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 2008

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 Poultry Council (DPC)	Danish Poultry Council (DPC) is an umbrella organisation for the Danish poultry industry and DPC coordinates the veterinary conditions for the table egg production and the broiler production. DCP is responsible for the contact with the authorities.	Data

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 2008 .

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

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

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

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

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

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1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information:

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:

Average number of livestock and herds in 2008.

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

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

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Cattle (bovine animals)	**in total**	22958		511300		1598038			
Gallus gallus (fowl)	**broilers** [1)]	580		100304000		20000000		243	
	grandparent breeding flocks for meat production line	23				100000		6	
	laying hens	295				2900000		215	
	parent breeding flocks for egg production line [2)]	9				54000		8	
	parent breeding flocks for meat production line	246				850000		62	
Goats	**in total** [3)]	3475		2140		23142			
Pigs	**fattening pigs**	10959		18582288		12195000			
Sheep	**in total**	9080		89520		173131			
Solipeds, domestic	**horses - in total**			2627					
Turkeys	**in total**	51				481975			

Comments:

[1)] Number of flocks is the capacity on dec 31 2008. Total number of flocks produced is 3717

[2)] Number of flocks is the capacity on dec 31 2008. Total number of flocks produced is 508

[3)] In Denmark, very few goats are used for food, most goats are pet animals in petting zoos and similar settings.

Footnote:

In the 'number of herds or flcoks and the livestock numbers' columns data reported represent the Danish capacity on dec 31 2008 and not the total number of flocks/herds produced. this is stated in the prevalence tables as we sample all flocks

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.

In 2006, 1,658 laboratory-confirmed episodes of salmonellosis were reported corresponding to 30.5 cases per 100,000 inhabitants. This represents an increase of 8% in the number of infections compared to 2004, and a decrease of 7% compared to 2005. Overall, the number of infections with S. Enteritidis and S Typhimurium was stable during 2004-7.

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 2008, 3,656 laboratory-confirmed episodes of salmonellosis were reported corresponding to 66.8 cases per 100,000 inhabitants. This is an increase of 55% compared to 2007. Mainly due to a very large S. Typhomurium outbreak (See description in the outbreak chapter)

In 2008, there were 638 reported episodes of S. Enteritidis corresponding to an incidence of 11.7 per 100,000. There were 2002 reported episodes of S. Typhimurium corresponding to an incidence of 36.6 per 100,000 inhabitants. This is an increase of 83% compared to 2007.

Other Salmonella serotypes accounted for 1016 episodes, corresponding to an incidence of 18.6 per 100,000 inhabitants.

In precious years, 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. During 2007 an interview survey was initiated in order to get better information about travel history of human cases. And is was estimated that app 45% of the cases was travel related in 2007.

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

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 2008, 3,656 laboratory-confirmed episodes of salmonellosis were reported corresponding to 66.8 cases per 100,000 inhabitants. This is an increase of 55% compared to 2007.

In 2008, there were 638 reported episodes of S. Enteritidis corresponding to an incidence of 11.7 per 100,000. There were 2002 reported episodes of S. Typhimurium corresponding to an incidence of 36.6 per 100,000 inhabitants. This is an increase of 83% compared to 2007.

Other Salmonella serotypes accounted for 1016 episodes, corresponding to an incidence of 18.6 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 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)

B. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

A surveillance 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

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

At meat processing plant

Other: depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

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

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: 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 and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium

DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the programme is now a part of the project on intensified control for Salmonella and Campylobacter in Danish and imported meat

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 2008 a total of 518 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

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

C. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

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

Since 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

Every batch is sampled

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Random sampling of batches of Turkey cuts shortly prior to packaging.
5 g subsample are collected from a sample (meat cuts), if possible with skin. Samples are pooled in 25 g for AM positive batches and 50 g for AM negative batches

At meat processing plant

Depend on survey

At retail

Depend on survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated.

At meat processing plant

Depend on survey.

At retail

depend on survey

Diagnostic/analytical methods used

At meat processing plant

Other: Depend on survey

At retail

Other: Depend on survey

Control program/mechanisms

The control program/strategies in place

mandatory PM examination.

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the programme is now a part of the project on intensified control for Salmonella and

Campylobacter in Danish and imported meat

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. In 2008, 69 flocks were tested for Salmonella and one flock was positive.

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

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

D. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

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

At meat processing plant

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

At retail

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

Frequency of the sampling

At slaughterhouse and cutting plant

Other: Depend on the slaughterhouse capacity

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

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

At meat processing plant

Depend on the survey

At retail

Depend on the survey

Definition of positive finding

At slaughterhouse and cutting plant

A sample is considered positive when Salmonella has been isolated

At meat processing plant

A sample is considered positive when Salmonella has been isolated

At retail

A sample is considered positive when Salmonella has been isolated

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at

the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the programme is now a part of the project on intensified control for Salmonella and Campylobacter in Danish and imported meat

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 2008, 27,045 swab samples were collected and pooled and the prevalence of Salmonella in single swab samples was estimated to be 1,3% (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 144 samples were collected from slaughterhouses with a small production and were analysed individually. Of these samples, 2% were positive for Salmonella. Based on results from the previous 12 months, the moving average varied between 1,17 and 1,31 in 2008. As in previous years, the most common serotypes observed were S. Typhimurium, S. Derby and S. Infantis.

E. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

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

At meat processing plant

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

At retail

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

Frequency of the sampling

At slaughterhouse and cutting plant

>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

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend of the survey

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The carcass are swabed in three designated areas (the rump, breast and flank) 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

Other: Depend on the laboratory

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Suggestions to the Community for the actions to be taken

None

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the

programme is now a part of the project on intensified control for Salmonella and Campylobacter in Danish and imported meat

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 2008, 7915 samples were pooled and the prevalence of Salmonella was estimated to be 0.2% 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 205 samples were collected from slaughterhouses with a smaller production and analysed individually. All samples were negative. In total, S. Dublin was isolated from 56% of the positive samples

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

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - - neck skin - Control and eradication programmes - industry sampling - objective sampling (300 samples of 1g is pooled into samples of 60 subsamples (60g))	DPC	slaughter	60g	518	3			3

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Derby	S. Dublin	S. Enteritidis	S. Infantis	S. Livingstone
Meat from bovine animals - fresh - - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100 cm2)	DFVA	animal		7915	9			5			
Meat from pig - fresh - - carcass swabs - Control and eradication programmes - industry sampling - objective sampling [1)]	DFVA	animal		27045	199	2	56			11	6

	S. Typhimurium	Salmonella spp., unspecified
Meat from bovine animals - fresh - - carcass swabs - Control and eradication programmes - industry sampling - objective sampling (3x100 cm2)		4
Meat from pig - fresh - - carcass swabs - Control and eradication programmes - industry sampling - objective sampling [1)]	88	36

Comments:

[1)] 3x100 cm2

2.1.4 Salmonella in animals

A. 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

Type of specimen taken

Meat production flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

Meat production flocks: Before slaughter at farm

5 sock/boot swabs per flock

Case definition

Meat production flocks: Before slaughter at farm

A sample is considered positive when Salmonella has been isolated.

Control program/mechanisms

The control program/strategies in place

Meat production flocks

Mandatory AM examination

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the programme is now a part of the project on intensified control for Salmonella and Campylobacter in Danish and imported meat

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 2008, 69 flocks were tested for Salmonella and one flock was positive.

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

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

A part of the Danish produced turkey meat is reimported.

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

Additional information

The production of geese in Denmark is limited.

C. 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

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 pooled prior to bacterial analysis.

Case definition

Meat production flocks: Before slaughter at farm

A sample is considered positive when Salmonella has been isolated.

Diagnostic/analytical methods used

Meat production flocks: Before slaughter at farm

Other: Depend on the laboratory

Vaccination policy

Breeding flocks

No Salmonella vaccinations occur.

Meat production flocks

No Salmonella vaccinations occur.

Control program/mechanisms

The control program/strategies in place

Meat production flocks

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

Measures in case of the positive findings or single cases

When Salmonella is detected in a sample, the DFVA must be notified and actions will be taken to identify the source.

The Danish surveillance programme for multi-drug resistant S. Typhimurium DT104 (MRDT104) has been in place since 1998. The programme mandates a zero-tolerance for this pathogen in all foods. Meat imported from 3rd countries and the EU is randomly tested for Salmonella. Sample analysis is performed at the RVFCA. If MRDT104 is detected the batch is rejected or heat-treated.

2006, in November the sampling plan for this programme was changed, as the programme is now a part of the project on intensified control for Salmonella and Campylobacter in Danish and imported meat

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 duck flocs are now being exported as live animals. Therefore there is no data on ducks.

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

D. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

Every month, blood samples from ten randomly selected young females (4-7 months old)are serologically tested. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous) are >=5, bacteriologic confirmatory testing is carried out at the farm.

In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.

The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Multiplying herds

Every month, blood samples from ten randomly selected young females (4-7 months old)are serologically tested. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous) are >= 5, bacteriologic confirmatory testing is carried out at the farm.

In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.

The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Fattening herds

Slaughter pig herds are monitored continuously by serologic testing of meat juice at the slaughter house. Random meat samples for testing are collected at the slaughter line, where the number of samples and frequency of sampling per farm are determined by the size of the herd.

A Salmonella index is calculated for each finisher herd based on the weighted average Salmonella values (SV = OD% minus 10) from the previous 3 months, where results from the current month weigh three times as much as the two previous ones.

Every month, finisher herds are assigned to one of three levels according to their Salmonella index: Level 1: no action required; Level 2: herd intervention necessary; Level 3: herd intervention and increased hygienic precautions during

slaughter are implemented. Herds with 40<= index <70 are assigned to Level 2; herds with index >=70 are assigned to Level 3.

Herds placed in Level 2 or Level 3 will have bacteriologic confirmatory testing carried out. Herds supplying pigs to finisher herds in Levels 2 or 3 will also have bacteriologic confirmatory testing carried out.

In case of clinically symptoms of Salmonella bacteriological confirmation tests must be conducted.

The surveillance programme for detection of Salmonella infection in pig herds was implemented in the beginning of 1995.

Frequency of the sampling

Breeding herds

Other: Once a month, and when needed

Multiplying herds

Other: Once a month, and when needed

Fattening herds at farm

Other: When needed

Fattening herds at slaughterhouse (herd based approach)

Depend on herd size

Type of specimen taken

Breeding herds

Other: Blood and faeces

Multiplying herds

Other: Blood and faeces

Fattening herds at farm

Faeces

Fattening herds at slaughterhouse (herd based approach)

Meat juice

Methods of sampling (description of sampling techniques)

Breeding herds

Every month, blood samples from ten randomly selected young females 4-7 months are collected. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous) are >=5, faecal samples are requested.

The number of faecal samples depend on the herds size. Herds with > 400

animals collect 20 samples (5 pools) and herds with 100-400 animals collect 4-16 samples (1-4 pools).

Multiplying herds

Every month, blood samples from ten randomly selected young females 4-7 months are collected. If the salmonella index, calculated as the average of OD-values for three months (last months average have higher weight than the two previous)are >=5, faecal samples are requested.

The number of faecal samples depend on the herds size. Herds with > 400 animals collect 20 samples (5 pools) and herds with 100-400 animals collect 4-16 samples (1-4 pools).

Fattening herds at farm

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

Fattening herds at slaughterhouse (herd based approach)

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

Case definition

Breeding herds

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

Multiplying herds

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

Fattening herds at farm

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

Fattening herds at slaughterhouse (herd based approach)

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

Diagnostic/analytical methods used

Breeding herds

Other: Bacteriological and serological

Multiplying herds

Other: Bacteriological and serological

Vaccination policy

Breeding herds

No salmonella vaccination occur

Multiplying herds

No salmonella vaccination occur

Fattening herds

No salmonella vaccination occur

Other preventive measures than vaccination in place

Breeding herds

Control program/mechanisms

The control program/strategies in place

Breeding herds

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 2008, 1.5 % and 0.4% of the herds were assigned to Level 2 and 3, respectively.

In 2007, the percentage of breeding and multiplying herds increased dramatically compared to 2006 and in Dec 13,3% of the herds had an index above 5. The 12 month average (moving over the previous 12 month) increased from 8.2% in January 2007 to 12.5 in December 2007. In December 2008, 13.5%of breeding and multiplying herds were Salmonella positive and the yearly moving average slightly decreased from 13.0 in January to 12.6 in December 2008.

Additional information

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

E. 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)

Serological method: 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 2008, 16.3% of milk-producing herds were classified into level 2, which is similar to 2007. For the non-milk producing herds, the percentage of herds in level 1 increased from 77.5% in 2006 to 81,7% in 2007.

Clinical disease in combination with the finding of Salmonella was recorded in 44 herds.

Herds are placed under official veterinary supervision if MRDT104 is found in the cattle, or the herd has been in contact with herds infected with MRDT104.

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.

F. Salmonella spp. in animal - Wildlife

Monitoring system

Sampling strategy

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

G. 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)

Treatment with antibiotics is not allowed

H. 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 salmpled. 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

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 2008, 518 flocks were tested and 4 were positive with Salmonella. 2 flocks were from the same house at a farm, one following the other and they only had

100 birds each.

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.

I. 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

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 floc is declared positive after the first sample. All positive flocks are slaughtered at the same

slaughterhouse in Denmark and heat treated after slaughter.

Recent actions taken to control the zoonoses

The second sampling at the farm was introduced in 2008

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, an epidemiological investigation must be undertaken and 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, an epidemiological investigation must be undertaken and 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 2008, 3717 flocks were tested and 43 was positive. Additionally, two parents flocks out of 293 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 i the broilerproduction is very low and has been so for many years.

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - grandparent breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	18	DPC	flock	18	0						
Gallus gallus (fowl) - grandparent breeding flocks for meat production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	6	DPC	flock	6	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	6	DPC	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	10	DPC	flock	10	0						
Gallus gallus (fowl) - parent breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	293	DPC	flock	293	2				2		
Gallus gallus (fowl) - parent breeding flocks for meat production line - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	146	DPC	flock	146	0						

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Anatum	S. Carmel	S. Derby	S. Enteritidis	S. Indiana	S. Infantis
Ducks - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling [1)]		DPC	flock	61	43	29			1	12	
Gallus gallus (fowl) - broilers - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	3717	DPC	flock	3717	45	1	1	2		3	4
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling	508	DPC	flock	508	2				1		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	508	DFVA	flock	508	3				1		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size < 1000 animals)	13	DFVA	flock	13	1						
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size >1000 animals)	495	DVFA	flock	495	0						
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - suspect sampling	508	DVFA	flock	16	1						

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Anatum	S. Carmel	S. Derby	S. Enteritidis	S. Indiana	S. Infantis
Gallus gallus (fowl) - laying hens - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	258	DPC	flock	258	1						
Turkeys - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling	51	DPC	flock	69	1				1		

	S. Kottbus	S. Livingstone	S. Mbandaka	S. Newport	S. Poona	S. Regent	S. Tennessee	S. Typhimurium	S. Yoruba	S. 4,12:-:-	S. 4,12:b:-
Ducks - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling [1)]	13			1		12		3			
Gallus gallus (fowl) - broilers - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling		1	1		1		1	13	1	1	1
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling				1							
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling				1				1			

Table Salmonella in other poultry

	S. Kottbus	S. Livingstone	S. Mbandaka	S. Newport	S. Poona	S. Regent	S. Tennessee	S. Typhimurium	S. Yoruba	S. 4,12:-:-	S. 4,12:b:-
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size < 1000 animals)				1							
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size >1000 animals)											
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - suspect sampling								1			
Gallus gallus (fowl) - laying hens - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling								1			
Turkeys - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling											

	S. 6,7:-:-	Salmonella spp., unspecified
Ducks - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling [1)]		5

Table Salmonella in other poultry

	S. 6,7:-:-	Salmonella spp., unspecified
Gallus gallus (fowl) - broilers - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	1	13
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size < 1000 animals)		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling (flock size >1000 animals)		
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - suspect sampling		
Gallus gallus (fowl) - laying hens - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling		

Table Salmonella in other poultry

	S. 6,7:-:-	Salmonella spp., unspecified
Turkeys - meat production flocks - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - objective sampling		

Comments:

[1)] Many flocks are infected with more than one serovar

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Badgers - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	11	1			1
Birds - at zoo - Clinical investigations (1 hawk, 1 hyde park parakeet, 1 parrot, 3 peacocks, 1 pelican, 2 ducks, 1 rainbow lorikeet and 4 inca terns) [1)]	Vet-DTU	animal	15	1			1
Birds - wild - Clinical investigations (1 pigeon, 2 common eiders, 1 mallard, 2 black-headed gulls, 1 mute swan, 1 short-eared owl, 1 common buzzard, 1 raven, 1 bird of prey, 1 great cormorant, 1 wood pigeon, 1 barn owl, 1 starling, 3 swans, 4 herring gulls and 1 peregrine falcon) [2)]	Vet-DTU	animal	23	1			1
Cats - Clinical investigations (Pet animal)	Vet-DTU	animal	4	1			1
Dogs - Clinical investigations (Pet animal)	Vet-DTU	animal	10	0			
Foxes - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	6	0			
Hares - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	1	0			
Hedgehogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	37	12			12
Marten - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	2	0			
Minks - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	46	0			
Pigs - breeding animals - raised under controlled housing conditions in integrated production system - sows - - blood - Surveillance - official controls - objective sampling ((Herd level results are based on 106 positive samples out of 2028 animal samples per December 2008))	DFVA	herd	208	28			28

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - - meat juice - Surveillance - official controls - objective sampling ((Herd level results are based on 195 positive samples out of 4637 animal samples per December 2008))	DFVA	herd	9445	185			185
Raccoon dogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	4	0			
Zoo animals, all - at zoo - Clinical investigations (4 monkeys, 1 chimpanzee, 1 elephant, 2 orangutans, 1 pudu, 1 lion, 1 moose, 1 capybara, 1 zebra, 1 barbary ape, 1 lizzard, 2 royal pythons and 2 skinks) [3)]	Vet-DTU	animal	19	2			2

Comments:

[1)] 1 positive sample from 1 rainbow lorikeet

[2)] 1 positive sample from a black-headed gull

[3)] Positive samples from 1 elephant and 1 lizzard

2.1.5 Salmonella in feedingstuffs

A. Salmonella spp. in feed

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

In 2008: In feed material, the national survey for Salmonella in the feed sector has shown a higher prevalence than last year. Approximately twice as many samples were taken from feed material in 2008 compared to 2007 but there were 4 times more findings of Salmonella in 2008. The indirect monitoring of Salmonella in compound feed as monitored by process samples was comparable in 2008 to the years before.
In 2008, Salmonella infantis was detected on 6 individual occasions in 4 different seed companies.
In general the prevalence of Salmonella as monitored in the official surveys of the feed sector in Denmark, has been low for several years and the serotypes found in the feed stuff sector are normally uncommon among human cases.
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. In 2008, the major focus was surveys of soy and rape as these feed materials have been shown to have a relatively large prevalence of Salmonella. Among these feed materials, special focus has been on the feed material that was not going to be heat treated and on imported material. Presence of Salmonella in compound feed was surveyed by environmental sampling at the risk point within the companies. Official samples are taken 1 to 4 times a year depending on the risk profile of the companies including an assessment of how well the companies have implemented their quality systems.

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

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 spp.	S. Agona	S. Cubana	S. Enteritidis	S. Infantis	S. Isangi	S. Kraligen
Compound feedingstuffs, not specified - process control - Monitoring - official sampling - selective sampling ((Environmental sample during feed processing))	PDIR	single	25g	1085	18	1			5	1	1
Feed material of oil seed or fruit origin - rape seed derived	PDIR	single	25g	51	5	2			1		1
Feed material of oil seed or fruit origin - soya (bean) derived	PDIR	single	25g	82	6	1	1				
Other feed material - other plants	PDIR	single	25g	51	0						

	S. Lexington	S. Liverpool	S. Livingstone	S. Mbandaka	S. Montevideo	S. Ruiru	S. Senftenberg	S. Typhimurium	Salmonella spp., unspecified
Compound feedingstuffs, not specified - process control - Monitoring - official sampling - selective sampling ((Environmental sample during feed processing))	1	2		2	1	1	3		
Feed material of oil seed or fruit origin - rape seed derived							1		
Feed material of oil seed or fruit origin - soya (bean) derived	1		1	1			1		
Other feed material - other plants									

2.1.6 Salmonella serovars and phagetype distribution

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

Table Salmonella serovars in animals

Serovars	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)		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - during production period - - faeces - 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	**43**			**33**		**5**					**43**		**4**
Number of isolates serotyped	**94**	**0**	**0**	**33**	**0**	**5**	**0**	**0**	**0**	**0**	**43**	**0**	**4**
Number of isolates per serovar													
S. Anatum	29												

Table Salmonella serovars in animals

Serovars	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)		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - during production period - - faeces - 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	**43**			**33**		**5**					**43**		**4**
Number of isolates serotyped	**94**	**0**	**0**	**33**	**0**	**5**	**0**	**0**	**0**	**0**	**43**	**0**	**4**
Number of isolates per serovar													
S. Derby				13							2		
S. Enteritidis	1												1
S. Indiana	12										3		
S. Infantis											4		
S. Kottbus	13												
S. Newport	1												2

Table Salmonella serovars in animals

Serovars	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)		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - industry sampling - census sampling		Gallus gallus (fowl) - laying hens - during production period - - faeces - 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	**43**			**33**		**5**					**43**		**4**
Number of isolates serotyped	**94**	**0**	**0**	**33**	**0**	**5**	**0**	**0**	**0**	**0**	**43**	**0**	**4**
Number of isolates per serovar													
S. Regent	12												
S. Tennessee											1		
S. Typhimurium	3			20		5					11		1
S. 4,12:b:-											1		
Not typeable	5										2		
Other serotypes	18										19		

Table Salmonella serovars in animals

Serovars	Gallus gallus (fowl) - laying hens - during production period - - faeces - 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		**1**	
Number of isolates serotyped	**0**	**1**	**0**
Number of isolates per serovar			
S. Anatum			
S. Derby			
S. Enteritidis		1	
S. Indiana			
S. Infantis			
S. Kottbus			

Table Salmonella serovars in animals

Serovars	Gallus gallus (fowl) - laying hens - during production period - - faeces - 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		**1**	
Number of isolates serotyped	**0**	**1**	**0**
Number of isolates per serovar			
S. Newport			
S. Regent			
S. Tennessee			
S. Typhimurium			
S. 4,12:b:-			
Not typeable			

Table Salmonella serovars in animals

Serovars	Gallus gallus (fowl) - laying hens - during production period - - faeces - 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		1	
Number of isolates serotyped	0	1	0
Number of isolates per serovar			
Other serotypes			

Table Salmonella serovars in food

Serovars	Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Other poultry		Other products of animal origin	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory	**9**		**199**							
Number of isolates serotyped	**9**	**0**	**199**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Number of isolates per serovar										
S. Agona			2							
S. Derby			56							
S. Dublin	5									
S. Infantis			11							
S. Livingstone			6							
S. Panama			1							
S. Typhimurium			88							
Not typeable	2		31							
Other serotypes	2		4							

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of oil seed or fruit origin - soya (bean) derived - Control and eradication programmes - official sampling		Compound feedingstuffs, not specified - process control - Monitoring - official sampling - selective sampling (Environmental sampling during feed processing)		Feed material of oil seed or fruit origin - rape seed derived - Control and eradication programmes - official sampling	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**6**		**18**		**5**	
Number of isolates serotyped	**0**	**0**	**6**	**0**	**18**	**0**	**5**	**0**
Number of isolates per serovar								
S. Agona			1		1		2	
S. Cubana			1					
S. Infantis					5		1	
S. Isangi					1			
S. Kraligen					1		1	
S. Lexington			1		1			
S. Liverpool					2			
S. Livingstone			1					
S. Mbandaka			1		2			
S. Montevideo					1			

Table Salmonella serovars in feed

Serovars	Compound feedingstuffs for pigs		Feed material of oil seed or fruit origin - soya (bean) derived - Control and eradication programmes - official sampling		Compound feedingstuffs, not specified - process control - Monitoring - official sampling - selective sampling (Environmental sampling during feed processing)		Feed material of oil seed or fruit origin - rape seed derived - Control and eradication programmes - official sampling	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**6**		**18**		**5**	
Number of isolates serotyped	**0**	**0**	**6**	**0**	**18**	**0**	**5**	**0**
Number of isolates per serovar								
S. Ruiru					1			
S. Senftenberg			1		3		1	

Table Salmonella Enteritidis phagetypes in animals

Phagetype	Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - laying hens - during production period - - faeces - Control and eradication programmes - official and industry sampling - census sampling		Cattle (bovine animals)	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory							**1**			
Number of isolates phagetyped	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
Number of isolates per type										
8							1			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - official and industry sampling - census sampling		Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling		Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**20**		**5**					**13**		**2**		**1**
Number of isolates phagetyped	**0**	**20**	**0**	**5**	**0**	**0**	**0**	**0**	**13**	**0**	**2**	**0**	**1**
Number of isolates per type													
DT 7													1
DT 12		1							3				
DT 104		5		2									
DT 120									4		1		
DT 193				1									

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - official and industry sampling - census sampling		Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling		Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**20**		**5**					**13**		**2**		**1**
Number of isolates phagetyped	**0**	**20**	**0**	**5**	**0**	**0**	**0**	**0**	**13**	**0**	**2**	**0**	**1**
Number of isolates per type													
Not typeable		10		1					3				
DT 41											1		
DT 15a									1				
DT 107		1		1									
DT 135									1				

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Gallus gallus (fowl) - broilers - before slaughter - - faeces - Control and eradication programmes - official and industry sampling - census sampling		Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling		Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**
Number of isolates in the laboratory		**20**		**5**					**13**		**2**		**1**
Number of isolates phagetyped	**0**	**20**	**0**	**5**	**0**	**0**	**0**	**0**	**13**	**0**	**2**	**0**	**1**
Number of isolates per type													
U 292		3							1				

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling	Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**	
Number of isolates phagetyped	**0**	**1**	**0**
Number of isolates per type			
DT 7			
DT 12			
DT 104			
DT 120			
DT 193			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling	Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**	
Number of isolates phagetyped	**0**	**1**	**0**
Number of isolates per type			
Not typeable			
DT 41		1	
DT 15a			
DT 107			
DT 135			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Gallus gallus (fowl) - laying hens - during rearing period - flocks under control porgramme - at farm - environmental sample - boot swabs - Surveillance - official controls - objective sampling	Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official and industry sampling - objective sampling	
Sources of isolates	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory		**1**	
Number of isolates phagetyped	**0**	**1**	**0**
Number of isolates per type			
U 292			

Table Salmonella Typhimurium phagetypes in food

Phagetype	Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Other poultry		Other products of animal origin	
Sources of isolates	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**	**Monitoring**	**Clinical**
Number of isolates in the laboratory			**103**							
Number of isolates phagetyped	**0**	**0**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Number of isolates per type										
DT 12			16							
DT 104			9							
DT 120			19							
DT 170			4							
DT 193			2							
Not typeable			19							
DT 17			11							
DT 135			2							
U 312			1							
U 288			1							
Other			19							

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

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

Animals are slaughtered under special hygienic precautions and an

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

Notification system in place

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

Results of the investigation

13 S Dublin isolates and 18 S Typhimurium isolates were subject to susceptibility testing

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

The results were similar to previous years.

B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

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

Type of specimen taken

faecal samples

Procedures for the selection of isolates for antimicrobial testing

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

Methods used for collecting data

All isolated were tested at the 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

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

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

Notification system in place

Positve findings are reported to the Danish Veterinary and Food Administration

Results of the investigation

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

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

The results were similar to previous years.

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

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

Type of specimen taken

faecal samples

Procedures for the selection of isolates for antimicrobial testing

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

Methods used for collecting data

All isolated were tested at the 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

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

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

Notification system in place

Positve findings are reported to the Danish Veterinary and Food Administration

Results of the investigation

No results from susceptibility testing of poultry samples were availible for 2008.

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

The results were similar to previous years.

D. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

No 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 2008.

E. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Sampling strategy used in monitoring

Frequency of the sampling

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

Type of specimen taken

meat samples

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

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

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

Notification system in place

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

Results of the investigation

126 isolates of Salmonella in pig meat were subjected for susceptibility testing in 2008.

F. 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 2008.

Table Antimicrobial susceptibility testing of S. Derby - qualitative data

S. Derby		Pigs - - faeces - Control and eradication programmes - official sampling - selective sampling		Pigs - fattening pigs - at slaughterhouse	
Isolates out of a monitoring program (yes/no)		yes		no	
Number of isolates available in the laboratory		5		14	
Antimicrobials:		N	n	N	n
Aminoglycosides	Apramycin	5	1		
	Gentamicin	5	1	14	0
	Neomycin	5	0	14	0
	Spectinomycin	5	2		
	Streptomycin	5	3	14	1
Amphenicols	Chloramphenicol	5	0	14	0
	Florfenicol	5	0	14	0
Cephalosporins	Cefotaxim	5	0	14	0
	Ceftiofur	5	0	14	0
Fluoroquinolones	Ciprofloxacin	5	0	14	0
Penicillins	Amoxicillin / Clavulanic acid	5	2		
	Ampicillin	5	2	14	3
Polymyxins	Colistin			14	0
Quinolones	Nalidixic acid	5	0	14	0
Sulfonamides	Sulfamethoxazol	5	2	14	1
Tetracyclines	Tetracyclin	5	2	14	2
Trimethoprim	Trimethoprim	5	2	14	1

Table Antimicrobial susceptibility testing of S. Derby in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

S. Derby		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		no																								
Number of isolates available in the laboratory		8																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		0	0																						
	Gentamicin	*2*	8	0							7	1														
	Kanamycin		0	0																						
	Neomycin	*4*	8	0									8													
	Spectinomycin		0	0																						
	Streptomycin	*16*	8	0											8											
Amphenicols	Chloramphenicol	*16*	8	0										4	4											
	Florfenicol	*16*	8	0										7	1											
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	*1*	8	0					8																	
	Ceftiofur	*2*	8	0							3	5														
Fluoroquinolones	Ciprofloxacin	*1*	8	0			8																			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin	*4*	8	0								8														
Polymyxins	Colistin	*2*	8	0								8														
Quinolones	Nalidixic acid	*16*	8	0										8												
Sulfonamides	Sulfonamide	*256*	0	0																						
Tetracyclines	Tetracyclin	*8*	8	1									7				1									

Table Antimicrobial susceptibility testing of S. Derby in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

S. Derby		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		no																							
Number of isolates available in the laboratory		8																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	**Trimethoprim**	*2*	8	0								8													
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	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]

S. Dublin		Cattle (bovine animals) - - 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		13																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		13	13		0	0	0	0	0	0	0	0	12	1	0	0	0	0	0						
	Gentamicin		13	13		0	0	0	0	0	11	2	0	0	0	0	0	0	0	0						
	Kanamycin		0	0																						
	Neomycin		13	13		0	0	0	0	0	0	0	13	0	0	0	0	0	0	0						
	Spectinomycin		13	13		0	0	0	0	0	0	0	0	0	0	1	7	5	0	0						
	Streptomycin		11	11		0	0	0	0	0	0	0	0	0	4	7	0	0	0	0						
Amphenicols	Chloramphenicol		13	13		0	0	0	0	0	0	0	1	9	3	0	0	0	0	0						
	Florfenicol		13	13		0	0	0	0	0	0	0	2	11	0	0	0	0	0	0						
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		13	13		0	0	0	13	0	0	0	0	0	0	0	0	0	0	0						
	Ceftiofur		13	13		0	0	0	0	0	5	8	0	0	0	0	0	0	0	0						
Fluoroquinolones	Ciprofloxacin		13	13		3	10	0	0	0	0	0	0	0	0	0	0	0	0	0						
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		13	13		0	0	0	0	0	0	0	11	0	1	1	0	0	0	0						
	Ampicillin		13	13		0	0	0	0	0	0	10	1	0	0	0	0	2	0	0						
Polymyxins	Colistin		13	13		0	0	0	0	0	0	1	1	11	0	0	0	0	0	0						
Quinolones	Nalidixic acid		13	13		0	0	0	0	0	0	0	0	12	1	0	0	0	0	0						
Sulfonamides	Sulfonamide		13	13		0	0	0	0	0	0	0	0	0	0	0	0	13	0	0						
Tetracyclines	Tetracyclin		13	13		0	0	0	0	0	0	0	11	0	0	0	0	2	0	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]

S. Dublin		Cattle (bovine animals) - - 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		13																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		13	13		0	0	0	0	0	0	13	0	0	0	0	0	0	0	0						
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of S. Dublin - qualitative data

S. Dublin		Cattle (bovine animals) - - 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		13	
Antimicrobials:		N	n
Aminoglycosides	Apramycin	13	0
	Gentamicin	13	0
	Neomycin	13	0
	Spectinomycin	13	0
	Streptomycin	13	2
Amphenicols	Chloramphenicol	13	0
	Florfenicol	13	0
Cephalosporins	Cefotaxim	13	0
	Ceftiofur	13	0
Fluoroquinolones	Ciprofloxacin	13	0
Penicillins	Amoxicillin / Clavulanic acid	13	2
	Ampicillin	13	2
Quinolones	Nalidixic acid	13	0
Sulfonamides	Sulfonamide	13	0
Tetracyclines	Tetracyclin	13	2
Trimethoprim	Trimethoprim	13	0

Table Antimicrobial susceptibility testing of S. Infantis - qualitative data

S. Infantis		Pigs - fattening pigs - at slaughterhouse - Survey	
Isolates out of a monitoring program (yes/no)		no	
Number of isolates available in the laboratory		8	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	8	0
	Neomycin	8	0
	Streptomycin	8	0
Amphenicols	Chloramphenicol	8	0
	Florfenicol	8	0
Cephalosporins	Ceftiofur	8	0
Fluoroquinolones	Ciprofloxacin	8	0
Penicillins	Ampicillin	8	0
Polymyxins	Colistin	8	0
Quinolones	Nalidixic acid	8	0
Sulfonamides	Sulfamethoxazol	8	0
Tetracyclines	Tetracyclin	8	0
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	8	0

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

S. Typhimurium		Pigs - - faeces - Survey - EU baseline survey		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)		no		yes		yes									
Number of isolates available in the laboratory		46		18		497									
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin	46	0	18	0	497	12								
	Gentamicin	46	0	18	0	497	13								
	Neomycin	46	1	18	0	497	28								
	Spectinomycin	46	3	18	3	497	74								
	Streptomycin	46	15	18	9	497	228								
Amphenicols	Chloramphenicol	46	3	18	3	497	51								
	Florfenicol	46	3	18	2	497	33								
Cephalosporins	Cefotaxim			18	0	497	4								
	Cefpodoxime	46	0												
	Ceftiofur	46	0	18	0	497	1								
	Cephalothin	46	0												
Fluoroquinolones	Ciprofloxacin	46	2	18	0	497	4								
Penicillins	Amoxicillin / Clavulanic acid	46	0	18	7	497	143								
	Ampicillin	46	15	18	8	497	201								
Polymyxins	Colistin	46	0												
Quinolones	Nalidixic acid	46	1	18	0	497	3								
Sulfonamides	Sulfamethoxazol	46	13												
	Sulfonamide			18	10	497	236								
Tetracyclines	Tetracyclin	46	20	18	7	497	208								

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

S. Typhimurium		Pigs - - faeces - Survey - EU baseline survey		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)		no		yes		yes									
Number of isolates available in the laboratory		46		18		497									
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n
Trimethoprim	Trimethoprim			18	0	497	37								
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides	46	2												

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

S. Typhimurium		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		no																								
Number of isolates available in the laboratory		46																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		0	0																						
	Gentamicin	*2*	46	0								46														
	Kanamycin		0	0																						
	Neomycin	*4*	46	1									44	1			1									
	Spectinomycin		0	0																						
	Streptomycin	*16*	46	15										5	22	4		15								
Amphenicols	Chloramphenicol	*16*	46	3									2	34	7			3								
	Florfenicol	*16*	46	3									3	36	4		3									
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		0	0																						
	Ceftiofur	*2*	46	0							25	21														
Fluoroquinolones	Ciprofloxacin		0	0																						
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin	*4*	46	15								22	8	1			15									
Polymyxins	Colistin	*2*	46	0								46														
Quinolones	Nalidixic acid	*16*	46	1										42	1	2		1								
Sulfonamides	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	*8*	46	20									26				20									

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

S. Typhimurium		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		no																							
Number of isolates available in the laboratory		46																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	**Trimethoprim**	*2*	46	2									44				2									
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	0																					

Table Antimicrobial susceptibility testing of S. Typhimurium in mixed herds - Pigs - raised under controlled housing conditions in integrated production system - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling - quantitative data [Dilution method]

S. Typhimurium		Pigs - mixed herds - raised under controlled housing conditions in integrated production system - - 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		497																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		497	497		0	0	0	0	0	0	0	0	474	11	0	0	12	0	0	0	0	0			
	Gentamicin		497	497		0	0	0	0	0	399	85	0	0	2	6	5	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		497	497		0	0	0	0	0	0	0	464	5	2	1	0	25	0	0	0	0	0			
	Spectinomycin		497	497		0	0	0	0	0	0	0	0	0	0	8	375	40	6	8	60	0	0			
	Streptomycin		497	497		0	0	0	0	0	0	0	0	0	252	17	9	24	69	126	0	0	0			
Amphenicols	Chloramphenicol		497	497		0	0	0	0	0	0	0	8	249	176	13	1	6	44	0	0	0	0			
	Florfenicol		497	497		0	0	0	0	0	0	0	16	394	43	11	29	1	3	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		497	497		0	0	0	459	34	3	0	0	0	1	0	0	0	0	0	0	0	0			
	Ceftiofur		497	497		0	0	0	0	0	306	170	20	0	0	1	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		497	497		75	382	36	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		497	497		0	0	0	0	0	0	0	295	59	113	29	1	0	0	0	0	0	0			
	Ampicillin		497	497		0	0	0	0	0	0	231	53	12	0	0	0	201	0	0	0	0	0			
Polymyxins	Colistin		497	497		0	0	0	0	0	0	496	1	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		497	497		0	0	0	0	0	0	0	0	423	66	5	0	0	3	0	0	0	0			
Sulfonamides	Sulfonamide		497	497		0	0	0	0	0	0	0	0	0	0	0	0	260	1	0	0	2	234			
Tetracyclines	Tetracyclin		497	497		0	0	0	0	0	0	0	269	19	1	1	30	177	0	0	0	0	0			

Table Antimicrobial susceptibility testing of S. Typhimurium in mixed herds - Pigs - raised under controlled housing conditions in integrated production system - at farm - animal sample - faeces - Control and eradication programmes - official sampling - selective sampling - quantitative data [Dilution method]

S. Typhimurium		Pigs - mixed herds - raised under controlled housing conditions in integrated production system - - 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		497																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		497	497		0	0	0	0	0	0	457	3	0	0	0	0	37	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		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]

S. Typhimurium		Cattle (bovine animals) - - 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		18																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		18	18		0	0	0	0	0	0	0	0	17	1	0	0	0	0	0	0	0	0			
	Gentamicin		18	18		0	0	0	0	0	12	5	1	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		18	18		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0			
	Spectinomycin		18	18		0	0	0	0	0	0	0	0	0	0	0	14	1	0	0	3	0	0			
	Streptomycin		18	18		0	0	0	0	0	0	0	0	0	9	0	1	1	2	5	0	0	0			
Amphenicols	Chloramphenicol		18	18		0	0	0	0	0	0	0	0	12	3	0	0	0	3	0	0	0	0			
	Florfenicol		18	18		0	0	0	0	0	0	0	0	14	1	1	2	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		18	18		0	0	0	17	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Ceftiofur		18	18		0	0	0	0	0	10	7	1	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		18	18		3	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		18	18		0	0	0	0	0	0	0	10	1	4	3	0	0	0	0	0	0	0			
	Ampicillin		18	18		0	0	0	0	0	0	10	0	0	0	0	0	8	0	0	0	0	0			
Polymyxins	Colistin		18	18		0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		18	18		0	0	0	0	0	0	0	0	16	2	0	0	0	0	0	0	0	0			
Sulfonamides	Sulfonamide		8	8		0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0			
Tetracyclines	Tetracyclin		18	18		0	0	0	0	0	0	0	9	2	0	0	3	4	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]

S. Typhimurium		Cattle (bovine animals) - - 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		18																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		18	18		0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of S. Typhimurium - qualitative data

S. Typhimurium		Meat from pig - carcass - chilled - - carcass swabs - Control and eradication programmes - industry sampling	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		99	
Antimicrobials:		N	n
Aminoglycosides	Apramycin	99	3
	Gentamicin	99	4
	Neomycin	99	2
	Spectinomycin	99	12
	Streptomycin	99	41
Amphenicols	Chloramphenicol	99	4
	Florfenicol	99	2
Cephalosporins	Cefotaxim	99	2
	Ceftiofur	99	1
Fluoroquinolones	Ciprofloxacin	99	0
Penicillins	Amoxicillin / Clavulanic acid	99	27
	Ampicillin	99	38
Polymyxins	Colistin	99	0
Quinolones	Nalidixic acid	99	0
Sulfonamides	Sulfonamide	99	40
Tetracyclines	Tetracyclin	99	30
Trimethoprim	Trimethoprim	99	7

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

S. Typhimurium		Meat from pig - carcass - chilled - - carcass swabs - Control and eradication programmes - industry sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		99																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		99	99		0	0	0	0	0	0	0	0	95	1	0	0	3	0	0	0	0	0			
	Gentamicin		99	99		0	0	0	0	0	69	26	0	0	1	2	1	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		99	99		0	0	0	0	0	0	0	95	2	0	0	0	2	0	0	0	0	0			
	Spectinomycin		99	99		0	0	0	0	0	0	0	0	0	0	1	77	9	1	1	10	0	0			
	Streptomycin		99	99		0	0	0	0	0	0	0	0	0	57	1	0	7	7	27	0	0	0			
Amphenicols	Chloramphenicol		99	99		0	0	0	0	0	0	0	1	53	41	0	0	0	4	0	0	0	0			
	Florfenicol		99	99		0	0	0	0	0	0	0	3	90	4	0	1	0	1	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		99	99		0	0	0	95	2	1	0	0	0	1	0	0	0	0	0	0	0	0			
	Ceftiofur		99	99		0	0	0	0	0	68	27	3	0	0	1	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		99	99		10	84	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		99	99		0	0	0	0	0	0	0	61	11	22	4	1	0	0	0	0	0	0			
	Ampicillin		99	99		0	0	0	0	0	0	53	8	0	0	0	0	38	0	0	0	0	0			
Polymyxins	Colistin		99	99		0	0	0	0	0	0	99	0	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		99	99		0	0	0	0	0	0	0	0	91	8	0	0	0	0	0	0	0	0			
Sulfonamides	Sulfonamide		99	99		0	0	0	0	0	0	0	0	0	0	0	0	59	0	0	0	0	40			
Tetracyclines	Tetracyclin		99	99		0	0	0	0	0	0	0	69	0	0	0	2	28	0	0	0	0	0			

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

S. Typhimurium		Meat from pig - carcass - chilled - - carcass swabs - Control and eradication programmes - industry sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		99																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		99	99		0	0	0	0	0	0	91	1	1	0	0	0	6	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of Salmonella in animals

Salmonella spp.		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring program (yes/no)				yes									
Number of isolates available in the laboratory				10									
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin			10	0								
	Gentamicin			10	1								
	Neomycin			10	1								
	Spectinomycin			10	1								
	Streptomycin			10	2								
Amphenicols	Chloramphenicol			10	0								
	Florfenicol			10	0								
Cephalosporins	Cefotaxim			10	0								
	Ceftiofur			10	0								
Fluoroquinolones	Ciprofloxacin			10	0								
Penicillins	Amoxicillin / Clavulanic acid			10	2								
	Ampicillin			10	3								
Quinolones	Nalidixic acid			10	0								
Sulfonamides	Sulfonamide			10	2								
Tetracyclines	Tetracyclin			10	3								
Trimethoprim	Trimethoprim			10	0								

Table Antimicrobial susceptibility testing of Not typeable - qualitative data

Not typeable		Meat from pig - carcass - chilled - - carcass swabs - Control and eradication programmes - industry sampling	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		27	
Antimicrobials:		N	n
Aminoglycosides	Apramycin	27	0
	Gentamicin	27	0
	Neomycin	27	0
	Spectinomycin	27	4
	Streptomycin	27	7
Amphenicols	Chloramphenicol	27	3
	Florfenicol	27	1
Cephalosporins	Cefotaxim	27	0
	Ceftiofur	27	0
Fluoroquinolones	Ciprofloxacin	27	0
Penicillins	Amoxicillin / Clavulanic acid	27	8
	Ampicillin	27	8
Polymyxins	Colistin	27	0
Quinolones	Nalidixic acid	27	0
Sulfonamides	Sulfonamide	27	10
Tetracyclines	Tetracyclin	27	7
Trimethoprim	Trimethoprim	27	3

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

Not typeable		Meat from pig - carcass - - carcass swabs - Control and eradication programmes - industry sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		27																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		27	27		0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0			
	Gentamicin		27	27		0	0	0	0	0	14	13	0	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		27	27		0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0			
	Spectinomycin		27	27		0	0	0	0	0	0	0	0	0	0	0	23	0	1	1	2	0	0			
	Streptomycin		27	27		0	0	0	0	0	0	0	0	0	16	4	1	0	3	3	0	0	0			
Amphenicols	Chloramphenicol		27	27		0	0	0	0	0	0	0	0	11	12	1	0	0	3	0	0	0	0			
	Florfenicol		27	27		0	0	0	0	0	0	0	0	19	6	1	1	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		27	27		0	0	0	0	24	3	0	0	0	0	0	0	0	0	0	0	0	0			
	Ceftiofur		27	27		0	0	0	0	0	13	13	1	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		27	27		8	16	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		27	27		0	0	0	0	0	0	0	19	0	7	1	0	0	0	0	0	0	0			
	Ampicillin		27	27		0	0	0	0	0	0	12	7	0	0	0	0	8	0	0	0	0	0			
Polymyxins	Colistin		27	27		0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		27	27		0	0	0	0	0	0	0	0	24	3	0	0	0	0	0	0	0	0			
Sulfonamides	Sulfonamide		27	27		0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	10			
Tetracyclines	Tetracyclin		27	27		0	0	0	0	0	0	0	18	2	0	0	2	5	0	0	0	0	0			

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

Not typeable		Meat from pig - carcass - - carcass swabs - Control and eradication programmes - industry sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		27																							
Antimicrobials:		**break points**	**N**	**n**	**<=0.008**	**0.015**	**0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Trimethoprim	**Trimethoprim**		27	27		0	0	0	0	0	0	24	0	0	0	0	0	3	0	0	0	0	0			
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	0																					

Table Antimicrobial susceptibility testing of Other serotypes - qualitative data

Other serotypes		Pigs - fattening pigs - at slaughterhouse - Survey	
Isolates out of a monitoring program (yes/no)		no	
Number of isolates available in the laboratory		12	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	12	0
	Neomycin	12	0
	Streptomycin	12	3
Amphenicols	Chloramphenicol	12	0
	Florfenicol	12	0
Cephalosporins	Cefotaxim	12	0
	Ceftiofur	12	0
Fluoroquinolones	Ciprofloxacin	12	1
Penicillins	Ampicillin	12	2
Polymyxins	Colistin	12	0
Quinolones	Nalidixic acid	12	1
Sulfonamides	Sulfamethoxazol	12	4
Tetracyclines	Tetracyclin	12	4
Trimethoprim	Trimethoprim	12	2

Table Antimicrobial susceptibility testing of Other serotypes in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

Other serotypes		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		no																								
Number of isolates available in the laboratory		20																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		0	0																						
	Gentamicin	*2*	20	0							10	10														
	Kanamycin		0	0																						
	Neomycin	*4*	20	0									20													
	Spectinomycin		0	0																						
	Streptomycin	*16*	20	3											15	2		2	1							
Amphenicols	Chloramphenicol	*16*	20	0										7	13											
	Florfenicol	*16*	20	0										19	1											
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim	*1*	20	0					18	2																
	Ceftiofur	*2*	20	0							4	16														
Fluoroquinolones	Ciprofloxacin	*1*	20	0		2	17			1																
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin	*4*	20	0								15	3	2												
Polymyxins	Colistin	*2*	20	0								20														
Quinolones	Nalidixic acid	*16*	20	1										17	2			1								
Sulfonamides	Sulfonamide		0	0																						
Tetracyclines	Tetracyclin	*8*	20	4									16				4									

Table Antimicrobial susceptibility testing of Other serotypes in Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey - quantitative data [Dilution method]

Other serotypes		Pigs - fattening pigs - at slaughterhouse - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		no																							
Number of isolates available in the laboratory		20																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	**Trimethoprim**	*2*	20	2								18					2									
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	0																					

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	16				4	32				
	Gentamicin	2				0.5	32				
	Neomycin	4				2	32				
	Spectinomycin	64				16	256				
	Streptomycin	16				8	128				
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.5				0.125	4				
	Ceftiofur	2				0.5	8				
Fluoroquinolones	**Ciprofloxacin**	0.06				0.015	4				
Penicillins	**Amoxicillin / Clavulanic acid**	4				2	32				
	Ampicillin	4				1	32				
Polymyxins	**Colistin**	2				1	16				
Quinolones	**Nalidixic acid**	16				4	64				

Table Breakpoints for antibiotic resistance testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Sulfonamides	**Sulfonamide**	256				64	1024				
Tetracyclines	**Tetracyclin**	8				2	32				
Trimethoprim	**Trimethoprim**	2				1	32				

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	16				4	32				
	Gentamicin	2				0.5	32				
	Neomycin	4				2	32				
	Spectinomycin	64				16	256				
	Streptomycin	16				8	128				
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.5				0.125	4				
	Ceftiofur	2				0.5	8				
Fluoroquinolones	**Ciprofloxacin**	0.06				0.015	4				
Penicillins	**Amoxicillin / Clavulanic acid**	4				2	32				
	Ampicillin	4				1	32				
Polymyxins	**Colistin**	2				1	16				
Quinolones	**Nalidixic acid**	16				4	64				

Table Breakpoints for antibiotic resistance testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Sulfonamides	**Sulfonamide**	256				64	1024				
Tetracyclines	**Tetracyclin**	8				2	32				
Trimethoprim	**Trimethoprim**	2				1	32				

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	2									
	Neomycin	4									
	Streptomycin	16									
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.5									
	Ceftiofur	2									
Fluoroquinolones	**Ciprofloxacin**	0.06									
Penicillins	**Ampicillin**	4									
Polymyxins	**Colistin**	2									
Quinolones	**Nalidixic acid**	16									
Sulfonamides	**Sulfonamide**	256									
Tetracyclines	**Tetracyclin**	8				8	32				
Trimethoprim	**Trimethoprim**	2									

Table Breakpoints for antibiotic resistance testing

Table Breakpoints for antibiotic resistance testing

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	2									
	Neomycin	4									
	Streptomycin	16									
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.5									
	Ceftiofur	2									
Fluoroquinolones	**Ciprofloxacin**	0.06									
Penicillins	**Ampicillin**	4									
Polymyxins	**Colistin**	2									
Quinolones	**Nalidixic acid**	16									
Sulfonamides	**Sulfonamide**	256									
Tetracyclines	**Tetracyclin**	8				8	32				
Trimethoprim	**Trimethoprim**	2									

Table Breakpoints for antibiotic resistance testing

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

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. Data on travel history is currently not reliably recorded in the surveillance system; therefore, the incidence of people infected outside Denmark is unknown. It is estimated that approximately one third of cases are travel related.

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. In 2008, the number of infections decreased with 11% compared to the year before.

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

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 2008. 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 leading cause of bacterial gastrointestinal disease in Denmark. In 2008, there were 3,454 reported cases, corresponding to an incidence of 63.0 cases per 100,000 inhabitants. This constituted a decrease of 11% compared to the number of infections the year before. 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. Data on travel history is currently not reliably recorded in the surveillance system; therefore, the incidence of people infected outside Denmark is unknown. It is estimated that approximately one third of cases are travel related.

Results of the investigation

In 2008, there were 3,454 reported cases, corresponding to an incidence of 63 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. Data on travel history is currently not reliably recorded in the surveillance system. It is estimated that approximately one third of cases are travel related

Relevance as zoonotic disease

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

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

Other: Every flock

At meat processing plant

Other: Depend on the survey

At retail

Other: Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

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

Other: Depend on the survey

At retail

Other: Depend on the survey

Notification system in place

Campylobacteriosis is not notifiable in broilers.

Results of the investigation

In 2008, sampling of both domestic produced, fresh, chilled and frozen broiler meat as well as chilled broiler meat at slaughter happened unevenly over the year. Samples of chilled and frozen broiler meat mainly occurred during the high prevalent periods, and sampling of chilled broiler meat at slaughter only occurred during the last two quarters of the year, which is the high prevalent period. This uneven sampling means that data is not compareable to previous years as data do not represent yearly mean estimates.

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

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

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - - meat - Monitoring - industry sampling - objective sampling [1)]	Food-DTU	single	10g or 15g	484	71					71
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - domestic production - Monitoring - official sampling - objective sampling [2)]	Food-DTU	single	10g or 15g	758	306					306
Meat from broilers (Gallus gallus) - fresh - frozen - at retail - domestic production - Monitoring - official sampling - objective sampling [3)]	Food-DTU	single	10g or 15g	299	81					81

Comments:

[1)] Data are not compareable to previous years as they only represent the last 2 quarters of the year, which is the high prevalent period.

[2)] The numbers are not yearly mean estimates. They represent the Campylobacter occurrence in the high prevalent period as most samples have been collected within this period.

[3)] 10g or 15g

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 2008. 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

Other: Cloacal swabs

Methods of sampling (description of sampling techniques)

At slaughter

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

Case definition

At slaughter

Samples are concidered 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 2008, there were 25.9% 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%, but at the same level as in previous years.

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

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 one sample from one flock from each broiler holding was speciated, if positive for Campylobacter, by conventional microbiological methods. Samples consisted of 10-pooled cloacal swabs. In total 395 flocks was tested under this program and 26,8% of the flocks was positive. The species identified were C. jejuni (90.5% of the positive samples), C. upsaliensis (2.8%) and 6.6% other/non typeable. No C. coli were found.

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Badgers - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	2	0					
Birds - wild - at hospital or care home - Clinical investigations (1 mallard, 1 black-headed gull, 1 mute swan, 4 great comorants and 1 herring gull)	Vet-DTU	animal	8	0					
Cats - Clinical investigations (Pet animal)	Vet-DTU	animal	14	1					1
Cattle (bovine animals) - adult cattle over 2 years - - faeces - Monitoring - industry sampling - objective sampling	Food-DTU	herd	168	103	5	98			
Chinchillas - pet animal - Clinical investigations (Pet animal)	Vet-DTU	animal	2	0					
Deer - wild - at hospital or care home - Clinical investigations (13 roe deer and 2 red deer) [1)]	Vet-DTU	animal	15	1					1
Dogs - Clinical investigations (Pet animal)	Vet-DTU	animal	19	0					
Foxes - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	8	1					1
Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Monitoring - official sampling - objective sampling	Vet-DTU	flock	4912	1272					1272
Hares - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	5	0					
Hedgehogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	8	0					
Marten - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	2	0					
Minks - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	29	1					1

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - - faeces - Monitoring - industry sampling - objective sampling	Food-DTU	herd	292	198	193	5			
Rabbits - pet animals - Clinical investigations (Pet animal)	Vet-DTU	animal	3	0					
Raccoon dogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	3	0					
Zoo animals, all - at zoo - Clinical investigations (2 monkeys, 2 orangutans, 1 pudu, 1 lion, 1 capybara, 1 zebra, 1 mara and 1 barbary ape) [2)]	Vet-DTU	animal	10	3					3

Comments:

[1)] 1 positive sample from 1 roe deer

[2)] 3 positive samples from 1 orangutan, 1 spider monkey and 1 barbary ape

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

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

90 isolates of C. jejuni from cattle were subjected to susceptibility testing in 2008.

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

The results were similar to previous years.

B. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the 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

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

No results from susceptibility testing from pigs were availible for 2008.

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

The results were similar to previous years.

C. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

The samples from animals at slaughter are collected by meat inspection staff or company personnel and sent to the 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.

In 2008, a baselinesurvey on broilers was carried out.

Type of specimen taken

faecal sample

In 2008, baseline survey, caecum collected at slaughter

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

Breakpoints used in testing

See table

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

82 isolates of C. jejuni from broilers were subjected to susceptibility testing in 2008.

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

The results were similar to previous years.

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

Sampling strategy used in monitoring

Frequency of the sampling

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

E. 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.

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

Sampling strategy used in monitoring

Frequency of the sampling

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

Type of specimen taken

Meat samples

Methods used for collecting data

All isolates are tested centrally at the DTU-FOOD.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See tables

Breakpoints used in testing

See tables

Preventive measures in place

None

Control program/mechanisms

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

26 isolates of C. jejuni from poultry meat samples were subjected to susceptibility testing in 2008.

Table Antimicrobial susceptibility testing of C. coli in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory																									
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		0	0																					
	Streptomycin		0	0																					
Amphenicols	Chloramphenicol		0	0																					
Fluoroquinolones	Ciprofloxacin		0	0																					
Macrolides	Erythromycin		0	0																					
Penicillins	Ampicillin		0	0																					
Quinolones	Nalidixic acid		0	0																					
Tetracyclines	Tetracyclin		0	0																					

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		no	
Number of isolates available in the laboratory		6	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	6	0
	Streptomycin	6	3
Amphenicols	Chloramphenicol	6	0
Fluoroquinolones	Ciprofloxacin	6	3
Macrolides	Erythromycin	6	2
Quinolones	Nalidixic acid	6	3
Tetracyclines	Tetracyclin	6	2

Table Antimicrobial susceptibility testing of C. jejuni in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory																									
Antimicrobials:		**break points**	**N**	**n**	**<=0.008**	**0.015**	**0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides	**Gentamicin**		0	0																					
	Streptomycin		0	0																					
Amphenicols	**Chloramphenicol**		0	0																					
Fluoroquinolones	**Ciprofloxacin**		0	0																					
Macrolides	**Erythromycin**		0	0																					
Penicillins	**Ampicillin**		0	0																					
Quinolones	**Nalidixic acid**		0	0																					
Tetracyclines	**Tetracyclin**		0	0																					

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey		Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - official sampling		Cattle (bovine animals) - at slaughterhouse - Monitoring - official sampling	
Isolates out of a monitoring program (yes/no)		no		yes		yes	
Number of isolates available in the laboratory		68		82		90	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin	68	0	82	0	90	0
	Streptomycin	68	6	82	4	90	1
Amphenicols	Chloramphenicol	68	0	82	0	90	0
Fluoroquinolones	Ciprofloxacin	68	15	82	10	90	18
Macrolides	Erythromycin	68	0	82	0	90	0
Quinolones	Nalidixic acid	68	15	82	10	90	18
Tetracyclines	Tetracyclin	68	6	82	8	90	3

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

C. jejuni		Cattle (bovine animals) - at slaughterhouse - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		90																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		90	90				0	7	64	19	0	0	0	0	0	0	0	0							
	Streptomycin		90	90				0	0	0	0	88	1	0	0	0	1	0	0							
Amphenicols	Chloramphenicol		90	90				0	0	0	0	0	76	14	0	0	0	0	0							
Fluoroquinolones	Ciprofloxacin		90	90				7	55	10	0	0	0	0	18	0	0	0	0							
Macrolides	Erythromycin		90	90				0	0	0	18	56	16	0	0	0	0	0	0							
Penicillins	Ampicillin		0	0																						
Quinolones	Nalidixic acid		90	90				0	0	0	0	0	1	49	20	2	0	1	17							
Tetracyclines	Tetracyclin		90	90				0	0	75	12	0	0	0	0	0	3	0	0							

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - official sampling - quantitative data [Dilution method]

C. jejuni		Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		82																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		82	82				0	2	45	34	1	0	0	0	0	0	0	0							
	Streptomycin		82	82				0	0	0	0	70	8	0	1	0	3	0	0							
Amphenicols	Chloramphenicol		82	82				0	0	0	0	0	12	63	7	0	0	0	0							
Fluoroquinolones	Ciprofloxacin		82	82				5	37	27	2	1	0	1	9	0	0	0	0							
Macrolides	Erythromycin		82	82				0	0	0	4	14	53	11	0	0	0	0	0							
Penicillins	Ampicillin		0	0																						
Quinolones	Nalidixic acid		82	82				0	0	0	0	0	1	42	22	7	1	0	9							
Tetracyclines	Tetracyclin		82	82				0	0	14	48	9	3	0	1	0	7	0	0							

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		26	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	26	0
	Streptomycin	26	1
Amphenicols	Chloramphenicol	26	0
Fluoroquinolones	Ciprofloxacin	26	5
Macrolides	Erythromycin	26	0
Quinolones	Nalidixic acid	26	5
Tetracyclines	Tetracyclin	26	3

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

C. jejuni		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		26																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		26	26				0	0	22	4	0	0	0	0	0	0	0	0							
	Streptomycin		26	26				0	0	0	0	25	0	0	0	0	1	0	0							
Amphenicols	Chloramphenicol		26	26				0	0	0	0	0	22	4	0	0	0	0	0							
Fluoroquinolones	Ciprofloxacin		26	26				1	18	2	0	0	0	0	5	0	0	0	0							
Macrolides	Erythromycin		26	26				0	0	0	11	13	2	0	0	0	0	0	0							
Penicillins	Ampicillin		0	0																						
Quinolones	Nalidixic acid		26	26				0	0	0	0	0	1	18	2	0	0	0	5							
Tetracyclines	Tetracyclin		26	26				0	0	21	2	0	0	0	0	1	2	0	0							

Table Antimicrobial susceptibility testing of Campylobacter in animals

Campylobacter spp., unspecified		Gallus gallus (fowl)		Cattle (bovine animals)		Pigs	
Isolates out of a monitoring program (yes/no)							
Number of isolates available in the laboratory						75	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin					75	6

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
eucast

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	1				0.125	16				
	Streptomycin	2				2	16				
Amphenicols	**Chloramphenicol**	16				2	32				
Fluoroquinolones	**Ciprofloxacin**	1				0.06	4				
Macrolides	**Erythromycin**	4				0.5	32				
Quinolones	**Nalidixic acid**	16				2	64				
Tetracyclines	**Tetracyclin**	2				0.25	16				

Footnote:

Only breakpoint for C.jejuni is reported.

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
eucast

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	1				0.125	16				
	Streptomycin	2				2	16				
Amphenicols	**Chloramphenicol**	16				2	32				
Fluoroquinolones	**Ciprofloxacin**	1				0.06	4				
Macrolides	**Erythromycin**	4				0.5	32				
Quinolones	**Nalidixic acid**	16				2	64				
Tetracyclines	**Tetracyclin**	2				0.25	16				

Footnote:

Only breakpoint for C.jejuni is reported.

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 2008, there were 51 cases in Denmark (an incidence of 0.9/100.000 population)corresponding to a decrease of 12% compared to last year. During recent years, however, the number of positive cases has been increasing from 29 in 2003 to 58 in 2007.

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 2008, there were 51 cases in Denmark (an incidence of 0.9/100.000 population)corresponding to a decrease of 12% compared to 2007. During recent years, however, the number of positive cases has been increasing from 29 in 2003 to 58 in 2007.

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 milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - hard - made from pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	batch	25	5	0	5	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	19	0	19	0			
Cheeses made from cows' milk - unspecified - made from pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	batch	25	10	0	2	0	8		
Dairy products (excluding cheeses) - butter - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	batch	25	9	0	8	0	1		
Dairy products (excluding cheeses) - ice-cream - at processing plant - domestic production - Surveillance - official controls - selective sampling	DFVA	batch	25	9	0	3	0	6		
Milk, cows' - pasteurised milk - at processing plant - domestic production - Surveillance - official controls - selective sampling	DVFA	batch	25	17	0	13	0	4		

Footnote:

5 single samples are collected from each batch

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cereals and meals - at processing plant - Surveillance - official controls - selective sampling	DFVA	batch	25	31	0			31		
Crustaceans - unspecified - cooked - at processing plant - Surveillance - official controls - selective sampling (For the enumeration testing, all data was reported as <100)	DFVA	batch	25	38	0	2	0	36	0	
Fish - cooked - at processing plant - Surveillance - official controls - selective sampling	DVFA	single	25	14	0	2	0	12		
Fish - cooked - at retail - Surveillance - official controls - selective sampling	DVFA	single	25	28	0	4	0	24		
Fish - smoked - at processing plant - Surveillance - official controls - selective sampling	DVFA	batch	25	18	0	7	0	11	0	
Fruits and vegetables - precut - at retail - Surveillance - official controls - selective sampling	DVFA	single	25	49	0	1	0	48		
Meat from bovine animals - meat products - cooked, ready-to-eat - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	81	0			81		
Meat from bovine animals - meat products - cooked, ready-to-eat - at retail - Surveillance - official controls - selective sampling	DFVA	single	25	162	0	1	0	161		
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	30	0	30				
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at retail - Surveillance - official controls - selective sampling	DFVA	single	25	58	0	58	0			

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Meat from other animal species or not specified - meat products - cooked, ready-to-eat - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	15	0			15		
Meat from other animal species or not specified - meat products - cooked, ready-to-eat - at retail - Surveillance - official controls - selective sampling	DFV A	single	25	10	0			10		
Meat from pig - meat products - cooked, ready-to -eat - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	270	0	34	0	236	0	
Meat from pig - meat products - cooked, ready-to -eat - at retail - Surveillance - official controls - selective sampling	DFVA	single	25	541	7	68	3	473	2	2
Meat from turkey - meat products - cooked, ready-to-eat - at processing plant - Surveillance - official controls - selective sampling	DVFA	single	25	10	0					
Meat from turkey - meat products - cooked, ready-to-eat - at retail - Surveillance - official controls - selective sampling	DVFA	single	25	22	0					
Other processed food products and prepared dishes - unspecified - ready-to-eat foods - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	66	0	12	0	54		
Other processed food products and prepared dishes - unspecified - ready-to-eat foods - at retail - Surveillance - official controls - selective sampling				133	1	24	1	109		
Ready-to-eat salads - containing mayonnaise - at processing plant - Surveillance - official controls - selective sampling	DFVA	single	25	87	3	5	0	82	3	
Ready-to-eat salads - containing mayonnaise - at retail - Surveillance - official controls - selective sampling	DVFA	single	25	175	2	10	0	165	2	

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Sauce and dressings - at retail - Surveillance - official controls - selective sampling	DFVA	single	25	76	0	2	0	74		

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 2006 to 2007, however it is similar to the 2004 level. In 2008, the number of registered infections were the same as in 2007.

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

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

The number of registered infections increased by 10% from 2006 to 2007, however it is similar to the 2004 level. In 2008, the number of registered cases were the same as in 2007.

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 2008, there were 161 reported cases positive with verocytotoxin-producing Escherichia coli (VTEC) infections; an incidence of 2.9 per 100,000. VTEC O157 was found in 15 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 2008, VTEC O157 was detected in 7,2% (16/222) 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%

Frequency of the sampling

Animals at slaughter (herd based approach)

Other: One animal per randomly selected herd

Type of specimen taken

Animals at slaughter (herd based approach)

Faeces

Methods of sampling (description of sampling techniques)

Animals at slaughter (herd based approach)

faecal samples are collected from slaughter calves at the slaughterhouses.

Case definition

Animals at slaughter (herd based approach)

An animal from which VTEC 0157 is isolated

Control program/mechanisms

The control program/strategies in place

VTEC is not notifiable in animals.

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

None

Results of the investigation

In 2008, VTEC O157 was detected in 7,2% (16/222) 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

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) - - faeces - Monitoring - industry sampling - objective sampling	DTU-food	animal	25	222	16	16		

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 EU, and the disease has not been diagnosed in cattle since 1988.

Deer farming began in Denmark in the early 1980 and until then bovine tuberculosis had never been diagnosed from deer. The farmed deer was primarily imported animals and in 1988 an outbreak was reported and during 1988-89 another 12 farms was diagnosed with bovine tuberculosis. In 1989 a control programme was initiated and in 1991, 1993 and 1994 tuberculosis was diagnosed from on 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

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 2008, one case 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

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

Methods of sampling (description of sampling techniques)

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

Case definition

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

Diagnostic/analytical methods used

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

Vaccination policy

No vaccination

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

In Denmark the control programmes are based on the following legislation: EU 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

511,300 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

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

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

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

Frequency of the sampling

All slaughtered animals are inspected at slaughter.

Type of specimen taken

Other: Tubercles ect.

Methods of sampling (description of sampling techniques)

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

Case definition

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

Diagnostic/analytical methods used

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

Vaccination policy

No vaccination

Other preventive measures than vaccination in place

None

Control program/mechanisms

The control program/strategies in place

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

Recent actions taken to control the zoonoses

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

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 spp.	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Cattle (bovine animals) - at slaughterhouse - Control and eradication programmes - official and industry sampling	Vet-DTU	animal	511300	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	18582288	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 examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
DANMARK	32000	1600000	32000	100		0	1	1550	740	0	0
Total	32000	1600000	32000	100.0	0	0.0	1	1550	740	0	0
Total - 1											

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

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 2008, 8 cases of brucellosis was reported, which is a decrease compared to 2007 but similar to the number of cases in 2006.

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

Other: Blood, fetuses, depending on stratigy

Methods of sampling (description of sampling techniques)

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

Case definition

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

Diagnostic/analytical methods used

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

2994 animals tested in 2008, all of which were negative.

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

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

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

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

Additional information

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

B. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Denmark is declared officially brucellosis.

Monitoring system

Sampling strategy

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

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

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

Case definition

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

Diagnostic/analytical methods used

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 2008, 3643 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

There have been no findings of Brucellose in animals or foodstuff

C. 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 2008, 3643 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

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 spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Cattle (bovine animals) - adult cattle over 2 years - - blood - Clinical investigations (Fertility problems)	Vet-DTU	animal	142	0				
Cattle (bovine animals) - breeding bulls - at AI station - Control and eradication programmes - official sampling - objective sampling	Vet-DTU	animal	2627	0				
Cattle (bovine animals) - unspecified - - blood - Control and eradication programmes - official sampling (Export)	Vet-DTU	animal	225	0				
Hares - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	1	0				
Marine mammals - wild - at zoo - Clinical investigations (1 dolphin)	Vet-DTU	animal	1	0				
Pigs - - blood - Clinical investigations (Fertility problems)	Vet-DTU	animal	143	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	15739	0				
Pigs - mixed herds - unspecified - - blood - Control and eradication programmes - official sampling (Export)	Vet-DTU	animal	8790	0				
Pigs - mixed herds - unspecified - - blood - Control and eradication programmes - official sampling (Import)	Vet-DTU	animal	124	0				
Sheep and goats - - blood - Control and eradication programmes - official sampling - selective sampling (Export)	Vet-DTU	animal	5	0				
Sheep and goats - - blood - Control and eradication programmes - official sampling - selective sampling (Import)	Vet-DTU	animal	98	0				

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Sheep and goats - at AI station - Surveillance - official controls - objective sampling	Vet-DTU	animal	3536	0				

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 microbiologically	Number of animals positive microbiologically
																		Sero logically	BST		
DANMARK	32000	1600000	32000	100		0	0	0	0	0	0	0		0	0	142	0	0	0	0	0
Total	32000	1600000	32000	100.0	0	0.0	0	0	0	0	0	0	0	0	0	142	0	0	0	0	0
Total - 1																					

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

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
DANMARK	12555	196000	12555	100		0	0	0	0	4	0	0	0	0
Total	12555	196000	12555	100.0	0	0.0	0	0	0	4	0	0	0	0
Total - 1														

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

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 2008, there were 330 reported infections with Yersinia enterocolitica (6.0 cases per 100,000 inhabitants), which is an increase of 18% compared to the year before. From 2000 to 2007, the annual number of infections has been almost unchanged. From 1985 to 2000 the number of cases dropped from more than 1,500 to around 250 cases with Y. enterocolitica annually. The infections are believed to be mostly domestically acquired and many patients are children; the median age of patients was 16 years, somewhat higher than in preceding years. 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.

2.7.3 Yersinia in animals

2.8 TRICHINELLOSIS

2.8.1 General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/or infection in the country

Since 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. A fairly large number of mink have been examined after Tri-chinella was found in wild mink in the island of Bornholm.

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 dis-ease 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.

Therefore an intensified collection and examination of mink on Bornholm was carried out as well as ex-amination of 50 rooks. So far, no other findings of Trichinella have been made.

No other indicator animals were tested positive for Trichinella in 2008.

The finding of Trichinella pseudospiralis in 2 wild mink has been taken into account when passing an evaluation to the commission. The animals posed no immediate threat to the human food chain, and a focused testing of wildlife in the island, where the mink were found, was carried out without any other infected animals being found. Therefore, results from 2008 have shown that Trichinella is not to be considered a relevant source of a zoonotic disease in Denmark.

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

In 2008 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 2008, 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 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 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 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

B. 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.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella spp.	T. spiralis	T. pseudospiralis	Trichinella spp., unspecified
Badgers - wild - Clinical investigations	Vet-DTU	animal	12	0			
Birds - wild - Clinical investigations (Rooks)	Vet-DTU	animal	50	0			
Foxes - wild - Clinical investigations	Vet-DTU	animal	122	0			
Marten - wild - Clinical investigations	Vet-DTU	animal	4	0			
Minks - wild - Clinical investigations	Vet-DTU	animal	142	2		2	
Otter - Clinical investigations (Wild)	Vet-DTU	animal	1	0			
Pigs - breeding animals - unspecified - sows and boars - - meat - Control and eradication programmes - industry sampling - census sampling	DMA	animal	353592	0			
Pigs - fattening pigs - raised under controlled housing conditions in integrated production system - - meat - Control and eradication programmes - industry sampling - census sampling	DMA	animal	18582288	0			
Raccoon dogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	5	0			
Solipeds, domestic - horses - - meat - Control and eradication programmes - industry sampling - census sampling	DMA	animal	2520	0			
Wild boars - farmed - - meat - Control and eradication programmes - industry sampling - census sampling	Vet-DTU	animal	1946	0			
Wild boars - zoo animals - at zoo - Clinical investigations	Vet-DTU	animal	4	0			

2.9 ECHINOCOCCOSIS

2.9.1 General evaluation of the national situation

A. Echinococcus spp. general evaluation

History of the disease and/or infection in the country

Surveillance and control of Echinococcus is carried out by the meat inspectors according the the 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 granulos infection in animals is notifiable, however it has never been detected in Denmark. Echinococcus multilocularis infection in animals is notifiable. It was detected in wild foxes in 2000, but since 2001, all foxes tested have been negative. In 2008, 4 racoon dogs were tested and all were negative.

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

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

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

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 2008, a total of 5 cases of E. granulosus was reported, all were imported. 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 were a few findings in foxes.

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus spp.	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals) - at slaughterhouse - Control and eradication programmes ((Visual examination by the meat inspectors))	DFVA	animal	511300	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	18582288	0			
Raccoon dogs - wild - at hospital or care home - Clinical investigations	Vet-DTU	animal	4	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

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

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 2007.

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

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 2008.

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 2007.

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)	Unspecified Lyssavirus	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Bats - wild - Clinical investigations	Vet-DTU	animal	16	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

2008 - Diagnostic analysis
Blood samples N= 229, pos=26 (Samples from 127 herds)
Tank milk samples N=607, pos=362 (Samples from 571 herds)

In 2008, serum samples 19 sheep/goats (6 herds), 18 deer (1 herd), 1 horse and 4 dogs as well as milk samples from 2 sheep/goats (2 herds) were analysed for Q-fever by serology (ELISA). Serum samples from 30 pigs (2 herds) were analysed by CFT, and placenta samples from 3 sheep/goats were tested by FISH. All samples tested negative.

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 (Table 8). However, the last three years the percentage of positive samples from cattle meant for export has increased to 7-11%, however there is no explanation for this increase. Since 2005 more focus has been put into diagnose of suspicious samples, and 15.0% and 27.5% of these samples were positive in 2005 and 2006, respectively. Further, a newly developed fluorescent in situ hybridisation method (FISH) was used to analyse tissue samples from diagnostic

cases of afterbirth in 2006. Fourteen samples were analysed, two samples were positive.

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 - - blood - Monitoring - official sampling [1)]	Vet-DTU	herd	229	26	26
Cattle (bovine animals) - dairy cows - - milk - Monitoring - official sampling [2)]	Vet-DTU	herd	607	362	362

Comments:

[1)] 229 serum samples from 127 herds

[2)] 607 bulk tank milk samples from 571 herds

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ENTEROCOCCUS, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.1.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

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

E. faecium		Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - official sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		51																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		51	51			0	0	0	0	0	0	0	0	0	0	50	0	1	0	0	0	0	0		
	Kanamycin		51	51			0	0	0	0	0	0	0	0	0	0	0	0	17	24	9	1	0	0		
	Streptomycin		51	51			0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	5		
Amphenicols	Chloramphenicol		51	51			0	0	0	0	0	0	6	24	21	0	0	0	0	0	0	0	0	0		
Fluoroquinolones	Moxifloxacin		0	0																						
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin		0	0																						
	Vancomycin		51	51			0	0	0	0	0	0	49	1	0	0	0	1	0	0	0	0	0	0		
Glycylcyclines	Tigecycline		51	51			7	21	9	6	2	6	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores	Salinomycin		51	51			0	0	0	0	0	0	10	8	27	5	1	0	0	0	0	0	0	0		
Macrolides	Erythromycin		51	51			0	0	0	0	13	7	16	7	2	2	0	4	0	0	0	0	0	0		
Orthosomycins	Avilamycin		51	51			0	0	0	0	0	0	23	25	0	2	0	1	0	0	0	0	0	0		
Oxazolidines	Linezolid		51	51			0	0	0	0	0	12	39	0	0	0	0	0	0	0	0	0	0	0		
Penicillins	Ampicillin		51	51			0	0	0	0	0	0	45	5	1	0	0	0	0	0	0	0	0	0		
	Penicillin		0	0																						

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

E. faecium		Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		51																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Streptogramins	Quinupristin/Dalfopristin		51	51			0	0	0	0	10	17	14	9	0	1	0	0	0	0	0	0	0	0		
Tetracyclines	Tetracyclin		51	51			0	0	0	0	0	45	2	0	0	0	0	4	0	0	0	0	0	0		
	Tetracyclines		0	0																						

Table Antimicrobial susceptibility testing of E. faecium - qualitative data

E. faecium		Gallus gallus (fowl) - at slaughterhouse - Monitoring - official sampling		Pigs - fattening pigs - at slaughterhouse - Monitoring - official sampling	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		51		145	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	51	1	145	0
	Kanamycin	51	0	145	34
	Streptomycin	51	5	145	63
Amphenicols	Chloramphenicol	51	0	145	0
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	51	1	145	0
Glycylcyclines	Tigecycline	51	8	145	0
Ionophores	Salinomycin	51	33	145	1
Macrolides	Erythromycin	51	8	145	46
Orthosomycins	Avilamycin	51	1	145	0
Oxazolidines	Linezolid	51	0	145	0
Penicillins	Ampicillin	51	1	145	13
Streptogramins	Quinupristin/Dalfopristin	51	1	145	2
Tetracyclines	Tetracyclin	51	4	145	88

Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - official sampling - quantitative data [Dilution method]

E. faecium		Pigs - fattening pigs - at slaughterhouse - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		145																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		145	145		0	0	0	0	0	0	0	0	0	0	142	3	0	0	0	0	0	0	0		
	Kanamycin		145	145		0	0	0	0	0	0	0	0	0	0	0	0	0	33	63	14	1	1	33		
	Streptomycin		145	145		0	0	0	0	0	0	0	0	0	0	0	0	79	3	0	6	22	16	19		
Amphenicols	Chloramphenicol		145	145		0	0	0	0	0	0	0	5	47	87	6	0	0	0	0	0	0	0	0		
Fluoroquinolones	Moxifloxacin		0	0																						
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin		0	0																						
	Vancomycin		145	145		0	0	0	0	0	0	128	12	5	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines	Tigecycline		145	145		1	5	117	17	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores	Salinomycin		145	145		0	0	0	0	0	0	0	144	0	1	0	0	0	0	0	0	0	0	0		
Macrolides	Erythromycin		145	145		0	0	0	0	0	21	5	39	34	5	0	0	41	0	0	0	0	0	0		
Orthosomycins	Avilamycin		145	145		0	0	0	0	0	0	0	0	139	5	1	0	0	0	0	0	0	0	0		
Oxazolidines	Linezolid		145	145		0	0	0	0	0	0	16	107	22	0	0	0	0	0	0	0	0	0	0		
Penicillins	Ampicillin		145	145		0	0	0	0	0	0	0	67	65	11	1	0	1	0	0	0	0	0	0		
	Penicillin		145	145		0	0	0	0	0	0	0	37	25	4	65	13	1	0	0	0	0	0	0		
Streptogramins	Quinupristin/Dalfopristin		145	145		0	0	0	0	0	20	7	75	41	2	0	0	0	0	0	0	0	0	0		
Tetracyclines	Tetracyclin		145	145		0	0	0	0	0	0	56	1	0	1	0	5	82	0	0	0	0	0	0		
	Tetracyclines		0	0																						

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

E. faecium		Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		15																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		15	15			0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0				
	Kanamycin		15	15			0	0	0	0	0	0	0	0	0	0	0	0	4	5	6	0				
	Streptomycin		15	15			0	0	0	0	0	0	0	0	0	0	0	13	1	0	0	1				
Amphenicols	Chloramphenicol		15	15			0	0	0	0	0	0	1	8	5	1	0	0	0	0	0	0				
Fluoroquinolones	Moxifloxacin		0	0																						
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin		15	15			0	0	0	0	0	0	6	7	2	0	0	0	0	0	0	0				
	Vancomycin		15	15			0	0	0	0	0	13	0	2	0	0	0	0	0	0	0	0				
Glycylcyclines	Tigecycline		15	15			1	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
Ionophores	Salinomycin		15	15			0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0				
Macrolides	Erythromycin		15	15			0	0	0	0	0	2	3	6	3	0	0	1	0	0	0	0				
Orthosomycins	Avilamycin		15	15			0	0	0	0	0	0	0	14	1	0	0	0	0	0	0	0				
Oxazolidines	Linezolid		15	15			0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0				
Penicillins	Ampicillin		15	15			0	0	0	0	0	0	12	2	1	0	0	0	0	0	0	0				
	Penicillin		15	15			0	0	0	0	0	0	5	7	1	1	1	0	0	0	0	0				
Streptogramins	Quinupristin/Dalfopristin		15	15			0	0	0	0	4	1	9	1	0	0	0	0	0	0	0	0				
Tetracyclines	Tetracyclin		15	15			0	0	0	0	0	13	0	0	0	0	0	2	0	0	0	0				
	Tetracyclines		0	0																						

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

E. faecium		Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		23																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		23	23				0	0	0	0	0	0	0	0	22	1	0	0	0	0	0	0			
	Kanamycin		23	23				0	0	0	0	0	0	0	0	0	0	0	10	7	4	1	1			
	Streptomycin		23	23				0	0	0	0	0	0	0	0	0	0	22	1	0	0	0	0			
Amphenicols	Chloramphenicol		23	23				0	0	0	0	0	1	7	15	0	0	0	0	0	0	0	0			
Fluoroquinolones	Moxifloxacin		0	0																						
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin		23	23				0	0	0	0	1	9	12	1	0	0	0	0	0	0	0	0			
	Vancomycin		23	23				0	0	0	0	21	2	0	0	0	0	0	0	0	0	0	0			
Glycylcyclines	Tigecycline		23	23				22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Ionophores	Salinomycin		23	23				0	0	0	0	0	22	0	1	0	0	0	0	0	0	0	0			
Macrolides	Erythromycin		23	23				0	0	0	10	3	5	3	2	0	0	0	0	0	0	0	0			
Orthosomycins	Avilamycin		23	23				0	0	0	0	0	0	22	1	0	0	0	0	0	0	0	0			
Oxazolidines	Linezolid		23	23				0	0	0	0	0	21	2	0	0	0	0	0	0	0	0	0			
Penicillins	Ampicillin		23	23				0	0	0	0	0	21	2	0	0	0	0	0	0	0	0	0			
	Penicillin		23	23				0	0	0	0	0	11	10	0	2	0	0	0	0	0	0	0			
Streptogramins	Quinupristin/Dalfopristin		23	23				0	0	0	10	3	8	2	0	0	0	0	0	0	0	0	0			
Tetracyclines	Tetracyclin		23	23				0	0	0	0	20	0	0	0	0	2	1	0	0	0	0	0			
	Tetracyclines		0	0																						

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

E. faecium		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		81																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin		81	81			0	0	0	0	0	0	0	0	0	81	0	0	0	0	0	0	0	0		
	Kanamycin		81	81			0	0	0	0	0	0	0	0	0	0	0	0	30	37	13	1	0	0		
	Streptomycin		81	81			0	0	0	0	0	0	0	0	0	0	0	76	2	0	0	1	1	1		
Amphenicols	Chloramphenicol		81	81			0	0	0	0	0	0	4	38	38	1	0	0	0	0	0	0	0	0		
Fluoroquinolones	Moxifloxacin		0	0																						
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin		81	81			0	0	0	1	0	1	16	48	14	1	0	0	0	0	0	0	0	0		
	Vancomycin		81	81			0	0	0	0	0	50	25	6	0	0	0	0	0	0	0	0	0	0		
Glycylcyclines	Tigecycline		81	81			8	71	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ionophores	Salinomycin		81	81			0	0	0	0	0	0	16	24	41	0	0	0	0	0	0	0	0	0		
Macrolides	Erythromycin		81	81			0	0	0	0	22	7	10	27	4	5	3	3	0	0	0	0	0	0		
Orthosomycins	Avilamycin		81	81			0	0	0	0	0	0	0	81	0	0	0	0	0	0	0	0	0	0		
Oxazolidines	Linezolid		81	81			0	0	0	0	0	1	73	7	0	0	0	0	0	0	0	0	0	0		
Penicillins	Ampicillin		81	81			0	0	0	0	0	0	79	1	1	0	0	0	0	0	0	0	0	0		
	Penicillin		81	81			0	0	0	0	0	0	57	16	6	1	1	0	0	0	0	0	0	0		
Streptogramins	Quinupristin/Dalfopristin		81	81			0	0	0	1	32	13	25	7	2	1	0	0	0	0	0	0	0	0		
Tetracyclines	Tetracyclin		81	81			0	0	0	0	0	74	0	0	0	2	2	3	0	0	0	0	0	0		
	Tetracyclines		0	0																						

Table Antimicrobial susceptibility testing of E. faecium - qualitative data

E. faecium		Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling		Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling	
Isolates out of a monitoring program (yes/no)		yes		yes		yes	
Number of isolates available in the laboratory		23		15		81	
Antimicrobials:		N	n	N	n	N	n
Aminoglycosides	Gentamicin	23	0	15	0	81	0
	Kanamycin	23	1	15	0	81	0
	Streptomycin	23	0	15	1	81	3
Amphenicols	Chloramphenicol	23	0	15	0	81	0
Glycopeptides (Cyclic peptides, Polypeptides)	Daptomycin	23	1	15	2	81	15
	Vancomycin	23	0	15	0	81	0
Glycylcyclines	Tigecycline	23	0	15	0	81	0
Ionophores	Salinomycin	23	1	15	0	81	41
Macrolides	Erythromycin	23	2	15	4	81	15
Orthosomycins	Avilamycin	23	0	15	0	81	0
Oxazolidines	Linezolid	23	0	15	0	81	0
Penicillins	Ampicillin	23	0	15	1	81	1
Streptogramins	Quinupristin/Dalfopristin	23	0	15	0	81	3
Tetracyclines	Tetracyclin	23	3	15	2	81	7

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	32				128	2048				
	Kanamycin	1024				128	2048				
	Streptomycin	128				128	2048				
Amphenicols	**Chloramphenicol**	32				2	64				
Glycopeptides (Cyclic peptides, Polypeptides)	**Daptomycin**	4				0.125	16				
	Vancomycin	4				2	32				
Glycylcyclines	**Tigecycline**	0.25				0.015	2				
Ionophores	**Salinomycin**	4				2	16				
Macrolides	**Erythromycin**	4				0.5	32				
Orthosomycins	**Avilamycin**	16				2	16				
Oxazolidines	**Linezolid**	4				1	8				
Penicillins	**Ampicillin**	4				2	64				
	Penicillin	16				2	32				
Streptogramins	**Quinupristin/Dalfopristin**	4				0.5	16				

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines	Tetracyclin	2				1	32				

Footnote:

Only breakpoint for E. faecium in broilers is reported.

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	32				128	2048				
	Kanamycin	1024				128	2048				
	Streptomycin	128				128	2048				
Amphenicols	**Chloramphenicol**	32				2	64				
Glycopeptides (Cyclic peptides, Polypeptides)	**Daptomycin**	4				0.125	16				
	Vancomycin	4				2	32				
Glycylcyclines	**Tigecycline**	0.25				0.015	2				
Ionophores	**Salinomycin**	4				2	16				
Macrolides	**Erythromycin**	4				0.5	32				
Orthosomycins	**Avilamycin**	16				2	16				
Oxazolidines	**Linezolid**	4				1	8				
Penicillins	**Ampicillin**	4				2	64				
	Penicillin	16				2	32				
Streptogramins	**Quinupristin/Dalfopristin**	4				0.5	16				

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines	Tetracyclin	2				1	32				

Footnote:

Only breakpoint for E. faecium in broilers is reported.

3.2 ESCHERICHIA COLI, NON-PATHOGENIC

3.2.1 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

The results were similar to previous years (Antimicrobial resistance)

Recent actions taken to control the zoonoses

No changes

3.2.2 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

Breakpoints 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

113 isolates from poultry meat, 63 isolates from beef and 66 isolates from pork were subjected for susceptibility testing of E. coli in 2008.

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

Breakpoints used in testing

See tables

Preventive measures in place

none

Control program/mechanisms

The control program/strategies in place

none

Measures in case of the positive findings or single cases

none

Notification system in place

E. coli is not a notifiable disease in Denmark.

Results of the investigation

114 isolates from broilers, 97 isolaters from cattle and 151 isolates from pigs were collected for susceptibility testing in 2008.

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

The results for 2007 were similar to 2006.

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

E. coli		Gallus gallus (fowl) - at slaughterhouse - Monitoring																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		114																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		114	114		0	0	0	0	0	0	0	0	80	31	3	0	0	0	0	0	0	0			
	Gentamicin		114	114		0	0	0	0	0	79	32	2	0	0	0	1	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		114	114		0	0	0	0	0	0	0	111	2	0	0	0	1	0	0	0	0	0			
	Spectinomycin		114	114		0	0	0	0	0	0	0	0	0	0	96	14	1	1	2	0	0	0			
	Streptomycin		114	114		0	0	0	0	0	0	0	0	0	102	3	4	4	1	0	0	0	0			
Amphenicols	Chloramphenicol		114	114		0	0	0	0	0	0	0	11	71	32	0	0	0	0	0	0	0	0			
	Florfenicol		114	114		0	0	0	0	0	0	0	12	83	19	0	0	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		114	114		0	0	0	113	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Ceftiofur		114	114		0	0	0	0	0	111	3	0	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		114	114		89	11	1	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin		114	114		0	0	0	0	0	0	18	42	39	1	0	0	14	0	0	0	0	0			
Polymyxins	Colistin		114	114		0	0	0	0	0	0	112	2	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		114	114		0	0	0	0	0	0	0	0	99	1	0	4	4	6	0	0	0	0			
Sulfonamides	Sulfonamide		114	114		0	0	0	0	0	0	0	0	0	0	0	0	101	0	0	0	0	13			
Tetracyclines	Tetracyclin		114	114		0	0	0	0	0	0	0	102	0	0	0	1	11	0	0	0	0	0			

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

E. coli		Gallus gallus (fowl) - at slaughterhouse - Monitoring																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		114																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		114	114		0	0	0	0	0	0	109	0	0	0	0	0	5	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

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

E. coli		Cattle (bovine animals) - at slaughterhouse - Monitoring																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		97																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		97	97		0	0	0	0	0	0	0	0	86	11	0	0	0	0	0	0	0	0			
	Gentamicin		97	97		0	0	0	0	0	92	5	0	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		97	97		0	0	0	0	0	0	0	96	1	0	0	0	0	0	0	0	0	0			
	Spectinomycin		97	97		0	0	0	0	0	0	0	0	0	0	86	8	2	1	0	0	0	0			
	Streptomycin		97	97		0	0	0	0	0	0	0	0	0	92	1	3	0	1	0	0	0	0			
Amphenicols	Chloramphenicol		97	97		0	0	0	0	0	0	0	1	24	67	4	0	1	0	0	0	0	0			
	Florfenicol		97	97		0	0	0	0	0	0	0	1	25	66	4	0	1	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		97	97		0	0	0	96	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Ceftiofur		97	97		0	0	0	0	0	97	0	0	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		97	97		70	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin		97	97		0	0	0	0	0	0	2	25	62	7	0	0	1	0	0	0	0	0			
Polymyxins	Colistin		97	97		0	0	0	0	0	0	96	1	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		97	97		0	0	0	0	0	0	0	0	96	1	0	0	0	0	0	0	0	0			
Sulfonamides	Sulfonamide		97	97		0	0	0	0	0	0	0	0	0	0	0	0	92	0	0	0	0	5			
Tetracyclines	Tetracyclin		97	97		0	0	0	0	0	0	0	74	19	0	0	0	4	0	0	0	0	0			

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

E. coli		Cattle (bovine animals) - at slaughterhouse - Monitoring																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		97																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim	Trimethoprim		97	97		0	0	0	0	0	0	94	1	0	0	0	0	2	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of E. coli in Pigs - at slaughterhouse - Monitoring - quantitative data [Dilution method]

E. coli		Pigs - at slaughterhouse - Monitoring																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		151																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		151	151		0	0	0	0	0	0	0	0	135	14	2	0	0	0	0	0	0	0			
	Gentamicin		151	151		0	0	0	0	0	133	15	2	0	1	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		151	151		0	0	0	0	0	0	0	141	5	0	0	2	3	0	0	0	0	0			
	Spectinomycin		151	151		0	0	0	0	0	0	0	0	0	0	108	16	6	7	7	7	0	0			
	Streptomycin		151	151		0	0	0	0	0	0	0	0	0	106	5	9	11	13	7	0	0	0			
Amphenicols	Chloramphenicol		151	151		0	0	0	0	0	0	0	6	60	82	2	1	0	0	0	0	0	0			
	Florfenicol		151	151		0	0	0	0	0	0	0	6	64	78	3	0	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		151	151		0	0	149	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Ceftiofur		151	151		0	0	0	0	0	150	1	0	0	0	0	0	0	0	0	0	0	0			
Fluoroquinolones	Ciprofloxacin		151	151		124	26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid		0	0																						
	Ampicillin		151	151		0	0	0	0	0	0	5	58	56	3	0	0	29	0	0	0	0	0			
Polymyxins	Colistin		151	151		0	0	0	0	0	0	0	150	1	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		151	151		0	0	0	0	0	0	0	0	148	2	0	0	0	1	0	0	0	0			
Sulfonamides	Sulfonamide		116	116		0	0	0	0	0	0	0	0	0	0	0	0	114	0	0	0	2	0			
Tetracyclines	Tetracyclin		151	151		0	0	0	0	0	0	0	97	8	1	0	4	41	0	0	0	0	0			
Trimethoprim	Trimethoprim		151	151		0	0	0	0	0	0	123	1	1	0	0	0	26	0	0	0	0	0			

Table Antimicrobial susceptibility testing of E. coli in Pigs - at slaughterhouse - Monitoring - quantitative data [Dilution method]

E. coli		Pigs - at slaughterhouse - Monitoring																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		151																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of E. coli in animals

E. coli		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys	
Isolates out of a monitoring program (yes/no)		yes		yes		yes			
Number of isolates available in the laboratory		97		151		114			
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin	97	0	151	0	114	0		
	Gentamicin	97	0	151	1	114	1		
	Neomycin	97	0	151	5	114	1		
	Spectinomycin	97	1	151	21	114	3		
Amphenicols	Chloramphenicol	97	1	151	1	114	0		
	Florfenicol	97	1	151	0	114	0		
Cephalosporins	Ceftiofur	97	0	151	0	114	0		
Fluoroquinolones	Ciprofloxacin	97	70	151	125	114	103		
Penicillins	Ampicillin	97	1	151	29	114	14		
Quinolones	Nalidixic acid	1	0	3	1	15	14		
Sulfonamides	Sulfonamide	97	5	151	37	114	13		
Tetracyclines	Tetracyclin	97	4	151	45	114	12		

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

E. coli		Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		66																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		66	66		0	0	0	0	0	0	0	0	51	13	2	0	0	0	0	0	0	0			
	Gentamicin		66	66		0	0	0	0	0	54	12	0	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		66	66		0	0	0	0	0	0	0	64	1	0	0	0	1	0	0	0	0	0			
	Spectinomycin		66	66		0	0	0	0	0	0	0	0	0	0	45	5	3	4	5	4	0	0			
	Streptomycin		66	66		0	0	0	0	0	0	0	0	0	43	2	7	7	3	4	0	0	0			
Amphenicols	Chloramphenicol		66	66		0	0	0	0	0	0	0	1	23	37	1	2	0	2	0	0	0	0			
	Florfenicol		66	66		0	0	0	0	0	0	0	4	22	38	2	0	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		66	66		0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Cefpodoxime		0	0																						
	Ceftiofur		66	66		0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0			
	Cephalothin		0	0																						
Fluoroquinolones	Ciprofloxacin		66	66		54	11	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Ampicillin		66	66		0	0	0	0	0	0	2	17	27	1	1	1	17	0	0	0	0	0			
Polymyxins	Colistin		66	66		0	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		66	66		0	0	0	0	0	0	0	0	65	0	0	0	0	1	0	0	0	0			
Streptogramins	Quinupristin/Dalfopristin		0	0																						

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

E. coli		Meat from pig - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		66																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Sulfonamides	**Sulfonamide**		66	66		0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	20			
Tetracyclines	**Tetracyclin**		66	66		0	0	0	0	0	0	0	43	0	1	0	1	21	0	0	0	0	0			
Trimethoprim	**Trimethoprim**		66	66		0	0	0	0	0	0	50	0	0	0	0	0	16	0	0	0	0	0			
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	0																					

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

E. coli		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		113																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		113	113		0	0	0	0	0	0	0	0	91	19	3	0	0	0	0	0	0	0			
	Gentamicin		113	113		0	0	0	0	0	91	18	4	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																					
	Neomycin		113	113		0	0	0	0	0	0	0	110	2	1	0	0	0	0	0	0	0	0			
	Spectinomycin		113	113		0	0	0	0	0	0	0	0	0	0	97	8	1	3	4	0	0	0			
	Streptomycin		113	113		0	0	0	0	0	0	0	0	0	102	2	7	1	1	0	0	0	0			
Amphenicols	Chloramphenicol		113	113		0	0	0	0	0	0	0	3	42	68	0	0	0	0	0	0	0	0			
	Florfenicol		113	113		0	0	0	0	0	0	0	0	4	50	58	1	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																					
	Cefotaxim		113	113		0	0	0	109	3	0	0	1	0	0	0	0	0	0	0	0	0	0			
	Cefpodoxime		0	0																					
	Ceftiofur		113	113		0	0	0	0	0	109	3	1	0	0	0	0	0	0	0	0	0	0			
	Cephalothin		0	0																					
Fluoroquinolones	Ciprofloxacin		113	113		78	31	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																					
Penicillins	Amoxicillin / Clavulanic acid		0	0																					
	Ampicillin		113	113		0	0	0	0	0	0	9	42	46	4	0	1	11	0	0	0	0	0	0		
Polymyxins	Colistin		113	113		0	0	0	0	0	0	113	0	0	0	0	0	0	0	0	0	0	0	0		
Quinolones	Nalidixic acid		113	113		0	0	0	0	0	0	0	0	104	6	0	0	0	3	0	0	0	0			

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

E. coli		Meat from broilers (Gallus gallus) - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		113																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Streptogramins	Quinupristin/Dalfopristin		0	0																					
Sulfonamides	Sulfonamide		113	113		0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	13			
Tetracyclines	Tetracyclin		113	113		0	0	0	0	0	0	0	101	7	0	0	0	5	0	0	0	0	0	0		
Trimethoprim	Trimethoprim		113	113		0	0	0	0	0	0	110	0	0	0	0	0	3	0	0	0	0	0			
Trimethoprim + sulfonamides	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of E. coli in food

E. coli		Meat from pig		Meat from bovine animals		Meat from broilers (Gallus gallus)		Meat from other poultry species	
Isolates out of a monitoring program (yes/no)		yes		yes		yes			
Number of isolates available in the laboratory		66		63		113			
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin	66	0	63	0	113	0		
	Gentamicin	66	0	63	0	113	0		
	Neomycin					113	0		
	Spectinomycin	66	13	63	0	113	7		
Amphenicols	Chloramphenicol	66	4	63	0	113	0		
	Florfenicol	66	0	63	0	113	0		
Cephalosporins	Ceftiofur	66	0	63	0	113	1		
Fluoroquinolones	Ciprofloxacin	66	55	63	43	113	82		
Penicillins	Ampicillin	66	19	63	4	113	12		
Quinolones	Nalidixic acid	1	1			9	3		
Sulfonamides	Sulfonamide	66	20	63	4	113	13		
Tetracyclines	Tetracyclin	66	22	63	4	113	5		

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

E. coli		Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		63																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin		63	63		0	0	0	0	0	0	0	0	55	7	1	0	0	0	0	0	0	0			
	Gentamicin		63	63		0	0	0	0	0	56	6	1	0	0	0	0	0	0	0	0	0	0			
	Kanamycin		0	0																						
	Neomycin		63	63		0	0	0	0	0	0	0	61	2	0	0	0	0	0	0	0	0	0			
	Spectinomycin		63	63		0	0	0	0	0	0	0	0	0	0	61	02	0	0	0	0	0	0			
	Streptomycin		63	63		0	0	0	0	0	0	0	0	0	57	1	1	1	3	0	0	0	0			
Amphenicols	Chloramphenicol		63	63		0	0	0	0	0	0	0	2	14	47	0	0	0	0	0	0	0	0			
	Florfenicol		63	63		0	0	0	0	0	0	0	0	19	44	0	0	0	0	0	0	0	0			
Cephalosporins	3rd generation cephalosporins		0	0																						
	Cefotaxim		63	63		0	0	62	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Cefpodoxime		0	0																						
	Ceftiofur		63	63		0	0	0	0	0	63	0	0	0	0	0	0	0	0	0	0	0	0			
	Cephalothin		0	0																						
Fluoroquinolones	Ciprofloxacin		63	63		43	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Enrofloxacin		0	0																						
Penicillins	Ampicillin		63	63		0	0	0	0	0	0	3	13	36	7	0	1	3	0	0	0	0	0			
Polymyxins	Colistin		63	63		0	0	0	0	0	0	63	0	0	0	0	0	0	0	0	0	0	0			
Quinolones	Nalidixic acid		63	63		0	0	0	0	0	0	0	0	63	0	0	0	0	0	0	0	0	0			
Streptogramins	Quinupristin/Dalfopristin		0	0																						

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

E. coli		Meat from bovine animals - fresh - at retail - domestic production - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		63																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Sulfonamides	**Sulfonamide**		63	63		0	0	0	0	0	0	0	0	0	0	0	0	59	0	0	0	0	4			
Tetracyclines	**Tetracyclin**		63	63		0	0	0	0	0	0	0	50	9	0	0	0	4	0	0	0	0	0			
Trimethoprim	**Trimethoprim**		63	63		0	0	0	0	0	0	62	0	0	0	0	0	1	0	0	0	0	0			
Trimethoprim + sulfonamides	**Trimethoprim + sulfonamides**		0	0																					

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
EUCAST

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	16				4	32				
	Gentamicin	2				0.5	16				
	Neomycin	8				2	32				
	Spectinomycin	64				16	256				
	Streptomycin	16				8	128				
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.25				0.125	4				
	Ceftiofur	1				0.5	8				
Fluoroquinolones	**Ciprofloxacin**	0.03				0.015	4				
Penicillins	**Ampicillin**	8				1	32				
Polymyxins	**Colistin**	2				1	16				
Quinolones	**Nalidixic acid**	16				4	64				
Sulfonamides	**Sulfonamide**	256				64	1024				

Table Breakpoints used for antimicrobial susceptibility testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines	**Tetracyclin**	8				2	32				
Trimethoprim	**Trimethoprim**	2				1	32				

Table Breakpoints used for antimicrobial susceptibility testing

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

Standards used for testing
EUCAST

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	Gentamicin	2				0.5	16				
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	Streptomycin	16				8	128				
Amphenicols	**Chloramphenicol**	16				2	64				
	Florfenicol	16				2	64				
Cephalosporins	**Cefotaxim**	0.25				0.125	4				
	Ceftiofur	1				0.5	8				
Fluoroquinolones	**Ciprofloxacin**	0.03				0.015	4				
Penicillins	**Ampicillin**	8				1	32				
Polymyxins	**Colistin**	2				1	16				
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Table Breakpoints used for antimicrobial susceptibility testing

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		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines	**Tetracyclin**	8				2	32				
Trimethoprim	**Trimethoprim**	2				1	32				

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 HISTAMINE

4.1.1 General evaluation of the national situation

4.1.2 Histamine in foodstuffs

4.2 ENTEROBACTER SAKAZAKII

4.2.1 General evaluation of the national situation

4.2.2 Enterobacter sakazakii in foodstuffs

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

4.3.2 Staphylococcal enterotoxins in foodstuffs

5. FOODBORNE

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

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of

In 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) and in 2006 this unit co-ordinated the collaboration between the National Food Institute, the SSI and the DVFA. Representatives from these 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

Causative agents:
Salmonella
Campylobacter
VTEC
Listeria
Yersinia
Shigella

National evaluation of the reported outbreaks in the country:

Descriptions of single outbreaks of special interest

2008 was an unusual year because of a very large outbreak of Salmonella Typhimurium. A total of 1224 cases of S. Typhimurium U292 belonging to the same MLVA cluster (FUD no. 788) were registered in what was the largest known salmonella outbreak in Denmark to date. The outbreak was detected 1 April and over the summer between 30 and 60 new cases appeared every week, gradually decreasing over the autumn and winter. This outbreak has been the subject of a very large and intensive investigation, including measures such as a large number of trawling questionnaires, case-control and cohort analyses, investigations of a number of slaughterhouses and food production facilities, comparative molecular subtyping of relevant isolates from many different sources, structured microbiological analyses of food samples from patients homes, investigation of shopping records obtained from supermarket computers,

epi and trace-back analyses of embedded outbreaks where several persons have been ill following participation in the same event and more. As of May 2009 cases are still appearing and the source of this outbreak is not known. Only very few cases with the outbreak strain have been detected outside of Denmark and the main hypothesis remains that the outbreak is caused by a series of different foods and originates from a pig reservoir. Two other relatively large outbreaks caused by S. Typhimurium strains belonging to the otherwise rare phage types, DT135 (FUD no. 854) and DT3 (FUD no. 853) also occurred and also remained unsolved (2). Both outbreaks bore similarities to the U292 outbreak and may have shared the same underlying cause.
Several other outbreaks with S. Typhimurium took place as well. One outbreak with phage type DT120 comprised 53 cases and occurred during June and July. This outbreak was solved as a spin-off of the U292 outbreak investigation when smoked ham sampled from the home of a case (the food samples were collected prior to MLVA typing) was found positive for the outbreak strain. Two outbreaks with phage type U288 occurred; they were unrelated and belonged to different MLVA types. The first of these outbreaks was localised to central Jutland and comprising 37 cases (among which were two Norwegian tourists) in the spring of 2008 (FUD no. 793); it was traced back to a small group of shawarma restaurants. The second U288 outbreak occurred in the autumn and winter of 2008 and comprised 39 registered cases (FUD no. 855) most of which lived on Zealand; four of the patients died. This outbreak was caused by pork in different forms; the outbreak strain was isolated form pork meat from different food producers that were supplied from the same slaughterhouse from which the outbreak strain was also isolated. A part of the contaminated pork meat was sold to Sweden and gave rise to illness in both Sweden and Norway. Finally a comparable outbreak took place in the winter 2008/09 (FUD no. 863). It comprised 42 cases (of which some occurred in 2009) and again was caused by different forms of pork meat that originated from a specific slaughterhouse.
Norovirus is not a zoonosis, but it should be mentioned that, as in previous years, norovirus accounted for the majority of registered outbreaks in 2008. 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 handling the food.

Foodborne Outbreaks: summarized data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	3	0	unknown	unknown	unknown	3
Campylobacter	5	4	15	0	0	1
Clostridium	5	4	117	1	0	1
Escherichia coli, pathogenic	0	0	unknown	unknown	unknown	0
Foodborne viruses	31	28	623	25	0	3
Listeria	1	1	3	1	0	0
Other agents	7	6	37	0	0	1
Parasites	0	0	unknown	unknown	unknown	0
Salmonella	18	11	58	8	0	7
Staphylococcus	1	0	unknown	unknown	unknown	1
Unknown	12	12	104	1	0	0
Yersinia	0	0	unknown	unknown	unknown	0

Verified Foodborne Outbreaks: detailed data

DT 120

	Value
Code	852
Subagent Choice	
Outbreak type	General
Human cases	53
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	Ham
Type of evidence	Laboratory characterization of food and human isolates, Laboratory detection in human cases, Laboratory detection in implicated food
Setting	Household
Place of origin of problem	Processing plant
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

DT 135

	Value
Code	854
Subagent Choice	
Outbreak type	General
Human cases	109
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Unknown
More Foodstuff	
Type of evidence	Analytical epidemiological evidence
Setting	Unknown
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	
Outbreaks	1
Comment	The outbreak continued in 2009, only laboratory confirmed cases in 2008 are reported

PT 8

	Value
Code	873
Subagent Choice	
Outbreak type	General
Human cases	40
Hospitalized	1
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	Patient interviews showed correlation with potatoes. Proberly cross-contamination between chicken and potatoes in the kitchen.
Type of evidence	Laboratory detection in human cases, Laboratory characterization of food and human isolates, Laboratory detection in implicated food
Setting	Household
Place of origin of problem	Unknown
Origin of foodstuff	Domestic
Contributory factors	Unknown
Outbreaks	1
Comment	

S. Derby

	Value
Code	875
Subagent Choice	Salmonella; S. Derby
Outbreak type	General
Human cases	10
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	
Type of evidence	Laboratory detection in human cases, Laboratory characterization of food and human isolates, Laboratory detection in implicated food
Setting	Unknown
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	Unknown
Outbreaks	1
Comment	

U 288

	Value
Code	855
Subagent Choice	
Outbreak type	General
Human cases	39
Hospitalized	unknown
Deaths	4
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	Fresh and processed pig meat
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases, Laboratory characterization of food and human isolates
Setting	Unknown
Place of origin of problem	Processing plant
Origin of foodstuff	Domestic
Contributory factors	Unknown
Outbreaks	1
Comment	

U 292

	Value
Code	788
Subagent Choice	
Outbreak type	General
Human cases	1224
Hospitalized	unknown
Deaths	11
Foodstuff implicated	Unknown
More Foodstuff	The outbreak is still ongoing. Large outbreak under investigation. the hypothesis is that the product is sliced meat, properly pork of some kind
Type of evidence	Laboratory detection in human cases, Laboratory detection in implicated food, Laboratory characterization of food and human isolates
Setting	Unknown
Place of origin of problem	Unknown
Origin of foodstuff	Domestic
Contributory factors	
Outbreaks	1
Comment	

U 312

	Value
Code	863
Subagent Choice	
Outbreak type	General
Human cases	24
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	The outbreak continued in 2009, only laboratory confirmed cases in 2008 are reported
Type of evidence	Laboratory characterization of food and human isolates, Laboratory detection in implicated food, Laboratory detection in human cases
Setting	Unknown
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	Unknown
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

Campylobacter spp., unspecified

	Value
Code	781
Subagent Choice	
Outbreak type	General
Human cases	28
Hospitalized	6
Deaths	0
Foodstuff implicated	Unknown
More Foodstuff	Most likely caused by chicken-sandwich eaten in India or on flight home.
Type of evidence	Analytical epidemiological evidence, Laboratory detection in human cases
Setting	Unknown
Place of origin of problem	Travel abroad
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

B. cereus

	Value
Code	778
Subagent Choice	
Outbreak type	General
Human cases	10
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	Meat balls on a buffet, shown to contain 400 Bacillus per gram
Type of evidence	Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Domestic
Contributory factors	Unknown
Outbreaks	1
Comment	

B. cereus

	Value
Code	825
Subagent Choice	
Outbreak type	General
Human cases	4
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	Buffet, shown to contain 540,000 Bacillus per gram bulgur
Type of evidence	Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

B. cereus

	Value
Code	840
Subagent Choice	
Outbreak type	General
Human cases	23
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	Paella with rice and shellfish
Type of evidence	Laboratory detection in implicated food
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Inadequate chilling
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

C. perfringens

	Value
Code	824
Subagent Choice	
Outbreak type	Household
Human cases	2
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Herbs and spices
More Foodstuff	Mix of herbs used in buffet dishes
Type of evidence	Laboratory detection in implicated food
Setting	Household
Place of origin of problem	Household, domestic kitchen
Origin of foodstuff	Unknown
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

S. aureus

	Value
Code	881
Subagent Choice	
Outbreak type	General
Human cases	42
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff	indications of bean sprouts to be the causative agent
Type of evidence	Laboratory detection in implicated food
Setting	Other setting
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

norovirus (Norwalk-like virus)

	Value
Code	847
Subagent Choice	
Outbreak type	General
Human cases	91
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	
Type of evidence	Laboratory detection in human cases, Analytical epidemiological evidence
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Other contributory factor
Outbreaks	1
Comment	Properly person-to-person transmission

norovirus (Norwalk-like virus)

	Value
Code	846
Subagent Choice	
Outbreak type	General
Human cases	18
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	
Type of evidence	Analytical epidemiological evidence
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Other contributory factor
Outbreaks	1
Comment	Properly person-to-person transmission

norovirus (Norwalk-like virus)

	Value
Code	850
Subagent Choice	
Outbreak type	General
Human cases	114
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	
Type of evidence	Analytical epidemiological evidence
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Other contributory factor
Outbreaks	1
Comment	Properly person-to-person transmission

Verified Foodborne Outbreaks: detailed data

Histamine

	Value
Code	848
Subagent Choice	
Outbreak type	Household
Human cases	1
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Fish and fish products
More Foodstuff	Tuna
Type of evidence	Laboratory detection in implicated food
Setting	Household
Place of origin of problem	Household, domestic kitchen
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	