to level 2.
Clinical disease in combination with the finding of Salmonella was recorded in 42 herds. Of these were, 29 herds placed under official veterinary supervision, while 6 were subject to hygienic slaughter due to confirmed infections of S. Dublin. The most common serotypes isolated from herds with clinical disease were S. Dublin and S. Typhimurium.

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

In 2004, 19.5% of milk-producing herds was classified as level 2 (herds with unknown S. Dublin status), which is a significant decrease compared to 2003 (25.9%) and october 2002(23%)when the programme was initiated. It is believed that changes in trading habits among farmers are major contributors to this decrease, i.e. since 2003 very few animals from level 2 have been sold to level 1 herds.
Due to the reduced validity period for blood samples in non-milk producing herds (implemended in the the second half of 2004) a large increase in the number of herds in level 2 was recorded by December 2004. In total, 44.3% of the herds were assigned to level 2, compared to 23.5% herds in December 2003. In october 2002 when the programme was initiated 47% of the herds were in level 2, a substantial part of them also due to missing samples.
Between 1.4 and 2.7% of the human cases are estimated to originate from Danish produced beef. Between 0.5 and 1.3% of the human cases are estimated to originate from imported beef.

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

Between 1.4 and 2.7% of the human cases are estimated to originate from Danish produced beef. Between 0.5 and 1.3% of the human cases are estimated to originate from imported beef.

H. Salmonella spp. in animal - Wildlife

Monitoring system

Sampling strategy

A small number of samples from wild life are tested for Salmonella at the Danish Food and Veterinary Research. Of the wild animals submitted by hunters, veterinarians and the public, was Salmonella isolated from 2 foxes and 6 hedgehogs.

Results of the investigation

Of the wild animals submitted by hunters, veterinarians and the public, was Salmonella isolated from 2 foxes and 6 hedgehogs.

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							
- during production period	DVFA/DPC			9	2		2
- during rearing period	DVFA/DPC			9	0		0
parent breeding flocks for meat production line							
- during rearing period	DVFA/DPC			283	1		
- during production period	DVFA/DPC			155	5		

Footnote

Compulsory surveillance program. Data from Danish Veterinary Food Administration and Danish Poultry Council

Table 3.2.2 Salmonella sp. in other commercial poultry

	Source of information	Remarks	Epidemiological unit	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium	S. Infantis
Gallus gallus								
laying hens								
- during rearing period	DVFA/DPC		flock	368	1	1		
- during production period	DVFA/DPC		flock	641	5	2	1	1
broilers								
- during rearing period	DVFA/DPC		flock	4313	66	4	13	18
Ducks								
- during production period	DVFA/DPC		flock	201	115			
Turkeys								
- during production period (1)	DVFA/DPC		flock	16	0			

(1) : From March 2004, turkeys were no longer slaughtered in Denamrk hence very few examined flocks.

Footnote

Compulsory surveillance program. Data from Danish Veterinary Food Administration and Danish Poultry Council

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
Cattle (bovine animals)	DFVF		animal and herd	221	8		5	2
Pigs								
fattening pigs	DVFA		herd	13752	519			

2.1.5. Salmonella in feedstuffs

A. Salmonella spp. in feed

History of the disease and/or infection in the country

All Danish feed compounders are monitored for Salmonella by the Danish Plant Directorate. Monitoring includes sampling of compound feeds and feed materials, including raw materials of animal origin, as well as sampling during feed processing (environmental samples).
Three different categories of meat and bone meal by-products, not intended for human consumption, have been set by regulation No. 1774 of 03/11/2002. Special processing plants and by-products of these cannot be used for feeding purposes. Category 3 materials must be by-products from healthy parts of animals and processed at category 3 processing plants. These materials may be used for feeding purposes. Monitoring of hygiene at the processing plants is mainly based on the plant's own-check programmes, which are inspected by the Regional Veterinary and Food Control Authority (RVFCA). Positive Salmonella samples must be reported to the RVFCA.

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

In general, the prevalence of Salmonella in feed was low, however due to changes in the sampling strategy and sample size of feed materials, the results from 2004 and 2003 are not readily comparable.
In 2004, 7,979 samples of meat and bone meal were examined for Salmonella. Of these, 4,180 were collected as a part of the plants' own-check programme and the remaining 3,799 samples as controls of the products. In total, 2.1% samples were found positive for Salmonella and all isolates were serotyped. S. Montevideo was the most common serotype found.
The most common serotypes isolated from feeding stuff is relativly uncommon among the human cases.

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

The most common serotypes isolated from feeding stuff is relativly uncommon among the human cases.

Recent actions taken to control the zoonoses

In 2004, the strategy for controlling Salmonella in feeding stuffs was revised as follows:
-Routine inspections of feed processing plants continued,
-Sampling of compound feeds discontinued. The presence of Salmonella in compound feed is now indirectly monitored by the environmental samples collected during feed processing,
-Sampling of feed materials increased from 300 samples to 1000 samples per year and the sampling method was modified,
-Samples from transport vehicles were collected (hygiene samples) prior to loading of feed compounds.

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. Montevideo	S. Infantis	S. Livingstone
Feed material of land animal origin											
Meat and bone meal	DVFA and processing plants				7979	164	0	1	89	21	24

Footnote

DVFA: The Danish Veterinary and Food Administration

Table 3.1.2 Salmonella sp. in feed of vegetable origin (Part A)

	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Lexington	S. Cubana	S. Kintambo	S. Llandoff	S. Montevideo	S. Quakam	S. Tennessee	S. Agona	S. Rissen	S. Infantis	S. Livingstone	S. Lexington var. 15
Feed material of oil seed or fruit origin																				
Rape seed derived	PD			25 g	59	5										4				
Soya (bean) derived	PD			25 g	1004	42			2	1	1	1	1	1	2	2	4	9	3	1
Sunflower seed derived	PD			25 g	38	2										1				

Footnote

Source: The Danish Plant Directorate (PD)

Table 3.1.2 Salmonella sp. in feed of vegetable origin (Part B)

	Feed material of oil seed or fruit origin	S. Mbandaka	S. Senftenberg	S. Bredeney	S. IIIb 43:r:e,n	S. Kentucky	S. 4,12:b:-
Rape seed derived							1
Soya (bean) derived		1	7		1	5	
Sunflower seed derived				1			

Footnote

Source: The Danish Plant Directorate (PD)

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								
Final product	PD	a)		25g	0	0		
Compound feedingstuffs for pigs								
Final product	PD	a)		25g	0	0		
Compound feedingstuffs for poultry (non specified)								
Final product	PD	a)		25g	0	0		

Footnote

a) Compulsory monitoring programme of all Danish feed compounders, carried out by the PD. For further details please refer to the Annual Report on Zoonoses in Denmark, 2003
Source: The Danish Plant Directorate (PD)

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=	65	42	922	45	66		163	
Number of isolates serotyped	N=	65	42	922	45	66		150	
Number of isolates per type									
S. Agona								1	
S. Anatum								43	
S. Bovismorbificans				1					
S. Brandenburg				2	1				
S. Bredeney				2					
S. Chicago						1			
S. Derby				170	8	1			
S. Dublin		36	25						
S. Enteritidis				1		4			
S. Falkensee				2					
S. Havana				2					
S. Heidelberg				1		2			
S. Idikan		1	1						
S. Indiana						11		40	
S. Infantis				32	2	18			
S. Kentucky				1		4			

S. Kottbus							15	
S. Livingstone			10	2				
S. Mbandaka			1					
S. Meleagridis	1		1					
S. Muenster							1	
S. Ohio			2					
S. Orion var. 15			1					
S. Panama			1					
S. Putten			2					
S. Regent					1		48	
S. Rissen			1					
S. Saintpaul							1	
S. Schwarzengrund			7					
S. Senftenberg			1					
S. Stanley			2		5			
S. Typhimurium	24	16	645	31	13			
S. Uganda								
S. Virchow			1					
S. Worthington			1	1	1		1	
S. 1,9,12:l,v:-			1					
S. 4,12:-:-			1					
S. 4,12:b:-			1		3			
S. 4,12:d:-			3					
S. 4,12:i:-			1					
S. 9,12:-:-	1		5					
S. 9,12:lv:-	2		9					
Not typeable			11		2		13	
Total of typed *Salmonella*isolates								

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.4 Salmonella serovars in food

Serovars		Bovine meat		Pig meat		Broiler meat		Other poultry		Other products of animal origin	
Sources of isolates		M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory	N=	38		280		24		2			
Number of isolates serotyped	N=	38		280		24		2			
Number of isolates per type											
S. Derby				62							
S. Dublin		23									
S. Infantis				16							
S. Typhimurium		4		96							
other serovars		5		58							
Not typeable		6		48							
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=					4			
Number of isolates serotyped	N=					4			
Number of isolates per type									
PT 6						3			
PT 1b						1			
Total of typed *Salmonella*isolates									

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.6 S.Enteridis phagetypes in food

Phagetype		Bovine meat		Pig meat		Broiler meat		Other poultry		Other products of animal origin	
Sources of isolates		M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory	N=			1							
Number of isolates serotyped	N=			1							

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=		546
Number of isolates serotyped	N=		546
Number of isolates per type			
PT 1			75
PT 4			128
PT 6			34
PT 8			114
PT 21			62
PT 1b			2
PT 7			1
Other			130
Total of typed *Salmonella*isolates			

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=	26		685		13			
Number of isolates serotyped	N=	26		685		13			
Number of isolates per type									
DT 1				1					
DT 7				1					
DT 12		5		172		5			
DT 66				22					
DT 104		4		47		1			
DT 104b				10					
DT 120		1		92		2			
DT 170		2		79		1			
DT 193		1		32					
DT 208				7					
U 302				10					
Not typable				25		1			
DT 40				1					
DT RDNC		8		55					
DT 22				4					
U 310				4					

DT 15a	1			10																
DT 17	4			50		1														
DT 99				2																
DT 10				8																
DT 110				2		2														
DT 97				1																
DT 93				1																
DT 44				1																
DT 35				1																
DT 3				1																
DT 20				2																
DT 135				6																
U 312				2																
U 288				23																
other (1)				7																
Total of typed *Salmonella*isolates																				

(1) : RU

Footnote

(*) M : Monitor, C : Clinical

Table 3.3.8 Salmonella Typhimurium phagetypes in food

Phagetype		Bovine meat		Pig meat		Broiler meat		Other poultry		Other products of animal origin	
Sources of isolates		M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)	M(*)	C(*)
Number of isolates in the laboratory	N=	4		96							
Number of isolates serotyped	N=	4		96							
Number of isolates per type											
DT 1				1							
DT 12		1		24							
DT 66				2							
DT 104				7							
DT 104b				1							
DT 120				7							
DT 170				10							
DT 193				4							
U 302				1							
Not typable				10							
DT 41				1							
DT RDNC				8							
DT 17				6							
DT 99		3									

DT 10			1							
DT 107			1							
DT 135			2							
U 288			4							
other (1)			6							
Total of typed *Salmonella*isolates										

(1) : RU

Footnote

(*) 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=		467
Number of isolates serotyped N=		467
Number of isolates per type		
DT 8		4
DT 12		83
DT 66		5
DT 104		46
DT 104b		3
DT 120		75
DT 170		22
U 302		18
DT 17		1
DT 99		1
DT 110		1
other		208
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

Frequency of the sampling

Only samples from clinical cases of Salmonellosis in cattle were collected

Type of specimen taken

Faecal samples

Procedures for the selection of isolates for antimicrobial testing

Clinical samples: Only one isolate per serotype per farm was selected for susceptibility testing

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

Examination of samples from cattle was done by non-selective pre-enrichment of 22 g material in 200 ml of buffered peptone water (BPW) and incubated overnight at 37°C . A plate with Modified Semi-solid Rappaport-Vassiliadis medium was inoculated with 0.1 ml of BPW deposited on the agar as 3 drops. Overnight incubation at 41.5°C was followed by serotyping of suspect colonies by slide agglutination.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

Detection of multi-resistant Salmonella Typhimurium DT104 (MRDT104)in Cattle herds is notifiable. Animals are slaughtered under special hygienic precautions and an epidimiological investigation of the herd and its trade contacts are performed.

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

Animals are slaughtered under special hygienic precautions and an epidimiological investigation of the herd and its trade contacts are performed.
Detection of DT104 in Cattle herds is notifiable. Animals from are slaughtered under special hiygienic precautions and an epidimiological investigation of the herd and its trade contacts are performed.

Notification system in place

Positve findings of MRDT104 must be reported to the Danish Veterinary and Food Administration

Results of the investigation

28 isolates from clinical cases of Salmonellosis in cattle were subjected to susceptibility testing.

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

The results were similar to previous years.

B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected maily from subclinical cases of salmonellosis in pigs.

Type of specimen taken

faecal samples

Procedures for the selection of isolates for antimicrobial testing

Only one isolate per serotype per farm was selected for susceptibility testing

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

Examination of samples from pigs was done by non-selective pre-enrichment of 22 g material in 200 ml of buffered peptone water (BPW) and incubated overnight at 37°C . A plate with Modified Semi-solid Rappaport-Vassiliadis medium was inoculated with 0.1 ml of BPW deposited on the agar as 3 drops. Overnight incubation at 41.5°C was followed by serotyping of suspect colonies by slide agglutination.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

Detection of DT104 in pig herds is notifiable. Animals from are slaughtered under special hygienic precautions and an epidimiological investigation of the herd and its trade contacts are performed.

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

Detection of DT104 in pig herds is notifiable. Animals from are slaughtered under special hygienic precautions and an epidimiological investigation of the herd and its trade contacts are performed.

Notification system in place

Positve findings are reported to the Danish Veterinary and Food Administration

Results of the investigation

814 isolates from subclinical cases of Salmonellosis in pigs were selected for susceptibility testing.

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

The results were similar to previous years.

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected maily from subclinical cases of salmonellosis in broilers.

Type of specimen taken

faecal samples

Procedures for the selection of isolates for antimicrobial testing

Only one isolate per serotype per farm was selected for susceptibility testing

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

Samples from poultry were examined by non-selective pre-enrichment in BPW of paired sock samples, or homogenized organs, at a ratio of 1:9 and incubated at 37°C overnight, followed by selective enrichment by inoculation of 9.9 ml Rappaport-Vassiliadis broth with 0.1 ml pre-enrichment broth and incubation at 41.5°C overnight. The selective broth was inoculated onto Rambach agar. Presumptive Salmonella isolates were verified and typed by slide agglutination.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See table

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

Detection of multi-resistant Salmonella Typhimurium DT104 (MRDT104)is notifiable. Detection of MRDT104 in slaughter-poultry or table egg production flocks will lead to slaughtering and heat treatment or destruction of the flock.

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

Detection of MRDT104 in slaughter-poultry or table egg production flocks will lead to slaughtering and heat treatment or destruction of the flock.

Notification system in place

Positve findings are reported to the Danish Veterinary and Food Administration

Results of the investigation

18 isolates from subclinical cases of Salmonellosis in broilers were subjected to susceptibility testing.

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

The results were similar to previous years.

D. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

No samples of Danish beef were subjected to susceptibility testing in 2004.

E. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Sampling strategy used in monitoring

Frequency of the sampling

Salmonella isolates were obtained from pork sold at wholesale and retail outlets as described under "Salmonella spp. in pig meat and products thereof/At retail"

Type of specimen taken

meat samples

Methods used for collecting data

All isolates are tested centrally at the Danish Institute for Food and Veterinary Research.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

When Salmonella is detected in a sample, the Danish Food and Veterinary Administration must be notified and actions will be taken to identify the source.
All meat products with positive MRDT104 are destructed or heat treated and if Salmonella are detected in the retail, the products are withdrawn.
Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected the batch is rejected or heat-treated

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

The Danish surveillance programme for multi-resistant Salmonella Typhimurium DT104 (MRDT104) has been in place since 1998. There is zero tolerance for the presence MRDT104 in all foods, and all meat products are destructed or heat-treated. If S. Typhimurium DT104 is detected in the retail, the products are withdrawn. Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected, the imported batch is rejected or heat-treated.

Notification system in place

When Salmonella is detected in a sample, the Danish Food and Veterinary Administration must be notified and actions will be taken to identify the source.
The programme mandates a zero-tolerance for this pathogen in all foods. All meat products with positive MRDT104 are destructed or heat treated and if Salmonella are detected in the retail, the products are withdrawn.
Meat imported for 3rd countries and the EU is randomly tested for Salmonella at either the entry point into EU or at the place of destination. If MRDT104 is detected the batch is rejected or heat-treated

Results of the investigation

13 samples from Danish pork were subjected to susceptibility testing.

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

The results were similar to previous years.

F. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

No samples of Danish broiler meat were subjected to susceptibility testing in 2004.

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	262	
Antimicrobials:	**N**	**%R**
Tetracycline		2%
Amphenicols		
Chloramphenicol		1%
Florfenicol		0%
Cephalosporin		
Cephalothin		0%
Ceftiofur		0%
Fluoroquinolones		
Ciprofloxacin		16%
Quinolones		
Nalidixic acid		16%
Trimethoprim		1%
Sulfonamides		
Sulfonamide		1%
Aminoglycosides		
Streptomycin		1%
Gentamicin		0%
Neomycin		1%
Penicillins		
Ampicillin		2%

Table Antimicrobial susceptibility testing of S. Enteritidis in humans - 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 humans - monitoring programme																				
Isolates out of a monitoring program	yes																				
Number of isolates available in the laboratory	262																				
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		2%							97,7	0,4				1,9								
Amphenicols																						
Chloramphenicol		1							0,8	80,2	17,9	0,4		0,4	0,4							
Cephalosporin																						
Cephalothin		0							56,9	39,7	3,4											
Ceftiofur		0					80,2	19,5	0,4													
Fluoroquinolones																						
Ciprofloxacin		16	84,0	0,4	9,9	5,7																
Quinolones																						
Nalidixic acid		16									83,6	0,4			0,4	15,6						
Trimethoprim		1%								99,2	0,4			0,4								
Sulfonamides																						
Sulfonamide		1												98,1	1,1							
Aminoglycosides																						
Streptomycin		1								96,9	2,7		0,4									
Gentamicin		0						99,6	0,4													
Neomycin		1							99,6				0,4									
Penicillins																						
Ampicillin		2						10,7	85,9	0,8	0,4	0,4		1,9								

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	yes		yes		yes			
Number of isolates available in the laboratory	28		814		18			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline		21%		40%		17%		
Amphenicols								
Chloramphenicol		14%		9%		6%		
Florfenicol		7%		5%		0%		
Cephalosporin								
Cephalothin		0%		1%		0%		
Ceftiofur		0%		0%		0%		
Fluoroquinolones								
Ciprofloxacin		0%		1%		0%		
Quinolones								
Nalidixic acid		0%		1%		0%		
Trimethoprim		4%		6%		0%		
Sulfonamides								
Sulfonamide		32%		38%		11%		
Aminoglycosides								
Streptomycin		39%		37%		17%		
Gentamicin		0%		1%		0%		
Neomycin		0%		8%		6%		
Penicillins								
Ampicillin		32%		22%		17%		

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - at slaughter - 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. Typhimurium
	Pigs - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	814

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		40%							55,9	3,8	0,4	0,1	4,7	35,1								
Amphenicols																						
Chloramphenicol		9							0,6	45,8	41,3	2,9	0,2	0,9	8,2							
Florfenicol		5							1,5	76,4	14,0	2,8	4,1	0,5	0,7							
Cephalosporin																						
Cephalothin		1							40,3	40,0	14,6	3,8	1,1	0,1								
Ceftiofur		0					34,9	57,5	7,6													
Fluoroquinolones																						
Ciprofloxacin		1	90,9	8,2	0,7		0,1															
Quinolones																						
Nalidixic acid		1										99,0	0,7		0,1	0,1						
Trimethoprim		6%								93,7				6,3								
Sulfonamides																						
Sulfonamide		38												53,6	8,7							
Aminoglycosides																						
Streptomycin		37								1,6	46,3	14,7	2,9	3,8	30,6							
Gentamicin		1						97,4	1,1		0,2	0,4	0,7	0,1								
Neomycin		8							89,3	2,6	0,4		0,9	6,9								
Penicillins																						
Ampicillin		22						60,3	15,0	2,3	0,1			22,2								

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - at slaughter - 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. Typhimurium
	Cattle (bovine animals) - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	28

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		21%							78,6			3,6	3,6	14,3								
Amphenicols																						
Chloramphenicol		14							7,1	60,7	17,9			7,1	7,1							
Florfenicol		7							14,3	71,4	7,1		3,6	3,6								
Cephalosporin																						
Cephalothin		0							42,9	32,1	25,0											
Ceftiofur		0					60,7	35,7	3,6													
Fluoroquinolones																						
Ciprofloxacin		0	96,4	3,6																		
Quinolones																						
Nalidixic acid		0										100										
Trimethoprim		4%								96,4				3,6								
Sulfonamides																						
Sulfonamide		32												57,1	10,7							
Aminoglycosides																						
Streptomycin		39								3,6	32,1	25,0		10,7	28,6							
Gentamicin		0						96,4	3,6													
Neomycin		0							92,9	7,1												
Penicillins																						
Ampicillin		32						57,1	10,7					32,1								

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus - at slaughter - 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. Typhimurium
	Gallus gallus - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	18

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		17%							77,8	5,6				16,7								
Amphenicols																						
Chloramphenicol		6							11,1	55,6	16,7	11,1			5,6							
Florfenicol		0							33,3	55,6	11,1											
Cephalosporin																						
Cephalothin		0							72,2	5,6	16,7	5,6										
Ceftiofur		0					83,3	11,1	5,6													
Fluoroquinolones																						
Ciprofloxacin		0	88,9	11,1																		
Quinolones																						
Nalidixic acid		0										100										
Trimethoprim		0%								100												
Sulfonamides																						
Sulfonamide		11												88,9								
Aminoglycosides																						
Streptomycin		17									22,2	61,1		5,6	11,1							
Gentamicin		0						94,4	5,6													
Neomycin		6							94,4					5,6								
Penicillins																						
Ampicillin		17						77,8		5,6				16,7								

Table Antimicrobial susceptibility testing of S. Typhimurium in Pig meat - at retail - 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. Typhimurium
	Pig meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	13

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		92%							7,7					92,3								
Amphenicols																						
Chloramphenicol		15							46,2		38,5				15,4							
Florfenicol		0								76,9	7,7	15,4										
Cephalosporin																						
Cephalothin		8							23,1	38,5	23,1	7,7	7,7									
Ceftiofur		0					7,7	92,3														
Fluoroquinolones																						
Ciprofloxacin		0	92,3	7,7																		
Quinolones																						
Nalidixic acid		0										100										
Trimethoprim		31%								69,2				30,8								
Sulfonamides																						
Sulfonamide		69												23,1	7,7							
Aminoglycosides																						
Streptomycin		46								7,7	23,1	23,1	7,7		38,5							
Gentamicin		8						92,3				7,7										
Neomycin		0							100													
Penicillins																						
Ampicillin		54						30,8	15,4					53,8								

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	425	
Antimicrobials:	**N**	**%R**
Tetracycline		46%
Cephalosporin		
Cephalothin		1%
Ceftiofur		0%
Fluoroquinolones		
Ciprofloxacin		3%
Quinolones		
Nalidixic acid		2%
Trimethoprim		8%
Sulfonamides		
Sulfonamide		40%
Aminoglycosides		
Streptomycin		40%
Gentamicin		1%
Neomycin		2%
Penicillins		
Ampicillin		40%

Table Antimicrobial susceptibility testing of S. Typhimurium in humans - 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. Typhimurium humans - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	425

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		46%							52,9	0,7		2,1	6,1	38,1								
Amphenicols																						
Chloramphenicol		11							3,3	65,9	20,2		0,2	1,9	8,5							
Florfenicol		4							5,6	82,1	4,5	3,5	3,8	0,2	0,2							
Cephalosporin																						
Cephalothin		1							49,4	34,8	13,6	1,6	0,2		0,2							
Ceftiofur		0					84,2	14,8	0,9													
Fluoroquinolones																						
Ciprofloxacin		3	96,5	0,9	0,7	0,7	0,2				0,9											
Quinolones																						
Nalidixic acid		2									97,4	0,2				2,4						
Trimethoprim		8%								92,5				7,5								
Sulfonamides																						
Sulfonamide		40												60,0	0,2							
Aminoglycosides																						
Streptomycin		40								8,9	46,4	4,7		7,8	32,2							
Gentamicin		1						98,6	0,7			0,2	0,5									
Neomycin		2							98,4				0,7	0,9								
Penicillins																						
Ampicillin		40						41,9	17,6	0,7				39,8								

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								
Number of isolates available in the laboratory								
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Penicillins								
Ampicillin		8%						

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		
Antimicrobials:	**N**	**%R**

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	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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

Since 1999, campylobacteriosis has been the single leading cause of bacterial gastrointestinal disease in Denmark. Consumption and handling of poultry and poultry products is believed to be the primary source of human campylobacteriosis in Denmark, though other sources also exist. Data on travel history is currently not reliably recorded in the surveillance system; therefore, the incidence of people infected outside Denmark is unknown. It is estimated that approximately one third of cases are travel related. Outbreaks of human campylobacteriosis are relatively rare.
Both humans and broilers have a distinct seasonal distribution in the number of Campylobacter spp with a summer peak in July/August and a much smaller winter peak in January/February.

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

A gradual decline in the prevalence of Campylobacter infections in broiler flocks from 1998 through 2002 does not coincide with the human trend. In fact, the number of human cases showed an overall increase of 37.0% from 1998 to 2001. However, in 2002 the number of human cases decreased by 5.2%, and again by 19.5% in 2003. This significant decrease coincides with the implementation of the voluntary intervention program in broilers. It is likely that the practice of allocating Campylobacter-negative flocks to the production of fresh products and Campylobacter-positive flocks for frozen product production, although not completely consistent, contributed to the reduction in human cases.

Recent actions taken to control the zoonoses

A voluntary intervention strategy aimed at reducing the number of Campylobacter positive broiler flocks was implemented in 2003 and continued in 2004. The intervention strategies included strict hygiene and bio security measures at the farm and higher prices paid to the farmers for delivering Campylobacter-negative flocks.

Additional information

Pigs and Cattle
As part of the DANMAP programme, caecal content of pigs and cattle was sampled at slaughterhouses and examined for Campylobacter spp. In 2004, the prevalence of Campylobacter in pigs was 79.6%, a decrease from 2003 (93.4%). The majority of these positive samples were identified as C. coli. In cattle, the prevalence was 64.2%, which was equivalent to that observed in 2003. The majority of these positive samples were identified as C. jejuni.
Serotyping of Campylobacter
Serotyping of Campylobacter isolates from cattle, pigs and broilers was discontinued at the DFVF during 2004. However, typing at the species level using biochemical tests was maintained. Human campylobacter isolates were not serotyped in 2004

2.2.2. Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Reporting system in place for the human cases

Campylobacter spp. is notifiable through the laboratory surveillance system. Cases diagnosed by a clinical microbiological laboratory are reported to the Unit of Gastrointestinal Infections at SSI.

Case definition

A case is concidered positive when Campylobacter has been isolated, or a clinical case with an epidemiological link to a culture confirmed case.

Diagnostic/analytical methods used

Bacteriology, isolation of Campylobacter from faecal samples.

Notification system in place

Cases of notifiable zoonotic enteric pathogens diagnosed by a clinical microbiological laboratory are reported through the laboratory surveillance system to the Unit of Gastrointestinal Infections at Statens Serum Institute (SSI). The laboratories must report positive results to the SSI within one week.

History of the disease and/or infection in the country

Since 1999, campylobacteriosis has been the single leading cause of bacterial gastrointestinal disease in Denmark. Consumption and handling of poultry and poultry products is believed to be the primary source of human campylobacteriosis in Denmark, though other sources also exist. Data on travel history is currently not reliably recorded in the surveillance system; therefore, the incidence of people infected outside Denmark is unknown. It is estimated that approximately one third of cases are travel related. Outbreaks of human campylobacteriosis are relatively rare.
Both humans and broilers have a distinct seasonal distribution in the number of Campylobacter spp with a summer peak in July/August and a much smaller winter peak in January/February.

Results of the investigation

In 2004, there were 3,724 reported cases corresponding to an incidence of 68.8 cases per 100,000 inhabitants.

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

Following two years of decline, this was a 5.1% increase in confirmed laboratory cases compared to 2003. However, the number of cases was still lower than in 2002 (4,378 cases). Consumption and handling of poultry and poultry products is believed to be the primary source of human campylobacteriosis in Denmark, though other sources also exist. Data on travel history is currently not reliably recorded in the surveillance system; therefore, the incidence of people infected outside Denmark is unknown. It is estimated that approximately one third of

cases are travel related.

Relevance as zoonotic disease

Consumption and handling of poultry and poultry products is believed to be the primary source of human campylobacteriosis in Denmark, though other sources also exist.

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

Campylobacter	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc	unknown status
	3724	0	0	0	0	0	0
C. coli							
C. jejuni							
C. upsaliensis							
Campylobacter spp.	3724						

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							49	28	21
1 to 4 years							278	167	110
5 to 14 years							329	204	125
15 to 24 years							723	340	383
25 to 44 years							1423	717	706
45 to 64 years							669	389	280
65 years and older							252	141	111
Age unknown							1		
Total :	0	0	0	0	0	0	3724	1986	1736

Table 6.3.C Campylobacteriosis in man - seasonal distribution

Month	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp.
	Cases	Cases	Cases	Cases
January				192
February				188
March				183
April				197
May				187
June				493
July				483
August				596
September				468
October				334
November				222
December				180
not known				1
Total :	0	0	0	3724

2.2.3. Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At meat processing plant

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

At retail

Monitoring for zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level.

Frequency of the sampling

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Definition of positive finding

At meat processing plant

Depend on the survey. Samples are concidered positve when Campylobacter has been detected either by using the PCR method of by bacteriological methods.

At retail

Depend on the survey. Samples are concidered positve when Campylobacter has been detected either by using the PCR method of by bacteriological methods.

Diagnostic/analytical methods used

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

None, the programme is volentary

Measures in case of the positive findings or single cases

None

Notification system in place

Campylobacteriosis is not notifiable in broilers.

Results of the investigation

Data was not available.

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

The gradual decline in the prevalence of Campylobacter infections in broiler flocks from 1998 through 2002 does not coincide with the human trend. In fact, the number of human cases showed an overall increase of 37.0% from 1998 to 2001. However, in 2002 the number of human cases decreased by 5.2%, and again by 19.5% in 2003. This significant decrease coincides with the implementation of the voluntary intervention program in broilers. It is likely that the practice of allocating Campylobacter-negative flocks to the production of fresh products and Campylobacter-positive flocks for frozen product production, although not completely consistent, contributed to the reduction in human cases.

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	DVFA		Sample		96					0
Poultry meat										
fresh										
- at retail	DVFA		Sample		584					137
Other meat										
fresh										
- at retail (1)	DFVA		Sample		7					0
cow milk										
raw	DFVA		Sample		9					0

(1) : Turkey

Footnote

DFVF=Danish Institute for Food and Veterinary Research

2.2.4. Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A voluntary intervention strategy aimed at reducing the number of Campylobacter positive broiler flocks was implemented in 2003 and continued in 2004. Cloacal swabs from randomly collected broiler from all slaughtered flocks were sampled at the slaughterhouse prior to slaughter.

Frequency of the sampling

At slaughter

Every flock is sampled

Type of specimen taken

At slaughter

Other: Cloacal swabs

Methods of sampling (description of sampling techniques)

At slaughter

10 cloacal swabs are collected from each flock/batch at the time of slaughter. Samples are pooled.

Case definition

At slaughter

Samples are concidered positve when Campylobacter has been detected using the PCR method.

Other preventive measures than vaccination in place

Generally, Campylobacter-negative flocks are allocated to the production of fresh products and Campylobacter-positive flocks for frozen product production, although not completely consistent.

Control program/mechanisms

The control program/strategies in place

None, the programme is volentary

Recent actions taken to control the zoonoses

A voluntary intervention strategy aimed at reducing the number of Campylobacter positive broiler flocks was implemented in 2003

Measures in case of the positive findings or single cases

None

Notification system in place

Campylobacteriosis is not notifiable in poultry

Results of the investigation

In 2004, there were 27.0% Campylobacter positive flocks out of 5159 flocks examined; which is a significant decrease compared to the years prior to implementation of the intervention strategy, where the prevalence was greater than 35%

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

The level of Campylobacter positive flocks in 2004 (27.0%), was significantly lower than than in the years prior to implementation of the intervention strategy. Although samples were collected from the flocks following transport to the slaughterhouse, it is believed that the observed prevalence reflects the flock status at the farm. Therefore, the significant reduction in prevalence is considered to be attributable to the enforcement of intervention strategies including strict hygiene and bio security measures at the farm and higher prices paid to the farmers for delivering Campylobacter-negative flocks.
The gradual decline in the prevalence of Campylobacter infections in broiler flocks from 1998 through 2002 does not coincide with the human trend. In fact, the number of human cases showed an overall increase of 37.0% from 1998 to 2001. However, in 2003 the number of human cases decreased by 5.2%, and again by 19.5% in 2004. This significant decrease coincides with the implementation of the voluntary intervention program in broilers. It is likely that the practice of allocating Campylobacter-negative flocks to the production of fresh products and Campylobacter-positive flocks for frozen product production, although not completely consistent, contributed to the reduction in human cases.

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

The gradual decline in the prevalence of Campylobacter infections in broiler flocks from 1998 through 2002 does not coincide with the human trend. In fact, the number of human cases showed an overall increase of 37.0% from 1998 to 2001. However, in 2003 the number of human cases decreased by 5.2%, and again by 19.5% in 2004. This significant decrease coincides with the implementation of the voluntary intervention program in broilers. It is likely that the practice of allocating Campylobacter-negative flocks to the production of fresh products and Campylobacter-positive flocks for frozen product production, although not completely consistent, contributed to the reduction in human cases.

Additional information

The PCR-method used in surveillance of Campylobacter does not differentiate between species of Campylobacter; however, as part of the monitoring programme for the occurrence of

antimicrobial resistance in zoonotic bacteria (DANMAP), one flock from each broiler house was examined for Campylobacter spp. by conventional microbiological methods. Each sample consisted of 10-pooled cloacal swabs. Of the 520 samples investigated, 19.4% were found to be positive for Campylobacter. Of these, 94.1% were identified as C. jejuni and 5.9% as C. coli.

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
Cattle (bovine animals)									
others	DFVA, DFVF		herd	67	43	42	1		
Pigs	DFVA, DFVF		herd	191	152	2	149		
Gallus gallus									
broilers									
- at farm	DPC, DFVA		flock	5159	1391				
Other poultry	DPC, DVFA	turkey	flock	16	0				

Footnote

DFVF=Danish Institute for Food and Veterinary Research
DVFA=The Danish Veterinary and Food Administration
DPC=Danish Poultry Council

2.2.5. Antimicrobial resistance in *Campylobacter* isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Sampling strategy used in monitoring

Frequency of the sampling

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the Danish Institute for Food and Veterinary Research (DFVF) for examination. The number of samples for each plant depend on the number of animals slaughtered per year. One sample represents one herd or flock. They are collected once a month (weekly for broilers). The cattle slaughter plants included in the surveillance programme account for 90% of the total production of these cattle in Denmark. Accordingly, the bacterial isolates may be regarded as representing a stratified random sample of the respective populations, so that the occurrence of resistance provides an estimate of the true occurrence in the populations.

Type of specimen taken

faecal sample

Procedures for the selection of isolates for antimicrobial testing

One isolate per herd

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

The samples were examined by direct inoculation of selective agar as well as by selective enrichment. As selective agar we used mCCD agar, which was incubated in micro-aerophilic atmosphere for 1-3 days at 42°C. Selective enrichment was done by inoculation of Preston broth at a ratio of 1:10, followed by incubation in microaerophilic atmosphere for 24 h at 42°C . Ten µl of this enrichment culture was inoculated onto mCCD agar and incubated 1 - 3 days at 42°C. Campylobacter-like colonies were identified by their catalase activity, by their ability to hydrolyse hippurate and indoxyl acetate. For isolates from cattle and pigs, also oxidase activity was tested.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See table

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

42 C. jejuni isolates from cattle were subjected to susceptibility testing.

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

The results were similar to previous years.

B. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the Danish Institute for Food and Veterinary Research (DFVF) for examination. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. Each sample represents one herd or flock. They are collected once a month. The pig slaughter plants included in the surveillance programme account for 95% of the total production of pigs in Denmark. Accordingly, the bacterial isolates may be regarded as representing a stratified random sample of the respective populations, so that the occurrence of resistance provides an estimate of the true occurrence in the populations.

Type of specimen taken

faecal sample

Procedures for the selection of isolates for antimicrobial testing

One isolate per herd

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

The samples were examined by direct inoculation of selective agar as well as by selective enrichment. As selective agar we used mCCD agar, which was incubated in micro-aerophilic atmosphere for 1-3 days at 42°C. Selective enrichment was done by inoculation of Preston broth

at a ratio of 1:10, followed by incubation in microaerophilic atmosphere for 24 h at 42°C . Ten µl of this enrichment culture was inoculated onto mCCD agar and incubated 1 - 3 days at 42°C. Campylobacter-like colonies were identified by their catalase activity, by their ability to hydrolyse hippurate and indoxyl acetate. For isolates from cattle and pigs, also oxidase activity was tested.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See table

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

100 C. coli isolates from pigs were subjected to susceptibility testing.

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

The results were similar to previous years.

C. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the Danish Institute for Food and Veterinary Research (DFVF) for examination. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. Each sample represents one herd or flock. They are collected once a month (weekly for broilers). The broiler slaughter plants included in the surveillance programme account for 95%of the total production of broilers in Denmark. Accordingly, the bacterial isolates may be regarded as representing a stratified random sample of the respective populations, so that the occurrence of resistance provides an estimate of the true occurrence in the populations.

Type of specimen taken

faecal sample

Procedures for the selection of isolates for antimicrobial testing

One isolate per flock

Methods used for collecting data

All isolated were tested at the Danish Institute for Food and Veterinary Research.

Laboratory methodology used for identification of the microbial isolates

The samples were examined by direct inoculation of selective agar as well as by selective enrichment. As selective agar we used mCCD agar, which was incubated in micro-aerophilic atmosphere for 1-3 days at 42°C. Selective enrichment was done by inoculation of Preston broth at a ratio of 1:10, followed by incubation in microaerophilic atmosphere for 24 h at 42°C . Ten µl of this enrichment culture was inoculated onto mCCD agar and incubated 1 - 3 days at 42°C. Campylobacter-like colonies were identified by their catalase activity, by their ability to hydrolyse hippurate and indoxyl acetate. For isolates from cattle and pigs, also oxidase activity was tested.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See table

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

77 C. jejuni isolates from broilers were subjected to susceptibility testing.

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

The results were similar to previous years.

D. Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

No samples of danish beef were subjected to susceptibility testing in 2004.

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

Sampling strategy used in monitoring

Frequency of the sampling

No samples of Danish pork were subjected to susceptibility testing in 2004.

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

Sampling strategy used in monitoring

Frequency of the sampling

All food samples were collected at wholesale and retail outlets by the Regional Veterinary and Food Control Authorities (RFCA) during the course of routine inspection carried out by the authorities, or on request specifically for the DANMAP surveillance programme.

Type of specimen taken

Meat samples

Methods used for collecting data

All isolates are tested centrally at the Danish Institute for Food and Veterinary Research.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

103 isolates of C. Jejuni and 9 isolates of C. Coli from broiler meat were subjected to susceptibility testing.

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

Similar findings as in previous years

Table Antimicrobial susceptibility testing of C. coli in Pigs - at slaughter - 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
	Pigs - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	100

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		0%					86,0	9,0	3,0	2,0												
Amphenicols																						
Chloramphenicol		0							3,0	23,0	69,0	5,0										
Fluoroquinolones																						
Ciprofloxacin		16		20,0	38,0	23,0	3,0			2,0	1,0	4,0	9,0									
Quinolones																						
Nalidixic acid		16								3,0	65,0	15,0	1,0	1,0	3,0							
Aminoglycosides																						
Streptomycin		47						5,0	31,0	17,0		1,0	5,0	19,0	22,0							
Gentamicin		0				20,0	75,0	5,0														
Neomycin		0						92,0	8,0													
Macrolides																						
Erythromycin		23				2,0	13,0	4,0	29,0	25,0	4,0			23,0								

Table Antimicrobial susceptibility testing of C. coli in Broiler meat - at retail - 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
	Broiler meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	9

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		22%					77,8						11,1	11,1								
Amphenicols																						
Chloramphenicol		0							11,1	66,7	11,1	11,1										
Fluoroquinolones																						
Ciprofloxacin		22		33,3	44,4							22,2										
Quinolones																						
Nalidixic acid		22								55,6	22,2				11,1	11,1						
Aminoglycosides																						
Streptomycin		56						22,2	11,1	11,1			44,4	11,1								
Gentamicin		0				55,6	44,4															
Neomycin		0						88,9	11,1													
Macrolides																						
Erythromycin		33				11,1	11,1	11,1	22,2	11,1				33,3								

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - at slaughter - 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 Cattle (bovine animals) - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	42

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		0%					100															
Amphenicols																						
Chloramphenicol		0							38,1	42,9	19,0											
Fluoroquinolones																						
Ciprofloxacin		2			28,6	61,9	7,1					2,4										
Quinolones																						
Nalidixic acid		2								11,9	78,6	4,8	2,4									
Aminoglycosides																						
Streptomycin		0						71,4	28,6													
Gentamicin		0				71,4	26,2	2,4														
Neomycin		0						90,5	9,5													
Macrolides																						
Erythromycin		0					11,9	31,0	52,4	4,8												

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus - at slaughter - 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 Gallus gallus - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	77

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		5%					92,2		2,6			2,6		2,6								
Amphenicols																						
Chloramphenicol		0						1,3	3,9	83,1	6,5	5,2										
Fluoroquinolones																						
Ciprofloxacin		5		2,6	32,5	50,6	5,2	1,3	2,6			1,3	3,9									
Quinolones																						
Nalidixic acid		5								9,1	75,3	7,8	2,6									
Aminoglycosides																						
Streptomycin		3						46,8	46,8	3,9			2,6									
Gentamicin		0				44,2	53,2	2,6														
Neomycin		0						87,0	13,0													
Macrolides																						
Erythromycin		1					5,2	32,5	46,8	14,3				1,3								

Table Antimicrobial susceptibility testing of C. jejuni in Broiler meat - at retail - 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 Broiler meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	103

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%					97,1	1,9														
Amphenicols																						
Chloramphenicol		0						4,9	58,3	35,0	1,9											
Fluoroquinolones																						
Ciprofloxacin		3		9,7	79,6	6,8		1,0				2,9										
Quinolones																						
Nalidixic acid		3								66,0	30,1	1,0			1,0	1,9						
Aminoglycosides																						
Streptomycin		0						63,1	34,0	2,9												
Gentamicin		0				87,4	12,6															
Neomycin		0						100														
Macrolides																						
Erythromycin		0				1,9	21,4	69,9	6,8													

Table 6.1.2 Antimicrobial susceptibility testing of Campylobacter in animals

	Campylobacter spp.					
	Cattle (bovine animals)		**Pigs**		**Poultry**	
Isolates out of a monitoring program	yes				yes	
Number of isolates available in the laboratory	42				77	
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline		0%				5%
Fluoroquinolones						
Ciprofloxacin		2%				5%
Quinolones						
Nalidixic acid		2%				5%
Macrolides						
Erythromycin		0%				1%

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								
Number of isolates available in the laboratory								
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline		1%						
Fluoroquinolones								
Ciprofloxacin		3%						
Quinolones								
Nalidixic acid		3%						
Macrolides								
Erythromycin		0%						

Footnote

From Camplylobacter jejuni only

Table 6.1.3 Antimicrobial susceptibility testing of Campylobacter in humans

	Campylobacter spp.	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	107	
Antimicrobials:	**N**	**%R**
Tetracycline		15%
Fluoroquinolones		
Ciprofloxacin		26%
Quinolones		
Nalidixic acid		27%
Macrolides		
Erythromycin		0%

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	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	16				0,5	32				
Amphenicols										
Chloramphenicol	32				1	64				
Fluoroquinolones										
Ciprofloxacin	4				0,03	16				
Quinolones										
Nalidixic acid	64				1	128				
Aminoglycosides										
Streptomycin	16				1	64				
Gentamicin	16				0,25	32				
Neomycin	16				1	64				
Macrolides										
Erythromycin	32				0,25	32				
Penicillins										
Ampicillin										

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	16				0,5	32				
Amphenicols										
Chloramphenicol	32				1	64				
Fluoroquinolones										
Ciprofloxacin	4				0,03	16				
Quinolones										
Nalidixic acid	64				1	128				
Aminoglycosides										
Streptomycin	16				1	64				
Gentamicin	16				0,25	32				
Neomycin	16				1	64				
Macrolides										
Erythromycin	32				0,25	32				
Penicillins										
Ampicillin										

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

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	16				0,5	32				
Amphenicols										
Chloramphenicol	32				1	64				
Fluoroquinolones										
Ciprofloxacin	4				0,03	16				
Quinolones										
Nalidixic acid	64				1	128				
Aminoglycosides										
Streptomycin	16				1	64				
Gentamicin	16				0,25	32				
Neomycin	16				1	64				
Macrolides										
Erythromycin	32				0,25	32				
Penicillins										
Ampicillin										

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	16				0,5	32				
Amphenicols										
Chloramphenicol	32				1	64				
Fluoroquinolones										
Ciprofloxacin	4				0,03	16				
Quinolones										
Nalidixic acid	64				1	128				
Aminoglycosides										
Streptomycin	16				1	64				
Gentamicin	16				0,25	32				
Neomycin	16				1	64				
Macrolides										
Erythromycin	32				0,25	32				
Penicillins										
Ampicillin										

2.3. LISTERIOSIS

2.3.1. General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Listeriosis is not a common disease in humans in Denmark. During the last 20 years, the incidence of listeriosis has been stable between 0.4 and 0.8 cases per 100,000 inhabitants.

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

Listeriosis is not a common disease in humans in Denmark.

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

Since 1998, Denmark has had guidelines on assessment of findings of Listeria monocytogenes. This guideline distinguishes between products supporting growth of Listeria and products not supporting growth covering all ready-to-eat foods. There is a zero tolerance to findings of L. monocytogenes in products supporting growth during the shelf-life period. For products not supporting growth within the shelf-life, findings of L. monocytogenes up to 100 cfu/g is accepted.

Recent actions taken to control the zoonoses

Since 1998, Denmark has had guidelines on assessment of findings of Listeria monocytogenes. This guideline distinguishes between products supporting growth of Listeria and products not supporting growth covering all ready-to-eat foods. There is a zero tolerance to findings of L. monocytogenes in products supporting growth during the shelf-life period. For products not supporting growth within the shelf-life, findings of L. monocytogenes up to 100 cfu/g is accepted.

Additional information

In 2004, a study was carried out in order to examin smoked and marinated fish products for L. monocytogenes. A total of 1,339 samples were analysed whereby, each sample was analysed both qualitatively and quantitatively. L. monocytogenes was detected in 10.3% of samples. 0.8% of samples were found to contain between 10 and 100 L. monocytogenes cfu (colony forming units)/g., and only 0.2% of samples were found to exceed 100 L. monocytogenes cfu/g.

2.3.2. Listeriosis in humans

A. Listeriosis in humans

Reporting system in place for the human cases

Listeria sp. infections are individually notifiable. The physicians report individually notifiable zoonotic diseases to Department of Epidemiology at the Statens Serum Institut (SSI)

Case definition

A case is confirmed once L. monocytogenes has been detected in blood or cerebrospinal fluid.

Diagnostic/analytical methods used

Bacteriology

Notification system in place

Listeria sp. infections are individually notifiable. The physicians report individually notifiable zoonotic diseases to Department of Epidemiology at the Statens Serum Institut (SSI)

History of the disease and/or infection in the country

Listeriosis is a rare disease in Denmark. During the last 20 years, the incidence of listeriosis has been stable between 0.4 and 0.8 cases per 100,000 inhabitants.

Results of the investigation

In 2004, there were 41 reported cases of listeriosis corresponding to an incidence of 0.8 cases per 100,000 inhabitants. Thirty-three cases presented with septicaemia, four with meningitis, three were classical maternofoetal cases, and one case presented with peritoneum. The patients came from all parts of Denmark. Based on sero-grouping, ribo-printing, and PFGE typing, no clusters could be identified. Twenty cases were assigned to serogroup 1 and 19 cases to serogroup 4, while the serogroup was undetermined for two cases.

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

Listeriosis is a rare disease in Denmark.

Relevance as zoonotic disease

Listeriosis is a rare disease in Denmark.

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

Listeria	Cases	Cases Inc
	41	0
Listeria spp.	41	
congenital cases	3	
deaths	8	

Table 7.2.B Listeriosis in man - age distribution

Age Distribution	L. monocytogenes			Listeria spp.		
	All	M	F	All	M	F
<1 year	3					
1 to 4 years						
5 to 14 years						
15 to 24 years						
25 to 44 years	2					
45 to 64 years	10					
65 years and older	26					
Age unknown						
Total :	41	0	0	0	0	0

2.3.3. Listeria in foodstuffs

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
Other meat									
meat products									
ready-to-eat									
- at processing plant	DFVF					397	396	1	1
Dairy products									
other products									
ready-to-eat									
- at retail	DFVF					6	6		
Fishery products									
fish									
smoked									
- at retail	DFVF					251	251		
Fruit & Vegetables	DFVF					26	26		

2.4. VEROCYTOTOXIC ESCHERICHIA COLI

2.4.1. General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

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

The annual number of human episodes has been steadily increasing since 1997; 2004 represented a 31.3% increase from 2003 to 2004. The overall increase is in part due to improved diagnostic methodologies and increased awareness.

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

Cattle is known to habour VTEC O157 and therefore there is a potential risk for contamination in the food chain, which require alertness at all steps from stable-to-table.

Recent actions taken to control the zoonoses

None

Additional information

In 2004, Denmark experienced its first VTEC outbreaks. The largest of these was caused by an O157:H- strain of phagetype 8 that encoded virulence genes vtx1, vtx2c and eae. It involved 25 confirmed cases, all of which were from or near Copenhagen. Initial case interviews suggested the source was a food product purchased in Denmark. A case-control study, involving 11 confirmed patients and 55 controls, clearly indicated that shopping from a specific supermarket chain was associated with the outbreak. This supermarket chain is only operational in the greater Copenhagen area. A specific type of milk produced from a relatively small organic dairy sold in this supermarket chain was also found to be associated with the outbreak, although less tightly linked. After thoroughly disinfecting and revising the procedures at the dairy, no further outbreak cases were reported. Milk and equipment surface samples collected from the dairy after disinfection were found to be negative for VTEC. The herds were not examined. The overall conclusion from this outbreak investigation was that a very small-scale contamination of a specific type of milk from this dairy was in all likelihood, the source of the outbreak.
The second VTEC outbreak occurred among visitors, primarily children, of a petting farm. This farm housed sheep and goats that the children were allowed to handle. At least five people became infected with various serotypes of VTEC following these visits. VTEC strains identified by PFGE sub-typing were isolated from three patients and from droppings. The farm was temporarily closed, but re-opened after improved sanitation facilities and measures were in place.

2.4.2. Verocytotoxic Escherichia coli in humans

A. Verotoxigenic Escherichia coli infections in humans

Reporting system in place for the human cases

Verocytotoxin-producing E. coli is notifiable through the laboratory surveillance system. Cases are diagnosed by a clinical microbiological laboratory and reported through the laboratory surveillance system to the Unit of Gastrointestinal Infections at SSI.
Haemolytic uraemic syndrome (HUS) is a notifiable disease.

Case definition

A case is positive when there is laboratory comfirmed bacteriological findings in faecal samples.

Diagnostic/analytical methods used

Laboratories testing samples from approximately 50% of the Danish population use molecular detection methods (PCR or dot blot hybridisation), which detect verocytotoxin genes, followed by slide agglutination and further typing methods. Most of the remaining laboratories use slide agglutination of suspect colonies, with OK-antisera against the most common VTEC and EPEC serotypes for microbiological diagnosis. At a few laboratories verocytotoxin-specific ELISA detection is used. In 2004, all VTEC isolates were real-time sub-typed using PFGE at the SSI.

Notification system in place

Verocytotoxin-producing E. coli is notifiable through the laboratory surveillance system

History of the disease and/or infection in the country

The annual number of episodes has been steadily increasing since 1997; 2004 represented a 31.3% increase from 2003 to 2004. The overall increase is in part due to improved diagnostic methodologies and increased awareness.

Results of the investigation

In 2004, there were 168 reported episodes of verocytotoxin producing Escherichia coli (VTEC) infections with an incidence of 3.1 per 100,000, 28.0% of which were caused by O157. The annual number of episodes has been steadily increasing since 1997; 2004 represented a 31.3% increase from 2003 to 2004. The overall increase is in part due to improved diagnostic methodologies and increased awareness. Two outbreaks that occurred in 2004 explain a major part of the increase from 2003 to 2004
In 2004, five cases of HUS were reported; none were fatal. VTEC strains were isolated from all cases, three of O-group O157 and one each of O-group O104 and O121.

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

So far the annual incidence in Denmark has been low and predominantly sporadic, however, it is possible that the incidence may increase in the future, partly due to improved diagnostic methodologies and increased awareness.

Relevance as zoonotic disease

Cattle is known to habour VTEC O157 and therefore there is a potential risk for contamination in the food chain, which require alertness at all steps from stable-to-table.

Additional information

In 2004, Denmark experienced its first VTEC outbreaks. The largest of these was caused by an O157:H- strain of phagetype 8 that encoded virulence genes vtx1, vtx2c and eae. It involved 25 confirmed cases, all of which were from or near Copenhagen. Initial case interviews suggested the source was a food product purchased in Denmark. A case-control study, involving 11 confirmed patients and 55 controls, clearly indicated that shopping from a specific supermarket chain was associated with the outbreak. This supermarket chain is only operational in the greater Copenhagen area. A specific type of milk produced from a relatively small organic dairy sold in this supermarket chain was also found to be associated with the outbreak, although less tightly linked. After thoroughly disinfecting and revising the procedures at the dairy, no further outbreak cases were reported. Milk and equipment surface samples collected from the dairy after disinfection were found to be negative for VTEC. The herds were not examined. The overall conclusion from this outbreak investigation was that a very small-scale contamination of a specific type of milk from this dairy was in all likelihood, the source of the outbreak.
The second VTEC outbreak occurred among visitors, primarily children, of a petting farm. This farm housed sheep and goats that the children were allowed to handle. At least five people became infected with various serotypes of VTEC following these visits. VTEC strains identified by PFGE sub-typing were isolated from three patients and from droppings. The farm was temporarily closed, but re-opened after improved sanitation facilities and measures were in place.

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	5					
- clinical cases						
- lab. confirmed cases	5					
- caused by O157 (VT+)	3					
- caused by other VTEC	2					
E.coli infect. (except HUS)						
- laboratory confirmed	163					
- caused by 0157 (VT+)	44					
- caused by other VTEC	119					

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	6	3	3	2	1	1	4	2	2
1 to 4 years	54	23	31	20	6	14	34	17	17
5 to 14 years	22	12	10	12	4	8	10	8	2
15 to 24 years	13	7	6	3	0	3	10	7	3
25 to 44 years	33	10	23	4	0	4	29	10	19
45 to 64 years	25	11	14	4	1	3	21	10	11
65 years and older	15	7	8	2	0	2	13	7	6
Age unknown									
Total :	168	73	95	47	12	35	121	61	60

The following amendments were made :

Date of modification	Zoonose	Line	Column	Old value	New value
2005-09-20	Verotoxigenic E. coli (VTEC)	5 to 14 years	All	22	22
	Verotoxigenic E. coli (VTEC)	5 to 14 years	M	12	12

2.4.3. Pathogenic Escherichia coli in foodstuffs

2.4.4. Pathogenic Escherichia coli in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

VTEC is not notifiable in animals.
The DFVF has monitored the occurrence of VTEC O157 in cattle since 1997 through examination of faecal samples from slaughter calves. These samples were collected at the slaughterhouses as part of the DANMAP programme

Frequency of the sampling

Animals at slaughter (herd based approach)

Other: One animal per randomly selected herd

Type of specimen taken

Animals at slaughter (herd based approach)

Faeces

Methods of sampling (description of sampling techniques)

Animals at slaughter (herd based approach)

faecal samples are collected from slaughter calves at the slaughterhouses.

Case definition

Animals at slaughter (herd based approach)

An animal from which VTEC 0157 is isolated

Control program/mechanisms

The control program/strategies in place

VTEC is not notifiable in animals.

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

In 2004, VTEC O157 was detected in 6.8% of faecal samples from slaughtered calves. There is a seasonal variation in the findings of VTEC O157 in slaughtered calves, as all VTEC O157 shedding animals were detected between April and October. During this period, the prevalence was 11.4% (17 positive animals out of 149 examined). This seasonal variation has also been observed in previous years.

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

Cattle is known to habour VTEC O157 and therefore there is a potential risk for contamination in the food chain, which require alertness at all steps from stable-to-table.

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)							
meat production animals	DFVF		animal, herd	251	21	21	

Footnote

DFVF=Danish Institute for Food and Veterinary Research

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

Eradication of bovine tuberculosis in Denmark started already in 1893. In 1953 the eradication programme was changed to a surveillance programme - since at that time only very few outbreaks were reported annually. Since 1980 Denmarks has been decleared officially free from bovine tuberculosis by EU, and the disease has not been diagnosed in cattle since 1988.
Deer farming began in Denmark in the early 1980 and until then bovine tuberculosis had never been diagnosed from deer. The farmed deer was primarily imported animals and in 1988 an outbreak was reported and during 1988-89 another 12 farms was diagnosed with bovine tuberculosis. In 1989 a control programme was initiated and in 1991, 1993 and 1994 tuberculosis was diagnosed from on efarm each year. Since 1994 tuberculosis has not been reported from deer in Denamrk
The disease is notifiable and at suspicion the herd is put under official supervision and the herd examined using tuberculin testing. In case of a positive diagnose are all herds, that have received animals from the infected herd put under official supervision and tested using the tubercolin test.

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

Denmark is officially free from bovine tuberculosis and the probability of contracting bovine tuberculosis from Danish animals or foodstuff is close to zero.

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

There have been no findings of Mycobacteria in animals or foodstuff

Recent actions taken to control the zoonoses

None, the zoonosis is under control

2.5.2. Tuberculosis in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Human tuberculosis caused by M. bovis and M. tuberculosis is individually notifiable in Denmark. Medical clinics/hospitals/regional medical officers report clinical cases to the Statens Serum Institut. Laboratories voluntarily report confirmed cases.

Case definition

A confirmed case of M. bovis or M. tuberculosis is a case where the bacteria has been isolated in the laboratory.

Diagnostic/analytical methods used

Microscopy PCR, bacteriology, resistensprofile and DNA-subtypning.

Notification system in place

Bovine tuberculosis has been notifiable in humans since May 1st 2000 according to the Danish Order no. 277 of 14/04/2000.

History of the disease and/or infection in the country

Since bovine tuberculosis was eliminated in Denmark in 1980, almost all bacteriological confirmed cases in humans have been caused by M. tuberculosis.

Results of the investigation

Two human cases of tuberculosis, caused by M. bovis, were reported. One case was a young foreigner with abdominal disease; the second was an elderly person suffering from extra pulmonary tuberculosis, believed to be the results of reactivation of the infection.

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

During the last 10 years, no cases reported has been associated with transmission from animals or food in Denmark. The few cases (less than 13 per year) reported each year are regarded as reactivation of latent infecions aquired before the eradication of bovine TB in cattle in Denmark or as infections aquired abroard.

Relevance as zoonotic disease

As Denmark is officially free from bovine tuberculosis, the probability of contracting M. bovis infection from Danish animals or animal products is close to zero.

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

Mycobacterium	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	2	0	1	0	1	0
M. bovis	2	0	1		1	
M. tuberculosis	0	0				
reactivation of previous cases	1	0	1			

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	2		
Total :	2	0	0

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

Denmark has been declared officially tuberculosis free since 1980 by the EFTA Surveillance Authority (ESA).

Monitoring system

Sampling strategy

All slaughtered animals are subject to monitoring at the slaughterhouse by the meat inspectors for the presence of TB lesions.
At semen collection centres, bulls are subject to pre-entry and annual intradermal tuberculin testing.

Frequency of the sampling

All slaughtered animals are inspected at slaughter
Bulls at semen collection centres: upon entry and annually thereafter

Type of specimen taken

Other: Meat inspection: Tubercles ect., Live bulls: Interdermal tuberculin test

Methods of sampling (description of sampling techniques)

Slaughtered animals: Meat inspectors at the slaughterhouse examin for lesions indicative for tuberculosis, collect tubercles ect.
Bulls at semen collection centres: Interdermal tuberculin testing.

Case definition

An animal is considered positive when when M. bovis or M. tuberculosis has been bacteriologically verified.

Diagnostic/analytical methods used

At the slaughterhouse: visual monitoring of carcass for lesions followed by microbiological detection of the mycobacterum.
At semen collection centres: Interdermal tuberculin testing, followed by bacteriological verification.

Vaccination policy

No vaccination

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

In Denmark the control programmes are based on the following legislation: EU Decisions 2000/69/EEC, 2000/442/EEC, 2000/694/EEC and Danish rule no. 432 of 09/06/2004 Animals at slaughter: Mandatory control programme.

Recent actions taken to control the zoonoses

Non, as the disease is not present in Denmark

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

Denmark would as a minimum implement the measures as laid down in Council Decisions 2000/69/EEC, 2000/442/EEC, 2000/694/EEC in case of positive findings or if suspicion of tuberculosis in bovine animals arise.

Notification system in place

Tuberculosis casused by M. bovis or M. tuberculosis of all species are notifiable. Cases are to be notified to the Danish Veterinary and Food administration

Results of the investigation

592,305 animals was examined at the slaughterhouse and none were found positive.
No bulls were found positive at the semen collection centres,

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

The last case of TB in cattle was diagnosed in 1988.

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

There have been no findings of M. bovis in animals or foodstuffs.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

All slaughtered animals are monitored by the meat inspectors at the slaughterhouse for the presence of lesions indicative for tuberculosis.

Frequency of the sampling

All slaughtered animals are inspected at slaughter.

Type of specimen taken

Other: Tubercles ect.

Methods of sampling (description of sampling techniques)

At slaughter: Visual monitoring of carcass for lesions, collection of tubercles ect. for microbiological testing.

Case definition

An animal is considered positive when M. bovis or M. tuberculosis has been bacteriologically verified.

Diagnostic/analytical methods used

No positive results were reported in other routine tests in Denmark.

Vaccination policy

No vaccination

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

In 1989, a controlprogramme for farmed deer was initiated according to the Danish Order no. 28 of 14/01/97

Recent actions taken to control the zoonoses

None, as the disease is not present in Denmark for the time beeing.

Measures in case of the positive findings or single cases

Denmark would as a minimum implement the measures as laid down in Danish Order no. 28 of 14/01/97 in case of positive findings or if suspicion of tuberculosis in bovine animals arise.

Notification system in place

Tuberculosis casused by M. bovis or M. tuberculosis of all species are notifiable. Cases are to be notified to the Danish Veterinary and Food administration

Results of the investigation

M. bovis was not indentified in deer

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

the last case of tuberculosis in deer was diagnosed in 1994.

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

There have been no findings of M. bovis in animals or foodstuffs.

Table 1.1.3 Tuberculosis in animals

	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	M. bovis	M. tuberculosis
Pigs	DFVF		animals	25197000	0	0	
Cattle (bovine animals)	DFVF		animals	592305	0	0	

Footnote

DFVF=Danish Institute for Food and Veterinary Research

1.1.1 Bovine tuberculosis

MANDATORY	**CATTLE**		
Number of herds under official control:		Number of animals under official control:	592305
	OTF bovine herds	**OTF bovine herds with status suspended**	**Bovine herds infected with tuberculosis**
Status of herds at year end (a):		0	0
New cases notified during the year (b):		0	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):	0	0	0
		Herds suspected	**Herds confirmed**
Follow up of suspected cases in post-mortem examination (e):		0	0
Follow-up investigation of suspected cases: trace, contacts (f):		0	0
	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):	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):			

1.1.1 Bovine tuberculosis - DANMARK

MANDATORY	**CATTLE**		
Number of herds under official control:	32412	Number of animals under official control:	592305
	OTF bovine herds	**OTF bovine herds with status suspended**	**Bovine herds infected with tuberculosis**
Status of herds at year end (a):	32412	0	0
New cases notified during the year (b):		0	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):	592305	0	0
		Herds suspected	**Herds confirmed**
Follow up of suspected cases in post-mortem examination (e):			
Follow-up investigation of suspected cases: trace, contacts (f):			
	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):			
Animals slaughtered (j):			
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

A. Brucellosis General evaluation

History of the disease and/or infection in the country

Brucellosis has been eradicated in Denmark since 1959 and in 1979, Denmark was declared officially free from Brucellose.
The disease have not been diagnosed in cattle since 1962. However in pigs the disease are diagnosed every now and then, last time in 1999. It is assumed that the source of infection originates for infected hare populations found especially in the middle and eastern Jutland. Brucellose has never been observed in shep and goats.

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

As bovine brucellose was eradidated in 1962, ovine and caprine brucellose has never been recorded and porcine brucelloses is very rare. The probability of contracting brucellose from Danish animals or animal products is close to zero.

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

There have been no findings of Brucellose in animals or foodstuff

Recent actions taken to control the zoonoses

None, the zoonosis is under control

2.6.2. Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

Brucella is not a notfiable disease in Denmark

Case definition

Laboratory confirmation of a clinical case

Diagnostic/analytical methods used

Serological analysis of blood or bone marrow using ELISA, or PCR assays for specific DNA and species specification.

Notification system in place

Brucella is not a notfiable disease in Denmark

History of the disease and/or infection in the country

Few cases are reported every year. Often no information on travel association is available.

Results of the investigation

Serological testing identified four cases of brucellosis. Two cases were found to be positive for B. abortus and two positive for both B. abortus and B. melitensis, one of which was confirmed by culture testing to be B. melitensis. No information on travel history was available for these cases.

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

Brucellosis is not common in Denmark, less than 20 cases are recorded annually, however the disease is not notifiable in humans.

Relevance as zoonotic disease

As Denmark is officially free from brucelloses in cattle, sheep and goats, the probability of contracting Brucella infection from Danish animals or animal products is close to zero.

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

	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
Brucella	4	0	0	0	0	0
B. abortus	2					
B. melitensis						
B. suis						
Brucella spp.(1)	2					
occupational cases						

(1) : Positive for both B. abortus and B. melitensis, one was confirmed by culture testing to be B. melitensis

Footnote

Not a notifiable disease in humans, hence the incidence is unknown

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(1)	2						2		
Total :	2	0	0	0	0	0	2	0	0

(1) : The two Brucella sp cases were postive for both B. abortus and B. melitensis

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

Since 1979, Denmark has been declared officially free from Brucellose according to the EU directive 97/175/EEC.

Monitoring system

Sampling strategy

Cattle are only tested serologically based on clinical indications. Abortion clusters in cattle are notifiable.
Breeding bulls are tested serologically.
Animals for import and export are tested serologically.

Frequency of the sampling

Bulls are subject to serological testing pre-entry to bovine semen collection centres, and annually thereafter
Animals for import and export are tested serologically.

Type of specimen taken

Other: Blood, fetuses, depending on stratigy

Methods of sampling (description of sampling techniques)

In case of abortion: Bacteriological examination of abortion material and/or serological analysis of the animal.
Breeding bulls: Blood samples.

Case definition

An animal showing significant antibody titre to Brucella spp. or an animal from which Brucella spp. has been isolated.
The herd is the epidemiolocal unit

Diagnostic/analytical methods used

Abortions: Bacteriology and serology (Antibody ELISA).
Breeding bulls: Serology (Antibody ELISA)
Clinical indications: serology (Antibody ELISA)
Import and export animals: serology (Antibody ELISA)

Vaccination policy

Vaccination of animals against Brucella spp. is prohibited in Denmark

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

In case of abortion: Bacteriological examination of abortion material and/or serological analysis of the animal.
Bulls are subject to serological testing pre-entry to bovine semen collection centres, and annually thereafter
In connection with clinical indications, for import and export, animals are tested serologically.

Recent actions taken to control the zoonoses

None, the disease is not present in Denmark.

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

Herds, that have received animals from a herd with a positive diagnose, will be put under official veterinary supervision and blood samples are send to the Danish Institute for Food and Veterinary Research for testing.
In the positive herds, slaughtering of animals that might retrieve the disease will take place. Sanitary actions will be taken at the farm and, at the earliest, one month after the Regional Veterinary and Food Control Authorities have approved the disinfection of the premises new animals may be put into the stables
Fields and other areas where the infected animals have been must not be used for new animals for 1 year. This includes areas where manure from infected animals has been spread out.

Notification system in place

Brucellose spp. in all species has been notifiable since 1959

Results of the investigation

5,312 animals tested in 2004, all of which were negative.

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

Bovine brucellose was eradidated in 1962, and since then no herds have been observed with clinical symptoms. The last single animal case was found in 1970.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as

a source of infection)

There have been no findings of Brucellose in animals or foodstuff

Additional information

From January 1st 1980, the annual rutine monitoring of tankmilk samples stopped, because Denmark was officially bruselose free according to EU directive 97/175/EEC.

B. Brucella melitensis in Sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Denmark is declared officially brucellosis.

Monitoring system

Sampling strategy

Monitoring is performed by testing for Brucella antibodies in blood samples from sheep and goats, which are submitted as part of a voluntary control programme for lentivirus.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

In case of abortion: Bacteriological examination of abortion material and/or serological analysis of the animal.
Monitoring: Blood samples

Case definition

An animal showing significant antibody titre to Brucella spp. or an animal from which Brucella spp. has been isolated.
The herd is the epidemiolocal unit

Diagnostic/analytical methods used

Abortions: Bacteriology and serology (Antibody ELISA).
Clinical indications: serology (Antibody ELISA)
Import and export animals: serology (Antibody ELISA)

Vaccination policy

Vaccination of animals against Brucella spp. is prohibited in Denmark

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

Monitoring for Brucella in goats are carried out as part of a voluntary control programme for lentivirus.

Recent actions taken to control the zoonoses

None, the disease is not present in Denmark

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

Isolation of herds, that have received animals from the infected herd. Blood samples are send to the Danish Institute for Food and Veterinary Research for testing. Slaughter of all susceptable animals within the infected herd and disinfection of the premises.

Notification system in place

Brucellose spp. in all species has been notifiable since 1959. Positive cases must be reported to the Danish Veterinary and Food Administration

Results of the investigation

In 2004, 4,707 samples from 650 goat or sheep herds were examined and found negative.

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

Caprine brucellosis has never benne recorded in Denmark

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

There have been no findings of Brucellose in animals or foodstuff

C. Brucella melitensis in Goat

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Denmark is declared officially brucellosis.

Monitoring system

Sampling strategy

Monitoring is performed by testing for Brucella antibodies in blood samples from sheep and goats, which are submitted as part of a voluntary control programme for lentivirus.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

In case of abortion: Bacteriological examination of abortion material and/or serological analysis of the animal.
Monitoring: Blood samples

Case definition

An animal showing significant antibody titre to Brucella spp. or an animal from which Brucella spp. has been isolated.
The herd is the epidemiolocal unit

Diagnostic/analytical methods used

Abortions: Bacteriology and serology (Antibody ELISA).
Clinical indications: serology (Antibody ELISA)
Import and export animals: serology (Antibody ELISA)

Vaccination policy

Vaccination of animals against Brucella spp. is prohibited in Denmark

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

Monitoring for Brucella in goats are carried out as part of a voluntary control programme for lentivirus.

Recent actions taken to control the zoonoses

None, the disease is not present in Denmark

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

Isolation of herds, that have received animals from the infected herd. Blood samples are send to the Danish Institute for Food and Veterinary Research for testing. Slaughter of all susceptable animals within the infected herd and disinfection of the premises.

Notification system in place

Brucellose spp. in all species has been notifiable since 1959. Positive cases must be reported to

the Danish Veterinary and Food Administration

Results of the investigation

In 2004, 4,707 samples from 650 goat or sheep herds were examined and found negative.

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

Ovine brucellosis has never benne recorded in Denmark

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

There have been no findings of Brucellose in animals or foodstuff

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)	DFVF		animals	34059	0		0	
Cattle (bovine animals)	DFVF		animals	5312	0		0	
Sheep and goats	DFVF		animals	47707	0		0	

(1) : Animals from 1,268 herds.

Footnote

DFVF=Danish Institute for Food and Veterinary Research

2.1.1 Bovine brucellosis

MANDATORY	**CATTLE**		
Number of herds under official control:	848	Number of animals under official control:	5312
	OBF bovine herds	**OBF bovine herds with status suspended**	**Bovine herds infected with brucellosis**
Status of herds at year end (a):	848	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):			
	Units tested	**Units suspected**	**Units positive**
Routine testing (d1) - data concerning herds:			
Routine testing (d2) - number of animals tested:			
Routine testing (d3) - number of animals tested individually:			
		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):	0		
Animals slaughtered (i):	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):			

2.1.1 Bovine brucellosis - Danmark

MANDATORY	CATTLE		
Number of herds under official control:		Number of animals under official control:	
	OBF bovine herds	**OBF bovine herds with status suspended**	**Bovine herds infected with brucellosis**
Status of herds at year end (a):			
New cases notified during the year (b):			
	Animals tested	**Animals suspected**	**Animals positive**
Notification of clinical cases, including abortions (c):			
	Units tested	**Units suspected**	**Units positive**
Routine testing (d1) - data concerning herds:			
Routine testing (d2) - number of animals tested:			
Routine testing (d3) - number of animals tested individually:			
		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):	5312		0
	All animals	**Positives**	**Contacts**
Animals destroyed (h):			
Animals slaughtered (i):			
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:	1268	Number of animals under official control:	34059
	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):	1268	0	0
New cases notified during the year (b):			
	Animals tested	**Animals suspected**	**Animals positive**
Notification of clinical cases, including abortions (c):			
	Units tested	**Units suspected**	**Units positive**
Routine testing (d) - data concerning holdings:			
Routine testing (d) - data concerning animals:			
		Holdings suspected	**Holdings confirmed**
Follow-up investigation of suspected cases: trace, contacts (e):		0	0
	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):			

2.1.2 Ovine and caprine brucellosis - DANMARK

MANDATORY	SHEEP AND GOATS		
Number of holdings under official control:	650	Number of animals under official control:	4707
	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):	650		
New cases notified during the year (b):	0		
	Animals tested	**Animals suspected**	**Animals positive**
Notification of clinical cases, including abortions (c):			
	Units tested	**Units suspected**	**Units positive**
Routine testing (d) - data concerning holdings:			
Routine testing (d) - data concerning animals:			
		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):			
Animals slaughtered (h):			
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

A. Yersinia entercolitica general evaluation

History of the disease and/or infection in the country

Infections with Y. enterocolitica have been steadily decreasing since 1985, where more than 1,500 human cases were reported.

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

Over the past five years, the annual number of human infections has been fairly stable around 250 cases per year. Overall, infections with Y. enterocolitica have been steadily decreasing since 1985, where more than 1,500 human cases were reported. This decline coincide with introduction of improved slaughtering routines at the slaughterhouses.

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

The primary source of yersiniosis in Denmark is believed to be pork and pork products. As part of the DANMAP programme, caecal contents were sampled from randomly selected pig herds at slaughterhouses and tested for Y. enterocolitica. In 2004, a total of 576 animals were tested, representing 576 herds, of which 10.4% were found positive for Y. enterocolitica.

Recent actions taken to control the zoonoses

None

2.7.2. Yersiniosis in humans

A. Yersinosis in humans

Reporting system in place for the human cases

Yersinia enterocolitica is notifiable through the laboratory surveillance system. Cases diagnosed by a clinical microbiological laboratory are reported to the Unit of Gastrointestinal Infections at SSI.

Case definition

A confirmed case of yersiniosis is a case where Yersinia sp. has been isolated in the laboratory.

Diagnostic/analytical methods used

Acute diarrhea: Faecal samples, bacteriology
Reactive arthritis and erythema nodosom: Bloodsample, antibodies.

Notification system in place

Yersinia enterocolitica is notifiable through the laboratory surveillance system

History of the disease and/or infection in the country

In the early 1980's the number of human Yersinia cases increased to 1500 cases in 1985. Thereafter, a decline began and continued until 2000. Since then, the annual number of human cases have been stable around 250. The decline coincide with the introduction of improved slaughtering routines.

Results of the investigation

There were 227 reported human cases of infection with Yersinia enterocolitica (4.2 cases per 100,000 inhabitants), which is 7% fewer than in 2003. As in previous years, the majority of isolates (88%) were serotype O:3. Generally, the infections were domestically acquired and the majority of patients were children; the median age of patients was 7.

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

Althought the incidence have decreased in recent years, the disease is still the third most commonly recorded foodborne zoonotic disease in Denmark. The majority of isolates (88%) are serotype O:3 and generally, the infections were domestically acquired.

Relevance as zoonotic disease

Yersiniosis is an important zoonotic disease in Denmark. The primary source of yersiniosis in Denmark is believed to be pork and pork products.

Additional information

Outbreaks of Y. enterocolitica are rare, but during August 2003 a cluster of patients appeared in North Jutland County. A case-control study invilving eight patients and 16 age, gender and

municipality matched controls found a specific butcher shop to be associated with disease and furthermore implicated consumption of wiener/cocktail sausages and minced pork. Samples taken at the premises were negative and the outbreak resolved within a few weeks.

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

Yersinia	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
	227	0	0	0	0	0
Y. enterocolitica	26					
Y. enterocolitica O:3	200					
Y. enterocolitica O:9	1					

Table 8.3.B Yersiniosis in man - age distribution

Age Distribution	Y. enterocolitica			Yersinia spp.		
	All	M	F	All	M	F
<1 year	16	10	6			
1 to 4 years	84	51	33			
5 to 14 years	40	25	15			
15 to 24 years	14	6	8			
25 to 44 years	28	15	13			
45 to 64 years	31	16	15			
65 years and older	14	8	6			
Age unknown						
Total :	227	131	96	0	0	0

Table 8.3.C Yersiniosis in man - seasonal distribution

Month	Y. enterocolitica	Yersinia spp.
	Cases	Cases
January	19	
February	11	
March	10	
April	14	
May	23	
June	20	
July	22	
August	28	
September	31	
October	18	
November	17	
December	14	
not known		
Total :	227	0

2.7.3. Yersinia in foodstuffs

2.7.4. Yersinia in animals

A. Yersinia entercolitica in pigs

Monitoring system

Sampling strategy

Animals at farm

There are no official monitoring programmes in regard to Y. enterocolitica in the animal production.

Animals at slaughter (herd based approach)

There are no official monitoring programmes in regard to Y. enterocolitica in slaughter animals. However, as part of the DANMAP programme, caecal contents were sampled from randomly selected pig herds at slaughterhouses and tested for Y. enterocolitica

Frequency of the sampling

Animals at slaughter (herd based approach)

Other: 576 animals spread over the year

Type of specimen taken

Animals at slaughter (herd based approach)

Faeces

Methods of sampling (description of sampling techniques)

Animals at slaughter (herd based approach)

Caecal content are tested from one animal per rendomly selected herd.

Vaccination policy

None

Other preventive measures than vaccination in place

none

Control program/mechanisms

The control program/strategies in place

There are no official monitoring programmes in regard to Y. enterocolitica in animals

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

In 2004, a total of 576 animals were tested, representing 576 herds, and 10.4% were found positive for Y. enterocolitica

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

Yersiniosis is an important zoonotic disease in Denmark. The primary source of yersiniosis in Denmark is believed to be pork and pork products.

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
Pigs (1)	DFVF			576	60		

(1) : epidemiolpgical unit=herd/animal

Footnote

DFVF=Danish Institute for Food and Veterinary Research

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 1930, Trichinella spp. have been observed in domesticated pigs and the last human cases caused by Danish produced meat was recorded in the 1930'. Prior the 1930, the infection was common, especially at rubbish tips where 10% of the free range pigs was infected. During 1900, large parts of the pig industry went through major changes from outdoor management to indoor management with little or no contact with potential infected material. In 1904, Copenhagen introduced monitoring for Trichinella of all pigs at rubbish tips and in 1906, Denmark introduced surveillance of all pigs for human consumption. In 1997, the EU directive 77/96/EEC demanded monitoring for Trichinella at slaughterhouses authorized for export.

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

Trichinella spp. has not been recorded in domistic pigs since 1930. However, in the wild fauna a very low infection rate cannot be ruled out. In 1995/96 and 1997/98 screenings of approximately 3000 foxes was carried out. Only in the 1995/96 screening were three samples found positive.

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

Since the parasite have not been observed in domistic pigs since 1930, the probability of contracting trichinellosis from Danish animal products is close to zero.

Recent actions taken to control the zoonoses

None, as the zoonosis is under control

2.8.2. Trichinellosis in humans

A. Trichinellosis in humans

Reporting system in place for the human cases

Trichinella spp. in humans is not notifiable in Denmark.

Case definition

A case must be laboratoy comformed

Diagnostic/analytical methods used

Muscle biopsy and histopathology (demonstration of Trichinella larvae in tissue)and serology.

Notification system in place

Trichinella spp. in humans is not notifiable

History of the disease and/or infection in the country

Since 1930, no cases of Trichinella spp. have been observed in domesticated pigs and the last human cases caused by Danish produced meat was recorded in the 1930'.

Results of the investigation

The few cases recorded in Denmark are believed to be acquired abroad or by consumption of self-imported meat. Nine cases were reported in 2004.

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

Since 1930', no cases reported has been associated with transmission from Danish produced meat. The few cases recorded in Denmark are believed to be acquired abroad or by consumption of self-imported meat.

Relevance as zoonotic disease

The probability of contracting trichinosis from Danish animals or animal products is close to zero.

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

	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
Trichinella	9	0	0	0	9	0
Trichinella spp.(1)	9				9	

(1) : All cases are believed to have been acquired abroad or by consumption of self-imported meat

Footnote

Not a notifiable disease in humans, hence the incidence is unknown

Table 4.2.B Trichinellosis in man - age distribution

Age Distribution	Trichinella spp.		
	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	9		
Total :	9	0	0

2.8.3. Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

Samples are taken from the diaphram muscle from all pigs slaughtered at export approved slaughterhouses according to the Council Directive 64/433/EEC.

Frequency of the sampling

Every slaughtered animal is sampled

Type of specimen taken

Diaphragm muscle

Methods of sampling (description of sampling techniques)

Methods used are according to Council Directive 77/96/EEC.
100 samples of 1 gram are pooled and analysed using the digestion method (K.K. 2598-1984, demands described by the Danish Veterinary and Food Administration)

Case definition

An animal where the Trichinella larvae has been detected in the test

Diagnostic/analytical methods used

Artificial digestion method of collective samples

Vaccination policy

No vaccination

Control program/mechanisms

The control program/strategies in place

All pigs slaughtered at export approved slaughterhouses must be controlled according to the Council Directive 64/433/EEC.

Recent actions taken to control the zoonoses

None, as the disease has not been recorded in domestic pigs since 1930.

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

Measures are taken according to Council Directive 64/433/EEC.

Notification system in place

Thichinella spp. is notifiable in pigs according to EU directive 77/96/EEC and Danish Order no. 432 of 09/06/2004

Results of the investigation

24,945,030 meat samples from pigs were tested; none were positive. Mandatory testing of slaughtered wild boars, confirmed no positive cases among the 1,141 animals examined.

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

Similar to previous years.
Trichinella spp. was last detected in domistic pigs in 1930.

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

There have been no findings of Trichinella in animals or foodstuff.

B. Trichinella in horses

Monitoring system

Sampling strategy

Samples are taken from the diaphram muscle from all horses slaughtered at export approved slaughterhouses according to the Council Directive 64/433/EEC.

Frequency of the sampling

Every slaughtered animal is sampled

Type of specimen taken

Other: Tongue or Musculus masseter

Methods of sampling (description of sampling techniques)

Methods used are according to Council Directive 77/96/EEC.
A total of 10 gram per animal are sampled. 20 samples of 5 gram are pooled and analysed using the digestion method (K.K. 2598-1984, demands described by the Danish Veterinary and Food Administration)

Case definition

An animal where the Trichinella larvae has been detected in the test

Diagnostic/analytical methods used

Artificial digestion method of collective samples

Vaccination policy

No vaccination

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

All horses slaughtered at export approved slaughterhouses must be controlled according to the Council Directive 64/433/EEC.

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Notification system in place

Thichinella spp. is notifiable in horses according to EU directive 77/96/EEC

Results of the investigation

1,278 horses were tested, none were positive.

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

Similar to previous years

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

There have been no findings of Trichinella in animals or foodstuff

C. Trichinella spp. in animal - Wildlife - at slaughter

Monitoring system

Sampling strategy

Samples are taken from the diaphram muscle from all wild boars slaughtered according to Council Directive 64/433/EEC.
Wild and farmed foxes are occasionally sampled.

Frequency of the sampling

At slaughter

Type of specimen taken

Organs/ tissues: Diaphragm

Case definition

An animal where the Trichinella larvae has been detected in the test

Diagnostic/analytical methods used

Digestion method

Vaccination policy

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Notification system in place

Thichinella spp. is notifiable in pigs according to EU directive 77/96/EEC and Danish Order no. 432 of 09/06/2004

Results of the investigation

Mandatory testing of slaughtered wild boars, confirmed no positive cases among the 1,141 animals examined.
No foxes were sampled in 2004.

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

Similar to previous years

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

There have been no findings of Trichinella in animals or foodstuff.

Table 4.1 Trichinella in animals

	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive
Pigs	DVFA		animals	24945030	0
Solipeds	DFVA		animals	1278	0
Wildlife					
wild boars	DFVA		animals	1141	0

Footnote

DVFA=The Danish Veterinary and Food Administration

The following amendments were made :

Date of modification	Species	Column	Old value	New value
2005-09-20	Wildlife - wild boars	Source of information		DFVA
	Wildlife - wild boars	Epidemiological unit		animals
	Wildlife - wild boars	Animals tested		1141
	Wildlife - wild boars	Animals positive		0

2.9. ECHINOCOCCOSIS

2.9.1. General evaluation of the national situation

A. Echinococcus spp general evaluation

History of the disease and/or infection in the country

Surveillance and control of Echinococcus is carried out by the meat inspectors according the the Council Directive 64/433/EEC. Mandatory meat inspection covers all known potential intermediate host species. All carcasses intended for human aconsumption are inspected for incidence of hydatid cysts.
Echinococcus granulos infection in animals is notifiable, however it has never been detected in Denmark. Echinococcus multilocularis infection in animals is notifiable. It was detected in wild foxes in 2000, but since 2001, all foxes tested have been negative.

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

As Echinococcus have only been detected very few times in Denmark, the risk of acquiring echinococcus in Denmark must be considered very low.

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

There have been no findings of Echinococcus spp. in animals or foodstuff

2.9.2. Echinococcosis in humans

A. Echinococcus spp in humans

Reporting system in place for the human cases

Echinococcus is not a notfiable disease in Denmark.

Case definition

A clinical case with laboratory confirmation.

Diagnostic/analytical methods used

Abdominal CT scanning, serology and histopathology.

History of the disease and/or infection in the country

The incidence of human Echinococcus spp. is unknown in Denmark, however a few imported cases of E. granulosus are reported every year. In 2004, the first case of an E. multilocularis infection was confirmed.

Results of the investigation

In 2004, 9 cases were reported; one case was infected with E. multilocularis and 8 cases with E. granulosus. E. granulosus has never been found in Denmark, hence the infections are believed to be acquired abroad.

Relevance as zoonotic disease

The risk of acquiring echinococcusis in Denmark is considered very low, as Echinococcus spp. have never been recorded in domesticated animals, and have not recorded in wild animals since 2000, where there were a few findings in foxes.

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

	Cases	Cases Inc	Autochtone cases	Autochtone Inc	Imported cases	Imported Inc
Echinococcus	9	0	0	0	8	0
E. granulosus(1)	8				8	
E. multilocularis	1					
Echinococcus spp.						

(1) : E. granulosus has never been found in Denmark, hence the infections probably acquired abroad.

Footnote

Not a notfiable disease in Denmark, hence the incidence is unknown

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									
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 :	8	0	0	1	0	0	0	0	0

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)	DFVA			592305	0		
Pigs	DFVA			25197000	0		
Wildlife							
foxes	DFVF			6	0		

Footnote

DFVF=Danish Institute for Food and Veterinary Research
DVFA=The Danish Veterinary and Food Administration

2.10. TOXOPLASMOSIS

2.10.1. General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/or infection in the country

Toxoplasmosis is not a notifiable disease in Denmark. Toxoplasma gondii is endemic in Denmark with the domestic cat as the final host.

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

Toxoplasmosis is not a notifiable disease in Denmark. Toxoplasma gondii is endemic in Denmark with the domestic cat as the final host. Since January 1999, newborn babies have been screened for congenital toxoplasmosis. On average 15-20 newborns are diagnosed each year.

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

The main source of infection is belived to be cysts in the muscles and organs from toxoplasmosis infected animals, especially pig, lam and game, and to a lesser extent beef and chicken.
During pregnancy the following risk factors have been outlined:
Eating of raw or undercooked meat
Bad hand- and kitchen hygiene
Eating of unwashed raw vegetables and fruit
Cleaning the cat litter box
Unpastorized milk

Recent actions taken to control the zoonoses

None

2.10.2. Toxoplasmosis in humans

A. Toxoplasmosis in humans

Reporting system in place for the human cases

Toxoplasma gondii infection is not notifiable in Denmark, and the incidence of toxoplasmosis in humans is unknown. However, since 1999, Denmark has had nationwide neonatal screening system for congenital toxoplasmosis.

Case definition

A case is concidered positive for toxoplasmosis after laboratory conformation based on serology.

Diagnostic/analytical methods used

Serology, antibody detection of IgM antibodies

Notification system in place

Toxoplasmosis is not a notifiable disease in Denmark

History of the disease and/or infection in the country

Approx. 25% of all pregnant woman have antibodies against the disease before pregnancy.
Approx 0,5-1% of the inhabitants are infected annually and around one out of 5000 are born with congenital toxoplasmosis.

Results of the investigation

In 2004, 66,820 newborns were tested, 9 were positive.

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

Toxoplasma gondii is endemic in Denmark.

Relevance as zoonotic disease

Toxoplasmosis is an important zoonotic disease in Denmark, because of the severity of infections in newborns and immunocompromised individuals.
Surveys have shown that the infection is common in Denmark and during pregnancy, the women should avoid the following risk factors:
Eating of raw or undercooked meat
Poor hand- and kitchen hygiene
Eating of unwashed raw vegetables and fruit
Cleaning the cat litter box
Unpastorized milk

Table 10.2.A Toxoplasmosis in man - species/serotype distribution

Toxoplasma	Cases	Cases Inc
	9	0
Toxoplasma spp.	9	
congenital cases	9	

Footnote

Not a notifiable disease in humans, hence the incidence is unknown

Table 10.2.B Toxoplasmosis in man - age distribution

Age Distribution	Toxoplasma spp.		
	All	M	F
<1 year	9		
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 :	9	0	0

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 notifiable for humans and all animals species in Denmark.

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

The classic sylvatic rabies virus, namely lyssa virus type 1, has never been reported in Denmark, nor has it been reported from closely surrounding areas for a many years. It is, however, endemic in Greenland, where arctic foxes transmit the disease to sledge dogs and other animals. Since 1985, the European bat lyssa virus (EBL) has been observed almost every year in the Danish bat population, latest in 2003.

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

The risk of exposure for humans is very low, however since EBL is found in the Danish bat population, people being in contact with bats should be aware of the risk.

Recent actions taken to control the zoonoses

None

2.11.2. Rabies in humans

A. Rabies in humans

Reporting system in place for the human cases

Individual cases are immediately reported the the Statens Serum Institut according to the Danish Order no. 277 of 14/04/2000. If a domistic animal source is suspected, the Regional Veterinary and Food Control Authorities are informed.

Case definition

A clinical case that is laboratory confirmed.

Diagnostic/analytical methods used

The final diagnose must be based on virus isolation or a biopsy of the brain. Blood sample or skinbiopsy from the neck can in all likelihood carry the diagnose.

Notification system in place

Rabies in humans is notifiable and must be reported immediately to the Statens Serum Institut.

Results of the investigation

No human cases of rabies were reported, however, 11 people underwent prophylactic treatment after being bitten by a bat. Only one of these attacking bats was examined and found negative for rabies. In addition, 73 people were treated by prophylactic vaccination following exposure abroad to bites from animals suspected of being infectious.

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

The classic sylvatic rabies virus, namely lyssa virus type 1, has never been reported in Denmark, nor has it been reported from closely surrounding areas for a many years. It is, however, endemic in Greenland, where arctic foxes transmit the disease to sledge dogs and other animals. Since 1985, the European bat lyssa virus (EBL) has been observed almost every year in the Danish bat population, latest in 2003.

Relevance as zoonotic disease

The risk of exposure for humans is very low, however since EBL is found in the Danish bat population, people being in contact with bats should be aware of the risk.

2.11.3. Lyssavirus (rabies) in animals

Table 5.1 Rabies in animals

	Source of information	Remarks	Animals tested	Animals positive
Wildlife				
bats			18	0
foxes			2	0
Pet animals				
dogs			1	0

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

E coli is not a notifiable disease in Denmark. Monitoring of zoonotic pathogens in foodstuffs is coordinated both at the regional and at the central level of administration. Each Regional Veterinary and Food Control Authority (RVFCA) is responsible for the control carried out in its own region, and the Danish Veterinary and Food Administration (DVFA) is responsible for the regulation, control strategy and the surveillance at the overall national level. Every year specific monitoring projects are conducted. Findings related to E coli are not reported to the central databases at the Danish Institute for Food and Veterinary Research.
The DANMAP programme monitors resistance in Escherichia coli from cattle, pigs, broiler, beef, pork and broiler meat.

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

The results were similar to previous years (Antimicrobial resistance)

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

The results were similar to previous years (Antimicrobial resistance)

Recent actions taken to control the zoonoses

No changes

3.1.2. Antimicrobial resistance in *Escherichia coli* isolates

A. Antimicrobial resistance of E.coli in food

Sampling strategy used in monitoring

Frequency of the sampling

All food samples were collected at wholesale and retail outlets by the Regional Veterinary and Food Control Authorities (RFCA) during the course of routine inspection carried out by the authorities, or on request specifically for the DANMAP surveillance programme. The collection of food samples for analyses of E. coli was planned and coordinated by the Danish Institute for Food and Veterinary Research (DFVF). The collected material consisted of Danish and imported foods, but only results from Danish foods are presented in the tables.

Type of specimen taken

Primarily cuts of fresh meat.

Methods of sampling (description of sampling techniques)

The food samples were collected according to the guidelines for microbiological examination of foods from the Danish Veterinary and Food Administration (Vejledning om mikrobiologisk kontrol af fødevarer, ISBN: 87-90978-46-3).

Methods used for collecting data

All isolates were tested at the DFVF, and entered into the central database.

Laboratory methodology used for identification of the microbial isolates

The material was inoculated directly onto Drigalski agar and incubated at 37°C overnight. Yellow colonies that were catalase positive and oxidase negative were identified according to the following standard criteria: indole, citrate, methyl red and Voges-Proskauer reaction.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

non

Control program/mechanisms

The control program/strategies in place

non

Measures in case of the positive findings or single cases

non

Notification system in place

E. coli is not a notifiable disease in Denmark.

Results of the investigation

In 2004, 490 E. coli isolates from Danish broiler meat (n=216), Danish beef (n= 96) and Danish pork (n=178) were collected and susceptibility tested in 2004.

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

From 2003 to 2004, no significant change in resistance was observed among E. coli from Danish broiler meat, pork and beef.

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

In E. coli isolates from healthy human volunteers, resistance levels were similar to resistance levels in E. coli from Danish meat products and E. coli isolates from imported beef and pork for most of the antimicrobials tested. However, E. coli isolates from imported broiler meat were significantly more resistant to tetracycline, ampicillin, sulfonamides, trimethoprim and nalidixic acid compared to isolates from human volunteers. In addition, the occurrence of reduced susceptibility to ciprofloxacin was significantly higher in E. coli from imported broiler meat compared to isolates from human volunteers.

Additional information

When comparing isolates from Danish (n=216) and imported broiler meat (n=93), the occurrence of tetracycline, chloramphenicol, ampicillin, sulfonamide, trimethoprim, spectinomycin, streptomycin and nalidixic acid resistance was significantly higher among E. coli isolates from imported broiler meat than among isolates from Danish broiler meat.
The sample sizes for imported beef and pork were small, which makes it difficult to detect differences in resistance between E. coli isolates from Danish and imported products. However, the occurrence of cephalothin resistance was significantly higher (P=0.002) in E. coli isolates from imported beef than in isolates from Danish beef. Among all E. coli isolates from food one isolate from imported beef was resistant to ceftiofur. This is the first E. coli isolate with extended spectrum beta-lactamase resistance ever found in foodstuff sold in Denmark.

B. Antimicrobial resistance of E.coli in animal

Sampling strategy used in monitoring

Frequency of the sampling

Bacterial isolates included in the monitoring programme are collected from animals at slaughter, as well as from
diagnostic submissions (from diarrhoea in cattle and pigs, and from septicaemia in poultry).
Samples from the slaughterhouses are collected once a month for pigs and cattle and weekly for broilers. The number of samples for each slaughter plant has been determined in proportion to the number of animals slaughtered per year. Each sample represents one herd or flock.
The DANMAP programme monitors resistance in Escherichia coli from cattle and pigs isolated from diagnostic Submissions. Most isolates from diagnostic submissions originate from animals already in antimicrobial therapy, or animals with a history of previous antimicrobial therapy.

Type of specimen taken

Monitoring programme: Faceal samples from pigs and cattle, cloacal swabs from broilers.
Diagnostic submissions: Faecal samples.

Methods of sampling (description of sampling techniques)

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the Danish Institute for Food and Veterinary Research (DFVF) for examination.
The samples from animals with clinical symptoms are collected by veterinary officers at the farm and sent to the Danish Institute for Food and Veterinary Research (DFVF) for examination.

Procedures for the selection of isolates for antimicrobial testing

The broiler, cattle and pig slaughter plants included in the surveillance programme account for 95%, 90% and 95%, respectively, of the total production of these animal species in Denmark. Accordingly, the bacterial isolates may be regarded as representing a stratified random sample of the respective populations, so that the occurrence of resistance provides an estimate of the true occurrence in the populations.
Bacterial isolates from diagnostic submissions are selected by a pseudo-random process among isolates from submissions to the DFVF from the laboratory of the Federation of Danish Pig Producers and Slaughterhouses, Kjellerup. Accordingly, the programme achieves nationwide coverage for these pathogens.

Methods used for collecting data

All isolates were tested at the DFVF, and entered into the central database.

Laboratory methodology used for identification of the microbial isolates

The material was inoculated directly onto Drigalski agar and incubated at 37°C overnight. Yellow colonies that were catalase positive and oxidase negative were identified according to the following standard criteria: indole, citrate, methyl red and Voges-Proskauer reaction.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

none

Control program/mechanisms

The control program/strategies in place

none

Measures in case of the positive findings or single cases

none

Notification system in place

E. coli is not a notifiable disease in Denmark.

Results of the investigation

Overall, 447 isolates from Danish broilers (n=142), cattle (n=97) and pigs (n=208) were collected and susceptibility tested in 2004. In addition 32 diagnostic isolates from cattle and 49 diagnostic isolates from pigs were selected for susceptibility testing.

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

From 2003 to 2004, significant increases in tetracycline, ampicillin, sulfonamide, trimethoprim and neomycin resistance were observed among indicator E. coli isolates from pigs. These coincide with increased tetracycline and broadspectrum penicillin consumption in weaners and finishers, while sulfonamide/trimethoprim consumption increased only in weaners and neomycin consumption remained unchanged in the same period.
No significant changes in resistance were observed in indicator E. coli isolates from broilers from 2003 to
2004. Among indicator E. coli isolates from cattle, sulfonamide and streptomycin, resistance significantly increased from 2003 to 2004.
From 2003 to 2004, significant increases in sulphonamide and neomycin (P=0.02) resistance were observed among E. coli isolates from diagnostic submissions from cattle. Among E. coli from diagnostic submissions from pigs no significant changes in resistance were observed from 2003 to 2004.

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

In E. coli isolates from healthy human volunteers, resistance levels were similar to resistance

levels in E. coli from Danish meat products and E. coli isolates from imported beef and pork for most of the antimicrobials tested. However, E. coli isolates from imported broiler meat were significantly more resistant to tetracycline, ampicillin, sulfonamides, trimethoprim and nalidixic acid compared to isolates from human volunteers. In addition, the occurrence of reduced susceptibility to ciprofloxacin was significantly higher in E. coli from imported broiler meat compared to isolates from human volunteers.

Additional information

In 2004, stool samples from 125 healthy human volunteers were collected and 111 E. coli isolates were subsequently isolated. As in 2002 and 2003, resistance to sulfonamide, ampicillin, tetracycline and streptomycin were most common. None of the isolates were resistant to gentamicin. Nalidixic acid resistance was observed in one percent of the isolates. No significant change in resistance was observed between 2003 and 2004.

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		yes			
Number of isolates available in the laboratory	97		208		142			
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline		12%		44%		11%		
Amphenicols								
Chloramphenicol		0%		9%		0%		
Florfenicol		0%		0%		0%		
Cephalosporin								
Cephalothin		1%		5%		2%		
Ceftiofur		0%		0%		0%		
Fluoroquinolones								
Ciprofloxacin		0%		3%		12%		
Quinolones								
Nalidixic acid		0%		3%		13%		
Trimethoprim		3%		21%		5%		
Sulfonamides								
Sulfonamide		14%		47%		18%		
Aminoglycosides								
Streptomycin		18%		48%		8%		
Gentamicin		0%		3%		0%		
Neomycin		0%		16%		1%		
Penicillins								
Ampicillin		8%		33%		18%		

Table Antimicrobial susceptibility testing of E.coli in Pigs - at slaughter - 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

	E.coli
	Pigs - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	208

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		44%							52,4	3,4	0,5	0,5	3,4	39,9								
Amphenicols																						
Chloramphenicol		9							2,4	50,5	36,5	1,4	1,4	1,9	5,8							
Florfenicol		0							6,3	48,1	43,8	1,9										
Cephalosporin																						
Cephalothin		5							1,9	17,3	49,0	26,9	3,4		1,4							
Ceftiofur		0					99,0	0,5	0,5													
Fluoroquinolones																						
Ciprofloxacin		3	96,6			2,9	0,5															
Quinolones																						
Nalidixic acid		3									96,6			0,5	2,9							
Trimethoprim		21%								79,3				20,7								
Sulfonamides																						
Sulfonamide		47												53,4				3,8				
Aminoglycosides																						
Streptomycin		48								16,8	26,9	8,7	6,3	13,9	27,4							
Gentamicin		3						92,3	3,4	1,0	1,0	2,4										
Neomycin		16							77,4	6,7			1,4	14,4								
Penicillins																						
Ampicillin		33						2,4	39,4	24,5	0,5		1,0	32,2								

Table Antimicrobial susceptibility testing of E.coli in Gallus gallus - at slaughter - 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

	E.coli
	Gallus gallus - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	142

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		11%							88,0	0,7		0,7		10,6								
Amphenicols																						
Chloramphenicol		0							6,3	64,8	28,2	0,7										
Florfenicol		0							9,2	74,6	16,2											
Cephalosporin																						
Cephalothin		2							7,0	21,8	54,2	14,8	0,7	0,7	0,7							
Ceftiofur		0					98,6	0,7	0,7													
Fluoroquinolones																						
Ciprofloxacin		12	86,6	1,4	2,8	9,2																
Quinolones																						
Nalidixic acid		13									85,2	1,4	1,4	0,7	9,9							
Trimethoprim		5%								94,4	0,7		4,9									
Sulfonamides																						
Sulfonamide		18												81,7	0,7		3,5	4,9				
Aminoglycosides																						
Streptomycin		8								16,2	69,7	5,6	2,8	4,2	1,4							
Gentamicin		0						99,3	0,7													
Neomycin		1							98,6				0,7	0,7								
Penicillins																						
Ampicillin		18						9,2	42,3	28,2	2,1	0,7		17,6								

Table Antimicrobial susceptibility testing of E.coli in Cattle (bovine animals) - at slaughter - 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

	E.coli
	Cattle (bovine animals) - at slaughter - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	97

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		12%							83,5	4,1				12,4								
Amphenicols																						
Chloramphenicol		0							1,0	39,2	59,8											
Florfenicol		0							3,1	30,9	64,9	1,0										
Cephalosporin																						
Cephalothin		1							1,0	7,2	71,1	19,6	1,0									
Ceftiofur		0					99,0	1,0														
Fluoroquinolones																						
Ciprofloxacin		0	100																			
Quinolones																						
Nalidixic acid		0									100											
Trimethoprim		3%								96,9				3,1								
Sulfonamides																						
Sulfonamide		14												85,6								
Aminoglycosides																						
Streptomycin		18								19,6	57,7	5,2	3,1	4,1	10,3							
Gentamicin		0						97,9	1,0	1,0												
Neomycin		0							92,8	5,2	2,1											
Penicillins																						
Ampicillin		8						4,1	35,1	49,5	3,1			8,2								

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	216				178		196	
Antimicrobials:	**N**	**%R**	**N**	**%R**	**N**	**%R**	**N**	**%R**
Tetracycline		9%				26%		9%
Amphenicols								
Chloramphenicol		1%				2%		1%
Florfenicol		0%				1%		0%
Cephalosporin								
Cephalothin		3%				5%		5%
Ceftiofur		0%				0%		0%
Fluoroquinolones								
Ciprofloxacin		6%				0%		2%
Quinolones								
Nalidixic acid		6%				2%		0%
Trimethoprim		3%				10%		4%
Sulfonamides								
Sulfonamide		15%				18%		7%
Aminoglycosides								
Streptomycin		6%				28%		9%
Gentamicin		0%				0%		0%
Neomycin		0%				3%		2%
Penicillins								
Ampicillin		15%				15%		8%

Table Antimicrobial susceptibility testing of E.coli in Broiler meat - at retail - 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

	E.coli
	Broiler meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	216

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		9%							90,3	0,9			1,4	7,4								
Amphenicols																						
Chloramphenicol		1							1,9	52,3	44,9	0,5										
Florfenicol		0							2,8	54,6	42,1	0,5										
Cephalosporin																						
Cephalothin		3							4,2	20,4	44,9	27,8	2,8									
Ceftiofur		0					99,5	0,5														
Fluoroquinolones																						
Ciprofloxacin		6	94,0		0,9	3,2	1,9															
Quinolones																						
Nalidixic acid		6									94,0		0,5	3,2	0,5	1,9						
Trimethoprim		3%								96,3	0,5			3,2								
Sulfonamides																						
Sulfonamide		15												83,3	1,4							
Aminoglycosides																						
Streptomycin		7								27,3	61,1	5,1	1,9	2,8	1,9							
Gentamicin		0						93,5	6,0	0,5												
Neomycin		0							88,0	11,6	0,5											
Penicillins																						
Ampicillin		15						10,2	43,5	31,0	0,5			14,8								

Table Antimicrobial susceptibility testing of E.coli in Bovine meat - at retail - 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

	E.coli
	Bovine meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	196

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		9%							87,8	3,1			0,5	8,7								
Amphenicols																						
Chloramphenicol		1							1,0	25,5	72,4				1,0							
Florfenicol		0							1,0	26,5	71,9	0,5										
Cephalosporin																						
Cephalothin		5							0,5	4,6	51,5	38,8	4,1	0,5								
Ceftiofur		0					98,5	1,5														
Fluoroquinolones																						
Ciprofloxacin		0	100																			
Quinolones																						
Nalidixic acid		0									100					0,4						
Trimethoprim		4%								95,9				5,1								
Sulfonamides																						
Sulfonamide		7												92,3	0,5							
Aminoglycosides																						
Streptomycin		9								15,8	68,4	6,6	1,0	2,6	5,6							
Gentamicin		0						90,8	7,7	1,5												
Neomycin		2							86,8	9,7	1,5		0,5	1,5								
Penicillins																						
Ampicillin		8						0,5	30,6	57,7	3,1	0,5		7,7								

Table Antimicrobial susceptibility testing of E.coli in Pig meat - at retail - 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

	E.coli
	Pig meat - at retail - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	178

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		26%							70,2	3,4			1,7	24,7								
Amphenicols																						
Chloramphenicol		2							5,6	38,8	53,4		1,1	1,1								
Florfenicol		1							11,2	38,8	48,3	0,6	1,1									
Cephalosporin																						
Cephalothin		5							0,6	15,7	53,4	25,8	3,9	0,6								
Ceftiofur		0					100															
Fluoroquinolones																						
Ciprofloxacin		2	96,1	2,2		1,7																
Quinolones																						
Nalidixic acid		2									98,3			0,6	0,6	0,6						
Trimethoprim		10%								90,4				9,6								
Sulfonamides																						
Sulfonamide		18												80,9	1,1			0,6				
Aminoglycosides																						
Streptomycin		28								20,2	44,9	6,7	4,5	12,4	11,2							
Gentamicin		0						94,9	3,9	1,1												
Neomycin		3							87,1	7,9	1,7		1,1	2,2								
Penicillins																						
Ampicillin		15						2,8	42,7	36,5	2,8			15,2								

Table 13.8 Antimicrobial susceptibility testing of E.coli. in humans - qualitative data

	E.coli	
	humans	
Isolates out of a monitoring program	yes	
Number of isolates available in the laboratory	111	
Antimicrobials:	**N**	**%R**
Tetracycline		17%
Amphenicols		
Chloramphenicol		4%
Florfenicol		0%
Cephalosporin		
Cephalothin		3%
Ceftiofur		0%
Fluoroquinolones		
Ciprofloxacin		1%
Quinolones		
Nalidixic acid		1%
Trimethoprim		14%
Sulfonamides		
Sulfonamide		22%
Aminoglycosides		
Streptomycin		22%
Gentamicin		0%
Neomycin		0%
Penicillins		
Ampicillin		23%

Table Antimicrobial susceptibility testing of E.coli in humans - 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

	E.coli
	humans - monitoring programme
Isolates out of a monitoring program	yes
Number of isolates available in the laboratory	111

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		17%							82,9				2,7	14,4								
Amphenicols																						
Chloramphenicol		4							4,5	37,8	54,1			1,8	1,8							
Florfenicol		0							5,4	58,6	36,0											
Cephalosporin																						
Cephalothin		3							0,9	16,2	58,6	21,6		2,7								
Ceftiofur		0					99,1	0,9														
Fluoroquinolones																						
Ciprofloxacin		1	98,2	0,9	0,9																	
Quinolones																						
Nalidixic acid		1									98,2	0,9			0,9							
Trimethoprim		14%								86,5				13,5								
Sulfonamides																						
Sulfonamide		22												77,5	0,9			1,8				
Aminoglycosides																						
Streptomycin		21								44,2	30,6	3,6	1,8	5,4	14,4							
Gentamicin		0						99,1		0,9												
Neomycin		0							99,1	0,9												
Penicillins																						
Ampicillin		23						2,7	26,1	43,3	4,5			23,4								

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	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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	breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracycline	16				2	32				
Amphenicols										
Chloramphenicol	32				2	64				
Florfenicol	32				2	64				
Cephalosporin										
Cephalothin	32				2	64				
Ceftiofur	8				0,5	8				
3rd generation cephalosporins										
Fluoroquinolones										
Ciprofloxacin	0,125				0,03	4				
Enrofloxacin										
Quinolones										
Nalidixic acid	32				8	128				
Trimethoprim	16				4	32				
Sulfonamides										
Sulfonamide	512				64	1024				
Aminoglycosides										
Streptomycin	32				4	64				
Gentamicin	8				1	32				
Neomycin	16				2	32				
Kanamycin										
Trimethoprim + sulfonamides										
Penicillins										
Ampicillin	32				1	32				

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

In Denmark, there are three different systems for reporting suspected food-borne outbreaks caused by zoonotic agents. I) Physicians are obligated to report all suspect food-borne infections prior to clinical confirmation. These early notifications are sent to the regional medical officer, as well as to the Department of Epidemiology at the Statens Serum Institut (SSI). II) Clusters of cases identified through the laboratory surveillance system of gastrointestinal zoonotic infections are reported via the Unit of Gastrointestinal Infections at the SSI. III) Individuals who experience food poisoning may report these incidents directly to the Regional Veterinary and Food Control Authorities (RVFCA), who investigate and report the outbreaks to the Danish Food and Veterinary Administration (DVFA). Overlaps between these three systems may exist. A fourth system exists for water-borne outbreaks that are reported to and handled by the local municipalities.
At the end of 2004, the responsibility of tracking food- or waterborne outbreaks was divided between three ministries based on the outbreak source: Ministry for the Interior and Health for infectious diseases, Ministry of Family and Consumer Affairs for food and animal related diseases and the Ministry of Environment for water related diseases. The Danish Zoonosis Centre (DZC) co-ordinates the close collaborations between the Danish Institute for Food and Veterinary Research (DFVF), SSI and DFVA. Representatives from these institutions meet regularly to discuss the surveillance results and compare the incidence in humans, with the occurrence of zoonotic agents in animals, food and feedstuffs. Local outbreaks are typically investigated by the RVFCA and the medical officer in collaboration.

Description of the types of outbreaks covered by the reporting:

Definition of Food borne outbreaks:
1)two or more human cases of the same disease or infection suspected of orginating from the same source
2)a higher number of cases than expected (the endemic level) within an area in a limited period
Type of outbreaks:
Family outbreaks
General outbreaks
Hospital outbreaks
Causative agents:
Salmonella
Campylobacter
VTEC

Listeria
Yersinia
Shigella

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

Fewer outbreaks were registered in 2004 compared to 2003. General practitioners reported a total of 48 outbreaks to the SSI, equal to that for 2003. The RVFCA reported 29 outbreaks in 2004, but zoonotic agents were only verified as the caused in two of these. Both were also reported via the laboratory system. The laboratory based surveillance system identified eight outbreaks, representing a total of 152 confirmed cases. In 2003, 12 outbreaks and 115 confirmed cases were reported through the laboratory based surveillance system. S. Typhimurium was the cause of all Salmonella outbreaks detected by the laboratory surveillance system. This may be partly the reflection of increased typing efforts. In 2004, S. Typhimurium isolates were routinely sub-typed by phage typing, PFGE and antimicrobial resistance profiling, and additionally by MLVA during the latter half of the year. In contrast, S. Enteritis isolates were only phage typed. Aside from a single regional point-source outbreak, which was traced to a specific butcher shop, the S. Typhimurium outbreaks involved patients from the entire country registered over lengthy periods of time, however, the sources of these outbreaks or patient clusters were generally difficult to identify.

Descriptions of single outbreaks of special interest

In 2004, Denmark experienced the first VTEC outbreaks. The largest cluster from these outbreaks was caused by an O157:H- strain of phagetype 8 encoding virulence genes vtx1, vtx2c and eae. It involved 25 confirmed cases, all of which were from within or near Copenhagen. Initial case interviews suggested the source was the result of the consumption of a food product purchased in Denmark. A case-control study, involving 11 confirmed patients and 55 controls, clearly indicated that food from a specific supermarket chain was associated with the outbreak. This supermarket chain is only operational in the region of Denmark in which the patients resided. A specific type of milk produced from a relatively small organic dairy sold in this supermarket chain was also, although less strongly, found to be associated. After thorough disinfection and review of procedures at the dairy, no further outbreak cases were reported. Samples taken from milk and equipment at the dairy were found to be negative for the pathogen under investigation, and therefore, the herds were not examined. The overall conclusion from this outbreak investigation was that a very small-scale contamination of a specific type of milk from this dairy, in all likelihood, was the source of the outbreak.
The second VTEC outbreak occurred among visitors, primarily children, of a farm designed for kindergarten group tours. The farm housed sheep and goats that the children were allowed to handle. At least five people became infected with various serotypes of VTEC following these visits. VTEC strains identified by PFGE sub-typing were isolated from three patients and from droppings. The farm was temporarily closed, but re-opened after improved sanitation facilities and measures were in place.

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
Campylobacter	7					chicken, various or inknown food items			Epidemiological evidence	home	
Yersinia	2					unknown	x		Epidemiological evidence	home	
Campylobacter		9				chicken, eggs, unpasteurized milk, ham, secondary case	x		Epidemiological evidence	home	
Yersinia		1				unknown	x		Epidemiological evidence	home	
Trichinella		1				s,oked pork sausages	x		Epidemiological evidence	home	
Unknown/ spoilage	8					pizza, shrimp, various food items, unknown	x		Epidemiological evidence	home	
Unknown/ spoilage		2				chicken, fish, various food items	x		Epidemiological evidence	home	
Salmonella - S. Enteritidis	2					Various food items	x		Epidemiological evidence	home	
Salmonella - S. Enteritidis		6				Shrimp, turkey, chiken, eggs	x		Epidemiological evidence	home	
Salmonella - S. Typhimurium	4					pizza, various food items, unknown	x		Epidemiological evidence	home	
Salmonella - S. Typhimurium		1				chicken	x		Epidemiological evidence	home	
Salmonella - Salmonella spp.	1					unknown	x		Epidemiological evidence	home	
Salmonella - Salmonella spp.		2				unknown	x		Epidemiological evidence	home	
Pathogenic Escherichia coli - Verotoxigenic E. coli (VTEC)	1		5			Goats, petting zoo		x	laboratory confirmed	Petting farm	
Pathogenic Escherichia coli - Verotoxigenic E. coli (VTEC) - VTEC O 157:H-	1		25			pastorized milk	x		laboratory confirmed and case-control study	home	

Salmonella - S. Typhimurium - DT 12(1)	1		24			Butcher shop		x	laboratory confirmation	home	
Salmonella - S. Typhimurium - Not typable(2)	1		34			pork	x		laboratory confirmed	home	
Salmonella - S. Typhimurium - Not typable(3)	1		10			imported pork	x		laboratory confirmed	home	
Salmonella - S. Typhimurium - DT 12											
Salmonella - S. Typhimurium - DT 12(4)	1		25			unknown			laboratory confirmed	home	
Salmonella - S. Typhimurium - DT 120(5)	1		18			pork			laboratory confirmed	home	
Salmonella - S. Typhimurium - DT 104(6)	1		11			Danish Pork			laboratory confirmed	home	

(1) : Fully susceptible
(2) : AST resistant
(3) : ASSuT resistant
(4) : Fully susceptible
(5) : Fully susceptible
(6) : AS resistant