European Food Safety Authority

ZOONOSES MONITORING

DENMARK

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

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

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

IN 2009

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Denmark

Reporting Year:

Laboratory name	Description	Contribution
National Food Institute, Technical University of Denmark	The National Food Institute conducts research and gives advice on nutrition, food safety, environment and health. Our work involves the entire food chain within five primary disciplines: nutrition, chemistry, toxicology, microbiology and epidemiology. We carry out scientifically based risk assessments, give advice to Danish and international authorities and industry, monitor food consumption patterns and the national food safety situation, and provide diagnostic and analytical services. The National Food Institute is the national reference laboratory for chemical and microbial food safety and also serves as an international reference laboratory for the EU, WHO (World Health Organization) and EFSA (European Food Safety Authority) in a number of areas.	The national reporting officer is employed at the Danish Zoonosis Centre at The National Food Institute. Contributing with data and text.

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
Danish Veterinary and Food administrations (DVFA)	The Danish Veterinary and Food Administration (DVFA) is part of the Ministry of Family and Consumer Affairs. DVFA deals with food safety and health from farm to fork. The head office is situated just north of Copenhagen and handles development, co-ordination and the formation of rules and regulations. Food control and veterinary inspections are handled by three regional veterinary and food control centres. The regional centres are local knowledge centres on food issues and give information and advice to consumers, livestock owners, enterprises and practising veterinarians.	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
National Veterinary Institute, technical University of Denmark	The National Veterinary Institute conducts research and gives advice on animal diseases. We carry out scientifically based risk assessments, give advice to Danish and international authorities and provide diagnostic and analytical services. The Institute covers all disciplines relating to infectious diseases: pathology, bacteriology, virology, parasitology, immunology, vaccinology, serology and epidemiology. The National Veterinary Institute serves as an international reference laboratory for the EU and OIE (World Organisation for Animal Health) and gives advice EFSA (European Food Safety Authority) in a number of areas.	Data

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
Danish Plant Directorate (PDir)	The Danish Plant Directorate is a government institution under the Danish Ministry of Food, Agriculture and Fisheries. The Danish Plant Directorate concentrates on the first stage of the food chain from farm to fork. 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 fielsds of competence.	Data
Danish Agriculture and Food Council (L&F)	The Danish Agriculture & Food Council represents the agricultural and food industry in Denmark and is the result of a merger between the Danish Agricultural Council, Danish Bacon and Meat Council, Danish Pig Production and Danish Agriculture. The merger also includes a major part of the business activities of the Danish Dairy Board.	Data

PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/99/ EC*. The information has also been forwarded to the European Food Safety Authority (EFSA).

The report contains information on trends and sources of zoonoses and zoonotic agents in Denmark during the year 2009 .

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

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

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

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

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

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1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information

Data source: The Central husbandry Register, administered under the ministry of Family and Consumer Affairs. All farmers in Denmark 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

Number of livestock and herds in 31 of dec 2009.
Number of slaughtered animals are totals for 2009

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 Susceptible animal populations

* Only if different than current reporting year

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	- in total	22476		507200		1626528			
Gallus gallus (fowl) - broilers	broilers - before slaughter	578		100132000		21993093		237	
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line	grandparent breeding flocks for broiler production line - adult	18				50000		4	
	grandparent breeding flocks for broiler production line - during rearing period	5				50000		2	
Gallus gallus (fowl) - laying hens	laying hens - adult	288				3020000		211	
Gallus gallus (fowl) - laying hens - during rearing period	laying hens - during rearing period - flocks under control programme	152				1400000		90	
Gallus gallus (fowl) - parent breeding flocks for broiler production line	parent breeding flocks for broiler production line - adult	152				720000		46	
	parent breeding flocks for broiler production line - during rearing period	95				130000		16	
Gallus gallus (fowl) - parent breeding flocks for egg production line	parent breeding flocks for egg production line - adult	6				30000		6	
	parent breeding flocks for egg production line - during rearing period	5				20000		4	
Goats	- in total [1)]	3626		2073		25799			
Pigs	fattening pigs	8569		18972880		6657061			
Pigs - breeding animals - unspecified	breeding animals - unspecified - sows and gilts			412490					

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Sheep	- in total	8738		89987		164857			
Solipeds, domestic	horses - in total			2863					
Turkeys	- in total	49		7588		486839			
Wild boars	farmed - in total			1445					

Comments:

[1)] the majority of animals are used in petting zoo

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

The number of human Salmonella infections in Denmark began to rise in the mid 80s. During the following years three distinct waves of salmonellosis related to the consumption of broiler meat (peaking in 1988), pork (peaking in 1994) and table eggs (peaking in 1997) were observed. Since 1997, a steadily decreasing trend has been seen. This reduction in the incidence of human cases may to a large extent be attributed to the large-scale national efforts aimed at reducing the occurrence of Salmonella in broilers, pigs and table-egg layers raised in Denmark.

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

In 2009, 2,129 laboratory-confirmed episodes of salmonellosis were reported corresponding to 38.5 cases per 100,000 inhabitants.
In 2009, there were 600 reported episodes of S. Enteritidis corresponding to an incidence of 10.8 per 100,000. There were 767 reported episodes of S. Typhimurium corresponding to an incidence of 13.9 per 100,000 inhabitants.

Other Salmonella serotypes accounted for 762 episodes, corresponding to an incidence of 13.8 per 100,000 inhabitants.

In the years prior to 2007, the number of cases reported as travel-related was known to be underreported. Before 2003, the number of travel-related cases among patients with unknown travel history was estimated using data from cases with a known travel history (i.e. responding yes or no to travel). However, from 2003 to 2007, this approach proved extremely difficult, since the majority (approximately 70% in 2005) of patients has no travel information. From middle of 2007 information on travel history was obtaind through telephone interviews. And is was estimated that 31% of the cases was travel related in 2007.

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

The number of human Salmonella infections in Denmark began to rise in the mid 80s. During the following years three distinct waves of salmonellosis related to the consumption of broiler meat (peaking in 1988), pork (peaking in 1994) and table eggs (peaking in 1997) were observed. Since 1997, a steadily decreasing trend has been seen. This reduction in the incidence of human cases may to a large extent be attributed to the large-scale national efforts aimed at reducing the occurrence of Salmonella in broilers, pigs and table-egg layers raised in Denmark.

Results of the investigation

In 2009, 2,129 laboratory-confirmed episodes of salmonellosis were reported corresponding to 38.5 cases per 100,000 inhabitants.
In 2009, there were 600 reported episodes of S. Enteritidis corresponding to an incidence of 10.8 per 100,000. There were 767 reported episodes of S. Typhimurium corresponding to an incidence of 13.9 per 100,000 inhabitants.

Other Salmonella serotypes accounted for 762 episodes, corresponding to an incidence of 13.8 per 100,000 inhabitants.

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.

2.1.3 Salmonella in foodstuffs

A. 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

Depend on the slaughterhouse capacity

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Depend on the survey

At retail

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

Depend on the laboratory

At meat processing plant

Depend on the survey

At retail

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

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

In 2009, 24385 swab samples were collected and pooled and the prevalence of Salmonella in single swab samples was estimated to be 1,1% (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 prevalence).

An additional 120 samples were collected from slaughterhouses with a small production and were analysed individually. Of these samples, 1,7% were positive for Salmonella. As in previous years, the most common serotypes observed were S. Typhimurium, S. Derby and S. Infantis.

B. 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

>200 animals/day = 5 swaps/day pooled into one analysis. >200 animals/month or <=200 animals/day = 5 swaps/200 animals pooled into one analysis. 50<animal<200/month = 5 samples/quarter pooled into one analysis. 50>animals/month= 1 sample/quarter

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Depend on the survey

At retail

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) after 12 hours of chilling 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

Depend on the laboratory

At meat processing plant

Depend on the survey

At retail

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

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 2009, 7080 samples were pooled and the prevalence of Salmonella was estimated to be 0.3% after using the conversion factor
(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 prevalence).
An additional 190 samples were collected from slaughterhouses with a smaller production and analysed individually. All samples were negative. In total, S. Dublin was isolated from the majority of positive samples

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

C. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A control and eradication programme is running. Last adjusted in Jan 2009.
All AM postive flocks are heat treated.

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

Other: slaughterhouses slaughtering only AM negative flocks: sample 1 flock a week (300 neckskin samples of 1 g, pooled into subsamples of 60). Slaughterhouses slaughtering AM postive flocks as well as AM negative flocks: sample all flocks on days when positive flocks are slaughtered as well (300 neckskin samples of 1 g, pooled into subsamples of 60) and sample one flocks on days when no positive flocks are slaughtered (300 neckskin samples of 1 g, pooled into subsamples of 60)

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

At meat processing plant

depend on the survey

At retail

Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Random sampling of neckskin samples

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

Depend on the laboratory

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Preventive measures in place

At the slaughterhouse: AM positive flocks are slaughtered at the end of the day. Speciel hygenic measures apply

At retail: compliance with the microbiological criteria

Control program/mechanisms

The control program/strategies in place

The national Salmonella control programme for poultry implemented in 1988 and adjusted in 1996, 2000 and 2008. The Salmonella surveillance programme is mandatory.

Recent actions taken to control the zoonoses

In 2008 an extra sock sample at the farm was introduced, intensified sampling of AM negative flocks slaughtered at slaughterhouses where AM positive flocks are also slaughtered, and mandatory heat treatment of all positive flocks at slaughter was introduced

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified

Notification system in place

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

Results of the investigation

In 2009 a total of 375 slaughterbatches was tested and 3 batches was found positive.

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

Generally the level of Salmononella has been declining during the last many years. With the new measures in place at the farm (an extra socksample was introduced) as well as at slaughter (heattreatment and intensified sampling) we expect a further decline in the coming years.

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

Findings of Salmonella in poultry is highly relevant as a source of Salmonella in food and humans

D. 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. In Denmark the breeder and layer flocks are tested many times during the production period and tested based on serology. Too high serological reaction will result in suspcious sampling at the farm by sock samples

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)

E. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting 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.

Since 2004 very few turkeys are 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

Depend on the survey

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Depend on the survey

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Depend on the survey

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

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 meat processing plant

Depend on survey

At retail

Depend on survey

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 2004, turkeys are no longer slaughtered commercially in Denmark, as the only major turkey slaughterhouse closed. Most turkeys raised in Denmark are hereafter transported abroad for slaughter.

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

A part of the Danish produced turkey meat is probably re-imported.

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Control and eradication programmes - industry sampling - selective sampling	DAFC	Batch		0	0			0
Meat from broilers (Gallus gallus) - fresh - with skin - at slaughterhouse - animal sample - neck skin - Control and eradication programmes - industry sampling - objective sampling	DAFC	Batch		375	3			3

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. 3,10:-:-	S. 4,5,12:-:-	S. 6,7:-:-
Meat from bovine animals - fresh - at slaughterhouse	DFVA	Single		0	0		0	0			
Meat from pig - fresh - at slaughterhouse	DFVA	Single		0	0		0	0	0	0	0
Meat from bovine animals - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100 cm2)	DFVA	Single		7080	13		1	8			
Meat from other animal species or not specified - meat preparation - intended to be eaten cooked - at retail - domestic production - Survey - national survey (marinated chicken, pork or beef) [1)]	DFVA	Batch	200	430	2			2			
Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100cm2)	DFVA	Single		24385	157		57	25	1	2	1

	S. 9,12:lv:-	S. Agona	S. Brandenburg	S. Derby	S. Dublin	S. Infantis	S. Livingstone	S. London	S. Putten	S. Saintpaul	S. Schwarzengrund
Meat from bovine animals - fresh - at slaughterhouse				0	0						
Meat from pig - fresh - at slaughterhouse	0	0	0	0		0	0	0	0	0	0
Meat from bovine animals - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100 cm2)				1	3						

Table Salmonella in red meat and products thereof

	S. 9,12:lv:-	S. Agona	S. Brandenburg	S. Derby	S. Dublin	S. Infantis	S. Livingstone	S. London	S. Putten	S. Saintpaul	S. Schwarzengrund
Meat from other animal species or not specified - meat preparation - intended to be eaten cooked - at retail - domestic production - Survey - national survey (marinated chicken, pork or beef) [1)]											
Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100cm2)	3	4	2	45		3	4	5	2	1	1

	S. Senftenberg
Meat from bovine animals - fresh - at slaughterhouse	
Meat from pig - fresh - at slaughterhouse	0
Meat from bovine animals - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100 cm2)	
Meat from other animal species or not specified - meat preparation - intended to be eaten cooked - at retail - domestic production - Survey - national survey (marinated chicken, pork or beef) [1)]	
Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100cm2)	1

Table Salmonella in red meat and products thereof

Comments:

[1)] 1 meat preparation from pork meat and 1 marinated chicken positive

2.1.4 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Monitoring system

Frequency of the sampling

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

Every flock is sampled

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

Other: Parents-Per Unit: week: 1,2,4,8 and 2 weeks prior to moving. Grand parents-Per unit: week: 4,8 and 2 weeks prior to moving

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

Other: Parent - per unit: every week; Grandparants- per unit: 0-4 weeks before moving0-8 week before slaughter

Type of specimen taken

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

Internal linings of delivery boxes

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

Socks/ boot swabs

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

Socks/ boot swabs

Case definition

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

A sample positive with Salmonella

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

A sample positive with Salmonella

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

A sample positive with Salmonella

Diagnostic/analytical methods used

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

Depend on the laboratory

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

Depend on the laboratory

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

Depend on the laboratory

Vaccination policy

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

Not allowed in Denmark

Other preventive measures than vaccination in place

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

Preventive treatment with antibiotics is not allowed

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

From 2008, all broiler flocks are tested twice during rearing period. 15-21 days and 7-10 days before slaughter at the farm using sock samples

Frequency of the sampling

Broiler flocks: Rearing period

Every flock is sampled

Broiler flocks: Before slaughter at farm

Every flock is sampled

Type of specimen taken

Broiler flocks: Rearing period

Socks/ boot swabs

Broiler flocks: Before slaughter at farm

Socks/ boot swabs

Case definition

Broiler flocks: Rearing period

A positive case is a flocks found positive in the laboratory

Broiler flocks: Before slaughter at farm

A positive case is a flocks found positive in the laboratory

Diagnostic/analytical methods used

Broiler flocks: Rearing period

Depend on the laboratory

Broiler flocks: Before slaughter at farm

Depend on the laboratory

Vaccination policy

Broiler flocks

Not allowed in Denmark

Other preventive measures than vaccination in place

Broiler flocks

Preventive treatment with antimicrobials is not allowed in Denmark

Control program/mechanisms

The control program/strategies in place

Broiler flocks

Al broiler flocks are sampled two times at the farm unless the flock is declared positive after the first sample. All positive flocks are slaughtered at the same slaughterhouse in Denmark and heat treated after slaughter.

Measures in case of the positive findings or single cases

Broiler flocks: Rearing period

If the flock is positive, the flock will be slaughtered under special hygenic precautions and the meat is heat treated. At the farm special hygenic actions are taken.

Broiler flocks: Before slaughter at farm

If the flock is positive, the flock will be slaughtered under special hygenic precautions and the meat is heat treated. At the farm special hygenic actions are taken.

Notification system in place

Salmonella sp is notifiable to the Danish veterinary and food administration

Results of the investigation

In 2009, 3767 flocks were tested and 35 was positive. Additionally, three parents flocks out of 225 were positive during production period. No parent flocks was reported positive during rearing period.

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

The level of Salmonella in the broilerproduction is very low and has been so for many years.

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

Monitoring system

Frequency of the sampling

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

4 weeks and 2 weeks before moving

Laying hens: Production period

Every 9 weeks starting at 24 weeks

Laying hens: Before slaughter at farm

Every flock is sampled

Laying hens: At slaughter

Other: AM negative flocks slaughtered at slaughterhouses where only AM negative flocks are slaugtered: 1 flocks a week. AM negative flocks slaughtered at slaughterhouses slaughtering both AM positive and negative flocks: All slaughter batches are sampled. AM positive flocks have to be heat treated at slaughter

Type of specimen taken

Laying hens: Day-old chicks

Internal linings of delivery boxes

Laying hens: Rearing period

Socks/ boot swabs

Laying hens: Production period

At 24 weeks: Dust samples and socks/ boot swabs

Laying hens: Before slaughter at farm

Socks/ boot swabs

Laying hens: At slaughter

Neck skin

Case definition

Laying hens: Day-old chicks

A positive case is a flock where Salmonella has been detected in the laboratory

Laying hens: Rearing period

A positive case is a flock where Salmonella has been detected in the laboratory

Laying hens: Production period

A positive case is a flock where Salmonella has been detected in the laboratory

Laying hens: Before slaughter at farm

A positive case is a flock where Salmonella has been detected in the laboratory

Laying hens: At slaughter

A positive case is a flock where Salmonella has been detected in the laboratory

Diagnostic/analytical methods used

Laying hens: Day-old chicks

Depend of the Laboratory

Laying hens: Rearing period

Depend of the Laboratory

Laying hens: Production period

Depend of the Laboratory

Laying hens: Before slaughter at farm

Depend of the Laboratory

Laying hens: At slaughter

Depend of the Laboratory

Vaccination policy

Laying hens flocks

Vacination is not permitted

Other preventive measures than vaccination in place

Laying hens flocks

Preventive treatment with Antibiotics is not allowed

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

The first national Salmonella control programme for egg production was implimented in 1996-1997 and has been adjusted over the years. The programme is mandatory

Measures in case of the positive findings or single cases

Laying hens flocks

If the flock i positive, all eggs have to be heat treated and the flocks will be slaughtered under special hygenic precautions and the meat is heat treated. At the farm, an epidemiological investigation must be undertaken and special hygenic actions are taken.

Notification system in place

Detection of Salmonella sp is notifiable and must be reported to the Danish Food and Veterinary Administration (DFVA)

Results of the investigation

In 2009, 454 flocks were tested and 8 were positive with Salmonella.

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

The Salmonella situation in Denmark in the poulty production is very good and Denmark has applied to the EU for a speciel status.

D. 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

Milk producing-herd: 4 tank milk samples, distributed over 13 months. Non-milk producing herd: 8 blood samples (at farm or slaughter)

Animals at slaughter (herd based approach)

Non-milk producing herd: 8 blood samples (at farm or slaughter)

Type of specimen taken

Animals at farm

Milk and blood. Sick animals: faecal samples

Animals at slaughter (herd based approach)

Blood

Methods of sampling (description of sampling techniques)

Animals at farm

Serological testing on tank milk-samples and blood samples.

Faecal samples from calves or sick animals.

Animals at slaughter (herd based approach)

Milk producing herds:
four tank milk samples taken within a period of 13 months, min. 3 weeks inbetween.

Non-milk producing herds:
Blood samples from animals collected at the farm or the slaughterhouse.

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.

Farms with cattle for the meat production 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)

Mix-ELISA

Vaccination policy

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.

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 January 2010, 9.6% of milk-producing and 7.5% of non-milk producing herds were classified into level 2.

Additional information

It is well known that S. Dublin serum are transfered with the milk from the S. Dublin infected milk-producing cow to the new born calves and again around day 17 after birth.

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

Monitoring system

Sampling strategy

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

Max 3 weeks before

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

Two pairs of sock/boot swabs are collected from each flock. The samples are analysed individually

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

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

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 2007, the only Danish slaughter house slaughtering ducks was closed and therefore the majority of duck flocks are now being exported as live animals. In 2009, 85 flocks were tested for Salmonella and

63,5% were positive.

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

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

Additional information

The production of geese in Denmark is limited.

G. 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

Once a month, and when needed

Multiplying herds

Once a month, and when needed

Fattening herds at farm

When needed

Fattening herds at slaughterhouse (herd based approach)

Depend on herd size

Type of specimen taken

Breeding herds

Blood and faeces

Multiplying herds

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

Bacteriological and serological

Multiplying herds

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

Each month, a serological breeder- and multiplier index (BM-index) is calculated for each herd, based on the mean serological reaction from the last three months. The index gives more weight to the results from the more recent months (1:3:6). If the BM-index exceeds 5, it is mandatory to collect pen-faecal samples for Salmonella analysis and the herd owner must inform buyers of breeding animals about the infection level and Salmonella type in the herd.

Multiplying herds

Each month, a serological breeder- and multiplier index (BM-index) is calculated for each herd, based on the mean serological reaction from the last three months. The index gives more weight to the results from the more recent months (1:3:6). If the BM-index exceeds 5, it is mandatory to collect pen-faecal samples for Salmonella analysis and the herd owner must inform buyers of breeding animals about the infection level and Salmonella type in the herd.

Fattening herds

Surveillance by serological testing of meat juice samples is carried out in herds producing more than 200 slaughter pigs per year. Each month, a serological slaughter pig index (SP-index) is calculated for each

herd, based on the proportion of seropositive meat juice samples from the last three months. The index gives more weight to the results from the most recent month (1:1:3). The SP-index serve to assign the slaughter pig herds to one of three infection levels:

- ; Herds in Level 1 have none or only a small proportion of positive samples,
- ; Herds in Level 2 have a higher proportion of positive samples,
- ; Herds in Level 3 have an unacceptably high proportion of positive samples.

In July 2005, the surveillance system was changed into a risk-based surveillance, following which the sample size in herds with a SP-index of zero (no positive samples the previous 3 months) was reduced to one sample per month.

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.

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 the end of the year 2009, 1.8 % and 0.5% of the herds were assigned to Level 2 and 3, respectively.

Additional information

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

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

Monitoring system

Sampling strategy

Meat production flocks

Since 2004 very few turkey flocks are slaughtered in Denmark, as the only major turkey slaughterhouse closed. Turkeys raised in Denmark were hereafter transported abroad for slaughter.

Frequency of the sampling

Meat production flocks: Before slaughter at farm

max 3 weeks

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. Analysed individually

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

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 2009, 15 flocks were tested for Salmonella and no flocks were positive.

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

.

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

A part of the Danish produced turkey meat is probalby reimported.

I. Salmonella spp. in animal - Wildlife

Monitoring system

Sampling strategy

Hunters, veterinarians and the public submit wild animals to the national Veterinary Institute.

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	18	DAFC	Flock	18	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	7	DAFC	Flock	7	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	225	DAFC	Flock	225	4	2			1		0
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	140	DAFC	Flock	140	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	6	DAFC	Flock	6	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	13	DAFC	Flock	13	0						

Table Salmonella in breeding flocks of Gallus gallus

	S. Derby
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	1
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Ducks - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling	85	DAFC	Flock	85	54			54
Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling	3767	DAFC	Flock	3767	35	0	13	22
Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling	454	DAFC	Flock	454	4	3	1	
Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	454	DAFC	Flock	454	8	5	3	
Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size < 1000 animals)	15	DAFC	Flock	15	0			
Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size > 1000 animals) [1)]	439	DAFC	Flock	439	4	2	2	
Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - suspect sampling	454	DAFC	Flock	21	0	0		

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Gallus gallus (fowl) - laying hens - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	253	DAFC	Flock	253	0			
Turkeys - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling	15	DAFC	Flock	15	0			

Comments:

[1)] This is indicator 3 when calculating the target

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Birds - wild - Clinical investigations	Vet-DTU	Animal	47	2			2
Birds - zoo animal - Clinical investigations	Vet-DTU	Animal	9	0			
Cats - pet animals - Clinical investigations	Vet-DTU	Animal	2	0			
Dogs - pet animals - Clinical investigations	Vet-DTU	Animal	12	0			
Wild animals - Clinical investigations (Mammals) [1)]	Vet-DTU	Animal	67	6			6
Zoo animals, all - Clinical investigations (Mammals and reptiles) [2)]	Vet-DTU	Animal	22	3			3

Comments:

[1)] Positive samples from 1 fox, 4 European hedgehogs and 1 mink

[2)] Positive samples from 1 pink tounge skink, 1 Brazilian rainbow boa and 1 Indian python

2.1.5 Salmonella in feedingstuffs

A. Salmonella spp. in feed

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

After the EU regulation on feed hygiene (183/2005) came into force in 2006, the feed companies have developed and implemented HACCP based quality systems which includes regular monitoring for Salmonella at their identified CCP's.
After this change in the responsibilities of the seed business operators, the official surveys have been mainly risk based.

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

The Danish Plant Directorate inspects all feed compounders at risk for the presence of Salmonella. The EU regulation on feed hygiene (183/2005) came into force in January 2006 and the Danish Plant Directorate changed focus from control of the feed to control of the responsibility of the feed business operators. Therefore fewer samples are collected by the Danish Plant Directorate and more samples are collected by the feed business operators as part of their own check system. In 2004 and 2005, the Danish Plant Directorate sampled large ships of soy bean meal. This sampling is now taken over by the importers.

The routine inspection of feed includes:
- ; The presence of Salmonella in compound feed is indirectly monitored by the environmental samples collected during feed processing. Companies are sampled 1 to 4 times a year depending on their individual risk profile.
- ; Sampling of feed materials at risk (predominantly soy bean meal and rapeseed cake). 200 samples per year.
- ; Samples from transport vehicles (hygiene samples) prior to loading of feed compounds. 200 samples per year.

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Infantis	S. Rissen	S. Senftenberg
Feed material of oil seed or fruit origin - rape seed derived	PDIR	Single		45	1				1		
Feed material of oil seed or fruit origin - soya (bean) derived	PDIR	Single		92	2					1	1
Other feed material - other plants	PDIR	Single		33	0						
Compound feedingstuffs, not specified - process control - Monitoring - official sampling - selective sampling (Enviromental sampling during feed processing)	PDIR	Single									

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Livingstone
Feed material of land animal origin - feather meal	PDIR	Single		3	0				
Feed material of land animal origin - meat and bone meal	PDIR	Single		2	0				
Feed material of land animal origin - meat meal	PDIR	Single		6	1				1
Feed material of marine animal origin - fish meal	PDIR	Single		5	0				

2.1.6 Salmonella serovars and phagetype distribution

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

Table Salmonella serovars in animals

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling (many flocks are infected with more than one serovar)		Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory	0		0		0		0		54		35		8
Number of isolates serotyped	0	0	0	0	0	0	0	0	54	0	35	0	8
Number of isolates per serovar													
S. 4,5,12:i:-											1		
S. Anatum									19				
S. Derby											4		
S. Enteritidis													5
S. Indiana									14		1		

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling (many flocks are infected with more than one serovar)		Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory	0		0		0		0		54		35		8
Number of isolates serotyped	0	0	0	0	0	0	0	0	54	0	35	0	8
Number of isolates per serovar													
S. Infantis											6		
S. Kentucky											1		
S. Kottbus									3				
S. Matopeni											5		
S. Mbandaka									1		2		

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling (many flocks are infected with more than one serovar)		Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory	0		0		0		0		54		35		8
Number of isolates serotyped	0	0	0	0	0	0	0	0	54	0	35	0	8
Number of isolates per serovar													
S. Paratyphi B var. Java											1		
S. Regent									13				
S. Richmond											1		
S. Senftenberg									1				
S. Tennessee											3		

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Ducks - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling (many flocks are infected with more than one serovar)		Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory	0		0		0		0		54		35		8
Number of isolates serotyped	0	0	0	0	0	0	0	0	54	0	35	0	8
Number of isolates per serovar													
S. Typhimurium											9		3
Salmonella spp.									3		1		

Table Salmonella serovars in animals

Serovar	Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling	Turkeys - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		0	
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. 4,5,12:i:-			
S. Anatum			
S. Derby			
S. Enteritidis			
S. Indiana			

Table Salmonella serovars in animals

Serovar	Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling	Turkeys - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		0	
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Infantis			
S. Kentucky			
S. Kottbus			
S. Matopeni			
S. Mbandaka			

Table Salmonella serovars in animals

Serovar	Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling	Turkeys - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		0	
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Paratyphi B var. Java			
S. Regent			
S. Richmond			
S. Senftenberg			
S. Tennessee			

Table Salmonella serovars in animals

Serovar	Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - census sampling	Turkeys - meat production flocks - before slaughter - at farm - environmental sample - boot swabs - Monitoring - industry sampling - objective sampling	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		0	
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Typhimurium			
Salmonella spp.			

Table Salmonella serovars in food

Serovar	Meat from bovine animals	Meat from pig	Meat from broilers (Gallus gallus)	Meat from other poultry species	Other products of animal origin
Sources of isolates	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Number of isolates in the laboratory	11	157	0	0	0
Number of isolates serotyped	11	157	0	0	0
Number of isolates per serovar					
Not typeable	1	15			
S. 3,10:-:-		1			
S. 4,5,12:i:-		2			
S. 6,7:-:-		1			
S. 9,12:lv:-		3			
S. Agona		4			
S. Brandenburg		2			
S. Derby	1	45			
S. Dublin	7				
S. Infantis		3			
S. Livingstone		4			

Table Salmonella serovars in food

Serovar	Meat from bovine animals	Meat from pig	Meat from broilers (Gallus gallus)	Meat from other poultry species	Other products of animal origin
Sources of isolates	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Number of isolates in the laboratory	11	157	0	0	0
Number of isolates serotyped	11	157	0	0	0
Number of isolates per serovar					
S. London		5			
S. Muenchen		1			
S. Putten		2			
S. Saintpaul		1			
S. Schwarzengrund		1			
S. Senftenberg		1			
S. Typhimurium	2	57			
Salmonella spp.		9			

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Feed material of oil seed or fruit origin - rape seed derived - Control and eradication programmes - official sampling		Feed material of oil seed or fruit origin - soya (bean) derived - Control and eradication programmes - official sampling	
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical
Number of isolates in the laboratory			1		2	
Number of isolates serotyped	0	0	1	0	2	0
Number of isolates per serovar						
S. Infantis			1			
S. Rissen					1	
S. Senftenberg					1	

Table Salmonella Enteritidis phagetypes in animals

Phagetype	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes	
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical
									1		5	
	0	0	0	0	0	0	0	0	1	0	5	0
8											2	
PT 13a									1		3	

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling		Gallus gallus (fowl) - broilers - before slaughter - at farm - animal sample - faeces - Control and eradication programmes - official sampling - census sampling		Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes
	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
									1		12		3
	0	0	0	0	0	0	0	0	1	0	12	0	3
DT 104													1
DT 120											7		
DT 40													1
DT 41									1		3		1
DT RDNC											2		

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Gallus gallus (fowl) - laying hens - adult - at farm - environmental sample - boot swabs - Control and eradication programmes
	Clinical
	0
DT 104	
DT 120	
DT 40	
DT 41	
DT RDNC	

2.1.7 Antimicrobial resistance in Salmonella isolates

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 DTU-FOOD

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

Cut-off values 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

11 S Dublin isolates and 7 S Typhimurium isolates were subject to susceptibility testing in 2009.

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 foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

No isolates of S. Typhimurium from Danish beef were subjected to susceptibility testing.

Results of the investigation

No results from susceptibility testing of beef samples were availible for 2009.

C. 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

Procedures for the selection of isolates for antimicrobial testing

.

Methods used for collecting data

All isolates are tested centrally at the DTU-FOOD.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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

100 isolates of Salmonella in pig meat were subjected for susceptibility testing in 2009.

D. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Results of the investigation

No results from susceptibility testing of poultry meat samples were availible for 2009.

E. 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 DTU-FOOD.

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

Cut-off values 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

395 isolates from subclinical cases of Salmonellosis in pigs were selected for susceptibility testing in 2009.

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 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 DTU-FOOD.

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

Cut-off values 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

No results from susceptibility testing of poultry samples were availible for 2009.

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

The results were similar to previous years.

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		Not typeable		S. 4,12:i:-		S. 4,5,12:i:-	
Isolates out of a monitoring program (yes/no)			yes				yes		yes		yes	
Number of isolates available in the laboratory			372				7		6		8	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			372	31			7	0	6	1	8	0
Amphenicols - Florfenicol			372	16			7	0	6	0	8	0
Fluoroquinolones - Ciprofloxacin			372	1			7	0	6	0	8	0
Quinolones - Nalidixic acid			372	1			7	0	6	0	8	0
Trimethoprim			372	35			7	0	6	1	8	0
Aminoglycosides - Streptomycin			372	171			7	2	6	4	8	6
Aminoglycosides - Gentamicin			372	8			7	1	6	1	8	0
Aminoglycosides - Neomycin			372	15			7	1	6	1	8	0
Penicillins - Ampicillin			372	151			7	3	6	4	8	7
Tetracyclines - Tetracycline			372	146			7	2	6	3	8	7
Aminoglycosides - Apramycin			372	8			7	1	6	1	8	0
Aminoglycosides - Spectinomycin			372	48			7	0	6	1	8	0
Cephalosporins - Cefotaxim			372	0			7	0	6	0	8	0
Cephalosporins - Ceftiofur			372	0			7	0	6	0	8	0
Polymyxins - Colistin			372	0			7	0	6	0	8	0
Sulfonamides - Sulfamethoxazol			372	188			7	2	6	5	8	6

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

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Dublin	
Isolates out of a monitoring program (yes/no)			yes				yes	
Number of isolates available in the laboratory			7				11	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			7	2			11	0
Amphenicols - Florfenicol			7	2			11	0
Fluoroquinolones - Ciprofloxacin			7	0			11	0
Quinolones - Nalidixic acid			7	0			11	0
Trimethoprim			7	0			11	0
Aminoglycosides - Streptomycin			7	5			11	1
Aminoglycosides - Gentamicin			7	0			11	0
Aminoglycosides - Neomycin			7	2			11	0
Penicillins - Ampicillin			7	5			11	1
Tetracyclines - Tetracycline			7	5			11	1
Aminoglycosides - Apramycin			7	0			11	0
Aminoglycosides - Spectinomycin			7	2			11	0
Cephalosporins - Cefotaxim			7	0			11	0
Cephalosporins - Ceftiofur			7	0			11	0
Polymyxins - Colistin			7	0			11	11
Sulfonamides - Sulfamethoxazol			7	5			11	0

Table Antimicrobial susceptibility testing of Salmonella in meat from pig

Salmonella	Salmonella spp.		Not typeable		S. 4,12:-:-		S. 4,12:i:-		S. 4,5,12:i:-		S. Typhimurium	
Isolates out of a monitoring program (yes/no)			yes		yes		yes		yes		yes	
Number of isolates available in the laboratory			21		1		2		2		74	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			21	2	1	0	2	0	2	0	74	10
Amphenicols - Florfenicol			21	0	1	0	2	0	2	0	74	4
Fluoroquinolones - Ciprofloxacin			21	0	1	0	2	0	2	0	74	0
Quinolones - Nalidixic acid			21	0	1	0	2	0	2	0	74	0
Trimethoprim			21	2	1	0	2	0	2	0	74	6
Aminoglycosides - Streptomycin			21	9	1	0	2	2	2	1	74	36
Aminoglycosides - Gentamicin			21	2	1	0	2	0	2	0	74	0
Aminoglycosides - Neomycin			21	1	1	0	2	0	2	0	74	9
Penicillins - Ampicillin			21	7	1	0	2	2	2	1	74	24
Tetracyclines - Tetracycline			21	6	1	0	2	2	2	1	74	32
Aminoglycosides - Apramycin			21	2	1	0	2	0	2	0	74	0
Aminoglycosides - Spectinomycin			21	5	1	0	2	0	2	0	74	12
Cephalosporins - Cefotaxim			21	0	1	0	2	0	2	0	74	0
Cephalosporins - Ceftiofur			21	0	1	0	2	0	2	0	74	0
Polymyxins - Colistin			21	0	1	0	2	0	2	0	74	0
Sulfonamides - Sulfamethoxazol			21	9	1	0	2	2	2	1	74	36

Table Antimicrobial susceptibility testing of Salmonella in meat from bovine animals

Salmonella	Salmonella spp.		Not typeable		S. Typhimurium	
Isolates out of a monitoring program (yes/no)			yes		yes	
Number of isolates available in the laboratory			2		2	
Antimicrobials:	N	n	N	n	N	n
Amphenicols - Chloramphenicol			1	0	2	0
Amphenicols - Florfenicol			1	0	2	0
Fluoroquinolones - Ciprofloxacin			1	0	2	0
Quinolones - Nalidixic acid			1	0	2	0
Aminoglycosides - Streptomycin			1	1	2	0
Aminoglycosides - Gentamicin			1	0	2	0
Aminoglycosides - Neomycin			1	0	2	0
Penicillins - Ampicillin			1	1	2	0
Tetracyclines - Tetracycline			1	1	2	0
Aminoglycosides - Apramycin			1	0	2	0
Aminoglycosides - Spectinomycin			1	0	2	0
Cephalosporins - Cefotaxim			1	0	2	0
Cephalosporins - Ceftiofur			1	0	2	0
Polymyxins - Colistin			1	0	2	0
Sulfonamides - Sulfamethoxazol			1	0	2	0

Table Antimicrobial susceptibility testing of S. Dublin in Cattle (bovine animals) - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling - quantitative data [Dilution method]

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

S. Dublin	Cattle (bovine animals) - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	11																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	11	0		0	0	0	0	0	0	0	3	7	1	0	0	0	0	0	0	0	0			
Amphenicols - Florfenicol	16	11	0		0	0	0	0	0	0	0	3	8	0	0	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	11	1		0	0	0	0	0	0	0	10	0	0	0	0	1	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin		11	0		3	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	11	0		0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0			
Trimethoprim		11	0		0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	11	1		0	0	0	0	0	0	0	0	0	5	5	0	0	0	1	0	0	0			
Aminoglycosides - Gentamicin	2	11	0		0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	4	11	0		0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0			
Penicillins - Ampicillin	4	11	1		0	0	0	0	0	0	9	0	1	0	0	0	1	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.5	11	0		0	0	0	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	11	0		0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	11	0		0	0	0	0	0	0	0	0	0	0	0	8	3	0	0	0	0	0			
Cephalosporins - Ceftiofur	2	11	0		0	0	0	0	0	7	4	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	11	11		0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	11	0		0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0			

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling - quantitative data [Dilution method]

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

S. Typhimurium	Cattle (bovine animals) - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	7																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	7	2		0	0	0	0	0	0	0	0	4	1	0	0	0	2	0	0	0	0			
Amphenicols - Florfenicol	2	7	2		0	0	0	0	0	0	0	0	5	0	0	1	1	0	0	0	0	0			
Tetracyclines - Tetracycline	8	7	5		0	0	0	0	0	0	0	2	0	0	0	0	5	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	7	0		2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	7	0		0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0			
Trimethoprim		7	0		0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	6	4		0	0	0	0	0	0	0	0	0	1	1	1	0	3	0	0	0	0			
Aminoglycosides - Gentamicin	2	7	0		0	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	4	7	2		0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0			
Penicillins - Ampicillin	4	7	5		0	0	0	0	0	0	2	0	0	0	0	0	5	0	0	0	0	0			
Cephalosporins - Cefotaxim		7	0		0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	7	0		0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	7	2		0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	2	0	0			
Cephalosporins - Ceftiofur	2	7	0		0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	7	0		0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	7	5		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	5			

Table Antimicrobial susceptibility testing of S. 4,12:i:- in Pigs - at farm - Surveillance - official controls - suspect sampling - quantitative data [Dilution method]

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

S. 4,12:i:-	Pigs - at farm - Surveillance - official controls - suspect sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	6																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	6	3			0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0			
Amphenicols - Florfenicol	16	6	0			0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	20	6	3			0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	6	0			6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	6	0			0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0			
Trimethoprim	2	6	1			0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	6	4			0	0	0	0	0	0	0	0	1	1	0	0	0	4	0	0	0			
Aminoglycosides - Gentamicin	2	6	1			0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	20	6	1			0	0	0	0	0	0	5	0	0	0	0	1	0	0	0	0	0			
Penicillins - Ampicillin	4	6	4			0	0	0	0	0	2	0	0	0	0	0	4	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.5	6	0			0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	6	1			0	0	0	0	0	0	0	3	2	0	0	1	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	6	1			0	0	0	0	0	0	0	0	0	0	2	3	0	0	1	0	0			
Cephalosporins - Ceftiofur	2	6	0			0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	6	0			0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	6	5			0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5			

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Pigs - at farm - Surveillance - official controls - suspect sampling - quantitative data [Dilution method]

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

S. 4,5,12:i:-	Pigs - at farm - Surveillance - official controls - suspect sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	8																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	8	0		0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0	0	0			
Amphenicols - Florfenicol	2	8	0		0	0	0	0	0	0	0	0	7	0	1	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	8	7		0	0	0	0	0	0	0	1	0	0	0	0	7	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	8	0		1	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	8	0		0	0	0	0	0	0	0	0	3	4	1	0	0	0	0	0	0	0			
Trimethoprim		8	0		0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	8	6		0	0	0	0	0	0	0	0	0	2	0	0	0	0	6	0	0	0			
Aminoglycosides - Gentamicin	4	8	0		0	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	4	8	0		0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0			
Penicillins - Ampicillin	4	8	7		0	0	0	0	0	0	1	0	0	0	0	0	7	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.5	8	0		0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	8	0		0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	8	0		0	0	0	0	0	0	0	0	0	0	1	5	2	0	0	0	0	0			
Cephalosporins - Ceftiofur	2	8	0		0	0	0	0	0	3	4	1	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	8	8	0		0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	8	6		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	6			

Table Antimicrobial susceptibility testing of Not typeable in Pigs - at farm - Surveillance - official controls - suspect sampling - quantitative data [Dilution method]

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

Not typeable	Pigs - at farm - Surveillance - official controls - suspect sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	7																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	7	0			0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0			
Amphenicols - Florfenicol	2	7	0			0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	7	2			0	0	0	0	0	0	4	1	0	0	0	2	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	7	0			7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	7	0			0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0			
Trimethoprim		7	0			0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	7	2			0	0	0	0	0	0	0	0	5	0	0	0	1	1	0	0	0			
Aminoglycosides - Gentamicin	2	7	1			0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	4	7	1			0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0			
Penicillins - Ampicillin	4	7	3			0	0	0	0	0	3	1	0	0	0	0	3	0	0	0	0	0			
Cephalosporins - Cefotaxim		7	0			0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	7	1			0	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	7	0			0	0	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0			
Cephalosporins - Ceftiofur	2	7	0			0	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	8	7	0			0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	7	2			0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2			

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - at farm - Surveillance - official controls - suspect sampling - quantitative data [Dilution method]

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

S. Typhimurium	Pigs - at farm - Surveillance - official controls - suspect sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	372																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	372	31		0	0	0	0	0	0	0	1	157	176	7	1	6	24	0	0	0	0	0		
Amphenicols - Florfenicol	2	372	16		0	0	0	0	0	0	0	4	296	48	8	14	0	2	0	0	0	0	0		
Tetracyclines - Tetracycline	8	372	146		0	0	0	0	0	0	0	193	33	0	0	10	136	0	0	0	0	0	0		
Fluoroquinolones - Ciprofloxacin	0.06	372	1		94	256	21	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Quinolones - Nalidixic acid	16	372	1		0	0	0	0	0	0	0	0	266	97	8	0	0	1	0	0	0	0	0		
Trimethoprim		372	35		0	0	0	0	0	0	337	0	0	0	0	0	35	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	32	372	171		0	0	0	0	0	0	0	0	0	166	35	6	10	37	118	0	0	0	0		
Aminoglycosides - Gentamicin	2	372	8		0	0	0	0	0	341	20	3	0	0	5	3	0	0	0	0	0	0	0		
Aminoglycosides - Neomycin	4	372	15		0	0	0	0	0	0	0	349	8	0	0	1	14	0	0	0	0	0	0		
Penicillins - Ampicillin	4	372	151		0	0	0	0	0	0	138	73	10	1	0	0	150	0	0	0	0	0	0		
Cephalosporins - Cefotaxim	0.5	372	0		0	0	0	335	35	2	0	0	0	0	0	0	0	0	0	0	0	0	0		
Aminoglycosides - Apramycin	16	372	8		0	0	0	0	0	0	0	0	351	13	0	0	8	0	0	0	0	0	0		
Aminoglycosides - Spectinomycin	64	372	48		0	0	0	0	0	0	0	0	0	0	9	266	49	1	8	39	0	0	0		
Cephalosporins - Ceftiofur	2	372	0		0	0	0	0	0	147	207	18	0	0	0	0	0	0	0	0	0	0	0		
Polymyxins - Colistin	8	372	0		0	0	0	0	0	0	370	2	0	0	0	0	0	0	0	0	0	0	0		
Sulfonamides - Sulfamethoxazol	256	372	188		0	0	0	0	0	0	0	0	0	0	0	0	182	1	1	0	0	188	0		

Table Antimicrobial susceptibility testing of Not typeable in Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling - quantitative data [Dilution method]

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

Not typeable	Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	21																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	21	21		0	0	0	0	0	0	0	0	3	15	1	0	1	1	0	0	0	0			
Amphenicols - Florfenicol	16	21	21		0	0	0	0	0	0		0	16	3	2	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	21	21		0	0	0	0	0	0	0	11	4	0	0	0	6	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	21	21		3	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	21	21		0	0	0	0	0	0	0	0	19	2	0	0	0	0	0	0	0	0			
Trimethoprim	2	21	21		0	0	0	0	0	0	19	0	0	0	0	0	2	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	21	21		0	0	0	0	0	0	0	0	0	10	2	1	1	1	6	0	0	0			
Aminoglycosides - Gentamicin	2	21	21		0	0	0	0	0	18	1	0	0	1	0	1	0	0	0	0	0	0			
Aminoglycosides - Neomycin	16	21	21		0	0	0	0	0	0	0	20	0	0	0	0	1	0	0	0	0	0			
Aminoglycosides - Kanamycin	8	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Cephalosporins - 3rd generation cephalosporins		0	0		0	0	0	0	0																
Penicillins - Ampicillin	4	21	21		0	0	0	0	0	0	9	5	0	0	0	0	7	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.5	21	21		0	0	0	17	4	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	21	21		0	0	0	0	0	0	0	0	17	2	0	0	2	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	21	21		0	0	0	0	0	0	0	0	0	0	0	11	5	1	1	3	0	0			
Cephalosporins - Ceftiofur	2	21	21		0	0	0	0	0	7	14	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	21	21		0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	21	21		0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0	0	9			

Table Antimicrobial susceptibility testing of S. Typhimurium in Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling - quantitative data [Dilution method]

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

S. Typhimurium	Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	74																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	74	10		0	0	0	0	0	0	0	1	28	34	1	1	2	7	0	0	0	0			
Amphenicols - Florfenicol	16	74	4		0	0	0	0	0	0	0	0	59	8	3	2	1	1	0	0	0	0			
Tetracyclines - Tetracycline	8	74	32		0	0	0	0	0	0	0	33	9	0	0	3	29	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.06	74	0		23	49	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	74	0		0	0	0	0	0	0	0	0	58	16	0	0	0	0	0	0	0	0			
Trimethoprim	2	74	6		0	0	0	0	0	0	67	1	0	0	0	0	6	0	0	0	0	0			
Aminoglycosides - Streptomycin	32	74	36		0	0	0	0	0	0	0	0	0	34	4	0	4	9	23	0	0	0			
Aminoglycosides - Gentamicin	2	74	0		0	0	0	0	0	68	6	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	4	74	9		0	0	0	0	0	0	0	63	2	0	0	0	9	0	0	0	0	0			
Penicillins - Ampicillin	4	74	24		0	0	0	0	0	0	27	23	0	0	0	0	24	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.5	74	0		0	0	0	73	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	74	0		0	0	0	0	0	0	0	0	71	2	1	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	74	12		0	0	0	0	0	0	0	0	0	0	1	47	14	0	1	11	0	0			
Cephalosporins - Ceftiofur	2	74	0		0	0	0	0	0	32	42	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	16	74	0		0	0	0	0	0	0	73	1	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	74	36		0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	0	36			

Table Antimicrobial susceptibility testing of S. 4,12:-:- in Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling - quantitative data [Dilution method]

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

S. 4,12:-:-	Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	1											1											
Amphenicols - Florfenicol	16	1	1											1											
Tetracyclines - Tetracycline	8	1	1										1												
Fluoroquinolones - Ciprofloxacin	0.06	1	1			1																			
Quinolones - Nalidixic acid	16	1	1										1												
Trimethoprim	2	1	1								1														
Aminoglycosides - Streptomycin	32	1	1											1											
Aminoglycosides - Gentamicin		1	1							1															
Aminoglycosides - Neomycin	4	1	1									1													
Penicillins - Ampicillin	4	1	1									1													
Cephalosporins - Cefotaxim	0.5	1	1						1																
Sulfonamides		1	1														0								

Table Antimicrobial susceptibility testing of S. 4,5,12:i:- in Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling - quantitative data [Dilution method]

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

S. 4,5,12:i:-	Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	2																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	2	2										1	1											
Amphenicols - Florfenicol	16	2	2										2												
Tetracyclines - Tetracycline	8	2	2									1					1								
Fluoroquinolones - Ciprofloxacin	1	2	2			2																			
Quinolones - Nalidixic acid	16	2	2										2												
Trimethoprim	2	2	2								2														
Aminoglycosides - Streptomycin	32	2	2												1				1						
Aminoglycosides - Gentamicin	2	2	2							2															
Aminoglycosides - Neomycin	4	2	2									2													
Penicillins - Ampicillin	4	2	2								1						1								
Cephalosporins - Cefotaxim	0.5	2	2					2																	

Table Antimicrobial susceptibility testing of S. 4,12:i:- in Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling - quantitative data [Dilution method]

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

S. 4,12:i:-	Meat from pig - carcass - chilled - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	2																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	2	2											2											
Amphenicols - Florfenicol	16	2	2										1	1											
Tetracyclines - Tetracycline	8	2	2														2								
Fluoroquinolones - Ciprofloxacin	0.06	2	2			2																			
Quinolones - Nalidixic acid	16	2	2										2												
Trimethoprim	2	2	2								2														
Aminoglycosides - Streptomycin	32	2	2																2						
Aminoglycosides - Gentamicin	2	2	2							2															
Aminoglycosides - Neomycin	4	2	2									1	1												
Penicillins - Ampicillin	4	2	2														2								
Cephalosporins - Cefotaxim	0.5	2	2					1	1																

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

Test Method Used
Broth dilution

Standard methods used for testing
EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
	Florfenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
	Sulfamethoxazol		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
	Neomycin		4	
	Apramycin		16	
	Spectinomycin		64	
Cephalosporins	Cefotaxim		0.5	

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Cephalosporins	Ceftiofur		2	
Penicillins	Ampicillin		4	
Polymyxins	Colistin		2	

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
	Florfenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
	Sulfamethoxazol		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
	Neomycin		4	
	Apramycin		16	
	Spectinomycin		64	
Cephalosporins	Cefotaxim		0.5	

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Cephalosporins	Ceftiofur		2	
Penicillins	Ampicillin		4	
Polymyxins	Colistin		2	

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

Test Method Used	Standard methods used for testing

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

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Since 1999, campylobacteriosis has been the single leading cause of bacterial gastrointestinal disease in Denmark. The incidence of Campylobacter in humans has a distinct seasonal distribution, with a summer peak in June-September. 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.

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

Campylobacteriosis has been the leading cause of bacterial gastrointestinal disease in Denmark since 1999, where it surpassed salmonellosis. The number of infections rose dramatically (by a factor of four) from 1991 to 2001 after which a decreasing trend can be observed. However, the number of infections in 2007 constituted an increase of 19% compared to the number of infections the year before and was the highest recorded in 5 years.

The epidemiology of Campylobacter is not understood in the same detail as for salmonella. As in other Western countries consumption and handling of poultry and poultry products is believed to be the primary source of human campylobacteriosis in Denmark, though several other sources also exist. A case-control study of sporadic infections performed in 2000-01 found the main risk factor for infection to be consumption of non-frozen chicken.

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

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.

Recent actions taken to control the zoonoses

The voluntary intervention strategy aimed at reducing the number of Campylobacter positive broiler flocks implemented in 2003 was continued in 2009. All broiler flocks are sampled for Campylobacter at the slaughterhouse prior to slaughter, and the samples are analysed using a PCR detection method.

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. The incidence of Campylobacter in humans has a distinct seasonal distribution, with a summer peak in June-September. 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.

Results of the investigation

In 2009, there were 3,352 reported cases, corresponding to an incidence of 60.6 cases per 100,000 inhabitants.

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

The incidence of Campylobacter in humans has a distinct seasonal distribution, with a summer peak in June-September. 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.

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.

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 slaughterhouse and cutting plant

Every flock

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Meat samples

At meat processing plant

Meat samples

At retail

Meat samples

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 or bacteriological methods.

At retail

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

Diagnostic/analytical methods used

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Notification system in place

Campylobacteriosis is not notifiable in broilers.

Results of the investigation

Sampling of chilled broiler meat at slaughter are from the two major slaughterhouses in Denmark, representing 98% of the total production

Results from a survey on chilled and frozen broiler meat at retail are not yearly mean estimates. The high prevalent period (3. Quarter) is underrepresented in 2009

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

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 Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - animal sample - Monitoring - industry sampling - objective sampling (Data are from the two major slaughterhouses in Denmark, representing 98% of the total production) [1)]	Food-DTU	Single	10g or 15g	986	122					122
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - domestic production - Monitoring - official sampling - objective sampling [2)]	Food-DTU	Single	10g or 15g	702	228					228
Meat from broilers (Gallus gallus) - fresh - frozen - at retail - domestic production - Monitoring - official sampling - objective sampling [3)]	Food-DTU	Single	10g or 15g	548	146					146

Comments:

[1)] Data are from the two major slaughterhouses in Denmark, representing 98% of the total production

[2)] The numbers are not yearly mean estimates. The high prevalent period (3. Quarter) is underrepresented in 2009

[3)] The numbers are not yearly mean estimates. The high prevalent period (3. Quarter) is underrepresented in 2009

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

The voluntary intervention strategy aimed at reducing the number of Campylobacter positive broiler flocks implemented in 2003 was continued in 2009. All broiler flocks are sampled for Campylobacter at the slaughterhouse prior to slaughter, and the samples are analysed using a PCR detection method.

Frequency of the sampling

At slaughter

Every flock is sampled

Type of specimen taken

At slaughter

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 positive 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 2009, there were 29.4% Campylobacter positive flocks. This is a significant decrease compared to the years prior to implementation of the strategy, where the prevalence was greater than 38%

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

Since 2001, there has been a 25% reduction in the number of human campylobacteriosis cases. This decrease coincide with a reduction in the flock prevalence from 43% to 26% after the implementation of the voluntary intervention programme 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)

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.

Additional information

The PCR-method used in surveillance of Campylobacter in broilers does not differentiate between species of Campylobacter. However, as part of the monitoring programme for the occurrence of antimicrobial resistance in zoonotic bacteria (DANMAP), approximately 100 positive flocks are speciated every year. In 2009, 105 flocks was tested under this program and 29,4% of the flocks was positive. The species identified were C. jejuni (89.0% of the positive samples) and C. coli (11,0%)

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Cats - pet animals - Clinical investigations	Vet-DTU	Animal	5	0					
Cattle (bovine animals) - adult cattle over 2 years - at farm - animal sample - faeces - Monitoring - industry sampling - objective sampling	Food-DTU	Animal	188	109	2	107			
Dogs - pet animals - Clinical investigations	Vet-DTU	Animal	5	0					
Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring - official sampling - objective sampling	Vet-DTU	Animal	4591	1350					1350
Pigs - fattening pigs - not raised under controlled housing conditions in integrated production system - at farm - animal sample - faeces - Monitoring - industry sampling - objective sampling	Food-DTU	Animal	287	160	137	23			

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 DTU-FOOD 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 DTU-FOOD.

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

Cut-off values 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

87 isolates of C. jejuni from cattle were subjected to susceptibility testing in 2009.

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 foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

No Campylobacter isolates from Danish beef were subjected to susceptibility testing.

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

Sampling strategy used in monitoring

Frequency of the sampling

No isolates of Campylobacter from Danish pork were subjected to susceptibility testing.

D. 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 DTU-FOOD.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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

26 isolates of C. jejuni from poultry meat samples were subjected to susceptibility testing in 2009.

E. 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 DTU-FOOD 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 DTU-FOOD.

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

Cut-off values 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

113 isolates of C. coli from pigs were subjected to susceptibility testing in 2009.

F. 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 DTU-FOOD 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 DTU-FOOD.

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

Cut-off values 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

75 isolates of C. jejuni from broilers were subjected to susceptibility testing in 2009.

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

The results were similar to previous years.

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

Campylobacter	Campylobacter spp., unspecified		C. jejuni	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			75	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			75	10
Quinolones - Nalidixic acid			75	10
Aminoglycosides - Gentamicin			75	0
Macrolides - Erythromycin			75	0
Tetracyclines - Tetracycline			75	9
Aminoglycosides - Streptomycin			75	1
Amphenicols - Chloramphenicol			75	0

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

Campylobacter	Campylobacter spp., unspecified		C. jejuni	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			87	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			87	17
Quinolones - Nalidixic acid			87	17
Aminoglycosides - Gentamicin			87	0
Macrolides - Erythromycin			87	0
Tetracyclines - Tetracycline			87	2
Aminoglycosides - Streptomycin			87	4
Amphenicols - Chloramphenicol			87	0

Table Antimicrobial susceptibility testing of Campylobacter in Pigs

Campylobacter	Campylobacter spp., unspecified		C. coli	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			113	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			113	14
Quinolones - Nalidixic acid			113	14
Aminoglycosides - Gentamicin			113	0
Macrolides - Erythromycin			113	14
Tetracyclines - Tetracycline			113	10
Aminoglycosides - Streptomycin			113	54
Amphenicols - Chloramphenicol			113	0

Table Antimicrobial susceptibility testing of Campylobacter in Meat from broilers (Gallus gallus)

Campylobacter	Campylobacter spp., unspecified		C. jejuni	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			26	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			26	0
Quinolones - Nalidixic acid			26	0
Aminoglycosides - Gentamicin			26	0
Macrolides - Erythromycin			26	0
Tetracyclines - Tetracycline			26	1
Aminoglycosides - Streptomycin			26	0
Amphenicols - Chloramphenicol			26	0

Table Antimicrobial susceptibility testing of C. jejuni in Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - animal sample - meat - Monitoring - industry sampling - objective sampling - quantitative data [Dilution method]

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

C. jejuni	Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - animal sample - meat - Monitoring - industry sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	26																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	26	0				0	0	0	0	0	20	5	1	0	0									
Tetracyclines - Tetracycline	2	26	1				0	0	22	3	0	0	0	0	0	1									
Fluoroquinolones - Ciprofloxacin	1	26	0				4	15	7	0	0	0	0	0	0	0									
Quinolones - Nalidixic acid	16	26	0				0	0	0	0	0	3	12	11	0	0									
Aminoglycosides - Streptomycin	2	26	0				0	0	0	0	26	0	0	0	0	0									
Aminoglycosides - Gentamicin	1	26	0				0	8	16	2	0	0	0	0	0	0									
Macrolides - Erythromycin	4	26	0				0	0	0	10	12	4	0	0	0	0									

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

C. jejuni	Cattle (bovine animals) - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	87																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	87	0				0	0	0	0	0	57	30	0	0	0	0	0							
Tetracyclines - Tetracycline	2	87	2				0	0	71	14	0	0	0	0	0	2	0	0							
Fluoroquinolones - Ciprofloxacin	1	87	17				12	54	3	1	0	0	0	17	0	0	0	0							
Quinolones - Nalidixic acid	16	87	17				0	0	0	0	0	3	55	11	1	0	0	17							
Aminoglycosides - Streptomycin	2	87	4				0	0	0	0	80	3	0	0	1	3	0	0							
Aminoglycosides - Gentamicin	1	87	0				0	24	53	10	0	0	0	0	0	0	0	0							
Macrolides - Erythromycin	4	87	0				0	0	0	38	36	12	1	0	0	0	0	0							

Table Antimicrobial susceptibility testing of C. coli in Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

C. coli	Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	113																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	113	0				0	0	0	0	0	16	57	34	6	0	0	0							
Tetracyclines - Tetracycline	2	113	10				0	0	53	29	17	4	0	1	1	8	0	0							
Fluoroquinolones - Ciprofloxacin	1	113	14				28	39	28	4	0	0	2	12	0	0	0	0							
Quinolones - Nalidixic acid	16	113	22				0	0	0	0	0	2	14	53	22	8	1	13							
Aminoglycosides - Streptomycin	2	113	54				0	0	0	0	50	9	0	2	2	50	0	0							
Aminoglycosides - Gentamicin	1	113	0				0	17	50	43	3	0	0	0	0	0	0	0							
Macrolides - Erythromycin	4	113	15				0	0	0	31	25	33	9	1	0	0	14	0							

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Surveillance - official controls - objective sampling - quantitative data [Dilution method]

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

C. jejuni	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Surveillance - official controls - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	75																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	75	0				0	0	0	0	0	5	65	4	1	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	2	75	9				0	0	29	32	4	1	0	0	0	9	0	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	1	75	10				6	36	21	2	0	0	0	10	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	75	10				0	0	0	0	0	3	37	25	0	0	1	9	0	0	0	0			
Aminoglycosides - Streptomycin	2	75	1				0	0	0	0	71	3	0	0	0	1	0	0	0	0	0	0			
Aminoglycosides - Gentamicin	1	75	0				0	8	54	13	0	0	0	0	0	0	0	0	0	0	0	0			
Macrolides - Erythromycin	4	75	0							1	11	60	3												

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Quinolones	Nalidixic acid		16	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	
Amphenicols	Chloramphenicol		16	

Footnote:

Only breakpoint for C. jejuni is reported.

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

Test Method Used
Broth dilution

Standard methods used for testing
EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Quinolones	Nalidixic acid		16	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	
Amphenicols	Chloramphenicol		16	

Footnote:

Only breakpoint for C. jejuni is reported.

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

Test Method Used	Standard methods used for testing

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

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Listeriosis is not a common disease in humans in Denmark, however the incidence has been increasing during recent years

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

In 2009, there were 97 cases in Denmark corrosponding to an incidence of 1.8 cases per 100.000 inhabitants. This was a 70% increase compared to 2008

Recent actions taken to control the zoonoses

From January 2006 a new EU Regulation on microbiological criteria for foodstuffs1 came into force. In this Regulation harmonised criteria for Listeria monocytogenes are introduced. The new EU criteria distinguish between products supporting growth of Listeria and products not supporting growth and cover all ready-to-eat foods

Additional information

There is great concern in Denmark about the increasing incidence

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.

Results of the investigation

In 2009, there were 97 cases in Denmark corrosponding to an incidence of 1.8 cases per 100.000 inhabitants. This was a 70% increase compared to 2008

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, however due to the severity of the disease, there is great concern about the increasing incidence.

2.3.3 Listeria in foodstuffs

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Listeria	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - smoked - at processing plant	DFVA	Batch	25 g	2	1	1	1	1	0	0
Fish - smoked - at retail	DFVA	Single	1 g	1	0			1	0	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at processing plant	DFVA	Batch	1 g	1	0			1	0	0
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail	DFVA	Single	1 g	2	0			2	0	0
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at retail	DFVA	Single	1 g	1	0			1	0	0
Meat from pig - meat products - cooked, ready-to-eat - at retail	DFVA	Single	1 g	9	0			9	0	0
Crustaceans - shrimps - cooked - at retail - Survey	DFVA	Single	1 g	1	0			1	0	0
Meat from pig - meat products - cooked, ready-to-eat - at processing plant - domestic production - Survey	DFVA	Batch	25 g	4	1	2	1	2	0	0
Meat from pig - meat products - cooked, ready-to-eat - at processing plant - domestic production - Survey - national survey	DFVA	Single	25 g	3	0	3	0			
Meat from pig - meat products - cooked, ready-to-eat - at retail - domestic production - Survey [1)]	DFVA	Batch	1 g	1	0			1	0	0
Meat from pig - meat products - cooked, ready-to-eat - at retail - domestic production - Survey - national survey	DFVA	Single	25 g	1	0	1	0			

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Listeria	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Meat, red meat (meat from bovines, pigs, goats, sheep, horses, donkeys, bison and water buffalos) - meat products - cooked, ready-to-eat - chilled - at retail - domestic production - Survey	DFVA	Single	1 g	3	0			3	0	0
Other processed food products and prepared dishes - pasta - at retail - Survey	DFVA	Single	1 g	1	0			1	0	0
Ready-to-eat salads - at processing plant - domestic production - Survey	DFVA	Single	25 g	1	0	1	0			
Soups - ready-to-eat - at retail - domestic production - Survey	DFVA	Single	1 g	1	0			1	0	0

Comments:

[1)] Sausage with walnuts

Footnote:

Batches are based on five samples, analysed individually.

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Listeria	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - hard - made from pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	Batch	25 g	1	0	1	0			
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	Batch	25 g	2	0	2	0			
Dairy products (excluding cheeses) - butter - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	Batch	25 g	2	0	2	0			
Dairy products (excluding cheeses) - buttermilk - at processing plant - domestic production - Survey	DFVA	Batch	25 g	3	0	3	0			
Dairy products (excluding cheeses) - chocolate milk - at processing plant - domestic production - Survey	DFVA	Batch	25 g	1	0	1	0			
Dairy products (excluding cheeses) - cream - made from pasteurised milk - at processing plant - domestic production - Survey - national survey	DFVA	Batch	25 g	3	0	3	0			
Dairy products (excluding cheeses) - yoghurt - at processing plant - domestic production - Survey - national survey	DFVA	Batch	25 g	3	0	3	0			
Milk, cows' - pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	Batch	25	5	0	5	0			

Table Listeria monocytogenes in milk and dairy products

Footnote:

Batches are based on five samples, analysed individually.

2.4 E. COLI INFECTIONS

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 number of registered infections increased by 10% from

Since the beginning of the surveillance in 1997 the incidence has increased; an increase which is primarily assumed to reflect improved diagnostics and increased awareness. However, Denmark does not have a centrally coordinated standard testing method for VTEC and the incidence through the past 10 years has been 3 to 10 times higher in counties using a diagnostic approach involving molecular detection methods.

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

2.4.2 E. coli infections 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. From 2006, 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

Since the beginning of the surveillance in 1997 the incidence has increased; an increase which is primarily assumed to reflect improved diagnostics and increased awareness. However, Denmark does not have a centrally coordinated standard testing method for VTEC and the incidence through the past 10 years has been 3 to 10 times higher in counties using a diagnostic approach involving molecular detection methods.

Results of the investigation

In 2009, there were 168 reported cases positive with verocytotoxin-producing Escherichia coli (VTEC) infections; an incidence of 3.0 per 100,000. VTEC O157 was found in 24 cases.

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

Denmark does not have a centrally coordinated standard testing method for VTEC. It should be noted that the incidence through the past 11 years (1997-2007) has been 3 to 10 times higher in counties using a diagnostic approach involving molecular detection methods.

2.4.3 Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

VTEC is not notifiable in animals.
The National Food Institute has monitored the occurrence of VTEC O157 in cattle since June 1997 through yearly examination of approximately 200 faecal samples from slaughter calves. The samples are collected at the slaughterhouses as part of the DANMAP programme. The samples (25 g) are investigated by overnight enrichment in buffered peptone water followed by immunomagnetic separation and seeding on to sorbitol MacConkey agar supplemented with cefixime and potassium tellurite. Isolates of E. coli O157 are investigated for genes encoding verocytotoxin by PCR analysis.

In 2009, VTEC O157 was detected in 8,7% (23/263) of the investigated samples. This prevalence is in line with the findings in the previous years, where the observed prevalence has ranged from 2,8 to 10,3%

Frequency of the sampling

Animals at slaughter (herd based approach)

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 2009, VTEC O157 was detected in 8,7% (23/263) of the investigated samples. This prevalence is in line with the findings in the previous years, where the observed prevalence has ranged from 2,8 to 10,3% with an average prevalence of 5,7%

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 VT E. coli in animals

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC) - VTEC O157	Verotoxigenic E. coli (VTEC) - VTEC non-O157	Verotoxigenic E. coli (VTEC) - VTEC, unspecified
Cattle (bovine animals) - at slaughterhouse - animal sample - faeces - Monitoring - industry sampling - objective sampling	DTU-food	Animal	25	263	23	23		

2.5 TUBERCULOSIS, MYCOBACTERIAL DISEASES

2.5.1 General evaluation of the national situation

A. Tuberculosis general evaluation

History of the disease and/or infection in the country

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 EFTA surveillance Authority (EAS), 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 farm 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 has been officially free from bovine tuberculosis since 1980 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, mycobacterial diseases 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

In 2009, no cases caused by M. Bovis was registrered.

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.

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

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 2004/320/EEC and Danish rule no. 306 of 03/05/2004

Animals at slaughter: Mandatory control programme.

Recent actions taken to control the zoonoses

None, 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 Decision 2004/320/EEC in case of positive findings or if suspicion of tuberculosis in bovine animals arise.

Notification system in place

Tuberculosis caused by M. bovis or M. tuberculosis of all species are notifiable. Cases are to be notified to the Veterinary Institute, DTU

Results of the investigation

507,200 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

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 being. Since 1994, Mycobacterium bovis has not been detected in deer

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. 306 of 3/5/2000 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 Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Cattle (bovine animals) - Control and eradication programmes - official and industry sampling	Vet-DTU	Animal	507200	0			
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - at slaughterhouse - Control and eradication programmes - official and industry sampling	Vet-DTU	Animal	18972880	0			

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Danmark	22479	1626528	22479	100	0	0	others, please specify ____18	1700	0	2	0
Total : [1)]	22479	1626528	22479	100	0	0	N.A.	1700	0	2	0

Comments:

[1)] N.A.

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 1980, 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 sheep 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

In 2009, 7 cases of brucellosis was reported.

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, hence the incidence is unknown

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.

2.6.3 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

Since 1980, 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

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

SAT (primarily), RBT, CFT and 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 Veterinary Institute, DTU 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

2701 animals tested in 2009, all of which 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 goats

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

RBT (primarily), SAT and CFT.

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 National Veterinary Institute 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 2009, 1307 samples from sheep and goats were analysed, all were negative.

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

Ovine brucellosis has never been 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 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

RBT (primarily), SAT and CFT.

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 National Veterinary Institute 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 2009, 1278 goat and sheep samples were examined and found negative.

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

Caprine brucellosis has never been 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 Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Cattle (bovine animals) - adult cattle over 2 years - at farm - animal sample - blood - Clinical investigations (Fertility problems)	Vet-DTU	Animal	77	0				
Cattle (bovine animals) - breeding bulls - at AI station - Control and eradication programmes - official sampling - objective sampling	Vet-DTU	Animal	2215	0				
Cattle (bovine animals) - unspecified - at farm - animal sample - blood - Control and eradication programmes - official sampling (Export)	Vet-DTU	Animal	329	0				
Pigs - at farm - animal sample - blood - Clinical investigations (Fertility problems)	Vet-DTU	Animal	72	0				
Pigs - breeding animals - raised under controlled housing conditions in integrated production system - boars - at AI station - Control and eradication programmes - official sampling - objective sampling	Vet-DTU	Animal	14605	0				
Pigs - mixed herds - unspecified - at farm - animal sample - blood - Control and eradication programmes - official sampling (Export)	Vet-DTU	Animal	10012	0				
Pigs - mixed herds - unspecified - at farm - animal sample - blood - Control and eradication programmes - official sampling (Import)	Vet-DTU	Animal	6	0				
Sheep and goats - at AI station - Surveillance - official controls - objective sampling	Vet-DTU	Animal	1218	0				
Sheep and goats - at farm - animal sample - blood - Control and eradication programmes - official sampling - selective sampling (Export)	Vet-DTU	Animal	15	0				

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Sheep and goats - at farm - animal sample - blood - Control and eradication programmes - official sampling - selective sampling (Import)	Vet-DTU	Animal	15	0				

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

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
Danmark	12410	191397	12410	100	0	0	117	880	0	0				
Total : [1)]	12410	191397	12410	100	0	0	117	880	0	0	0	0	0	0

Comments:

[1)] N.A.

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds	Number of bovine herds tested	Number of animals or pools tested	Number of infected herds	Number of notified abortions whatever cause	Number of isolations of Brucella infection	Number of abortions due to Brucella abortus	Number of animals tested with serological blood tests	Number of suspended herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Danmark	22479	1626528	22479	100	0	0		1700					41	0	0	0	0	0	0	0	
Total : [1)]	22479	1626528	22479	100	0	0	0	1700	0	0	0	0	41	0	0	0	0	0	0	0	0

Comments:

[1)] N.A.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica 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. From 1999-2004, caecal contents were sampled from randomly selected pig herds at slaughterhouses and tested for Y. enterocolitica. Between 10,4% and 17,0% of the herds was positive.

Recent actions taken to control the zoonoses

None

Additional information

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

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

In 2009, there were 238 reported infections with Yersinia enterocolitica (4.3 cases per 100,000 inhabitants). The primary source of human yersiniosis in Denmark is presumed to be pork and pork products.

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

The disease is the third most commonly recorded foodborne zoonotic disease in Denmark. The majority of isolates 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.

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 not been observed in domesticated pigs and the last human cases caused by Danish produced meat was recorded in the 1930s. 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 2006, the EU directive 2075/2005 came into force.

In 2007, Denmark was assigned the status as a region where the risk of Trichinella in domestic swine is officially recognised as negligible (EU regulation 2075/2005)

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

A risk based monitoring programme for Trichinella in Danish slaughter pigs as well as in wildlife was established prior to the classification as a region with negligible risk. Changing the established practice of extensive testing does however necessitate the acceptance from third country trade partners, who have entered into trade arrangements based on this extensive testing of Danish slaughter pigs.

The fox population has been reduced due to a national outbreak of scabies, and the number of foxes available for testing has not reached the targeted number. Other animals such as badgers, stone martens, martens, otters and mink have been tested.

In 2008 the National Veterinary Institute found Trichinella pseudospiralis in 2 wild mink on the island of Bornholm. This species of Trichinella is not very contagious to pigs and causes moderate to severe disease in humans, and the infection has been seen in mink only. Relevant species of animals in Denmark naturally infected by the larvae are not likely to be eaten by humans. However it is possible that other wild animals are included in the life cycle of the parasite. On Bornholm there are no foxes or other wild living carnivores, but it is possible that the infection has been transmitted through birds of prey, crows or seagulls.

An intensified collection and examination of mink on Bornholm was carried out as well as examination of 50 rooks in 2008. No other findings of Trichinella was made and the intensified collection was discontinued in 2009

As the possibility of using a risk based approach rather than the traditional testing of millions of animals has not yet been implemented in Denmark, time has been used to refine procedures for the risk based monitoring programme, which will be implemented when trade concerns so permits.

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

In 2009 as in previous years the Statens Serum Institut has detected no cases (persons with a positive

an-tibody titre) of autochthonous trichinosis in humans.

2.8.2 Trichinellosis in humans

A. Trichinellosis in humans

Description of the positive cases detected during the reporting year

In 2009, no cases of trichinellosis was reported.

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

Trichinella is not notifiable in humans, hence the true incidence is unknown. However, trichinella has not been recorded in domestic animals since 1930

2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Type of specimen taken

Meat sample

Methods of sampling (description of sampling techniques)

Digestion method (Directive 2075/2005)

Diagnostic/analytical methods used

Digestion method according to EU Regulation (EC) No 2075/2005

Sampling strategy

For categories of holdings officially recognised Trichinella-free

All horses are examined for Trichinella spp. at slaughter in accordance with EU Regulation (EC) No 2075/2005.

B. Trichinella in pigs

Officially recognised regions with negligible Trichinella risk

In july 2007 Denmark was officially recognised as a region with negligible Trichinella risk

Monitoring system

Sampling strategy

General

All pigs slaughtered at Danish export approved slaughterhouses are examined for Trichinella spp. in accordance with Eu regulation 2075/2005. Further, it is compulsory to examine slaughtered wild boars.

For regions with negligible Trichinella risk

As a result of this status the future monitoring programme for Trichinella can be risk based which means that slaughter pigs reared under controlled housing conditions in integrated production does not have to be testet for Trichinella. All other categories of pigs and other species, domestic or game, that can become infected with Trichinella will be examined in accordance with the methods laid down in the Regulation No 2075/2005. Further, pork exported to 3. market countries will be tested for Trichinella unless the importing country accept the new monitoring programme.

In addition, a monitoring programme for Trichinella in wildlife will be initiated from 2008; and approximately 300 foxes and 50 other carnivores will be examined annually.

Frequency of the sampling

General

All pigs are sampled at slaughter

For regions with negligible Trichinella risk

Slaughter pigs reared under controlled housing conditions in integrated production does not have to be testet for Trichinella.
All other categories of pigs and other species, domestic or game, that can become infected with Trichinella will be examined in accordance with the methods laid down in the Regulation No 2075/2005. Further, pork exported to 3. market countries will be tested for Trichinella unless the importing country accept the new monitoring programme.

In addition, a monitoring programme for Trichinella in wildlife will be initiated from 2008; and approximately 300 foxes and 50 other carnivores will be examined annually.

Type of specimen taken

For regions with negligible Trichinella risk

Meat sample

Methods of sampling (description of sampling techniques)

For regions with negligible Trichinella risk

Digestion method (Directive 2075/2005)

Diagnostic/analytical methods used

For regions with negligible Trichinella risk

digestion method according to EU regulation 2075/2005

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified
Foxes	DFVA	Animal	139	0		
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system [1)]	DFVA	Animal	22766246	0		
Solipeds, domestic - horses [2)]	DFVA	Animal	3444	0		
Wild boars - farmed [3)]	DFVA	Animal	1079	0		
Badgers - wild - Monitoring - industry sampling - selective sampling	DFVA	Animal	78	0		
Birds - wild - Monitoring - industry sampling - selective sampling	DFVA	Animal	34	0		
Minks - wild - Monitoring - industry sampling - selective sampling	DFVA	Animal	8	0		
Pigs - breeding animals - raised under controlled housing conditions in integrated production system - sows and boars - at slaughterhouse - animal sample - meat - Control and eradication programmes - industry sampling - census sampling [4)]	DFVA	Animal	464078	0		
Raccoon dogs - wild - Monitoring - industry sampling - selective sampling	DFVA	Animal	23	0		

Comments:

[1)] 18972880 animals slaughtered. the difference is due to a data error. All animals has been tested

[2)] 2863 animals slaughtered. the difference is due to a data error. All animals has been tested

[3)] 1445 animals slaughtered. the difference is due to a data error. All animals has been tested

[4)] 412490 animals slaughtered. the difference is due to a data error. All animals has been tested

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 Danish Act no. 432 of 09/06/2004. Mandatory meat inspection covers all known potential intermediate host species. All carcasses intended for human aconsumption are inspected for incidence of hydatid cysts.

Echinococcus granulosis infection in animals is notifiable, however it has never been detected in Denmark. Echinococcus multilocularis infection in animals is notifiable. It was detected in one wild fox in 2000. All foxes tested have been negative since then.

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

As Echinococcus have only been detected once 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 humans

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, since the disease is not notifiable.

Results of the investigation

In 2009, a total of 11 cases of E. granulosus was reported, all were acquired abroad. No cases of E. multiocularis was reported.

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 one fox was found to be positive with one worm

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals) - at slaughterhouse - Control and eradication programmes (Visual examination by meat inspectors)	DFVA	Animal	507200	0			
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - at slaughterhouse - Control and eradication programmes (Visual examination by meat inspectors)	DFVA	Animal	18972880	0			

2.10 TOXOPLASMOSIS

2.10.1 General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/or infection in the country

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. From 1999-2006, newborn babies were screened for congenital toxoplasmosis. On average 15-20 newborns were diagnosed each year. This surveillance stopped in 2007

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, From 1999 to 2006, Denmark had a nationwide neonatal screening system for congenital toxoplasmosis. this screening stopped in 2007

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.

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 immunocompromissed 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

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 2009.

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

An increased interest in the potential risk of exposure of cats to EBL from bats was raised during 2005. It is known that cats can be experimentally and fatally infected with EBL but EBL has never been detected in cats submitted for diagnosis in Denmark. In summary, the risk of exposure of humans from cats is considered very low.

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. 432 of 09/06/2004. 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 in 2009.

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

The classic sylvatic rabies virus, namely lyssa virus type 1, has not been recorded in animals in Denmark since 1982, 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 2009.

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 Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified	European Bat Lyssavirus 1 (EBL 1)
Bats - wild - Clinical investigations	Vet-DTU	Animal	9	1				1
Dogs - pet animals	Vet-DTU	Animal	2	0				

2.12 Q-FEVER

2.12.1 General evaluation of the national situation

2.12.2 Coxiella (Q-fever) in animals

A. C. burnetii in animal - Cattle (bovine animals) - at farm - animal sample - blood - Clinical investigations - suspect sampling

Monitoring system

Sampling strategy

Official sampling based on suspicious, eg abortion

Type of specimen taken

milk, blood and tissue samples

Methods of sampling (description of sampling techniques)

Milk samples, blood samples, tissue samles of afterbirth

Diagnostic/analytical methods used

Antibodies - ELISA (Cattle, sheep/goats, other)
CFT (Pig)
FISH (placenta or foetal tissue)

Results of the investigation

2009 - Diagnostic analysis
Blood samples N= 111, pos=22 (Samples from 69 herds)
Tank milk samples N=157, pos=155 (Samples from 124 herds)

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

Since 1989, blood samples from cattle, mainly for export markets, have been tested for antibodies against C. burnetii at the National Veterinary Institute. Between 0% and 4 % of the examined animals were positive from 1989-2003

From 2007, tank milk samples were used of diagnosic testing as a suplement for the bloodsamples.

Table Coxiella burnetii (Q fever) in animals

	Source of information	Sampling unit	Units tested	Total units positive for Coxiella (Q-fever)	C. burnetii
Cattle (bovine animals) - dairy cows - at farm - animal sample - blood - Monitoring - official sampling [1)]	Vet-DTU	Animal	111	22	22
Cattle (bovine animals) - dairy cows - at farm - animal sample - milk - Monitoring - official sampling [2)]	Vet-DTU	Animal	157	124	124

Comments:

[1)] 111 Serum samples from 69 herds

[2)] 157 bulk tank milk samples from 155 herds

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

A. Escherichia coli general evaluation

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 NFI.

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, non-pathogenic

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.

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).

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

Cut-off values used in testing

See tables

Preventive measures in place

non

Control program/mechanisms

The control program/strategies in place

none

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

143 isolates from poultry meat, 32 isolates from beef and 106 isolates from pork were subjected for susceptibility testing of E. coli in 2009.

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.

Samples are collected at slaughter 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.

Type of specimen taken

Faceal samples from pigs and cattle, cloacal swabs from broilers.

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 DTU-FOOD 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%, 95% and 98%, 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. The observed prevalence of resistant isolates provides an estimate of the true occurrence in the populations.

Methods used for collecting data

All isolates were tested at the DTU-FOOD. Results were 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 37Â°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

Cut-off values 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

152 isolates from broilers, 94 isolaters from cattle and 150 isolates from pigs were collected for susceptibility testing in 2009.

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

The results were similar to previous years.

Table Antimicrobial susceptibility testing of E. coli in Pigs

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	150	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	150	7
Amphenicols - Florfenicol	150	1
Fluoroquinolones - Ciprofloxacin	150	1
Quinolones - Nalidixic acid	150	1
Trimethoprim	150	28
Aminoglycosides - Streptomycin	150	64
Aminoglycosides - Gentamicin	150	0
Aminoglycosides - Neomycin	150	9
Penicillins - Ampicillin	150	39
Tetracyclines - Tetracycline	150	53
Aminoglycosides - Apramycin	150	0
Aminoglycosides - Spectinomycin	150	37
Cephalosporins - Cefotaxim	150	0
Cephalosporins - Ceftiofur	150	0
Polymyxins - Colistin	150	0
Sulfonamides - Sulfamethoxazol	150	50

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

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	94	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	94	1
Amphenicols - Florfenicol	94	1
Fluoroquinolones - Ciprofloxacin	94	0
Quinolones - Nalidixic acid	94	0
Trimethoprim	94	0
Aminoglycosides - Streptomycin	94	3
Aminoglycosides - Gentamicin	94	0
Aminoglycosides - Neomycin	94	0
Penicillins - Ampicillin	94	2
Tetracyclines - Tetracycline	94	2
Aminoglycosides - Apramycin	94	0
Aminoglycosides - Spectinomycin	94	0
Cephalosporins - Cefotaxim	94	0
Cephalosporins - Ceftiofur	94	0
Polymyxins - Colistin	94	0
Sulfonamides - Sulfamethoxazol	94	3

Table Antimicrobial susceptibility testing of E. coli in Gallus gallus (fowl)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	152	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	152	1
Fluoroquinolones - Ciprofloxacin	152	18
Quinolones - Nalidixic acid	152	16
Trimethoprim	152	9
Aminoglycosides - Streptomycin	152	14
Aminoglycosides - Gentamicin	152	0
Aminoglycosides - Neomycin	152	0
Penicillins - Ampicillin	152	28
Tetracyclines - Tetracycline	152	19
Aminoglycosides - Apramycin	152	0
Aminoglycosides - Spectinomycin	152	4
Cephalosporins - Cefotaxim	152	0
Cephalosporins - Ceftiofur	152	2
Polymyxins - Colistin	152	0
Sulfonamides - Sulfamethoxazol	152	21

Table Antimicrobial susceptibility testing of E. coli in Meat from broilers (Gallus gallus)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	143	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	143	1
Amphenicols - Florfenicol	143	0
Fluoroquinolones - Ciprofloxacin	143	6
Quinolones - Nalidixic acid	143	6
Trimethoprim	143	5
Aminoglycosides - Streptomycin	143	15
Aminoglycosides - Gentamicin	143	3
Aminoglycosides - Neomycin	143	2
Penicillins - Ampicillin	143	28
Tetracyclines - Tetracycline	143	16
Aminoglycosides - Apramycin	143	2
Aminoglycosides - Spectinomycin	143	3
Cephalosporins - Cefotaxim	143	0
Cephalosporins - Ceftiofur	143	0
Polymyxins - Colistin	143	0
Sulfonamides - Sulfamethoxazol	143	11

Table Antimicrobial susceptibility testing of E. coli in Meat from pig

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	106	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	106	1
Amphenicols - Florfenicol	106	0
Fluoroquinolones - Ciprofloxacin	106	1
Quinolones - Nalidixic acid	106	1
Trimethoprim	106	27
Aminoglycosides - Streptomycin	106	45
Aminoglycosides - Gentamicin	106	0
Aminoglycosides - Neomycin	106	6
Penicillins - Ampicillin	106	31
Tetracyclines - Tetracycline	106	34
Aminoglycosides - Apramycin	106	0
Aminoglycosides - Spectinomycin	106	17
Cephalosporins - Cefotaxim	106	1
Cephalosporins - Ceftiofur	106	1
Polymyxins - Colistin	106	0
Sulfonamides - Sulfamethoxazol	106	40

Table Antimicrobial susceptibility testing of E. coli in Meat from bovine animals

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	32	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	32	0
Amphenicols - Florfenicol	32	0
Fluoroquinolones - Ciprofloxacin	32	0
Quinolones - Nalidixic acid	32	0
Trimethoprim	32	0
Aminoglycosides - Streptomycin	32	1
Aminoglycosides - Gentamicin	32	0
Aminoglycosides - Neomycin	32	0
Penicillins - Ampicillin	32	1
Tetracyclines - Tetracycline	32	1
Aminoglycosides - Apramycin	32	0
Aminoglycosides - Spectinomycin	32	0
Cephalosporins - Cefotaxim	32	0
Cephalosporins - Ceftiofur	32	0
Polymyxins - Colistin	32	0
Sulfonamides - Sulfamethoxazol	32	1

Table Antimicrobial susceptibility testing of E. coli in Gallus gallus (fowl) - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	152																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol		152	1		0	0	0	0	0	0	0	15	97	39	0	0	0	1	0	0	0	0			
Amphenicols - Florfenicol	16	152	1		0	0	0	0	0	0	0	18	100	33	0	0	0	1	0	0	0	0			
Tetracyclines - Tetracycline	8	152	19		0	0	0	0	0	0	0	133	0	0	1	4	14	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.03	152	18		117	17	6	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	152	16		0	0	0	0	0	0	0	0	135	1	0	2	6	8	0	0	0	0			
Trimethoprim	2	152	9		0	0	0	0	0	0	143	0	1	1	0	0	7	0	0	0	0	0			
Aminoglycosides - Streptomycin		152	14		0	0	0	0	0	0	0	0	0	129	9	3	5	3	3	0	0	0			
Aminoglycosides - Gentamicin	2	152	0		0	0	0	0	0	109	42	1	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	152	0		0	0	0	0	0	0	0	151	1	0	0	0	0	0	0	0	0	0			
Penicillins - Ampicillin	8	152	28		0	0	0	0	0	0	17	64	42	1	0	1	27	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	152	0		0	0	0	147	5	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	152	0		0	0	0	0	0	0	0	0	104	48	0	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	152	4		0	0	0	0	0	0	0	0	0	0	114	32	2	2	2	0	0	0			
Cephalosporins - Ceftiofur	1	152	2		0	0	0	0	0	146	4	2	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	8	152	0		0	0	0	0	0	0	149	3	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	152	21		0	0	0	0	0	0	0	0	0	0	0	0	130	0	1	0	0	21			

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals) - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	94																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	94	1		0	0	0	0	0	0	0	2	38	53	0	0	0	1	0	0	0	0			
Amphenicols - Florfenicol	16	94	1		0	0	0	0	0	0	0	2	41	47	3	0	0	1	0	0	0	0			
Tetracyclines - Tetracycline	8	94	2		0	0	0	0	0	0	0	78	14	0	0	1	1	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin		94	0		67	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	94	0		0	0	0	0	0	0	0	0	90	4	0	0	0	0	0	0	0	0			
Trimethoprim	2	94	0		0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	16	94	3		0	0	0	0	0	0	0	0	0	89	2	1	0	0	2	0	0	0			
Aminoglycosides - Gentamicin	2	94	0		0	0	0	0	0	83	8	3	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	94	0		0	0	0	0	0	0	0	90	3	1	0	0	0	0	0	0	0	0			
Penicillins - Ampicillin	8	94	2		0	0	0	0	0	0	2	24	58	8	0	0	2	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	94	0		0	0	0	93	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	94	0		0	0	0	0	0	0	0	0	87	5	2	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	94	0		0	0	0	0	0	0	0	0	0	0	88	5	1	0	0	0	0	0			
Cephalosporins - Ceftiofur	1	94	0		0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	94	0		0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	94	3		0	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	3			

Table Antimicrobial susceptibility testing of E. coli in Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	150																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	150	7		0	0	0	0	0	0	0	3	79	60	1	3	1	3	0	0	0	0			
Amphenicols - Florfenicol	16	150	1		0	0	0	0	0	0	0	3	80	62	4	0	0	1	0	0	0	0			
Tetracyclines - Tetracycline	8	150	53		0	0	0	0	0	0	0	94	3	0	2	2	49	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.03	150	1		114	35	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	150	1		0	0	0	0	0	0	0	0	146	2	1	0	0	1	0	0	0	0			
Trimethoprim	2	150	28		0	0	0	0	0	0	122	0	0	0	0	0	28	0	0	0	0	0			
Aminoglycosides - Streptomycin	16	150	64		0	0	0	0	0	0	0	0	0	79	7	8	24	14	18	0	0	0			
Aminoglycosides - Gentamicin	2	150	0		0	0	0	0	0	126	22	2	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	150	9		0	0	0	0	0	0	0	134	6	1	1	4	4	0	0	0	0	0			
Penicillins - Ampicillin	8	150	39		0	0	0	0	0	0	9	36	57	9	0	0	39	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	150	0		0	0	0	149	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	150	0		0	0	0	0	0	0	0	0	121	26	3	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	150	37		0	0	0	0	0	0	0	0	0	0	89	17	7	7	19	11	0	0			
Cephalosporins - Ceftiofur	1	150	0		0	0	0	0	0	149	1	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	8	150	0		0	0	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	150	50		0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	50			

Table Antimicrobial susceptibility testing of E. coli in Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	106																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	106	1		0	0	0	0	0	0	0	7	36	62	0	1	0	0	0	0	0	0			
Amphenicols - Florfenicol	16	106	0		0	0	0	0	0	0	0	7	40	58	1	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	106	34		0	0	0	0	0	0	0	67	5	0	0	2	32	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.03	106	1		59	46	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	106	1		0	0	0	0	0	0	0	0	104	1	0	0	0	1	0	0	0	0			
Trimethoprim	2	106	27		0	0	0	0	0	0	78	1	0	0	0	0	27	0	0	0	0	0			
Aminoglycosides - Streptomycin	16	106	45		0	0	0	0	0	0	0	0	0	55	6	4	5	17	19	0	0	0			
Aminoglycosides - Gentamicin	2	106	0		0	0	0	0	0	83	20	3	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	106	6		0	0	0	0	0	0	0	95	3	2	0	2	4	0	0	0	0	0			
Penicillins - Ampicillin	8	106	31		0	0	0	0	0	0	3	25	45	2	0	1	30	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	106	1		0	0	0	103	2	0	0	0	0	1	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	106	0		0	0	0	0	0	0	0	0	88	18	0	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	106	17		0	0	0	0	0	0	0	0	0	0	75	10	4	3	10	4	0	0			
Cephalosporins - Ceftiofur	1	106	1		0	0	0	0	0	105	0	0	0	0	1	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	106	0		0	0	0	0	0	0	106	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	106	40		0	0	0	0	0	0	0	0	0	0	0	0	66	0	0	0	0	40			

Table Antimicrobial susceptibility testing of E. coli in Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	143																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	143	1		0	0	0	0	0	0	0	3	58	81	0	0	0	1	0	0	0	0			
Amphenicols - Florfenicol	16	143	0		0	0	0	0	0	0	0	2	62	79	0	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	143	16		0	0	0	0	0	0	0	114	13	0	0	1	15	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.03	143	6		78	59	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	143	6		0	0	0	0	0	0	0	0	134	3	0	0	0	6	0	0	0	0			
Trimethoprim	2	143	5		0	0	0	0	0	0	138	0	0	0	0	0	5	0	0	0	0	0			
Aminoglycosides - Streptomycin	16	143	15		0	0	0	0	0	0	0	0	0	121	7	3	2	6	4	0	0	0			
Aminoglycosides - Gentamicin	2	143	3		0	0	0	0	0	108	27	5	0	1	1	1	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	143	2		0	0	0	0	0	0	0	135	6	0	0	1	1	0	0	0	0	0			
Penicillins - Ampicillin	8	143	28		0	0	0	0	0	0	7	48	57	3	0	0	28	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	143	0		0	0	0	140	3	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	143	2		0	0	0	0	0	0	0	0	106	33	2	0	2	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	143	3		0	0	0	0	0	0	0	0	0	0	119	20	1	2	1	0	0	0			
Cephalosporins - Ceftiofur	1	143	0		0	0	0	0	0	141	2	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	143	0		0	0	0	0	0	0	142	1	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	143	11		0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	0	0	11			

Table Antimicrobial susceptibility testing of E. coli in Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	32																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	32	0		0	0	0	0	0	0	0	0	6	26	0	0	0	0	0	0	0	0			
Amphenicols - Florfenicol	16	32	0		0	0	0	0	0	0	0	0	7	24	1	0	0	0	0	0	0	0			
Tetracyclines - Tetracycline	8	31	0		0	0	0	0	0	0	0	26	5	0	0	0	0	0	0	0	0	0			
Fluoroquinolones - Ciprofloxacin	0.03	32	0		16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Quinolones - Nalidixic acid	16	32	0		0	0	0	0	0	0	0	0	31	1	0	0	0	0	0	0	0	0			
Trimethoprim	2	32	0		0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Streptomycin	16	32	1		0	0	0	0	0	0	0	0	0	30	1	0	1	0	0	0	0	0			
Aminoglycosides - Gentamicin	2	32	0		23	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Neomycin	8	32	0		0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0			
Penicillins - Ampicillin	8	32	1		0	0	0	0	0	0	0	6	25	0	1	0	0	0	0	0	0	0			
Cephalosporins - Cefotaxim	0.25	32	0		0	0	0	31	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Aminoglycosides - Apramycin	16	32	0		0	0	0	0	0	0	0	0	17	14	1	0	0	0	0	0	0	0			
Aminoglycosides - Spectinomycin	64	32	0		0	0	0	0	0	0	0	0	0	0	29	3	0	0	0	0	0	0			
Cephalosporins - Ceftiofur	1	32	0		0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0			
Polymyxins - Colistin	2	32	0		0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0			
Sulfonamides - Sulfamethoxazol	256	32	1		0	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	1			

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
	Florfenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
	Sulfamethoxazol		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
	Neomycin		8	
	Apramycin		16	
	Spectinomycin		64	
Cephalosporins	Cefotaxim		0.25	

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Cephalosporins	Ceftiofur		1	
Penicillins	Ampicillin		8	
Polymyxins	Colistin		2	

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
	Florfenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
	Sulfamethoxazol		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
	Neomycin		8	
	Apramycin		16	
	Spectinomycin		64	
Cephalosporins	Cefotaxim		0.25	

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Cephalosporins	Ceftiofur		1	
Penicillins	Ampicillin		8	
Polymyxins	Colistin		2	

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

Test Method Used	Standard methods used for testing

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

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of E. faecalis 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.

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).

Laboratory methodology used for identification of the microbial isolates

Enterococci was isolated by adding 5 g of the sample to 45 ml of azide dextrose broth, which was incubated overnight at 44°C and subsequently streaked onto
Slanetz-Bartley agar. After incubation at 44°C for 48 hours, colonies typical of E. faecium and E. faecalis were further identified by the following criteria: Motility, arginine dihydrolase and the ability to ferment mannitol, sorbitol, arabinose, raffinose and melibiose.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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. faecalis is not a notifiable disease in Denmark.

Results of the investigation

39 isolates from poultry meat, 28 isolates from beef and 96 isolates from pork were subjected for susceptibility testing of E. faecalis in 2009.

B. Antimicrobial resistance of E. faecium 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.

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).

Laboratory methodology used for identification of the microbial isolates

Enterococci was isolated by adding 5 g of the sample to 45 ml of azide dextrose broth, which was incubated overnight at 44°C and subsequently streaked onto Slanetz-Bartley agar. After incubation at 44°C for 48
hours, colonies typical of E. faecium and E. faecalis
were further identified by the following criteria: Motility, arginine dihydrolase and the ability to ferment mannitol, sorbitol, arabinose, raffinose and melibiose.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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. faecium is not a notifiable disease in Denmark.

Results of the investigation

98 isolates from poultry meat and 17 isolates from pork were subjected for susceptibility testing of E. faecium in 2009.

C. Antimicrobial resistance of E. faecalis in Animals

Sampling strategy used in monitoring

Frequency of the sampling

Bacterial isolates included in the monitoring programme are collected from animals at slaughter.

Type of specimen taken

Faceal samples from pigs and cloacal swabs from broilers.

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 DTU-FOOD 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%, 95% and 98%, 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. The observed prevalence of resistant isolates provides an estimate of the true occurrence in the populations.

Methods used for collecting data

All isolates were tested at the DTU-FOOD. Results were entered into the central database.

Laboratory methodology used for identification of the microbial isolates

For samples from pigs, one drop of faecal material suspended in 2 ml sodium chloride(0.9%) was spread on Slanetz-Bartley agar and incubated for 2 days at 42°C. Three colonies with morphology typical of E. faecalis and E. faecium were sub-cultivated on blood agar. White colonies were identified by the following criteria: Motility, arginine, dihydrolase and the ability to ferment mannitol, sorbitol, arabinose, raffinose and melibiose. For samples from broiles, cloacal swabs were incubated overnight at 42°C in Enterococcus Selective Broth, prepared with a composition identical to that of Enterococcosel broth. Cultures were inoculated on Slanetz-Bartley agar and incubated for 48 h at 37°C followed by the same identification criteria as mentioned for isolates from pigs.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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. faecalis is not a notifiable disease in Denmark.

Results of the investigation

19 isolates from broilers and 133 isolates from pigs were collected for susceptibility testing of E. faecalis in 2009.

D. Antimicrobial resistance of E. faecium in Animals

Sampling strategy used in monitoring

Frequency of the sampling

Bacterial isolates included in the monitoring programme are collected from animals at slaughter.

Type of specimen taken

Faceal samples from pigs and cloacal swabs from broilers.

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 DTU-FOOD 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%, 95% and 98%, 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. The observed prevalence of resistant isolates provides an estimate of the true occurrence in the populations.

Methods used for collecting data

All isolates were tested at the DTU-FOOD. Results were entered into the central database.

Laboratory methodology used for identification of the microbial isolates

For samples from pigs, one drop of faecal material suspended in 2 ml sodium chloride(0.9%) was spread on Slanetz-Bartley agar and incubated for 2 days at 42°C. Three colonies with morphology typical of E. faecalis and E. faecium were sub-cultivated on blood agar. White colonies were identified by the following criteria: Motility, arginine, dihydrolase and the ability to ferment mannitol, sorbitol, arabinose, raffinose and melibiose. For samples from broiles, cloacal swabs were incubated overnight at 42°C in Enterococcus Selective Broth, prepared with a composition identical to that of Enterococcosel broth. Cultures were inoculated on Slanetz-Bartley agar and incubated for 48 h at 37°C followed by the same identification criteria as mentioned for isolates from pigs.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Cut-off values 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. faecium is not a notifiable disease in Denmark.

Results of the investigation

43 isolates from broilers and 151 isolates from pigs were collected for susceptibility testing of E. faecium in 2009.

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Gallus gallus (fowl)

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	19		43	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	19	0	43	0
Tetracyclines - Tetracycline	19	10	43	7
Aminoglycosides - Streptomycin	19	4	43	2
Aminoglycosides - Gentamicin	19	0	43	0
Aminoglycosides - Kanamycin	19	1	43	1
Penicillins - Ampicillin	19	0	43	6
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	19	0	43	0
Ionophores - Salinomycin	19	2	43	27
Macrolides - Erythromycin	19	9	43	10
Orthosomycins - Avilamycin	19	0	43	3
Oxazolidines - Linezolid	19	0	43	0
Penicillins - Penicillin	19	0	43	6
Streptogramins - Quinupristin/Dalfopristin	0	0	43	3

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Pigs

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	133		151	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	133	26	151	0
Tetracyclines - Tetracycline	133	117	151	100
Aminoglycosides - Streptomycin	133	50	151	73
Aminoglycosides - Gentamicin	133	26	151	0
Aminoglycosides - Kanamycin	133	41	151	46
Penicillins - Ampicillin	133	0	151	45
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	133	0	151	1
Glycylcyclines - Tigecycline	133	0	151	0
Ionophores - Salinomycin	133	0	151	0
Macrolides - Erythromycin	133	65	151	54
Orthosomycins - Avilamycin	133	0	151	0
Oxazolidines - Linezolid	133	0	151	0
Penicillins - Penicillin	133	0	151	54
Streptogramins - Quinupristin/Dalfopristin	0	0	151	4

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Meat from broilers (Gallus gallus)

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	39		98	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	39	1	98	0
Tetracyclines - Tetracycline	39	10	98	14
Aminoglycosides - Streptomycin	39	5	98	1
Aminoglycosides - Gentamicin	39	0	98	0
Aminoglycosides - Kanamycin	39	1	98	0
Penicillins - Ampicillin	39	0	98	1
Glycopeptides (Cyclic peptides, Polypeptides) - Daptomycin	39	0	98	12
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	39	0	98	0
Glycylcyclines - Tigecycline	39	0	98	0
Ionophores - Salinomycin	39	0	98	37
Macrolides - Erythromycin	39	10	98	16
Orthosomycins - Avilamycin	39	0	98	1
Oxazolidines - Linezolid	39	0	98	0
Penicillins - Penicillin	39	0	98	2

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Meat from bovine animals

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	28		5	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	28	1	5	0
Tetracyclines - Tetracycline	28	5	5	0
Aminoglycosides - Streptomycin	28	2	5	0
Aminoglycosides - Gentamicin	28	0	5	0
Aminoglycosides - Kanamycin	28	2	5	0
Penicillins - Ampicillin	28	0	5	0
Glycopeptides (Cyclic peptides, Polypeptides) - Daptomycin	28	0	5	1
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	28	0	5	0
Glycylcyclines - Tigecycline	28	0	5	0
Ionophores - Salinomycin	28	0	5	0
Macrolides - Erythromycin	28	2	5	1
Orthosomycins - Avilamycin	28	0	5	0
Oxazolidines - Linezolid	28	0	5	0
Penicillins - Penicillin	28	0	5	0

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Meat from pig

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	96		17	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	96	5	17	0
Tetracyclines - Tetracycline	96	19	17	3
Aminoglycosides - Streptomycin	96	4	17	2
Aminoglycosides - Gentamicin	96	3	17	0
Aminoglycosides - Neomycin	96	4		
Aminoglycosides - Kanamycin	96	4	17	2
Penicillins - Ampicillin	96	0	17	1
Glycopeptides (Cyclic peptides, Polypeptides) - Daptomycin	96	0	17	1
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	96	0	17	0
Glycylcyclines - Tigecycline	96	0	17	0
Ionophores - Salinomycin	96	0	17	0
Macrolides - Erythromycin	96	12	17	6
Orthosomycins - Avilamycin	96	0	17	0
Oxazolidines - Linezolid	96	0	17	0
Penicillins - Penicillin	96	0	17	1

Table Antimicrobial susceptibility testing of E. faecium in Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecium	Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	151																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	151	0			0	0	0	0	0	0	3	43	102	2	1	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	8	151	100			0	0	0	0	0	50	1	0	0	0	5	95	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	151	73			0	0	0	0	0	0	0	0	0	0	0	77	1	2	2	12	28	29		
Aminoglycosides - Gentamicin	32	151	0			0	0	0	0	0	0	0	0	0	146	5	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	151	46			0	0	0	0	0	0	0	0	0	0	0	0	27	61	14	3	0	46		
Penicillins - Ampicillin	4	151	45			0	0	0	0	0	0	54	52	44	0	1	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	151	1			0	0	0	0	0	134	10	6	0	0	1	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	151	0			3	95	50	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	151	0			0	0	0	0	0	0	150	1	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	151	54			0	0	0	0	14	3	46	34	0	0	0	54	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	151	0			0	0	0	0	0	0	0	149	2	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	151	0			0	0	0	0	0	15	133	3	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	8	151	54			0	0	0	0	0	0	23	20	11	43	53	1	0	0	0	0	0	0		
Streptogramins - Quinupristin/Dalfopristin	32	151	4			0	0	0	0	13	10	77	47	4	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecalis in Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecalis	Pigs - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	133																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	133	26		0	0	0	0	0	0	0	0	23	83	0	1	10	16	0	0	0	0	0		
Tetracyclines - Tetracycline	2	133	117		0	0	0	0	0	0	16	0	0	0	0	10	107	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	133	50		0	0	0	0	0	0	0	0	0	0	0	0	19	64	0	0	1	2	47		
Aminoglycosides - Gentamicin	512	133	26		0	0	0	0	0	0	0	0	0	0	106	1	0	0	4	9	8	5	0		
Aminoglycosides - Kanamycin	1024	133	41		0	0	0	0	0	0	0	0	0	0	0	0	0	92	0	0	0	1	40		
Penicillins - Ampicillin	4	133	0		0	0	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	133	0		0	0	0	0	0	0	30	84	19	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.5	133	0		1	1	12	88	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	133	0		0	0	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	133	65		0	0	0	0	0	47	17	4	0	0	0	0	65	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	133	0		0	0	0	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	133	0		0	0	0	0	0	0	40	93	0	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	8	133	0		0	0	0	0	0	0	0	19	112	2	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecium in Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - carcass swabs - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecium	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - carcass swabs - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	43																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	43	0			0	0	0	0	0	0	0	16	25	1	1	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	43	7			0	0	0	0	0	36	0	0	0	0	2	5	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	43	2			0	0	0	0	0	0	0	0	0	0	0	41	0	0	0	0	0	2		
Aminoglycosides - Gentamicin	512	43	0			0	0	0	0	0	0	0	0	0	41	2	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	43	1			0	0	0	0	0	0	0	0	0	0	0	0	14	18	10	0	0	1		
Penicillins - Ampicillin		43	6			0	0	0	0	0	0	34	3	5	0	0	1	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	43	0			0	0	0	0	0	36	7	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	43	19			0	0	0	0	0	0	10	14	11	5	3	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	43	10			0	0	0	0	13	8	11	1	0	0	0	10	0	0	0	0	0	0		
Orthosomycins - Avilamycin	8	43	3			0	0	0	0	0	0	0	36	3	1	1	2	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	43	0			0	0	0	0	0	3	39	1	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	8	43	6			0	0	0	0	0	0	15	8	9	5	4	2	0	0	0	0	0	0		
Streptogramins - Quinupristin/Dalfopristin	32	43	3			0	0	0	0	10	14	11	5	3	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecalis	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	19																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	19	0				0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	19	10				0	0	0	0	9	0	0	0	0	5	5	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	19	6				0	0	0	0	0	0	0	0	0	0	10	3	1	1	0	0	4		
Aminoglycosides - Gentamicin	32	19	0				0	0	0	0	0	0	0	0	18	1	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	19	1				0	0	0	0	0	0	0	0	0	0	0	13	2	3	0	0	1		
Penicillins - Ampicillin	4	19	0				0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	19	0				0	0	0	0	8	11	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	19	2				0	0	0	0	0	8	9	2	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	19	9				0	0	0	2	3	3	2	3	1	1	4	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	19	0				0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	19	0				0	0	0	0	5	14	0	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	8	19	0				0	0	0	0	0	6	9	3	1	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecalis in Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecalis	Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	39																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	39	1				0	0	0	0	0	0	6	32	0	0	1	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	39	10				0	0	0	0	27	2	0	0	0	3	7	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	39	5				0	0	0	0	0	0	0	0	0	0	6	28	0	0	0	0	5		
Aminoglycosides - Gentamicin	32	39	0				0	0	0	0	0	0	0	0	39	0	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	39	1				0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	1		
Penicillins - Ampicillin	4	39	0				0	0	0	0	0	38	1	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	39	0				0	0	0	0	11	24	4	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	39	0				7	29	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	39	0				0	0	0	0	0	32	7	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	39	10				0	0	0	16	8	5	0	0	1	0	9	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	39	0				0	0	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	39	0				0	0	0	0	7	31	1	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	39	0				0	0	0	0	0	10	29	0	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecium in Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecium	Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	98																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	98	0			0	0	0	0	0	0	1	25	68	3	1	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	98	14			0	0	0	0	0	84	0	0	0	1	2	11	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	98	1			0	0	0	0	0	0	0	0	0	0	0	96	1	0	0	1	0	0		
Aminoglycosides - Gentamicin		98	0			0	0	0	0	0	0	0	0	0	97	1	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	98	0			0	0	0	0	0	0	0	0	0	0	0	0	46	34	14	4	0	0		
Penicillins - Ampicillin	4	98	1			0	0	0	0	0	0	92	5	1	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	98	0			0	0	0	0	0	49	43	6	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	98	0			1	76	20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	98	37			0	0	0	0	0	0	14	47	37	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	98	16			0	0	0	0	14	9	18	41	7	1	2	6	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	98	1			0	0	0	0	0	0	0	94	1	2	1	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	98	0			0	0	0	0	0	2	92	4	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	98	2			0	0	0	0	0	0	68	18	6	4	1	1	0	0	0	0	0	0		
Streptogramins - Quinupristin/Dalfopristin	32	98	3			0	0	0	1	49	6	34	5	2	1	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecalis in Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecalis	Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	28																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	28	1			0	0	0	0	9	18	0	0	0	0	0	1	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	28	5			0	0	0	0	0	23	0	0	0	0	0	5	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	28	2			0	0	0	0	0	0	0	0	0	0	0	12	14	0	0	0	0	2		
Aminoglycosides - Gentamicin	32	28	0			0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	28	2			0	0	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	2		
Penicillins - Ampicillin		28	0			0	0	0	0	0	0	26	2	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	28	0			0	0	0	0	0	9	19	0	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	28	0			1	12	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	28	0			0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	28	2			0	0	0	0	16	8	2	0	0	0	0	2	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	28	0			0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	28	0			0	0	0	0	0	4	23	1	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	28	0			0	0	0	0	0	0	11	17	0	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecium in Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecium	Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	5																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	5	0				0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	5	0				0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	5	0				0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0		
Aminoglycosides - Gentamicin		5	0				0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	5	0				0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0		
Penicillins - Ampicillin	4	5	0				0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	5	0				0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	5	0				5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	5	0				0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	5	1				0	0	0	1	0	2	1	1	0	0	0	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	5	0				0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	5	0				0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	5	0				0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0		
Streptogramins - Quinupristin/Dalfopristin	32	5	0				0	0	1	1	0	2	1	0	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecalis in Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecalis	Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	96																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	96	5		0	0	0	0	0	0	0	0	11	80	0	0	5	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	96	19		0	0	0	0	0	0	76	1	0	0	0	1	18	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	96	5		0	0	0	0	0	0	0	0	0	0	0	0	47	44	1	0	0	0	4		
Aminoglycosides - Gentamicin	32	96	3		0	0	0	0	0	0	0	0	0	0	92	1	0	0	0	0	1	2	0		
Aminoglycosides - Kanamycin	1024	92	0		0	0	0	0	0	0	0	0	0	0	0	0	0	91	1	0	0	0	0		
Penicillins - Ampicillin	4	96	0		0	0	0	0	0	0	0	95	1	0	0	0	0	0	0	0	0	0	0		
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	96	0		0	0	0	0	0	0	39	52	5	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	96	0		1	1	28	63	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	96	0		0	0	0	0	0	0	0	96	0	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin		94	10		0	0	0	0	0	39	26	19	0	0	0	0	10	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	96	0		0	0	0	0	0	0	0	0	96	0	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	96	0		0	0	0	0	0	0	3	93	0	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	96	0		0	0	0	0	0	0	0	27	68	1	0	0	0	0	0	0	0	0	0		

Table Antimicrobial susceptibility testing of E. faecium in Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

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

E. faecium	Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	17																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	17	0			0	0	0	0	0	0	0	7	8	1	1	0	0	0	0	0	0	0		
Tetracyclines - Tetracycline	2	17	3			0	0	0	0	0	14	0	0	0	0	0	3	0	0	0	0	0	0		
Aminoglycosides - Streptomycin	512	17	2			0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	1	1	0		
Aminoglycosides - Gentamicin		17	0			0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0		
Aminoglycosides - Kanamycin	1024	17	2			0	0	0	0	0	0	0	0	0	0	0	0	7	4	4	0	1	1		
Penicillins - Ampicillin	4	17	1			0	0	0	0	0	0	15	1	1	0	0	0	0	0	0	0	0			
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	17	0			0	0	0	0	0	16	1	0	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines - Tigecycline	0.25	17	0			3	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores - Salinomycin	4	17	0			0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0		
Macrolides - Erythromycin	4	17	6			0	0	0	0	1	4	2	4	3	1	0	2	0	0	0	0	0	0		
Orthosomycins - Avilamycin	16	17	0			0	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	0	0		
Oxazolidines - Linezolid	4	17	0			0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0		
Penicillins - Penicillin	16	17	1			0	0	0	0	0	0	4	10	1	1	1	0	0	0	0	0	0	0		
Streptogramins - Quinupristin/Dalfopristin	32	17	1			0	0	0	0	5	0	10	1	1	0	0	0	0	0	0	0	0	0		

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		128	
	Gentamicin		32	
	Kanamycin		1024	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
	Penicillin		16	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		4	
Tetracyclines	Tetracycline		4	
Oxazolidines	Linezolid		4	
Orthosomycins	Avilamycin		16	
Ionophores	Salinomycin		4	
Glycylcyclines	Tigecycline		0.25	

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

Footnote:

Only breakpoint for E. faecium is reported

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

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		128	
	Gentamicin		32	
	Kanamycin		1024	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
	Penicillin		16	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		4	
Tetracyclines	Tetracycline		4	
Oxazolidines	Linezolid		4	
Orthosomycins	Avilamycin		16	
Ionophores	Salinomycin		4	
Glycylcyclines	Tigecycline		0.25	

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

Footnote:

Only breakpoint for E. faecium is reported

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

Test Method Used	Standard methods used for testing

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

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

5. FOODBORNE

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

A. Foodborne outbreaks

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

In Denmark, local foodborne outbreaks are typically investigated by the Regional Veterinary and Food Control Authority (RVFCA) in collaboration with the medical officer; often also with the participation of the regional clinical microbiology laboratory. Larger outbreaks involving more than one region are typically investigated by the SSI, the National Food Institute, and the Danish Food and Veterinary Administration (DVFA). These institutions may also aid in the investigation of local outbreaks. In 2006, a new Danish Alert Unit for Food was established at the DVFA (see below.)Representatives from the three institutions meet regularly to discuss surveillance results, compare the occurrence of zoonotic agents in animals, food and feedstuffs with that in humans, and review major outbreaks. The formal responsibility of investigating food- or waterborne outbreaks is currently divided between three ministries based on the outbreak source: the Ministry for the Interior and Health for infectious diseases; the Ministry of Family and Consumer Affairs for food and animal related diseases; and the Ministry of the Environment (along with the municipality) for water related diseases.

Danish Alert Unit for Food

To secure unambiguous and coordinated instructions concerning the handling of food crises it is necessary to gather an overall picture of the situation as well as to perform creative thinking to produce the best solutions. This is one of the main reasons for the establishment of The Danish Alert Unit for Food in 2006 at The Danish Veterinary and Food Administration.

The purpose with the establishment of the unit is furthermore to place the responsibility at one spot, establish one channel of commands and thus secure a coordinated, effective and quick handling of food crises nationally and internationally.

Tasks:
- ; Coordination of the work with food borne outbreaks both national and regional
- ; Withdrawals and recalls of products not in compliance with the food safety requirements
- ; Contingency plans for food and for civil preparedness in the Danish Veterinary and Food Administration
- ; Early warnings of the public in emergency situations
- ; Civil emergency response and early warnings
- ; The Alert Food hot line for acute queries outside normal opening hours
- ; The Unit is the Danish Contact Point of the Rapid Alert System for Food and Feed
- ; Chair in Central Crisis Management Group for food borne diseases.
- ;Education and practice in preparedness planning
- ; Cooperation with other authorities in crises

The unit mainly has competences concerning coordinating and procedural issues in food crises situations. The professional knowledge in each case is still situated in other offices in the Danish Veterinary and Food Administration.

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

National evaluation of the reported outbreaks in the country:

Descriptions of single outbreaks of special interest

Outbreaks with S. Enteritidis have become rare in recent years as a result of the successful Salmonella control programs targeting the Danish egg layer and broiler production. Nevertheless, in 2009 two outbreaks caused by eggs occurred. One outbreak comprising 150 laboratory confirmed cases with S. Enteritidis phage type 8 occurred in the early summer. Interviews with cases revealed that several of the cases had become ill after eating in small groups at different restaurants, and trace-back of the suppliers of eggs to these restaurants pointed to one specific egg producer. Upon investigation, S. Enteritidis phage type 8 with a matching MLVA type was recovered from the egg producer. Following withdrawal of the eggs, the outbreak stopped. The second outbreak was caused by eggs contaminated with S. Enteritidis phage type 13a, originating from a single producer. The eggs gave rise to a general outbreak, which was detected as an increase in human cases in the period and to an outbreak confined to participants in a large swimming meet during a weekend in September. In the latter outbreak, 86 cases were identified from a cohort study and 42 cases were laboratory confirmed. A trace-back investigation of eggs used by caterers at the swimming meet helped to locate the producer. Positive salmonella test results from the premises resulted in a with drawl of all eggs that were potentially delivered by this producer.

An outbreak with Listeria monocytogenes occurred in the beginning of the year. The outbreak was detected by use of PFGE typing of patient isolates referred to Statens Serum Institut. It comprised eight cases; all were elderly, two died. All cases received food from a meals-on-wheels service catering for senior citizens and the source was found to be a specific dish containing beef, which was meant to receive final heat treatment by microwave oven in the homes of the costumers.

A large waterborne outbreak took place in June in a town with approx 5,000 inhabitants south of Copenhagen. A total of 39 cases of Campylobacter jejuni were laboratory confirmed and there was an estimated 500 cases in total based on results from a questionnaire study performed by Statens Serum Institut in which a little more than 1,000 inhabitants participated. The study showed a dose-response relationship between intake of tap water and the risk of becoming ill. The likely cause of the contamination was identified as a malfunctioning water pipe installation which became contaminated following heavy rainfall.

Two large outbreaks of S. Typhimurium which began in 2008 continued into 2009. The unusually large outbreak with S. Typhimurium phage type U292 gave rise to 228 laboratory confirmed cases and an outbreak with another rare phage type, S. Typhimurium DT135 accounted for 90 laboratory confirmed cases. These outbreaks, in particular the U292 outbreak, was the subject of intense investigations in both 2008 and 2009, however, the sources of the outbreaks were not found and only a very small number of new cases were seen towards the end of 2009. The U292 outbreak gave rise to 1,452 cases over both 2008 and 2009 and appeared to be largely confined to Denmark. The epidemiology of the outbreak was complex and towards the end of the outbreak period, the main hypothesis remained that the outbreak was caused by a series of different foods and originated from a pig reservoir.

Finally, it should also be mentioned that food borne outbreaks also occurred as a result of infections with non-zoonotic agents. As in previous years, norovirus was the single most frequent disease agent in the registered outbreaks. Of the 53 reported food borne outbreaks in 2009, norovirus accounted for 18 with a total of 626 registered cases. These outbreaks were generally a result of contamination events associated with workplace lunch buffets, restaurants and private parties. Several of these outbreaks followed gastrointestinal symptoms in persons preparing the food. Another non-zoonotic disease outbreak was caused by Shigella sonnei. A total of ten laboratory confirmed cases were caused by consumption of

contaminated sugar peas imported from Africa and cases also occurred in other European countries.

Table Foodborne Outbreaks: summarised data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	2	0	unknown	unknown	unknown	2
Campylobacter	4	3	8	0	0	1
Clostridium	1	0	unknown	unknown	unknown	1
Escherichia coli, pathogenic	0	0	unknown	unknown	unknown	0
Foodborne viruses	15	14	408	0	0	1
Listeria	1	1	8	8	2	0
Other agents	11	5	85	0	0	6
Parasites	0	0	unknown	unknown	unknown	0
Salmonella	14	9	94	2	0	5
Staphylococcus	0	0	unknown	unknown	unknown	0
Unknown	3	3	148	1	0	0
Yersinia	1	0	unknown	unknown	unknown	1

Two of the possible Salmonella outbreaks was acquired abroad. Malta (S. Enteritidis 6a, 10 cases) and Mallorca (S. Goldcoast, 6 cases, 2 hospitalized. One possible Salmonella outbread was due to S. typhi (3 cases.

Table Verified Foodborne Outbreaks: detailed data for Bacillus

Please use CTRL for multiple selection fields

B. cereus

	Value
Code	921
Outbreaks	1
Human cases	13
Hospitalized	8
Deaths	0
Foodstuff implicated	Broiler meat (Gallus gallus) and products thereof
More Foodstuff information	pastasalad with chicken and pesto
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Household, domestic kitchen
Origin of foodstuff	unknown
Contributory factors	Inadequate chilling
Other Agent (Mixed Outbreaks)	
Comment	

B. cereus

	Value
Code	889
Outbreaks	1
Human cases	48
Hospitalized	0
Deaths	0
Foodstuff implicated	Bovine meat and products thereof
More Foodstuff information	A beef casserole. The pathogen was found in a rosepaprika (spice)
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	Unknown
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Campylobacter

Please use CTRL for multiple selection fields

C. jejuni

	Value
Code	900
Outbreaks	1
Human cases	500
Hospitalized	3
Deaths	0
Foodstuff implicated	Tap water, including well water
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Other setting
Place of origin of problem	Water source
Origin of foodstuff	Not relevant
Contributory factors	Water treatment failure
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Clostridium

Please use CTRL for multiple selection fields

C. perfringens

	Value
Code	865
Outbreaks	1
Human cases	66
Hospitalized	0
Deaths	0
Foodstuff implicated	Broiler meat (Gallus gallus) and products thereof
More Foodstuff information	Chicken salat served in 13 different cantines receiving food from same catering
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Foodborne viruses

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Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	936
Outbreaks	1
Human cases	8
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	frugt
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	unknown
Origin of foodstuff	Imported from outside EU
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

Shigella - S. sonnei

	Value
Code	888
Outbreaks	1
Human cases	10
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	sugarpeas
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Household
Place of origin of problem	unknown
Origin of foodstuff	Imported from outside EU
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	Probably part of an international outbreak (Norway and Sweden)

Histamine

	Value
Code	923
Outbreaks	1
Human cases	5
Hospitalized	5
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	Tuna
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Histamine

	Value
Code	929
Outbreaks	1
Human cases	12
Hospitalized	0
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	Escolar fish
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Same as setting
Origin of foodstuff	Imported from outside EU
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Histamine

	Value
Code	898
Outbreaks	1
Human cases	4
Hospitalized	0
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	Tuna
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Retail sale outlet
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Histamine

	Value
Code	934
Outbreaks	1
Human cases	10
Hospitalized	0
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	Escolar fish
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Same as setting
Origin of foodstuff	Imported from outside EU
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

Histamine

	Value
Code	925
Outbreaks	1
Human cases	24
Hospitalized	22
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	Tuna sandwich
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Unknown
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Imported from outside EU
Contributory factors	Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Salmonella

Please use CTRL for multiple selection fields

S. Typhimurium - U 292

	Value
Code	788
Outbreaks	1
Human cases	288
Hospitalized	unknown
Deaths	0
Foodstuff implicated	unknown
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	unknown
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	The outbreak started in 2008 and continued through most of 2009. In total 1452 cases in 2008-2009. The outbreak has stopped.

S. Typhimurium - DT 135

	Value
Code	854
Outbreaks	1
Human cases	90
Hospitalized	0
Deaths	0
Foodstuff implicated	unknown
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	unknown
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	The outbreak started in 2008. In total 190 cases in 2008-2009. the outbreak has stopped

S. Enteritidis - PT 8

	Value
Code	891
Outbreaks	1
Human cases	132
Hospitalized	0
Deaths	2
Foodstuff implicated	Eggs and egg products
More Foodstuff information	
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

S. Enteritidis - PT 13a

	Value
Code	917
Outbreaks	1
Human cases	32
Hospitalized	0
Deaths	0
Foodstuff implicated	Eggs and egg products
More Foodstuff information	
Type of evidence	Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	

S. Enteritidis - PT 13a

	Value
Code	928
Outbreaks	1
Human cases	86
Hospitalized	3
Deaths	0
Foodstuff implicated	Eggs and egg products
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Temporary mass catering (fairs, festivals)
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	swimming meet

Table Verified Foodborne Outbreaks: detailed data for Yersinia

Please use CTRL for multiple selection fields

Y. enterocolitica - Y. enterocolitica, unspecified

	Value
Code	885
Outbreaks	1
Human cases	30
Hospitalized	0
Deaths	0
Foodstuff implicated	unknown
More Foodstuff information	
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Temporary mass catering (fairs, festivals)
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	unknown
Contributory factors	
Other Agent (Mixed Outbreaks)	
Comment	