European Food Safety Authority

ZOONOSES MONITORING

FINLAND

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 2010

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Finland

Reporting Year:

Laboratory name	Description	Contribution
Finnish Zoonosis Centre	Finnish Zoonosis Centre forms a cooperation body between Finnish Food Safety Authority Evira and the National Institute for Health and Welfare (THL). The Centre ensures a close cooperation between relevant experts in the field of animal health, human health, and food and feed safety.	General coordination and officering of the report
Finnish Food Safety Authority Evira	The operation of Evira is focused on ensuring the safety of food, promoting the health and welfare of animals and providing the required preconditions for plant and animal production as well as plant health. Evira is a central competent authority for food and feed control as well as for animal health and welfare control. The duties of Evira also include scientific research and risk assessment on food safety and animal diseases. Evira operates also as a national reference laboratory in its own field.	Texts and tables: animals, foodstuffs, feedstuffs, antimicrobial resistance, foodborne outbreaks, data on slaughtered animals
Ministry of Agriculture and Forestry (MAF) - Food and Health Department	Food and Health Department is concerned with veterinary issues in general, prevention and combating of animal diseases and zoonoses, animal welfare, hygiene of foodstuffs of animal origin, animal medication, production inputs used in agriculture and plant health.	Some texts

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
Information Centre of the Ministry of Agriculture and Forestry (Tike)	Tike provides administrative, informative and data management services to the MAF and other administrative organizations within its branch. Tike develops national official statistics in the field of food safety in co-operation with control authorities. At the moment, Tike complies most of the statistics on agriculture and food production in Finland.	Data on animal populations (holdings and live animals)

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 Finland during the year 2010 .

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 on holdings and live animals (except goats):
Information Centre of the Ministry of Agriculture and Forestry, Farm Register 2010
Data on holdings and goats:
Evira, Register of sheep and goats
Data on horses:
Suomen Hippos, the Finnish Trotting and Breeding Association
Data on reindeers:
Statistics of the Reindeer Herders' Association
Data on farmed deer:
Provincial veterinary offices
Data on slaughtered animals:
Meat inspection statistics of Finnish Food Safety Authority Evira

Dates the figures relate to and the content of the figures

Data on holdings and live animals:
Final data, situation as of 1 May 2010 (cattle, sheep, goats), 1 April (pigs, poultry).

Data on reindeers:
Final data, 2009/2010, reindeer herding year: 1 June-31 May.

Data on slaughtered animals: All animals slaughtered in 2010.

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

Fattening pigs contain all pigs except boars and sows. In national statistics pigs are divided in the following categories: boars over 50 kg, sows over 50 kg, fattening pigs over 50 kg, pigs 20-50 kg and piglets under 20 kg.

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

The production structure has changed considerably over the past decades. While some 70 per cent of farms had livestock in the 1970s and a good 62 per cent in the 1990s, in 2010 only 37 per cent of farms reared livestock. The number of dairy cows in 2010 was 289 000 and in 2000 they were 364 000. There is a decrease of 21 per cent in the number of dairy cows. Number of pigs has var-ied between 1.3 and 1.5 million during last ten years.

Geographical distribution and size distribution of the herds, flocks and holdings

Livestock production is concentrated in certain areas and, thus, there are large differencies in livestock numbers between different parts of the country. Dairy farms are particularly common in the Northern Finland, and fattening pigs in the Southern and Western parts of the country. The differencies are most marked in poultry production which are mostly located nearby the slaughter houses and processors.

In 2010, farms with dairy cows had 24 dairy cows per farm on average. 26% of all milk farms had at least 30 heads and 9% of farms at least 50 heads. Pig farms had 275 fattening pigs over 50 kg per farm on average. 30% of pig farms had at least 300 fattening pigs over 50 kg and 7% of farms at least 800 pigs. Farms with laying hens had 3166 hens per farm on average. 47% of farms with laying hens had less than 50 heads and 31% at least 2000 heads and 10% at least 10000 heads.

Table Susceptible animal populations

* Only if different than current reporting year

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	meat production animals					124675		7033	
	mixed herds					77160		2873	
	dairy cows and heifers					420861		12239	
	calves (under 1 year)					303095		14836	
	- in total [1)]			264233		925791		15641	
Deer	farmed - in total							7	
Ducks	- in total			1764		1005		71	
Gallus gallus (fowl)	mixed flocks/holdings					203		20	
	parent breeding flocks, unspecified - in total					446883		236	
	broilers			54570956		4616206		107	
	laying hens			108167		4231623		1082	
	parent breeding flocks for meat production line			394584					
	- in total			55073707		9295920		1238	

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Geese	- in total			5211		1122		47	
Goats	- in total [2)]					6442		693	
Pigs	breeding animals			52092		153658		1277	
	fattening pigs			2199696		1213274		2019	
	- in total [3)]			2251788		1366932		2078	
Reindeers	farmed - in total			84890		193650		4646	
Sheep	- in total			35464		125673		1349	
Solipeds, domestic	horses - in total			1452		74300		15000	
Turkeys	- in total			957981		279674		61	
Wild boars	farmed - in total			332					
Ostriches	farmed			38		124		10	
Pheasants	meat production flocks			13		5830		28	

Comments:

[1)] Number of holdings is the real situation; the same holding can have different kind of bovine animals.

[2)] Number of holdings contains both farms and other holdings which have goats as pet; this differs from last year

[3)] Number of holdings is the real situation; the same holding can have different kind of pigs.

Table Susceptible animal populations

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 Finnish situation regarding Salmonella in feedingstuffs, animals and food of animal origin has been very favourable for years. Majority of human salmonellosis cases have been acquired aboard.

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

The Salmonella situation in 2010 was again very good after the exceptional year 2009. In 2009, Salmonella Tennessee was detected from 50 pig holdings and 40 laying hen holdings due to the feed borne outbreak. The results from the year 2010 show that the measures during and after the outbreak were efficient. In 2010, S. Tennessee was detected from two pig holdings, both holdings were positive already in 2009. All the other 844 sampled pig holdings were negative for Salmonella spp. At the slaughterhouse sampling three pigs out of 6539 were positive (two S. Typhimurium, one S. Infantis). In the laying hen sector all the flocks were negative for Salmonella spp.

2.1.2 Salmonella in foodstuffs

A. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Finnish Salmonella Control Programme:
- at slaughterhouses: 3000 carcasses of fattening pigs and sows are sampled each year randomly from the populations. Sampling is carried out by food business operator under supervision of the official veterinarian.
- at cutting plants:
Sampling is compulsory for all cutting plants.
Random sampling, frequency is depending on production capacity of the cutting plant.
Sampling is performed by food business operator under supervison of offcial veterinarian.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse: surface of carcass, at cutting plant: fresh meat

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: 3 surface swab samples are taken from a carcass before refrigation. A total area of 1400 cm2 is swabbed. Sampling sites: the upper inner part of hind legs includung the pelvic entrance; the cut surface area of the abdomen and the chest; and the cheek.
Cutting plants: A sample consists of at least 25 grams of crushed meat taken from a cleaning tool of a conveyer belt, from tables or from similar point.

Definition of positive finding

At slaughterhouse and cutting plant

Foodstuff is considered to be positive when Salmonella spp is isolated from a sample

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

ISO 6579:2002 or NMKL No 71:1999

Control program/mechanisms

The control program/strategies in place

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Measures in case of the positive findings or single cases

After a positive salmonella result increased sampling is carried out at the slaughterhouse or at the cutting plant. The origin of contamination must be traced back, if possible. Effective cleaning and disinfection of

the premises and equipment.

Notification system in place

Laboratory has to notify the postive result to the competent authority and to the food business operator.

Results of the investigation

No isolates of domestic origin were obtained.

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

Salmonella situation in Finnish pig meat is very favourable.

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

Domestic pig meat is not considered to be an important source of human salmonellosis cases in Finland.

B. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Finnish Salmonella Control Programme:
- at slaughterhouses: together 3000 carcasses are sampled each year randomly from the cattle population. Sampling is carried out by food business operator under supervision of the official veterinarian.
- at cutting plants:
Sampling is compulsory for all cutting plants.
Random sampling, frequency is depending on production capacity of the cutting plant.
Sampling is performed by food business operator under supervison of offcial veterinarian.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse: surface of carcass, at cutting plant: fresh meat

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: 2 surface swab samples are taken from a carcass before refrigation. A total area of 1400 cm2 is swabbed. Sampling sites: the upper inner part of hind legs includung the pelvic entrance and the cut surface area of the abdomen and the chest.
Cutting plants:A sample consists of at least 25 grams of crushed meat taken from a cleaning tool of a conveyer belt, from tables or from similar point.

Definition of positive finding

At slaughterhouse and cutting plant

Foodstuff is considered to be positive when Salmonella spp is isolated from a sample

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

ISO 6579:2002 or NMKL No 71:1999

Control program/mechanisms

The control program/strategies in place

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Measures in case of the positive findings or single cases

After a positive salmonella result increased sampling is carried out at the slaughterhouse or at the cutting plant. The origin of contamination must be traced back, if possible. Effective cleaning and disinfection of the premises and equipment.

Notification system in place

Laboratory has to notify the postive result to the competent authority and to the food business operator.

Results of the investigation

No isolates of domestic origin were obtained.

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

Salmonella situation in domestic bovine meat is very favourable.

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

Domestic bovine meat is not considered to be an important source of human salmonellosis cases in Finland.

C. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Finnish Salmonella Control Programme:
Sampling is compulsory for all cutting plants.
Random sampling; frequency is depending on production capacity of the cutting plant.
Sampling is performed by food business operator under supervison of offcial veterinarian.

Frequency of the sampling

At slaughterhouse and cutting plant

Cutting plant production over 100 000 kg in a week: one sample every day, production between 20 000 - 100 000 kg in a weeek: one sample every week, production less that 20 000 kg in a week: one sample every month, small-capacity cutting plants: two samples in a year

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

A sample consists of at least 25 grams of crushed meat taken from a cleaning tool of a conveyer belt, from tables or from similar point.

Definition of positive finding

At slaughterhouse and cutting plant

Foodstuff is considered to be positive when Salmonella spp is isolated from a sample

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: ISO 6579:2002 or NMKL No 71:1999

Preventive measures in place

All focks must be tested for Salmonella before slaughter. If the flock is Salmonella positive, meat must be heat treated in an approved establishment.

Control program/mechanisms

The control program/strategies in place

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Measures in case of the positive findings or single cases

After a positive salmonella result increased sampling is carried out in the cutting plant. The origin of contamination must be traced back to the slaughterhouse, if possible. Effective cleaning and disinfection of the premises and equipment.

Notification system in place

Laboratory has to notify the postive result to the competent authority and to the food business operator.

Results of the investigation

No isolates of domestic origin were obtained.

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

Salmonella situation in domestic broiler meat has been favourable for years.

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

Domestic broiler meat is not considered to be an important source of human salmonellosis cases in Finland.

D. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Finnish Salmonella Control Programme:
Sampling is compulsory in all cutting plants.
Random sampling, frequency is depending on production capacity of the cutting plant.
Sampling is carried out by food business operator under supervision of the competent authority.

Frequency of the sampling

At slaughterhouse and cutting plant

Cutting plant production capacity over 100 000 kg in a week: one sample every day, production between 20 000 - 100 000 kg in a week: one sample in a week, production less than 20 000 kg in a week: one sample every month, low-capacity cutting plants: two samples in a year

Type of specimen taken

At slaughterhouse and cutting plant

Fresh meat

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Cutting plant: a sample consists of at least 25 gram of crushed meat taken from a cleaning tool of a conveyer belt, from tables or from similar points.

Definition of positive finding

At slaughterhouse and cutting plant

Foodstuff is considered to be positive when Salmonella spp is isolated from a sample.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

ISO 6579:2002 or NMKL No 71:1999

Preventive measures in place

All flocks must be tested for Salmonella before slaughter, if the flock is positive meat is heat treated in an approved establishment.

Control program/mechanisms

The control program/strategies in place

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Measures in case of the positive findings or single cases

After a positive salmonella result increased sampling is carried out in the cutting plant. The origin of contamination must be traced back, if possible. Effective cleaning and disinfection of the premises and equipment.

Notification system in place

Laboratory has to notify the positive results to the competent authority and to the food business operator.

Results of the investigation

No isolates of domestic origin were obtained.

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

Salmonella situation in domestic turkey meat has been favourable for years.

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

Domestic turkey meat is not considered to be an important source of human salmonellosis in Finland.

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from bovine animals - carcass - at slaughterhouse - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	1400 cm2	3169	0			
Meat from bovine animals - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	25 g	1905	0			
Meat from pig - carcass - at slaughterhouse - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	1400 cm2	6559	0			
Meat from pig - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	25 g	1529	0			

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	25 g	802	0			
Meat from turkey - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	25 g	287	0			

2.1.3 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Monitoring system

Sampling strategy

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

The Finnish Salmonella Control Programme:

Day-old chicks are sampled by the food business operator after arrived to the holding. Rearing flocks are sampled at the holding by the food business operator at four weeks old and two weeks before moving to laying unit or phase. Once a year samples are taken by the official veterinarian at each holding.

Adult breeding flocks - egg production line:
Flocks are sampled at the hatcheries every second week by the food business operator and twice a year by the official veterinarians. Every flock is sampled twice during the production cycle at the holding by the official veterinarian. Official sampling is also carried out at the holding if Salmonella spp. is detected from the sampling at the hatchery. If hatching eggs are exported or traded to the other EU country the breeding flocks are sampled every second week at the holdings instead of sampling at the hatcheries.

Adult breeding flocks - meat production line:
Flocks are sampled every second week at the holdings by the food business operator and twice during the production cycle by the official veterinarian.

In addition, the rearing and adult flock is always sampled by the official veterinarian if there is any reason to suspect that the flock is positive for Salmonella spp.

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

Every flock is sampled at age of four weeks and two weeks before moving to laying unit

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

Egg production line: Every flock is sampled at the hatchery every second week and twice during the production cycle at the holding
Meat production line: Every flock is sampled at the holding every second week

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

At hatchery: internal linings or swab samples from hatching baskets or egg shells / At holding: socks/boot

swabs and dust sample

Methods of sampling (description of sampling techniques)

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

Internal linings are collected from ten delivery boxes. Five papers are pooled together. If papers are not used swab samples from ten delivery boxes are taken. Five swab samples are pooled together.

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

Two pairs of socks/ boot swabs samples are taken. Both pairs are analysed separately.

Breeding flocks: Production period

At hatchery: Internal linings paper or swab samples from five hatching baskets or 10 g of broken egg shells from 25 hatching baskets are collected and pooled together. If there are more than 50000 hatching eggs of one breeding flock a second composite sample is taken.
At holding: One pair of socks/boot swabs samples and one dust sample collected by swab are taken. Both samples are analysed separately.

Case definition

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

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

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

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

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

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

Diagnostic/analytical methods used

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

ISO 6579:2002 / Amendment 1:2007

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

ISO 6579:2002 / Amendment 1:2007

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

ISO 6579:2002 / Amendment 1:2007

Vaccination policy

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

Vaccination against Salmonella is not allowed in Finland.

Other preventive measures than vaccination in place

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

Strict biosecurity and production hygiene at holdings. Salmonella control of feedstuffs.

Control program/mechanisms

The control program/strategies in place

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

The Finnish Salmonella Control Programme, approved by Commission Decision 2007/849/EC.

Recent actions taken to control the zoonoses

Salmonella control programme for breeding flocks was amended from the beginning of the year 2010. Earlier the adult breeding flocks of egg and meat production line were sampled at the hatcheries. Now the

adult breeding flocks of meat production line are sampled at the holdings. The adult breeding flocks of egg production line are still sampled at the hatcheries except the flocks at the holdings that trade hatching eggs to the other countries. The sampling method at the holdings is amended. One pair of socks/boot swabs and one swab dust sample are taken instead of five pairs of socks/boot swabs.

Measures in case of the positive findings or single cases

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

In case of positive finding at holding: the flock is destructed or slaughtered and meat heat treated. Hatching eggs are destructed or heat treated. All the other flocks at the holding are sampled by the official veterinarian. The holding is cleaned and desinficted, official environmental samples are taken, negative results are required before restocking. Official epidemiological investigation is carried out. Feedingstuffs are analysed for Salmonella.

In case of positive finding at hatchery: the flock of origin is sampled at the holding by the official veterinarian. Environmental samples are taken at the hatchery.

Notification system in place

The laboratory has to notify positive result to the competent authority and to the food business operator. Salmonella has been notifiable since 1995.

Results of the investigation

Salmonella spp. was not detected in the breeding flocks of egg production line.

One adult parent flock was positive in the meat production line (S. Albany).

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

Salmonella situation has been very favourable in Gallus Gallus breeding flocks for years.

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

Breeding flocks are not considered to be an important source of human salmonellosis cases in Finland.

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

The Finnish Salmonella Control Programme:
All broiler flocks are sampled at the holdings within three weeks before slaughter.
Sampling is carried out by the official veterinarian once a year at each holding otherwise the sampling is carried out by the food business operator.
In addition, the flock is sampled by the official veterinarian every time when there is a reason to suspect that the flock is positive for Salmonella spp.

Frequency of the sampling

Broiler flocks: Before slaughter at farm

Within three weeks before slaughter

Type of specimen taken

Broiler flocks: Before slaughter at farm

Samples taken by the food business operator; two pairs of socks/boot swabs
Samples taken by the official veterinarian; one pair of socks/boot swabs and one dust sample

Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

Sampling by the food business operator: two pairs of socks/boot swabs samples are taken. Both pairs are analysed separately.
Sampling by the official veterinarian: one pair of socks/boot swabs and one dust sample collected by swab are taken. Both samples are analysed separately.

Case definition

Broiler flocks: Before slaughter at farm

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

Diagnostic/analytical methods used

Broiler flocks: Before slaughter at farm

ISO 6579:2002 / Amendment 1:2007

Vaccination policy

Broiler flocks

Vaccination against Salmonella is not allowed in Finland.

Other preventive measures than vaccination in place

Broiler flocks

Strict biosecurity and production hygiene at holdings. Salmonella control of feedstuffs.
90% of flocks are treated with a competitive exclusion product as day-old chicks.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

The Finnish Salmonella Control Programme, approved by Commission Decision 2008/815/EC

Recent actions taken to control the zoonoses

Salmonella control programme for broiler flocks was amended from the beginning of the year 2010. Two pairs of socks/boot swabs or one pair of socks/boot swabs and one dust sample are taken instead of five pairs of socks/boot swabs.

Measures in case of the positive findings or single cases

Broiler flocks: Before slaughter at farm

In case of positive finding the flock is destructed or slaughtered and meat heat treated. The holding is cleaned and desinficted, official environmental samples are taken, negative results are required before restocking. Official epidemiological investigation is carried out. Feedingstuffs are analysed for Salmonella.

Notification system in place

The laboratory has to notify the positive result to the competent authority and to the food business operator. Salmonella has been notifiable since 1995.

Results of the investigation

Five broiler flocks out of 3070 (0,2 %) were positive for salmonella in 2010; four S. Livingstone and one S. Tennessee.

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

Salmonella situation has been favourable in broiler flocks for years.

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

Domestic broiler meat is not considered to be an important source of human salmonellosis cases in Finland.

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

Monitoring system

Sampling strategy

Laying hens flocks

The Finnish Salmonella Control Programme:
Flocks of day-old chicks are sampled at the hatcheries or at the holdings by the food business operator.
Rearing flocks are sampled at the holding two weeks before laying period by the food business operator.
Production flocks are sampled at the holdings every 15 weeks by the food business operator.
Sampling is carried out by the official veterinarian once a year at each rearing and laying holding.
In addition, the flock is sampled by the official veterinarian every time when a resason to suspect that the flock is positive for Salmonella spp.

Frequency of the sampling

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

Every flock is sampled two weeks before laying period

Laying hens: Production period

Every 15 weeks

Type of specimen taken

Laying hens: Day-old chicks

Internal linings of delivery boxes

Laying hens: Rearing period

faeces or sock samples / boot swabs

Laying hens: Production period

feaces or sock samples / boot swabs, dust

Methods of sampling (description of sampling techniques)

Laying hens: Day-old chicks

If sampling takes place at the hatchery five internal linings papers or five swab samples from hatching baskets or 25 x 10 g of broken egg shells are collected and pooled together.
If sampling takes place at the holding five internal lining papers are collected from delivery baskets and pooled together. If papers are not used five swab samples are taken.

Laying hens: Rearing period

Two pairs of boot swabs/sock samples are taken and pooled to one.
In cage flocks: two samples of 150 g of naturally mixed faeces are collected and pooled to one.

Laying hens: Production period

Two pairs of boot swabs/sock samples are taken and pooled to one.
In cage flocks: two samples of 150 g of naturally mixed faeces are collected and pooled to one.
In official sampling also a dust sample (250 ml, 100 g) is taken.

Case definition

Laying hens: Day-old chicks

Flock is considered to be positive if Salmonella spp. is isolated from any sample.

Laying hens: Rearing period

Flock is considered to be positive if Salmonella spp. is isolated from any sample.

Laying hens: Production period

Flock is considered to be positive if Salmonella spp. is isolated from any sample.

Diagnostic/analytical methods used

Laying hens: Day-old chicks

ISO 6579:2002 / Amendment 1:2007

Laying hens: Rearing period

ISO 6579:2002 / Amendment 1:2007

Laying hens: Production period

ISO 6579:2002 / Amendment 1:2007

Vaccination policy

Laying hens flocks

Vaccination against Salmonella is not allowed in Finland.

Other preventive measures than vaccination in place

Laying hens flocks

Strict biosecurity and production hygiene at holdings. Salmonella control of feedstuffs.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

The Finnish Salmonella Control Programme, approved by Commission Decision 2007/849/EC

Measures in case of the positive findings or single cases

Laying hens flocks

In case of positive finding the flock is destructed or slaughtered and meat heat treated. Eggs are destructed or heat treated. All the other flocks at the holding are sampled by the official veterinarian. The holding is cleaned and desinficted, official environmental samples are taken, negative results are required before restocking. Official epidemiological investigation is carried out. Feedingstuffs are analysed for Salmonella.

Notification system in place

The laboratory has to notify the positive result to the competent authority and to the food business operator. Salmonella has been notifiable since 1995.

Results of the investigation

Salmonella spp. was not detected in any flock of laying hens.

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

Salmonella situation has been very favourable in flocks of laying hens for years. 0-2 positive flocks have been detected yearly. S. Typhimurium has been the most common serovar. The year 2009 was exceptional due to the feedborne Salmonella Tennessee outbreak. In 2009, S. Tennessee was detected from 40 flocks of laying hens. The year 2010 was back to the normal situation, no Salmonella was

detected in flocks of laying hens.

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

Flocks of laying hens or eggs are not considered to be important source of human salmonellosis cases in Finland.

D. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

The Finnish Salmonella Control Programme:
- Together 3000 animals are sampled each year randomly from the cattle population at the slaughterhouses. Sampling is carried out by the food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at the farm by the official veterinarian
- Herds of origin of AI-bulls are sampled at farm before the transfer of the AI-bull by the food business operator.

Note! All sampling at slaughterhouses has an animal based approach, not herd based.

Frequency of the sampling

Animals at slaughter (herd based approach)

Sampling distributed evenly throughout the year

Type of specimen taken

Animals at farm

Faeces

Animals at slaughter (herd based approach)

Lymph nodes

Methods of sampling (description of sampling techniques)

Animals at farm

Sampling of suspect herds or herds of origin of AI bulls:
The number of faecal samples is dependent on the number of animals in the herd. In the herds with less than 40 animals all the animals are sampled. In the herds with 40-200 animals all the youngest 40 animals are sampled and from the rest animals every second is sampled. In the herds with over 200 animals all the youngest 40 animals are sampled, from the next youngest 160 animals every second is sampled and from the rest animals every fifth. Maximum of 20 samples may be pooled together.

Sampling of salmonella positive herds for releasing the restrictions:
A faecal sample is collected from each animal. Samples can be collected also from floors. Maximum of 20 samples may be pooled together.

Animals at slaughter (herd based approach)

From each carcass five ileo-caecal lymphnodes are taken. Lymph nodes are divided into two equal parts. Lymph nodes parts from five animals are pooled together for analyse. If the sample is positive each of the five individually samples are analysed separately.

Case definition

Animals at farm

Animal is positive if Salmonella spp. has been isolated from a sample. Herd is positive if one or more animals are Salmonella spp. positive.

Animals at slaughter (herd based approach)

Animal is positive if Salmonella spp. has been isolated from a sample.

Diagnostic/analytical methods used

Animals at farm

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002/Amendment 1:2007

Animals at slaughter (herd based approach)

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002/Amendment 1:2007

Vaccination policy

Vaccination against Salmonella is not allowed in Finland.

Control program/mechanisms

The control program/strategies in place

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Measures in case of the positive findings or single cases

At slaughterhouse: If a positive lymh node sample is detected in the slaughterhouse, the herd of origin is sampled by the official veterinarian.
At farm: Official restrictions: no trade of live animals except to slaughterhouse (meat is heat treated), milk is allowed to deliver only to an approved establishment for pasteurization. Sanitation and eradication is carried out according to the holding spesific plan. Restrictions are released after herd has been negative in two consecutive sampling sessions with interval of one month. Epidemiological investigation. Feedingstuffs are analysed for Salmonella.

Notification system in place

The laboratory has to notify the positive result to the competent authority and to the food business operator.

Results of the investigation

See table Salmonella in other animals.

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

Salmonella situation in cattle has been favourable for years.

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

Cattle is not considered to be an important source of human salmonellosis cases in Finland.

E. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

The Finnish Salmonella Control Programme:
- all nucleus and multiplier herds are sampled at the holding once a year by the operators.
- Together 3000 sows are sampled each year randomly from the sow population at the slaughterhouses. Sampling is carried out by the food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at the holding by the official veterinarian.

Note! All sampling at slaughterhouses has an animal based approach, not herd based.

Multiplying herds

Fattening herds

The Finnish Salmonella Control Programme:
- Together 3000 fattening pigs are sampled each year randomly from the population at the slaughterhouses. Sampling is carried out by the food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at the holding by the official veterinarian.

Note! All sampling at slaughterhouses has an animal based approach, not herd based.

Frequency of the sampling

Breeding herds

At slaughterhouses: sampling distributed evenly throughout the year. At holdings: nucleus and multiplier herds once a year

Fattening herds at slaughterhouse (herd based approach)

Sampling distributed evenly throughout the year

Type of specimen taken

Breeding herds

At farm: faeces, at slaughterhouse: lymph nodes

Fattening herds at farm

Faeces

Fattening herds at slaughterhouse (herd based approach)

Lymph nodes

Methods of sampling (description of sampling techniques)

Breeding herds

At holding:
Routine sampling of nucleus and multiplier herds and the sampling project of the industry for other breeding herds in 2010:
Sows: Every fift animal is sampled, samples are taken preferably from sows with piglets. Maximum of 20 samples may be pooled.
Growers, young breeding animals or weaned piglets (if present): two feacal samples are collected from a group of 10-15 animals, maximun of 20 samples may be pooled.
However, maximum number of pooled samples is 25 per holding.

Suspected herds:
Adult animals: feacal sample is collected from every fift animal. Maximum of 20 samples may be pooled.
Young animals: two faecal samples are collected from a group of 10-15 animals. Maximum of 20 samples may be pooled.

Sampling of salmonella positive herds for releasing the restrictions:
Adult animals: feacal sample is collected from every animal. 10-20 samples are pooled.
Young animals: composite faecal sample is collected from a group of 20-30 animals. Composite samples are not pooled. Also environmental samples are taken.

Slaughterhouse:
From each carcass five ileo-caecal lymphnodes are taken. Lymph nodes are divided into two equal parts. Lymph nodes parts from five animals are pooled together for analyse. If the sample is positive each of the five individually samples are analysed separately.

Fattening herds at farm

Sampling project of the industry in 2010:
Two faecal samples are collected from a group of 10-15 animals. Maximum of 20 samples may be pooled. The total number of pooled samples is one per 100-150 animals.

Suspected herds:
Two faecal samples are collected from a group of 10-15 animals. Maximum of 20 samples may be pooled.

Sampling of salmonella positive herds for releasing the restrictions:
Composite faecal sample is collected from pens of a group of 20-30 animals. Composite samples are not pooled. Also environmental samples are taken.

Fattening herds at slaughterhouse (herd based approach)

From each carcass five ileo-caecal lymphnodes are taken. Lymph nodes are divided into two equal parts. Lymph nodes parts from five animals are pooled together for analyse. If the sample is positive each of the five individually samples are analysed separately.

Case definition

Breeding herds

Herd is positive if one or more animals are Salmonella spp. positive.

Fattening herds at farm

Herd is positive if one or more animals are Salmonella spp. positive.

Fattening herds at slaughterhouse (herd based approach)

Animal is positive if Salmonella spp. has been isolated from a sample.

Diagnostic/analytical methods used

Breeding herds

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002 / Amendment 1:2007

Multiplying herds

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002 / Amendment 1:2007

Fattening herds at farm

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002 / Amendment 1:2007

Fattening herds at slaughterhouse (herd based approach)

ISO 6579:2002 or NMKL No 71:1999 or ISO 6579:2002 / Amendment 1:2007

Vaccination policy

Breeding herds

Vaccination against salmonella is not allowed in Finland.

Fattening herds

Vaccination against salmonella is not allowed in Finland.

Other preventive measures than vaccination in place

Breeding herds

Strict biosecurity and production hygiene at holdings. Salmonella control of feedstuffs.

Fattening herds

Strict biosecurity and production hygiene at holdings. Salmonella control of feedstuffs.

Control program/mechanisms

The control program/strategies in place

Breeding herds

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Fattening herds

The Finnish Salmonella Control Programme, approved by Commission Decision 94/968/EC of 28 December 1994.

Recent actions taken to control the zoonoses

Usually only the nucleus and multiplier herds are sampled annually for Salmonella. In 2010, the industry organized sampling of other herds to monitor the situation after the outbreak year 2009. Sampled herds were breeding herds (other than nucleus and multiplier), mixed herds and fattening herds that belong in Sikava (industry health care system and register of swine herds). Together 95 nucleus and multiplier herds and 745 other herds were sampled in 2010.

Measures in case of the positive findings or single cases

At slaughterhouse: If a positive lymh node sample is detected in the slaughterhouse, the herd of origin is sampled by the official veterinarian.
At farm: Official restrictions: no trade of live animals except to slaughterhouse (meat is heat treated). Sanitation and eradication is carried out according to the holding spesific plan. Restrictions are released after herd has been negative in two consecutive sampling sessions with one month intervals. Epidemiological investigation. Feedingstuffs are analysed for salmonella.

Notification system in place

Laboratory has to notify the positive result to the competent authority and to the food business operator.

Results of the investigation

Two pig herds out of 846 sampled herds were positive for Salmonella Tennessee. Both herds were positive already in 2009.
At slaughterhouse sampling three pigs out of 6539 (0,05%) were positive; two S. Typhimurium, one S. Infantis.

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

Salmonella situation in pigs has been very favourable for years. The year 2009 was unexceptional due to the feedborne Salmonella Tennessee outbreak. In 2009, S. Tennessee was detected from 50 holdings. In 2010, two of these holdings were still positive for S. Tennessee. Otherwise the year 2010 was back to the normal situation. Salmonella was not detected from any another holding althought the sampling was more intensive than before the outbreak.

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

Pigs are not considered to be an important source of human salmonellosis cases in Finland.

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

Monitoring system

Sampling strategy

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

The Finnish Salmonella Control Programme:
Day-old chicks are sampled by the food business operator after arrived to the holding.
Rearing flocks are sampled at the holding by the food business opearator at four weeks old and two weeks before moving to laying unit or phase. Once a year samples are taken by the official veterinarian at each holding.
Adult breeding flocks are sampled at the holding every second week by the food business operator and twice during the production cyckle by the official veterinarian.
In addition, the rearing and adult breeding flock is always sampled by the official veterinarian if there is any reason to suspect that the flock is positive for Salmonella spp.

Meat production flocks

The Finnish Salmonella Control Programme:
All meat production flocks are sampled at the holding within three weeks before slaughter. The sampling result is valid for three weeks except for small producers the result is valid for six weeks. At each holding sampling is carried out by the official veterinarian once a year, otherwise sampling is carried out by the food business operator.
In addition, the flock is always sampled by the official veterinarian if there is any reason to suspect that the flock is positive for Salmonella spp.

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

Every flock is sampled at age of 4 weeks and 2 weeks before moving to the laying unit

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

Every flock is sampled at the holding every second week.

Meat production flocks: Before slaughter at farm

Every flock is sampled within three weeks before salughter

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

One pair of socks/boot swabs and one dust sample

Meat production flocks: Before slaughter at farm

Samples taken by the food business operator; two pairs of socks/boot swabs
Samples taken by the official veterinarian; one pair of socks/boot swabs and one dust sample

Methods of sampling (description of sampling techniques)

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

Internal linigs are collected from ten delivery boxes. Five papers are pooled together. If papers are not used swab sampels from ten delivery boxes are taken. Five swab samples are pooled together.

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

Two pairs of socks/ boot swabs samples are taken. Both pairs are analysed separately.

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

One pair of socks/boot swabs samples and one dust sample collected by swab are taken. Both samples are analysed separately.

Meat production flocks: Before slaughter at farm

Sampling by the food business operator: two pairs of socks/boot swabs samples are taken. Both pairs are analysed separately.
Sampling by the official veterinarian: one pair of socks/boot swabs and one dust sample collected by swab are taken. Both samples are analysed separately.

Case definition

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

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

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

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

Meat production flocks: Before slaughter at farm

Flock is considered to be positive when Salmonella spp. is isolated from any sample.

Diagnostic/analytical methods used

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

ISO 6579:2002 /Amd. 1:2007

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

ISO 6579:2002/Amd. 1:2007

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

ISO 6579:2002/Amd. 1:2007

Meat production flocks: Before slaughter at farm

ISO 6579:2002/Amd. 1:2007

Vaccination policy

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

Vaccination against salmonella is not allowed in Finland.

Meat production flocks

Vaccination against salmonella is not allowed in Finland.

Other preventive measures than vaccination in place

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

Strict biosecurity and production hygiene in holdings. Competitive exclusion. Feedstuff control.

Meat production flocks

Strict biosecurity and production hygiene in holdings. Competitive exclusion. Feedstuff control.

Control program/mechanisms

The control program/strategies in place

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

The Finnish Salmonella Control Programme, approved by Commission Decision 2009/771/EC.

Meat production flocks

The Finnish Salmonella Control Programme, approved by Commission Decision 2009/771/EC.

Recent actions taken to control the zoonoses

Salmonella control programme for breeding and meat production flocks of turkeys was amended from the beginning of the year 2010. Earlier the adult breeding flocks were sampled every second week at the hatcheries, now at the holdings. One pair of socks/boot swabs and one swab dust sample are taken instead of five pairs of socks/boot swabs. For meat production flocks two pairs of socks/boot swabs or one pair of socks/boot swabs and one dust sample are taken instead of five pairs of socks/boot swabs.

Measures in case of the positive findings or single cases

In case of positive finding the flock is destructed or slaughtered and meat heat treated. Hatching eggs are destructed or heat treated. All the other flocks at the holding are sampled by the official veterinarian. The holding is cleaned and desinficted, official environmental samples are taken, negative results are required before restocking. Official epidemiological investigation is carried out. Feedingstuffs are analysed for Salmonella.

Notification system in place

Laboratory has to notify the positive result to the competent authority and to the food bussines operator. Salmonella has been notifiable since 1995.

Results of the investigation

Salmonella spp. was not detected in breeding or meat production flocks of turkeys.

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

Salmonella situation in turkey flocks has been favourable for years.

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

Domestic turkey meat is not considered to be an important source of human salmonellosis cases in Finland.

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Altona	S. Infantis	S. Tennessee
Cattle (bovine animals) - breeding bulls - at farm - Control and eradication programmes - industry sampling (Sampling of herds of origin of AI-bulls)	Evira	Herd	159	0							
Cattle (bovine animals) - unspecified - at farm - Control and eradication programmes - official sampling - suspect sampling	Evira	Herd	36	7	1	5			1		
Cattle (bovine animals) - unspecified - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3097	6		5			1		
Pigs - at farm - Control and eradication programmes - official sampling - suspect sampling	Evira	Herd	6	2							2
Pigs - at farm - Monitoring - industry sampling (Breeding herds (other than nucleus and multiplier), mixed herds and fattening herds)	Evira, Sikava	Herd	745	0							
Pigs - breeding animals - at farm - Control and eradication programmes - industry sampling - census sampling (Nucleus and multiplier herds)	Evira	Herd	95	0							
Pigs - breeding animals - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3207	1						1	
Pigs - fattening pigs - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3332	2		2					

Table Salmonella in other animals

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks	9	Evira	Flock	9	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period	9	Evira	Flock	9	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult	24	Evira	Flock	24	0						
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - day-old chicks	1	Evira	Flock	1	0						
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during rearing period	1	Evira	Flock	1	0						
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult	1	Evira	Flock	1	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks	69	Evira	Flock	69	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period	90	Evira	Flock	90	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult	137	Evira	Flock	137	1						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - day-old chicks	6	Evira	Flock	6	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period	7	Evira	Flock	7	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult	9	Evira	Flock	9	0						

Table Salmonella in breeding flocks of Gallus gallus

	Salmonella spp., unspecified	S. Albany
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks		
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period		
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult		
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - day-old chicks		
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during rearing period		
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult		
Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks		
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period		
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult		1
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - day-old chicks		
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period		
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult		

Table Salmonella in breeding flocks of Gallus gallus

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Livingstone	S. Tennessee
Gallus gallus (fowl) - laying hens - during rearing period	136	Evira	Flock	136	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	899	Evira	Flock	899	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	899	Evira	Flock	899	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	899	Evira	Flock	410	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling	899	Evira	Flock	10	0						
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling	3070	Evira	Flock	3070	5					4	1
Turkeys - breeding flocks, unspecified - day-old chicks - at farm - Control and eradication programmes - official and industry sampling	14	Evira	Flock	14	0						
Turkeys - breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes - official and industry sampling	10	Evira	Flock	10	0						
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes - official and industry sampling	10	Evira	Flock	10	0						
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling	348	Evira	Flock	348	0						

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Livingstone	S. Tennessee
Gallus gallus (fowl) - laying hens - day-old chicks - at farm - Control and eradication programmes [1)]		Evira	Flock	68	0						
Gallus gallus (fowl) - laying hens - day-old chicks - at hatchery - Control and eradication programmes [2)]		Evira	Flock	96	0						

Comments:

[1)] Number of existing flocks is unknown.
[2)] Number of existing flocks is unknown.

2.1.4 Salmonella in feedingstuffs

A. Salmonella spp. in feed

History of the disease and/or infection in the country

In Finland, animal feed has been controlled for Salmonella on the basis of animal feed legislation for more than 50 years. Control of imported feedingstuffs and domestic manufacturing has efficiently limited and prevented the spread of Salmonella from factories to farms. The strict liability principle in the animal feed legislation and the indemnity liability have contributed to the willingness of feedmills to develop their operations towards eliminating risks of Salmonella. The animal feed industry has also accepted its responsibility for the cleanliness of the national food chain by developing its own quality control systems.

Salmonella outbreaks originating from feed are rare on Finnish livestock farms. In 1995, the feed-borne S. Infantis outbreak was discovered on cattle farms. During the outbreak, approximately 0.7% of Finnish cattle farms were infected. In the spring of 2009, the feed-borne S. Tennessee outbreak spread to poultry and pig farms. Approximately 4 % of Finnish laying hen holdings and about 2 % of Finnish pig holdings were infected.

Foreign feedingstuffs of plant origin are considered particularly risky in terms of Salmonella. During the last ten years, an average of 370 million kilograms of plant-derived feedingstuffs has been imported into Finland annually, and an average of almost 6 % of it has been found to be contaminated by Salmonella. The majority - approximately 79 % - of plant-derived feedingstuffs has been oil plant seed products or by-products, such as post-extraction soya and rapeseed meal. Almost 8 % of these have been found to be contaminated by Salmonella. The most common serotypes established in plant-derived feedingstuffs have been S. Tennessee, S. Agona, S. Senftenberg and S. Mbandaka.

In the last ten years, Salmonella findings have been relatively rare in feed materials and compound feedingstuffs manufactured in Finland, i.e. on average in two samples annually. Salmonella has been found three times in feed materials of plant origin from the year 2001 to 2010. In feed materials of animal origin, Salmonella was found in two samples of meat-and-bone meal in 2005 and in one sample in 2010. Compound feedingstuffs that were salmonella-positive were almost without exception compound feedingstuffs intended for fur animals. Salmonella has not been found in samples taken in conjunction with the manufacturing of pet food.
The most common Salmonellas isolated from the control samples of domestic feed materials and compound feedingstuffs manufacturing have been S. Agona and S. Poona. In the 2009 Salmonella outbreak, compound feedingstuffs were contaminated with S. Tennessee.

The majority of salmonella tests for feed on the market have been carried out on pet food and sunflower seeds intended for outdoor birds. In samples taken from dried pig ears intended for dogs and from other similar products, an average of 4,1 % was found to be contaminated by salmonella. The contaminated feed has been mainly manufactured outside Finland.
The most common serotypes isolated from dried pig ears intended for dogs and other corresponding products have been S. Typhimurium, S. Derby, S. Anatum and S. Havana.

Additional information

Finnish Food Safety Authority Evira carries out inspections of feedingstuffs concerning manufacturing, marketing, distribution and import.

The Regulation of the Ministry of Agriculture and Forestry on undesirable substances, products and organisms in animal feed (No 11/2010) includes requirements for hygienic quality of feedingstuffs. According to this decision, feeds should not contain salmonella. According to the Finnish Feed Act (No 86/2008), the feed operator is obligated to pay compensation for damages caused by salmonella-contaminated feeds.

All feed business operators must inform Evira when salmonella is found in feeds, feed materials or manufacturing processes.

- Import from EU or third countries:
Imported lots of plant origin feeds are sampled according to the risk-based annual control plan. Salmonella analyses are made in Evira or in laboratories approved by Evira (9 approved laboratories, 26.5.2011). Custom is responsible for the documentary checks and to carry out the import quarantine restrictions on feeds of plant origin originating from third countries.
Feeds of animal origin from third countries are imported via designated BIPs, where they are submitted for veterinary border inspection. The border control veterinarians carry out official controls of feeds of animal origin from third countries to verify compliance with aspects of Feedingstuffs Act in accordance with Regulation (EC) 882/2004.

- Marketing control:
Evira provides the inspectors of Employment and Economic Development Centres with a sampling programme for the whole year in which the types of operators, the number of visits, the types of feed and the number of samples to be taken are specified.

- Control of domestic production:
Regulation (EC) No 183/2005 of the European Parliament and of the Council laying down requirements for feed hygiene describes general rules on feed hygiene, conditions and arrangements ensuring traceability of feed and conditions for registration and approval of establishments. The sampling of production is risk-based and targeted to specified feeds. The amount of production, the type of operator, the hygienic risk and the feed materials used have an impact on the amount so samples taken annually from the production.

- Measures in case of positive findings:
When salmonella is found in import control or from market, a prohibition concerning the lot, from which the sample was taken, is immediately issued. If salmonella is found in domestic feed production, the production line is stopped and disinfected.

Evira may upon reguest grant a permission to decontaminate the lot of feed material containing salmonella. The decontamination must be carried out according to instructions of Evira. After decontamination, Evira will resample the lot and if the lot is verified to be free from salmonella, Evira gives a permission to use the lot as feed.

In market control, the shop, where the salmonella was found, is contacted. The importer or the representative is also immediately informed, and the shop and the importer or representative are responsible for withdrawal of the product from market according to instructions of Evira

- Sampling:
Sampling for official control is carried out according to Evira's written directions which are based on the Commission Regulation (EC) No 152/2009 of January 2009 laying down the methods of sampling and analysis for the official control of feed.

- Analysis method:
In Evira salmonella is analysed mainly as described in the ISO 6579:2002 with some minor modifications. Analysis methods used in approved laboratories are ISO 6579:2002, NMKL No 71:1999 and NMKL No 187:2007. Serotyping is performed when salmonella is detected in a sample.

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Agona	S. Infantis	S. London
Feed material of cereal grain origin - barley derived	Evira	Single	25 g	12	0						
Feed material of cereal grain origin - maize	Evira	Batch	25 g	1	0						
Feed material of cereal grain origin - maize - derived	Evira	Batch	25 g	44	0						
Feed material of cereal grain origin - other cereal grain derived	Evira	Single	25 g	19	0						
Feed material of cereal grain origin - wheat derived	Evira	Single	25 g	8	0						
Feed material of oil seed or fruit origin - groundnut derived	Evira	Single	25 g	32	0						
Feed material of oil seed or fruit origin - linseed derived	Evira	Single	25 g	3	0						
Feed material of oil seed or fruit origin - other oil seeds derived	Evira	Single	25 g	3	0						
Feed material of oil seed or fruit origin - rape seed derived	Evira	Single	25 g	65	0						
Feed material of oil seed or fruit origin - soya (bean) derived	Evira	Single	25 g	5	0						
Feed material of oil seed or fruit origin - sunflower seed derived	Evira	Single	25 g	30	0						
Other feed material - forages and roughages	Evira	Batch	25 g	1	0						
Other feed material - other plants	Evira	Batch	25 g	1	0						
Other feed material - other seeds and fruits	Evira	Single	25 g	2	0						

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Agona	S. Infantis	S. London
Other feed material - tubers, roots and similar products	Evira	Single	25 g	35	0						
Feed material of cereal grain origin - other cereal grain derived - at feed mill	Evira	Batch	25 g	5	0						
Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling	Evira	Single	25 g	33	7		7				
Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - at feed mill - imported	Evira	Batch	25 g	107	0						
Feed material of cereal grain origin - wheat derived - at feed mill - imported	Evira	Batch	25 g	25	0						
Feed material of oil seed or fruit origin - linseed derived - at feed mill - imported	Evira	Batch	25 g	13	0						
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - imported	Evira	Batch	25 g	83	3						2
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - imported	Evira	Batch	25 g	134	2				1	1	
Other feed material - tubers, roots and similar products - at feed mill - imported	Evira	Batch	25 g	3	0						

	S. Tennessee
Feed material of cereal grain origin - barley derived	

Table Salmonella in other feed matter

	S. Tennessee
Feed material of cereal grain origin - maize	
Feed material of cereal grain origin - maize - derived	
Feed material of cereal grain origin - other cereal grain derived	
Feed material of cereal grain origin - wheat derived	
Feed material of oil seed or fruit origin - groundnut derived	
Feed material of oil seed or fruit origin - linseed derived	
Feed material of oil seed or fruit origin - other oil seeds derived	
Feed material of oil seed or fruit origin - rape seed derived	
Feed material of oil seed or fruit origin - soya (bean) derived	
Feed material of oil seed or fruit origin - sunflower seed derived	
Other feed material - forages and roughages	
Other feed material - other plants	
Other feed material - other seeds and fruits	
Other feed material - tubers, roots and similar products	

Table Salmonella in other feed matter

	S. Tennessee
Feed material of cereal grain origin - other cereal grain derived - at feed mill	
Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling	
Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - at feed mill - imported	
Feed material of cereal grain origin - wheat derived - at feed mill - imported	
Feed material of oil seed or fruit origin - linseed derived - at feed mill - imported	
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - imported	1
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - imported	
Other feed material - tubers, roots and similar products - at feed mill - imported	

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Agona	S. Cannstatt	S. Derby
Compound feedingstuffs for cattle - final product	Evira	Single	25 g	317	1		1				
Compound feedingstuffs for pigs - final product	Evira	Single	25 g	237	0						
Compound feedingstuffs for poultry (non specified) - final product	Evira	Single	25 g	53	0						
Compound feedingstuffs for poultry - broilers - final product	Evira	Single	25 g	75	0						
Pet food - dog snacks (pig ears, chewing bones) [1)]	Evira	Single	25 g	156	10		1		3	1	1
Complementary feedingstuffs - final product	Evira	Single	25 g	42	0						
Compound feedingstuffs for fish - final product	Evira	Single	25 g	23	0						
Compound feedingstuffs for fur animal - final product [2)]	Evira	Single	25 g	28	2						
Compound feedingstuffs for horses - final product	Evira	Single	25 g	34	0						
Compound feedingstuffs for reindeers - final product	Evira	Single	25 g	7	0						
Compound feedingstuffs for sheep - final product	Evira	Single	25 g	5	0						
Compound feedingstuffs, not specified - final product	Evira	Single	25 g	225	0						
Pet food - final product	Evira	Single	25 g	205	0						

Table Salmonella in compound feedingstuffs

	S. Goelzau	S. Livingstone	S. Ohio	S. Orion	S. Rissen	S. Schwarzengrund	S. Senftenberg	S. Tennessee	S. group E
Compound feedingstuffs for cattle - final product									
Compound feedingstuffs for pigs - final product									
Compound feedingstuffs for poultry (non specified) - final product									
Compound feedingstuffs for poultry - broilers - final product									
Pet food - dog snacks (pig ears, chewing bones) [1)]	1	1	1		1		2		1
Complementary feedingstuffs - final product									
Compound feedingstuffs for fish - final product									
Compound feedingstuffs for fur animal - final product [2)]				1		1		1	
Compound feedingstuffs for horses - final product									
Compound feedingstuffs for reindeers - final product									
Compound feedingstuffs for sheep - final product									
Compound feedingstuffs, not specified - final product									
Pet food - final product									

Comments:

[1)] In one positive unit two serotypes and in one positive unit three serotypes isolated

[2)] In one positive unit two serotypes isolated

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Infantis
Feed material of land animal origin - dairy products	Evira	Single	25 g	53	0				
Feed material of land animal origin - meat and bone meal	Evira	Single	25 g	45	1				1
Feed material of land animal origin - meat meal	Evira	Single	25 g	2	0				
Feed material of marine animal origin - fish meal	Evira	Batch	25 g	3	0				
Feed material of marine animal origin - other fish products	Evira	Single	25 g	4	0				

2.1.5 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

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
Sources of isolates	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Number of isolates in the laboratory	13	0	0	0	5	0	0	0	6	0	0	0	0
Number of isolates serotyped	13	0	0	0	5	0	0	0	6	0	0	0	0
Number of isolates per serovar													
S. Enteritidis - 3	1												
S. Typhimurium - DT 1	1												
S. Typhimurium - DT 104	3												
S. Typhimurium - DT 40					1								
S. Typhimurium - DT 41	1				1								
S. Typhimurium - DT RDNC	3												

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
Sources of isolates	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Number of isolates in the laboratory	13	0	0	0	5	0	0	0	6	0	0	0	0
Number of isolates serotyped	13	0	0	0	5	0	0	0	6	0	0	0	0
Number of isolates per serovar													
S. Albany									1				
S. Altona	2												
S. Infantis					1								
S. Livingstone									4				
S. Tennessee					2				1				
S. Typhimurium - U 277	2												

Serovar	Other poultry		
Sources of isolates	Monitoring	Clinical	Surveillance
Number of isolates in the laboratory	0	0	0
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Enteritidis - 3			

Table Salmonella serovars in animals

Serovar	Other poultry		
Sources of isolates	Monitoring	Clinical	Surveillance
Number of isolates in the laboratory	0	0	0
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Typhimurium - DT 1			
S. Typhimurium - DT 104			
S. Typhimurium - DT 40			
S. Typhimurium - DT 41			
S. Typhimurium - DT RDNC			
S. Albany			
S. Altona			
S. Infantis			
S. Livingstone			
S. Tennessee			
S. Typhimurium - U 277			

Table Salmonella serovars in animals

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Compound feedingstuffs for cattle - final product		Compound feedingstuffs for fur animal - final product		Feed material of cereal grain origin - other cereal grain derived - by -products of brewing and distilling		Feed material of land animal origin - meat and bone meal		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory			1		3		7		1		3		2
Number of isolates serotyped	0	0	1	0	3	0	7	0	1	0	3	0	2
Number of isolates per serovar													
S. Agona													1
S. Cannstatt													
S. Derby													
S. Goelzau													
S. Infantis									1				1
S. Livingstone													
S. London											2		
S. Ohio													
S. Orion					1								
S. Rissen													

Table Salmonella serovars in feed

Serovar	Compound feedingstuffs for pigs		Compound feedingstuffs for cattle - final product		Compound feedingstuffs for fur animal - final product		Feed material of cereal grain origin - other cereal grain derived - by -products of brewing and distilling		Feed material of land animal origin - meat and bone meal		Feed material of oil seed or fruit origin - rape seed derived		Feed material of oil seed or fruit origin - soya (bean) derived
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring
Number of isolates in the laboratory			1		3		7		1		3		2
Number of isolates serotyped	0	0	1	0	3	0	7	0	1	0	3	0	2
Number of isolates per serovar													
S. Schwarzengrund					1								
S. Senftenberg													
S. Tennessee					1						1		
S. Typhimurium			1				7						
S. group E													

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - soya (bean) derived	Pet food - dog snacks (pig ears, chewing bones)	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		13	
Number of isolates serotyped	0	13	0
Number of isolates per serovar			
S. Agona		3	
S. Cannstatt		1	
S. Derby		1	
S. Goelzau		1	
S. Infantis			
S. Livingstone		1	
S. London			
S. Ohio		1	
S. Orion			
S. Rissen		1	
S. Schwarzengrund			

Table Salmonella serovars in feed

Serovar	Feed material of oil seed or fruit origin - soya (bean) derived	Pet food - dog snacks (pig ears, chewing bones)	
Sources of isolates	Clinical	Monitoring	Clinical
Number of isolates in the laboratory		13	
Number of isolates serotyped	0	13	0
Number of isolates per serovar			
S. Senftenberg		2	
S. Tennessee			
S. Typhimurium		1	
S. group E		1	

Table Salmonella Enteritidis phagetypes in animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
	0	1	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0	0
3		1											

Phagetype	Other poultry		
	Monitoring	Clinical	Surveillance
	0	0	0
	0	0	0
3			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
	5	4	1	0	2	0	0	0	0	0	0	0	0
	5	4	1	0	2	0	0	0	0	0	0	0	0
DT 1	1												
DT 104		2	1										
DT 40					1								
DT 41	1				1								
DT RDNC	3												
U 277		2											

Phagetype	Other poultry		
	Monitoring	Clinical	Surveillance
	0	0	0
	0	0	0
DT 1			

Table Salmonella Typhimurium phagetypes in animals

Phagetype	Other poultry		
	Monitoring	Clinical	Surveillance
	0	0	0
	0	0	0
DT 104			
DT 40			
DT 41			
DT RDNC			
U 277			

2.1.6 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling

See Salmonella spp. in bovine animals.

Type of specimen taken

Details of sampling are described in the text Salmonella spp. in bovine animals.

Methods of sampling (description of sampling techniques)

Methods of sampling are described in the text Salmonella spp. in bovine animals.

Procedures for the selection of isolates for antimicrobial testing

The samples were taken as a part of the National Control Programme

Methods used for collecting data

The strains were isolated and identified in local laboratories and the diagnosis was confirmed in Evira.

Laboratory methodology used for identification of the microbial isolates

Details of the laboratory methodology are described in the text Salmonella spp. in bovine animals.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.

Microbiology Unit is accredited according to standard SFS-EN ISO/IEC 17025 to perform the antimicrobial susceptibility testing. The department participates regularly in proficiency tests.

Cut-off values used in testing

Epidemiological cut-off values were used.

Preventive measures in place

See Salmonella spp. in bovine animals.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in bovine animals.

Results of the investigation

Thirteen bovine salmonella isolates were isolated in the control programme; ten S. Typhimurium, two S. Altona, and one S Enteritidis.

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

Three S. Typhimurium isolates were resistant to two antibiotics (each to ampicillin and

sulphamethoxazole). Sources are unknown

B. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

Sampling strategy used in monitoring

Frequency of the sampling

See Salmonella spp. in bovine animals.

Type of specimen taken

Details of sampling are described in the text Salmonella spp. in bovine animals.

Methods of sampling (description of sampling techniques)

Methods of sampling are described in the text Salmonella spp. in bovine animals.

Procedures for the selection of isolates for antimicrobial testing

The samples were taken as a part of the National Control Programme

Methods used for collecting data

The strains were isolated and identified in local laboratories and the diagnosis was confirmed in Evira.

Laboratory methodology used for identification of the microbial isolates

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.

Cut-off values used in testing

Epidemiological cut-off values were used.

Preventive measures in place

See Salmonella spp. in bovine animals.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in bovine animals.

Results of the investigation

No isolates of domestic origin were obtained.

C. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Sampling strategy used in monitoring

Frequency of the sampling

See Salmonella spp. in pig meat and products thereof.

Type of specimen taken

See Salmonella spp. in pig meat and products thereof.

Methods of sampling (description of sampling techniques)

See Salmonella spp. in pig meat and products thereof.

Methods used for collecting data

Isolates are collected from local laboratories and tested in Evira.

Laboratory methodology used for identification of the microbial isolates

See Salmonella spp. in pig meat and products thereof.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.

Microbiology Unit is accredited according to standard SFS-EN ISO/IEC 17025 to perform the antimicrobial susceptibility testing. The department participates regularly in proficiency tests.

Cut-off values used in testing

Epidemiological cut-off were used.

Preventive measures in place

See Salmonella spp. in pig meat and products thereof.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in pig meat and products thereof.

Results of the investigation

No isolates of domestic origin were obtained.

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

The antimicrobial resistance situation of Salmonella in foodstuff derived from domestically raised pigs is very favourable.

D. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

Determined in the decree 20/EEO/2001 of the Ministry of Agriculture and Forestry

Methods used for collecting data

The strains were isolated and identified in a local laboratory and the diagnosis was confirmed in Evira.

Laboratory methodology used for identification of the microbial isolates

Details of the laboratory methodology are described in the texts Salmonella spp in Gallus gallus and turkey.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.
Microbiology Research Unit is accredited according to standard SFS-EN ISO/IEC 17025 to perform the antimicrobial susceptibility testing. The department participates regularly in proficiency tests.

Cut-off values used in testing

Epidemiological cut-off values were used.

Results of the investigation

No isolates of domestic origin were obtained.

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

The situation in domestic poultry meat production continues to be very favourable.

E. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Samples originate from the Finnish Salmonella control programme.

Type of specimen taken

Details of sampling are described in the text Salmonella spp in pigs.

Methods of sampling (description of sampling techniques)

Methods of sampling are described in the text Salmonella spp in pigs.

Procedures for the selection of isolates for antimicrobial testing

The sampling frequency is determined in the national control programme

Methods used for collecting data

Primary isolation and identification was performed in local laboratories and the diagnosis was confirmed in Evira.

Laboratory methodology used for identification of the microbial isolates

Details of the laboratory methodology are described in the text Salmonella spp in pigs.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.
Microbiology Unit is accredited according to standard SFS-EN ISO/IEC 17025 to perform the antimicrobial susceptibility testing. The unit participates regularly in proficiency tests.

Cut-off values used in testing

Epidemiological cut-off values were used.

Preventive measures in place

See Salmonella spp. in pigs.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in pigs.

Results of the investigation

Five salmonella isolates were obtained; two S. Typhimurium, two S. Tennessee and one S. Infantis. All isolates were fully sensitive to the antimicrobials tested

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

The overall salmonella situation and antimicrobial resistance in pigs is very favourable.

F. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

See Salmonella spp. in Gallus gallus - breeding flocks, flocks of laying hens and broiler flocks + and Salmonella spp. in turkey breeding flocks and meat production flocks

Type of specimen taken

See Salmonella spp. in Gallus gallus - breeding flocks, flocks of laying hens and broiler flocks + Salmonella spp. in turkey breeding flocks and meat production flocks

Methods of sampling (description of sampling techniques)

See Salmonella spp. in Gallus gallus - breeding flocks, flocks of laying hens and broiler flocks + and Salmonella spp. in turkey breeding flocks and meat production flocks

Procedures for the selection of isolates for antimicrobial testing

One isolate from each production batch was included.

Methods used for collecting data

Isolates were collected from local laboratories and tested in Evira.

Laboratory methodology used for identification of the microbial isolates

Details of the laboratory methodology are described in the texts Salmonella spp in Gallus gallus and turkey.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (NVI, Sweden); testing performed according to CLSI Document Version M31-A3 Vol. 28 No 8. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain.
Microbiology Research Unit is accredited according to standard SFS-EN ISO/IEC 17025 to perform the antimicrobial susceptibility testing. The department participates regularly in proficiency tests.

Cut-off values used in testing

Epidemiological cut-off values were used.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in Gallus gallus and turkeys.

Results of the investigation

Five salmonella isolates were obtained from broilers; three S. Livingstone, one S. Tennessee and one S. Albany. All isolates were fully sensitive to the antimicrobials included in testing.

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

The overall antimicrobial resistance situation in salmonella isolates from poultry continues to be favourable.

G. Antimicrobial resistance of S. Albany in Animals Gallus gallus (fowl) - breeding flocks for broiler production line - hatching eggs - at farm - environmental sample - dust - Control and eradication programmes - industry sampling - census sampling

Sampling strategy used in monitoring

Frequency of the sampling

According to the Finnish Salmonella Control Programme, approved by Commission Decision 2008/815/EC

Type of specimen taken

environmental (dust)

Methods of sampling (description of sampling techniques)

see Gallus gallus breeding flocks

Procedures for the selection of isolates for antimicrobial testing

One isolate from each batch was included.

Laboratory methodology used for identification of the microbial isolates

ISO 6579:2002 / Amendment 1:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

see Qualitative results -table

Cut-off values used in testing

see Cutoff values -table

Preventive measures in place

Strict biosecurity; vaccination against Salmonella is not allowed in Finland.

Control program/mechanisms

The control program/strategies in place

Finnish Salmonella Control Programme, approved by Commission Decision 2008/815/EC

Results of the investigation

One positive broiler breeding flock (S. Albany) was detected.

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

The situation continues to be very favourable

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes		yes	
Number of isolates available in the laboratory	0		2		3	
Antimicrobials:	N	n	N	n	N	n
Amphenicols - Chloramphenicol			2	0	3	0
Cephalosporins - 3rd generation cephalosporins			2	0	3	0
Fluoroquinolones - Ciprofloxacin			2	0	3	0
Quinolones - Nalidixic acid			2	0	3	0
Trimethoprim			2	0	3	0
Sulphonamides - Sulfonamide			2	0	3	0
Aminoglycosides - Streptomycin			2	0	3	0
Aminoglycosides - Gentamicin			2	0	3	0
Aminoglycosides - Kanamycin			2	0	3	0
Penicillins - Ampicillin			2	0	3	0
Tetracyclines - Tetracycline			2	0	3	0
Fully sensitive			2	2	3	3

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - broilers

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Livingstone	
Isolates out of a monitoring program (yes/no)	yes		yes		yes		yes	
Number of isolates available in the laboratory	0		0		1		3	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol					1	0	3	0
Cephalosporins - 3rd generation cephalosporins					1	0	3	0
Fluoroquinolones - Ciprofloxacin					1	0	3	0
Quinolones - Nalidixic acid					1	0	3	0
Trimethoprim					1	0	3	0
Sulphonamides - Sulfonamide					1	0	3	0
Aminoglycosides - Streptomycin					1	0	3	0
Aminoglycosides - Gentamicin					1	0	3	0
Aminoglycosides - Kanamycin					1	0	3	0
Penicillins - Ampicillin					1	0	3	0
Tetracyclines - Tetracycline					1	0	3	0
Fully sensitive					1	1	3	3

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

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.	
Isolates out of a monitoring program (yes/no)	yes		yes		yes	
Number of isolates available in the laboratory	1		10		2	
Antimicrobials:	N	n	N	n	N	n
Amphenicols - Chloramphenicol	1	0	10	0	2	0
Cephalosporins - 3rd generation cephalosporins	1	0	10	0	2	0
Fluoroquinolones - Ciprofloxacin	1	0	10	0	2	0
Quinolones - Nalidixic acid	1	0	10	0	2	0
Trimethoprim	1	0	10	0	2	0
Sulphonamides - Sulfonamide	1	0	10	3	2	0
Aminoglycosides - Streptomycin	1	0	10	0	2	0
Aminoglycosides - Gentamicin	1	0	10	0	2	0
Aminoglycosides - Kanamycin	1	0	10	0	2	0
Penicillins - Ampicillin	1	0	10	3	2	0
Tetracyclines - Tetracycline	1	0	10	0	2	0
Fully sensitive	1	1	10	7	2	2
Resistant to 1 antimicrobial			10	0		
Resistant to 2 antimicrobials			10	3		

Table Antimicrobial susceptibility testing of Salmonella in Gallus gallus (fowl) - breeding flocks for broiler production line - hatching eggs - at farm - environmental sample - dust - Control and eradication programmes - industry sampling - census sampling

Salmonella	S. Albany	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	1	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	1	0
Tetracyclines - Tetracycline	1	0
Fluoroquinolones - Ciprofloxacin	1	0
Quinolones - Nalidixic acid	1	0
Trimethoprim	1	0
Sulphonamides - Sulfonamide	1	0
Aminoglycosides - Streptomycin	1	0
Aminoglycosides - Gentamicin	1	0
Penicillins - Ampicillin	1	0
Cephalosporins - Cefotaxim	1	0

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - at slaughterhouse - Control and eradication programmes - industry sampling - census sampling - quantitative data [Dilution method]

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

S. Typhimurium	Cattle (bovine animals) - unspecified - at slaughterhouse - Control and eradication programmes - industry sampling - census sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	10																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	10	0									4	6										2	4
Tetracyclines - Tetracycline	8	10	0								7	3											1	2
Fluoroquinolones - Ciprofloxacin	0.06	10	0			6	4																0.032	0.064
Quinolones - Nalidixic acid	16	10	0									1	9										2	4
Trimethoprim	2	10	0						8	2													0.25	0.5
Sulphonamides - Sulfonamide	256	10	3											1	3	1		1	1			3	8	2048
Aminoglycosides - Streptomycin	32	10	0											3	7								8	16
Aminoglycosides - Gentamicin	2	10	0							5	5												0.5	1
Penicillins - Ampicillin	4	10	3								7							3					1	128
Cephalosporins - Cefotaxim	0.5	10	0				6	4															0.064	0.125

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - quantitative data [Dilution method]

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

S. Typhimurium	Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	2																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	2	0									1	1										2	4
Tetracyclines - Tetracycline	8	2	0								2												2	2
Fluoroquinolones - Ciprofloxacin	0.06	2	0			2																	0.03	0.03
Quinolones - Nalidixic acid	16	2	0										2										4	4
Trimethoprim	2	2	0						2														0.25	0.25
Sulphonamides - Sulfonamide	256	2	0												1		1						16	64
Aminoglycosides - Streptomycin	32	2	0												2								16	16
Aminoglycosides - Gentamicin	2	2	0							1		1											0.5	2
Penicillins - Ampicillin	4	2	0							1	1												0.5	1
Cephalosporins - Cefotaxim	0.5	2	0				2																0.06	0.06

Table Antimicrobial susceptibility testing of Other serovars in Cattle (bovine animals) - unspecified - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - census sampling - quantitative data [Dilution method]

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

Other serovars	Cattle (bovine animals) - unspecified - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - census sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	3																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	3	0										3											4	4
Tetracyclines - Tetracycline	8	3	0								2	1												1	2
Fluoroquinolones - Ciprofloxacin	0.06	3	0			2	1																	0.03	0.06
Quinolones - Nalidixic acid	16	3	0										3											4	4
Trimethoprim	2	3	0						3															0.25	0.25
Sulphonamides - Sulfonamide	256	3	0											1	1	1								8	32
Aminoglycosides - Streptomycin	32	3	0										1	2										4	8
Aminoglycosides - Gentamicin	2	3	0							1	2													0.5	1
Penicillins - Ampicillin	4	3	0								2	1												1	2
Cephalosporins - Cefotaxim	0.5	3	0				2	1																0.06	0.12

Table Antimicrobial susceptibility testing of Other serovars in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - census sampling - quantitative data [Dilution method]

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

Other serovars	Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - carcass swabs - Control and eradication programmes - industry sampling - census sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	3																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	3	0										3											4	4
Tetracyclines - Tetracycline	8	3	0								1	2												1	2
Fluoroquinolones - Ciprofloxacin	0.06	3	0			2	1																	0.93	0.06
Quinolones - Nalidixic acid	16	3	0										3											4	4
Trimethoprim	2	3	0							3														0.5	0.5
Sulphonamides - Sulfonamide	256	3	0											2	1									8	16
Aminoglycosides - Streptomycin	32	3	0												2	1								16	32
Aminoglycosides - Gentamicin	2	3	0							1	2													0.5	1
Penicillins - Ampicillin	4	3	0							2	1													0.5	1
Cephalosporins - Cefotaxim	0.5	3	0					3																0.12	0.12

Table Antimicrobial susceptibility testing of Other serovars in Gallus gallus (fowl) - broilers - before slaughter - at farm - animal sample - faeces - Control and eradication programmes - industry sampling - census sampling - quantitative data [Dilution method]

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

Other serovars	Gallus gallus (fowl) - broilers - before slaughter - at farm - animal sample - faeces - Control and eradication programmes - industry sampling - census sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	4																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	4	0										3	1										4	8
Tetracyclines - Tetracycline	8	4	0								2	1	1											1	4
Fluoroquinolones - Ciprofloxacin	0.06	4	0			1	3																	0.03	0.06
Quinolones - Nalidixic acid	16	4	0										3	1										4	8
Trimethoprim	2	4	0						3		1													0.25	1
Sulphonamides - Sulfonamide	256	4	0											1	1	2								8	32
Aminoglycosides - Streptomycin	32	4	0												3	1								16	32
Aminoglycosides - Gentamicin	2	4	0								4													1	1
Penicillins - Ampicillin	4	4	0							3		1												0.5	2
Cephalosporins - Cefotaxim	0.5	4	0				2	1	1															0.06	0.25

Table Antimicrobial susceptibility testing of S. Albany in Gallus gallus (fowl) - breeding flocks for broiler production line - hatching eggs - at farm - environmental sample - dust - Control and eradication programmes - industry sampling - census sampling - quantitative data [Dilution method]

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

S. Albany	Gallus gallus (fowl) - breeding flocks for broiler production line - hatching eggs - at farm - environmental sample - dust - Control and eradication programmes - industry sampling - census sampling																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	0										1											4	4
Tetracyclines - Tetracycline	8	1	0								1													1	1
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																	0.06	0.06
Quinolones - Nalidixic acid	16	1	0										1											4	4
Trimethoprim	2	1	0							1														0.5	0.5
Sulphonamides - Sulfonamide	256	1	0												1									16	16
Aminoglycosides - Streptomycin	32	1	0													1								32	32
Aminoglycosides - Gentamicin	2	1	0								1													1	1
Penicillins - Ampicillin	4	1	0								1													1	1
Cephalosporins - Cefotaxim	0.5	1	0					1																0.12	0.12

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

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulphonamides	Sulfonamide		256	
	Sulphonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	3rd generation cephalosporins		0.5	
	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

During the last 20 years the annual number of human cases has shown a rising overall trend with some exceptions. Since 1998 campylobacters have been more commonly reported cause of enteritis than salmonellas.

All Finnish broiler slaughterhouses have voluntarily monitored the prevalence of campylobacter in broilers at slaughter as a part of the own-check programme since the 1990's. From 1999 to 2002 the flock prevalence was on average 7.9% between June and September and 1.1% during the other months.

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

Thermophilic campylobacters, especially Campylobacter jejuni, are the most common bacterial cause of human enteric infections in Finland. A strong seasonal variation is typical for the incidence of campylobacteriosis, which has been consistently highest in July. A high percentage, up to 85% in 2009, of human campylobacter infections reported in Finland originate from travel abroad. However, the proportion of domestically acquired infections peaks in the summer season.

Since the implementation of a national campylobacter monitoring programme for broilers in 2004, the average prevalence of campylobacters in broiler slaughter batches has been between 6.3% during June-October and 1.3% during the rest of the year.

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

In late summer thermophilic campylobacters are detected in 20 to 30% of retail poultry meat of domestic origin. Poultry meat is considered as source of campylobacters in part of the sporadic cases.

Contaminated drinking water caused six large outbreaks in the years 1999 - 2007. Unpasteurized milk, imported turkey meat, chicken and strawberries have been suspected as source of few small outbreaks.

Recent actions taken to control the zoonoses

The Finnish campylobacter monitoring programme for broilers was introduced in June 2004. All broiler slaughter batches between June and October are sampled and examined for thermophilic campylobacters. Between January and May, and in November and December random samples are taken according to a specific sampling plan.

2.2.2 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A compulsory monitoring programme for broilers was introduced in June 2004. From June to October, when the prevalence is known to be at the highest, all broiler slaughter batches are sampled at slaughter. From January to May and from November to December, when the prevalence has consistently been low, random sampling of slaughter batches is performed according to a particular sampling scheme. Since 2008 the number of batches sampled is calculated with the following criteria: expected prevalence 1 %, accuracy 1 %, confidence level 95%.

Frequency of the sampling

At slaughter

Other: All broiler slaughter batches between June and October; random sampling (expected prevalence 1%, accuracy 1%, confidence level 95%) between January and May, and in November and December.

Type of specimen taken

At slaughter

Caecum samples

Methods of sampling (description of sampling techniques)

At slaughter

Intact caeca from ten birds are taken. Caecal contents are pooled into one sample in the laboratory.

Case definition

At slaughter

A case is defined as a slaughter batch, that is positive for Campylobacter jejuni or C. coli.

Diagnostic/analytical methods used

At slaughter

NMKL No 119 with modifications (no enrichment)

Vaccination policy

There is no vaccination against campylobacter in Finland.

Other preventive measures than vaccination in place

Strict biosecurity measures and production hygiene in holdings.

Control program/mechanisms

The control program/strategies in place

The Finnish campylobacter monitoring programme was introduced in June 2004. It is compulsory for all broiler slaughterhouses.

Measures in case of the positive findings or single cases

If campylobacters are detected in two consecutive growing batches from the same holding, all the flocks from the holding will be slaughtered at the end of the day until slaughter batches from two consecutive growing batches are negative. Special attention to the production hygiene in the holding will be paid in cooperation with the local municipal veterinarian.

Notification system in place

All positive flocks in the monitoring programme are reported to the authorities.

Results of the investigation

A total of 1409 slaughter batches were examined for thermophilic campylobacters between June and October 2010 in the monitoring programme. Campylobacters were detected in 84(6.0%) of these slaughter batches. Campylobacter jejuni was detected in 82 and C. coli in 2 slaughter batches. In January-May and November-December, the samples were taken from 338 slaughter batches in total. Thermophilic campylobacters were detected in 6 (1.8%)of these slaughter batches.

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

The results of the campylobacter monitoring programme in 2010 are consistent with the previous data concerning Finnish broiler slaughter batches. The prevalence of campylobacter in Finnish broiler batches is consistently low.

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

Consumption of poultry meat is considered as a source of campylobacter in part of the sporadic domestic human cases during the seasonal peak in summer.

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - caecum - Control and eradication programmes - industry sampling - census sampling (Sampling between June - October)	Evira	Slaughter batch	1409	84	2	82			
Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - caecum - Control and eradication programmes - industry sampling - objective sampling (Sampling in January-May and November-December)	Evira	Slaughter batch	338	6	3	3			

2.2.3 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Campylobacter coli were isolated in accordance with the FINRES-Vet monitoring programme (Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents): approx. 300 samples in 2010

Type of specimen taken

Faecal samples from healthy pigs

Methods of sampling (description of sampling techniques)

The samples were collected at slaughter. Approx. 50 g fresh sample was taken with a disposable glove and delivered refrigerated to the laboratory. One sample per herd was included.

Procedures for the selection of isolates for antimicrobial testing

If obtained, one C. coli isolate from each sample was tested for antimicrobial susceptibility. Susceptibility results were obtained from 84 C. coli isolates.

Methods used for collecting data

Isolation and susceptibility testing was performed in Evira.

Laboratory methodology used for identification of the microbial isolates

Modified standard NMKL 119:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (Department of Antibiotics, National Vetrinary Institute, Sweden) was used and the testing performed according to the CLSI standards; Campylobacter jejuni ATCC 33560 was used as a quality control strain. The antimicrobials tested are listed in the tables.

Cut-off values used in testing

EUCAST cut-off values were used for C. coli.

Preventive measures in place

General biosecurity

Control program/mechanisms

The control program/strategies in place

FINRES-Vet monitoring programme

Recent actions taken to control the zoonoses

No specific actions

Results of the investigation

Resistance figures are displayed in the relevant tables. Resistance to nalidixic acid, ciprofloxacin and streptomycin was found in 26% of the isolates. One isolate (1%) was resistant to gentamicin. All isolates were susceptible to erythromycin and tetracycline.

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

The resistance in C. coli is relatively low. C. coli from pigs have been monitored in 2004, 2007 and 2010: resistance to quinolones was higher in 2010 than in 2007 or 2004.

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

Relevance to be determined; however, the relatively low occurrence of resistance does not imply a role.

B. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

1 Jun - 31 Oct every production batch is sampled; 1 Nov - 31 May the frequency is set annually pending on production volume. Details of the sampling are described in 'Thermophilic Campylobacter in Gallus gallus'.

Type of specimen taken

10 intact caeca per batch, taken at slaughterhouse

Methods of sampling (description of sampling techniques)

Caeca are delivered refrigerated to the laboratory and the caecal contents are pooled into one sample in the laboratory.

Procedures for the selection of isolates for antimicrobial testing

All isolates were tested for antimicrobial susceptibility. Susceptibility results were obtained for 87 C. jejuni and 3 C. coli isolates.

Methods used for collecting data

Susceptibility testing was performed in Evira.

Laboratory methodology used for identification of the microbial isolates

Modified standard NMKL 119:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (Department of Antibiotics, National Vetrinary Institute, Sweden) was used and the testing performed according to the CLSI standards; Campylobacter jejuni ATCC 33560 was used as a quality control strain. The antimicrobials tested are listed in the tables.

Cut-off values used in testing

EUCAST cut-off values were used for C. jejuni and for C. coli.

Preventive measures in place

General biosecurity

Control program/mechanisms

The control program/strategies in place

According to the MAF Act 10/EEO/2007

Measures in case of the positive findings or single cases

If Campylobacter are detected repeatedly, official inspection of the facilities and revision of the management procedures. Batches from positive farms are slaughtered at the end of day. No specific measures for detection of antimicrobial resistance.

Results of the investigation

Resistance situation in broilers is very favourable. Two C. jejuni isolates (2%) were resistant to nalidixic acid and ciprofloxacin, and one isolate (1%) was resistant to gentamicin. Only streptomycin resistance was moderate and found in 19% of the C. jejuni isolates. One C. coli isolate was resistant to nalidixic acid and ciprofloxacin. Resistance to erythromycin or tetracycline was not detected.

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

Resistance among C. jejuni and C. coli from broilers was low as in previous years.

Table Antimicrobial susceptibility testing of Campylobacter in Pigs

Campylobacter	Campylobacter spp., unspecified		C. coli	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			87	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			87	23
Quinolones - Nalidixic acid			87	23
Aminoglycosides - Gentamicin			87	1
Macrolides - Erythromycin			87	0
Tetracyclines - Tetracycline			87	0
Fully sensitive			87	45
Resistant to 1 antimicrobial			87	19
Resistant to 2 antimicrobials			87	19
Resistant to 3 antimicrobials			87	3
Resistant to 4 antimicrobials			87	1
Resistant to >4 antimicrobials			87	0
Aminoglycosides - Streptomycin			87	23

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

Campylobacter	Campylobacter spp., unspecified		C. coli		C. jejuni - C. jejuni subsp. jejuni	
Isolates out of a monitoring program (yes/no)			yes		yes	
Number of isolates available in the laboratory			3		84	
Antimicrobials:	N	n	N	n	N	n
Fluoroquinolones - Ciprofloxacin			3	1	84	2
Quinolones - Nalidixic acid			3	1	84	2
Aminoglycosides - Gentamicin			3	0	84	1
Macrolides - Erythromycin			3	0	84	0
Tetracyclines - Tetracycline			3	0	84	0
Fully sensitive			3	2	84	68
Resistant to 1 antimicrobial			3	0	84	13
Resistant to 2 antimicrobials			3	1	84	1
Resistant to 3 antimicrobials					84	2
Aminoglycosides - Streptomycin			3	0	84	16

Table Antimicrobial susceptibility testing of C. jejuni - C. jejuni subsp. jejuni in Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - Monitoring - industry sampling - quantitative data [Dilution method]

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

C. jejuni subsp. jejuni	Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - Monitoring - industry sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	84																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	84	0					75	8	1													0.12	16
Fluoroquinolones - Ciprofloxacin	1	84	2				11	57	14					2									0.06	8
Quinolones - Nalidixic acid	16	84	2									3	60	17	2			2					1	64
Aminoglycosides - Streptomycin	2	84	16								16	52	13				1	2					0.5	64
Aminoglycosides - Gentamicin	1	84	1						7	45	31	1											0.12	16
Macrolides - Erythromycin	4	84	0							82	2												0.5	64

Footnote:

Broth dilution method was used.

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

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

C. coli	Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	87																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	87	0					19	35	33													0.12	16
Fluoroquinolones - Ciprofloxacin	1	87	23				17	29	18					12	11								0.06	8
Quinolones - Nalidixic acid	32	87	23									1	8	42	13		2	21					1	64
Aminoglycosides - Streptomycin	4	87	23								1	1	62	20				3					0.5	64
Aminoglycosides - Gentamicin	2	87	1						1	3	67	15	1										0.12	16
Macrolides - Erythromycin	16	87	0							37	24	23	3										0.5	64

Footnote:

Broth dilution method was used.

Table Cut-off values used for antimicrobial susceptibility testing of C. coli in Animals

Test Method Used
Broth dilution

Standard methods used for testing
NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline	EUCAST	2	
Fluoroquinolones	Ciprofloxacin	EUCAST	1	
Quinolones	Nalidixic acid	EUCAST	32	
Aminoglycosides	Gentamicin	EUCAST	2	
	Streptomycin	EUCAST	4	
Macrolides	Erythromycin	EUCAST	16	

Table Cut-off values used for antimicrobial susceptibility testing of C. coli in Food

Test Method Used	Standard methods used for testing

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

Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Animals

Test Method Used
Broth dilution

Standard methods used for testing
NCCLS/CLSI

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

Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Food

Test Method Used	Standard methods used for testing

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

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Since 1995 18-53 human listeriosis cases have been recorded annually. In the year 2010 70 cases were reported.

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

The annual incidence in humans has been 0,2-1,2 per 100 000. The actual source of infection is usually not identified but most cases are believed to be food-borne. Cold-smoked and gravad fishery products are considered to be risk foodstuffs. Food business operators monitor occurence of Listeria according to the Regulation 2073/2005, and also municipal food control authorities take samples for Listeria anlyses. Evira carries out special surveys for Listeria, but not annually.

2.3.2 Listeria in foodstuffs

A. L. monocytogenes in food

Monitoring system

Sampling strategy

A coordinated monitoring programme (EU baseline study) to assess the prevalence of Listeria monocytogenes in certain ready-to-eat food categories was carried out by Evira in samples selected at random at retail level. The samples were taken by the local food control authorites of the eight biggest cities in Finland during 01.01.-31.12.2010. The number of the samples per city was counted based on the population number of the city.

Frequency of the sampling

At retail

Sampling distributed evenly per month and the year.

Type of specimen taken

At retail

Vacuum or modified athmosphire packaged (not frozen), sliced or not sliced, hot or cold smoked or gravad fish; soft or semi-soft cheeses, excluding fresh cheeses, made from pasteurized or raw milk of any animal species and packaged or unpackaged but packaged at the point of sale to consumer; Vacuum or modified athmosphire packaged heat treated meat products, handled after heat-treatment (sliced or otherwise handled)

Methods of sampling (description of sampling techniques)

At retail

One of the paired fish samples was analysed within 24 hours after arrival. The other fish sample and the cheese and meat product samples were stored until the end of their shelf-life, fish at 4 C and the other products at 6 C, and were analysed. A laboratory sample of 50-100 g was composed of different parts of the sample and was homogenized. 25 g of the homogenized sample was analysed by qualitative method and 10 g by quantitative method.

Definition of positive finding

At retail

L. monocytogenes detected in 25 g sample by qualitative method or CFU/g by quantitative method.

Diagnostic/analytical methods used

At retail

ISO 11290- 1:1996 and 2:1998; Amendments 2004

Preventive measures in place

Sampling for listeria is included in own check programmes and official control carried out by the local food control authorities. The NCA has given guidelines on sampling and control of listeria in RTE-products.

Control program/mechanisms

Recent actions taken to control the zoonoses

Establishments repeatedly found to have products in which listeria was detected, or listeria levels were >100 cfu/g, were informed about the findings. The local food control authority carried out inspections to these establishments and corrective measures were taken. The establishments and local food control

authorities were given guidance by the NCA.

Measures in case of the positive findings

See above. In case the products containing L. monocytogenes >100 cfu/g are still on the market, the products are withdrawn. If listeria finding >100 cfu/g was detected in this survay in a product produced in Finland, Evira informed the food control authority controlling the producer, who must take actions and report of them. If needed, Evira made RASFF.

Notification system in place

In case of findings of L. monocytogenes in food samples taken by FBO, the findings must be reported to the local food control authority.

Results of the investigation

L. monocytogenes was not detected in cheese or meat products. L. monocytogenes was detected in 12/88 (13,6%) of the smoked and in 8/38 (21,1%) of the gravad fishery products. Two of the positive samples contained L. monocytogenes > 100 cfu/g.

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

In this survey the occurence of Listeria monocytogenes in fishery products was decreased compared to the survay conducted 2008-2009.

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

The same PFGE-types have been detected from fishery products and human listeriosis cases, but the connection has remained unclear.

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
Fishery products, unspecified - ready-to-eat - at retail - Survey - EU baseline survey (after sample collection)	Evira	Single	25 g	63	10	63	10	63	9	1
Fishery products, unspecified - ready-to-eat - at retail - Survey - EU baseline survey (at the end of shelf-life)	Evira	Single	25 g	63	10	63	10	63	9	1
Meat from other animal species or not specified - meat products - heat treated, ready to eat - at retail - Survey - EU baseline survey	Evira	Single	25 g	66	0	66	0	66	0	0

Footnote:

All the samples are tested simultaniously with the detection and enumeration methods.
Eight out of ten L. monocytogenes positive samples were positive both after the sample collection and at the end of shelf-life. L. monocytogenes concentration of the sample exceeding the level 100 cfu/g was 360 cfu/g after sample collection and 110 cfu/g at the end of shelf-life.

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 unspecified milk or other animal milk - soft and semi-soft - at retail - Survey - EU baseline survey	Evira	Single	25 g	66	0	66	0	66	0	0

Footnote:

All the samples are tested simultaniously with the detection and enumeration methods.

2.3.3 Listeria in animals

A. L. monocytogenes in animal - All animals

Monitoring system

Sampling strategy

L. monocytogenes causes most commonly neural and visceral infections and abortions in animals. The bacterium can also cause iritis in cattle. Mastitis caused by L. monocytogenes is rare. Samples are usually taken from diseased animals in post mortem examination but sometimes also from diseased live animals.

Case definition

Listeriosis diagnosis can be made by histopathological examination and/or microbiologically by isolation of the causative agent. Histopathological findings in brain tissue are so specific to neural listeriosis that diagnosis can also be made solely based on these findings without isolation of the bacterium. In other forms of Listeria infections diagnosis is based on isolation of causative agent.

Diagnostic/analytical methods used

Histopatholgy and/or cultivation.

Notification system in place

Listeriosis is classified as a monthly notifiable other infectious disease in the Decision N:o 1346/1995 of the Veterinary and Food Department of the Ministry of Agriculture and Forestry. It is therefore obligatory for any veterinarian to notify monthly any occurrence of listeriosis.

Results of the investigation

Listeria monocytogenes bacteria were isolated from 26 cases in 8 different animal species in 2010. Listeriosis was diagnosed in 8 bovine animals, in 8 sheep, in 4 wild hares, in 2 lynxes, in 1 goat, in 1 hen, in 1 horse and in 1 reindeer.

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

The relevance of findings in animals to findings in foodstuffs is negligible. Consumed milk and milk used in dairy products is mainly pasteurised. Other forms of listeriosis than mastitis in animals do not pose a public health risk.

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals)		Animal	unknown	8	8	
Gallus gallus (fowl)		Animal	unknown	1	1	
Goats		Animal	unknown	1	1	
Sheep		Animal	unknown	8	8	
Hares - wild		Animal	unknown	4	4	
Lynx - wild		Animal	unknown	2	2	
Reindeers - semi-domesticated		Animal	unknown	1	1	
Solipeds, domestic - horses		Animal	unknown	1	1	

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/or infection in the country

Before 1996, only sporadic human cases of VTEC were diagnosed. The reporting of VTEC in humans was voluntary until 1994. An enhanced surveillance of bloody diarrhoea was initiated in 1996-1997 which resulted in 8 diagnosed cases. The first Finnish outbreak of VTEC (E. coli O157) occurred in 1997. The outbreak was associated with swimming in a shallow lake in western Finland and involved 14 confirmed cases. The incidence of VTEC in humans has varied from 0.06 (1990) to 1.0 (1997), being between 0.2-0.9/100,000 during 1998-2010. Most human cases are sporadic. Family outbreaks or sporadic cases have been associated with consumption of unpasteurised milk or contact with a cattle farm.

Prevalence studies in slaughter cattle were performed in 1997 and 2003. The prevalence of E. coli O157 in cattle faeces in 1997 was 1.3%. In the latter study the prevalence of E. coli O157 in cattle faeces was 0.4%, in carcass surface samples 0.07%. The prevalence of non-O157 VTEC in cattle faeces was 30%, in carcass samples 11%.

A compulsory control programme for all bovine slaughterhouses started in January 2004. The total number of bovines sampled in a year is calculated with the following criteria: expected prevalence 1 %, accuracy 0,5 %, confidence level 95 %. The total number is divided between the different slaughterhouses depending on their slaughter capacity. The sampling is evenly distributed throughout the year.

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

The number of cases has been quite stable during the recent years although under-reporting might exist. Non-O157 serotypes have increased partly due to the development of laboratory methods. Cattle contact remains a risk of infection, espacially for young children.

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

The figures of VTEC cases are relatively low but the disease caused can be severe and lead to death which makes VTEC a serious zoonosis. Cattle seem to be the biggest reservoir of VTEC. Same PFGE subtypes are detected in strains of human cases and cattle which suggests a common source. More information is needed on the potential control strategies especially on farms and at slaughter level. In the year 2010, three human EHEC cases representing serotypes O157 and O26 and potentially associated to cattle farm visits were detected. Samples were taken from the suspected farms and analyzed for the presence of these serotypes. The isolated strains were genotyped with PFGE. Indistinguishable genotypes were found in O157 isolates from one farm and the isolate from the patient visiting that farm, verifying the source of the infection.

Recent actions taken to control the zoonoses

The Association for Animal Disease Prevention (industrial association) has launched on 2002 guidelines: General hygienic guidelines for bovine holdings to prevent faecal transmitted infections (Salmonella, VTEC, Campylobacter, Listeria).

In 2003, common guidelines were established by the authorities and by the industry. The guidelines give recommendations of how to prevent spreading of VTEC in bovine holdings and slaughterhouses. According to the recommendations a special risk management plan is planned by a official municipal veterinarian and health care veterinarian for the holding where VTEC is deteced in animals. The purpose of the plan is to minimize the spreading of the infection to other animals in the holding, to neighbouring holdings and to people.

2.4.2 Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

A compulsory control programme for all bovine slaughterhouses started in January 2004. Samples are taken from slaughtered bovines by the industry. The total number of bovines sampled in a year is calculated with the following criteria: expected prevalence 1 %, accuracy 0,5 %, confidence level 95 %. The total number is divided between the different slaughterhouses depending on their slaughter capacity. The sampling is evenly distributed throughout the year.
Note! Sampling at slaughter has an animal based approach, not herd based.

Frequency of the sampling

Animals at slaughter (herd based approach)

Sampling distributed evenly throughout the year

Type of specimen taken

Animals at farm

Faeces

Animals at slaughter (herd based approach)

Faeces

Methods of sampling (description of sampling techniques)

Animals at farm

If possible, 50 g of faeces is taken from the rectum and placed to plastic container and cooled to a temperature of 4 (+/-2)C. The sample is sent to Evira laboratory for analysis.

Animals at slaughter (herd based approach)

50 g of faeces is taken from the rectum and placed to plastic container and cooled to a temperature of 4 (+/-2)C. The sample is sent to an approved local laboratory for analysis. If VTEC is isolated at the local laboratory, the isolate is sent for confirmation and further typing to Evira.

Case definition

Animals at farm

Animal/herd is considered to be positive when E.coli O157 strain with the capacity of producing shigatoxin (stx I and/or stx II) and adhesion genes (eae) or an other VTEC-strain which has been connected to human cases is isolated from a a sample.

Animals at slaughter (herd based approach)

An animal is considered to be positive when E.coli O157 strain with the capacity of producing shigatoxin (stx I and/or stx II) and adhesion genes (eae) is isolated from a sample.

Diagnostic/analytical methods used

Animals at farm

E. coli O157 was isolated according to ISO 16654:2001. Other VTEC were analysed using PCR method

detecting the genes of stx1, stx2, ehxA and saa.

Animals at slaughter (herd based approach)

NMKL 164:2005

Other preventive measures than vaccination in place

Evira has published in 2006 an updated guideline for the prevention of VTEC on farms ans slaughterhouses.

Control program/mechanisms

The control program/strategies in place

A compulsory control/monitoring programme for bovine slaughterhouses started in 2004.
In addition it is compulsory to sample all bovine holdings which are suspected to have a connection to human VTEC cases. Sampling is carried out by the official municipal veterinarian.

Recent actions taken to control the zoonoses

In 2003, common guidelines were established by the authorities and by the industry. The guidelines were updated in 2006. They give recommendations of how to prevent spreading of VTEC in bovine holdings and slaughterhouses. According to the recommendations a special risk management plan is planned by the official municipal veterinarian and health care veterinarian for the holding where VTEC is detetced in animals. The purpose of the plan is to minimize the spreading of the infection to other animals in the holding, to neighbouring holdings and to people.

Measures in case of the positive findings or single cases

In case of the positive finding at the slaughterhouse the herd of origin is sampled by the official municipal veterinarian.
In case of positive finding at the holding the risk mangement plan is launched (see above). If the farmer does not follow the plan, the animals from the holding are slaughtered at the end of the working day with special attention to slaughter hygiene. Milk is allowed to deliver only to establishments for pasteurization. The access of visitors to the farm is restricted (especially children).

Notification system in place

National reference laboratory Evira notifies all the positive results to the competent authorities.

Results of the investigation

See Table VT E.coli in animals

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

VTEC is regarded as a serious zoonosis. Cattle are considered a reservoir of these organisms. Most human infections are sporadic and the source remains unclear. Farm-associated small outbreaks have occurred. The first Finnish outbreak was swimming-associated. One outbreak in 2001 was traced to eating imported kebab meat. The number of reported human cases has been at a relatively constant level during the recent years.

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

Direct or indirect contact with cattle is an important risk factor. Same PFGE subtypes are detected in strains of human cases and cattle which suggests a common source.

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) - unspecified - at slaughterhouse - animal sample - faeces - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	10 g	1531	8	8		

Footnote:

The samples are tested for VTEC O157 only (not for VTEC non-O157)

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

M. bovis was eradicated to a large extent during the 1960's. The last case of M. bovis infection in cattle in Finland was detected in one herd in 1982.

Finland has been granted the officially tuberculosis free status of bovine herds according to Council Directive 64/432/EEC. The disease status was established by Commission Decision 94/959/EC of 28 December 1994, confirmed by Commission Decision 2000/69/EC in 2000.

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

The national situation remains favourable.

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

The risk of introducing infection from animals, feedingstuffs or foodstuffs to humans remains negligible.

2.5.2 Mycobacterium in animals

A. Mycobacterium bovis in bovine animals

Status as officially free of bovine tuberculosis during the reporting year

The entire country free

Finland has been granted the officially tuberculosis free status of bovine herds by a Commission Decision 94/959/EC of 28 December 1994, confirmed by Commission Decision 2000/69/EC.

Monitoring system

Sampling strategy

All AI-bulls are tested by intradermal tuberculin test not more than 30 days before moving to AI-station and annually thereafter.
Clinical suspect cases are investigated by pathological examination of suspect lymph nodes or lesions.
All slaughtered animals are inspected for tuberculotic lesions.

Frequency of the sampling

AI bulls are tested annually. In addition, samples are taken from all suspected cases.

Type of specimen taken

lymph nodes or tuberculotic lesions.

Methods of sampling (description of sampling techniques)

Testing in live animals is done by intradermal tuberculin testing.
In suspect cases, biopsy of a lymph node or a whole lymph node is taken from a living animal. One or more tuberculotic lesions are collected from a dead animal. These samples are divided into two parts, one of which is sent without preservatives and the other part in 10 % buffered formalin solution.

Case definition

Confirmation of an inconclusive or positive intradermal testing is done by comparative intradermal tuberculin testing. Comparative testing is considered positive if bovine tuberculin injection site reaction is more than 4 mm thicker than avian tuberculin injection site when skin fold is measured or if there are clinical symptoms related to bovine tuberculin injection. Case is also considered positive if M. bovis is isolated. The whole herd is investigated as defined above in case of a suspicion in one animal.

Diagnostic/analytical methods used

Histology, Ziehl-Neelsen staining, cultivation.

Vaccination policy

Vaccination of animals against tuberculosis is prohibited in Finland.

Control program/mechanisms

The control program/strategies in place

Continuous monitoring by Decision 2/EEO/95 of the Ministry of Agriculture and Forestry. Culling of positive animals.

Measures in case of the positive findings or single cases

Movement restrictions, quarantine of suspect animals and orders as regards use of milk are given by official veterinarian. Culling of positive animals in case of confirmed findings.

Notification system in place

M. bovis and M. tuberculosis infections are immediately notifiable and classified as dangerous animal disease in the Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995. Possible cases of avian tuberculosis are also notifiable according to the same decision.

Results of the investigation

No cases of M.bovis were detected in cattle in 2010.

264233 bovine animals were slaughtered and subject to a routine post mortem examination. Samples from 10 animals were examined based on suspicion during meat inspection or autopsy, at the Finnish Food Safety Authority Evira. All results were negative.

A total of 775 intradermal tuberculin tests were performed on AI bulls.

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

The situation remains favourable.

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

The relation between human cases of tuberculosis and Finnish cattle population seems to be close to zero.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

Post mortem examination is performed on all slaughtered animals and samples are sent for examination.
The farms that deliver live deer are tested regularly with intradermal comparative test. A blood sample is collected from every tested deer before performing the first initial testing. An official veterinarian is responsible for performing these tests.
The deer in farms that do not deliver live deer are tested for tuberculosis by taking samples at meat inspection. An official meat inspecting veterinarian is responsible for taking these samples.
Imported deer are tested before import.
Clinically ill deer are killed and tested if tuberculosis is suspected.

Frequency of the sampling

The intradermal comparative testing is initially done three times during 12 to 24 months, then repeated at 24 to 30 months interval.

Type of specimen taken

intradermal comparative test. In suspect cases and post mortem examination lymph nodes.

Methods of sampling (description of sampling techniques)

0,1 ml avian tuberculin and 0,1 ml bovine tuberculin are injected 12,5 cm apart from each other intradermally at a shaved area in the neck in healthy skin between the cranially first and middle thirds. A skin fold at the sampling site is measured before and 72 hours after injections.
Blood sample of 10 ml is collected in a glass tube without preservatives.
At meat inspection, lymph nodes are collected from healthy animals from pharynx, throat, mediastinum, intestines and groin.
When tuberculosis is suspected, a whole animal or its head and organs including lymph nodes from chest, abdomen and groin are sent for examination.

Case definition

The intradermal test is considered positive if the bovine tuberculin injection site is more than 2,5 mm thicker than the first measure or at least the size of the avian tuberculin injection site or there are other clinical signs of positive reaction. Case is also considered positive if M. bovis is isolated.

Diagnostic/analytical methods used

Histology, Ziehl-Neelsen stain, cultivation.

Vaccination policy

Vaccination against tuberculosis is prohibited.

Control program/mechanisms

The control program/strategies in place

Continuous monitoring by Decision 22/2010 of the Ministry of Agriculture and Forestry. Positive animals are culled and movement restrictions for the infected farm are implemented. There is also a voluntary programme with regular testing of animals.

Measures in case of the positive findings or single cases

The whole deer farm is classified as tuberculosis positive farm. Following measures include restrictive orders, killing of positive animals, re-testing of remaining animals, epidemiological investigation and investigations in contact herds. Investigations also includes investigating presence of tuberculosis in wild fauna around the deer farm.

Notification system in place

M. bovis and M. tuberculosis infections are immediately notifiable and classified as dangerous animal disease in the Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995. Possible cases of avian tuberculosis are also notifiable according to the same decision.

Results of the investigation

No tuberculosis was detected in farmed deer in 2010.
Samples of 2 farmed deer were sent for laboratory examination and both were negative.

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

The situation remains favourable.

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

The relevance seems to be negligible.

Table Tuberculosis in farmed deer

Region	Total number of existing farmed deer		Free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds	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			
Suomi / Finland	7		7	100	0	0	others, please specify			2	0
Total : [1)]	7	0	7	100	0	0	N.A.	0	0	2	0

Comments:

[1)] N.A.

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Suomi / Finland	15641	925791	15641	100	0	0	no routine test			10	0
Total : [1)]	15641	925791	15641	100	0	0	N.A.	0	0	10	0

Comments:

[1)] N.A.

2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

A. Brucellosis general evaluation

History of the disease and/or infection in the country

The last case of Brucella abortus in Finland was recorded in 1960. Ovine and caprine brucellosis or porcine brucellosis have never been detected.

Finland is officially free from bovine, ovine and caprine brucellosis.

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

The situation remains favourable.

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

Brucellosis has no relevance to public health in Finland.

2.6.2 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

Finland has been granted the officially brucellosis free status of bovine herds according to Council Directive 64/543/EEC. The disease free status was established by Commission Decision 94/960/EC of 28 December 1994, confirmed by Commission Decision 2000/69/EC in 2000.

Monitoring system

Sampling strategy

1. Breeding animals: samples are taken at the AI station and from the herds of the origin sending bulls to the AI stations
2. Suspicious animals due to abortions.

Frequency of the sampling

1. Continuous
2. On suspicion

Type of specimen taken

2. blood and samples from afterbirth and fetus

Methods of sampling (description of sampling techniques)

Samples are taken from living animals at the AI station or at the farm.

Case definition

The animal is seropositive, if confirmation test is positive.

Diagnostic/analytical methods used

Screening: RBT, Confirmation: CFT

Vaccination policy

Vaccination against brucellosis is prohibited.

Control program/mechanisms

The control program/strategies in place

Continuous surveillance based on the Decision No 14/95 of the Veterinary and Food Department, 12 May 1995.

Measures in case of the positive findings or single cases

Measures include notification measures, investigation of all suspected cases by veterinary authorities by serological testing on blood samples and microbiological testing in case of abortions, isolation of suspect cases and herd restrictions, killing of positive herds and disinfection of the shed.

Notification system in place

The disease is obligatorily notifiable according to the Finnish veterinary legislation (Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995). Brucellosis is classified as a dangerous animal disease.

Results of the investigation

No cases of brucellosis were recorded in 2010.

1040 blood samples from AI bulls were tested for brucellosis. In addition, 94 bacteriological examinations and 101 serological tests were performed due to abortion or neonatal death.

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

The situation remains favourable.

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

There is no relevance to human cases.

B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Finland has been granted the officially brucellosis free status of caprine herds established by Commission Decision 94/965/EC of 28 December 1994.

Monitoring system

Sampling strategy

Individual blood samples are collected from caprine herds according to the Council Directive 91/68/EEC, which provides for random checks to be carried out on goat holdings in order to maintain the officially brucellosis free status with regard to B. melitensis.

Frequency of the sampling

Continuous

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood samples are taken from living animals at the farm.

Case definition

The animal is seropositive, if the confirmation test is positive

Diagnostic/analytical methods used

Screening: Rose Bengal test, Confirmation: CF

Vaccination policy

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Detailed instructions concerning combating brucellosis in ovine and caprine animals are in the Decision No 7/1997 of the Veterinary and Food Department, 31 January 1997.

Measures in case of the positive findings or single cases

Notification procedures, investigation of all suspected cases by veterinary authrities, isolation of suspected cases and herd restrictions, killing and destruction of herds.

Notification system in place

The disease is classified as a dangerous animal disease and obligatorily notifiable (Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995)

Results of the investigation

All results have been negative in 2010.
967 random blood samples from healthy animals were tested. No clinical suspect cases due to abortion were investigated bacteriologically.

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

The situation remains favourable.

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

There is no relevance to human cases.

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Finland has been granted the officially brucellosis free status of ovine herds established by Commission Decision 94/965/EC of 28 December 1994.

Monitoring system

Sampling strategy

Individual blood samples from ovine herds are taken according to Council Directive 91/68/EEC, which provides for random checks to be carried out on sheep holdings in order to maintain the officially brucellosis free status with regard to B. melitensis. An official veterinarian takes the blood samples.

Frequency of the sampling

Continuous

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood samples are taken from living animals at the farm.

Case definition

The animal is seropositive, if the confirmation test is positive.

Diagnostic/analytical methods used

Screening: Rose Bengal test, Confirmation: CFT

Vaccination policy

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

The control program is included in the national veterinary legislation, where brucellosis is classified as a dangerous animal disease. Detailed instructions are in the Decision No 7/1997 of the Veterinary and Food Department, 31 January 1997.

Measures in case of the positive findings or single cases

Notification procedures, investigation of all suspected cases by veterinary authorities, isoaltion of suspected cases and herd restrictions, killing and destruction of all ovine and caprine animals in the herd.

Notification system in place

The disease is obligatorily notifiable (Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995)

Results of the investigation

All results have been negative in 2010.
1443 random blood samples from healthy sheep were tested. In addition 3 clinical suspect cases due to abortion were investigated bacteriologically.

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

The situation remains favourable.

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

source of infection)

There is no relevance to human cases.

D. B. suis in animal - Pigs

Monitoring system

Sampling strategy

All boars are sampled at the AI quarantine station before transfer to AI station. All boars at the AI station are sampled annually and at the time of slaughter.

All suspected animals are tested for brucellosis.

All pigs sent for slaughter from progeny testing stations are sampled for B. suis.

Herds belonging to the Finnish SPF (specific pathogen free) system for breeding herds and multiplying herds were monitored.

Frequency of the sampling

Annual sampling at AI stations. Periodical or continuous sampling of the SPF herds

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood samples are collected for prevalence studies and in suspect cases. In suspect cases placental tissue and vaginal mucus is collected from sows that have aborted. Also whole piglets with skeletal or joint problems should be sent for laboratory examination if possible.

Case definition

The animal is considered seropositive, if the CFT is positive.

Diagnostic/analytical methods used

Screening: Rose Bengal test, Confirmation: CFT

Vaccination policy

Vaccination against brucellosis is prohibited in Finland.

Measures in case of the positive findings or single cases

Measures include herd restrictions and killing of all animals of positive herds. A herd is construed as positive if at least one animal is found positive of brucellosis.

Notification system in place

The disease is compulsorily notifiable according to the Decision No 1346/95 of the Veterinary and Food Department, 28 November 1995. Brucellosis in all animals is classified as a dangerous animal disease.

Results of the investigation

Altogether 2816 serological samples were tested for Brucella suis in 2010, all with negative results. In addition 49 serum samples and 21 microbiological samples were tested due to abortions with negative results.

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

The situation remains favourable.

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

The relevance seems to be negligible.

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Pigs	Evira	Animal	2816	0	0	0	0	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 microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Suomi / Finland	15641	925791	15641	100	0	0		1040	0				101			101		0		94	0
Total : [1)]	15641	925791	15641	100	0	0	0	1040	0	0	0	0	101	0	0	101	0	0	0	94	0

Comments:

[1)] N.A.

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
Suomi / Finland	2042	132115	2042	100	0	0	255	2410	0	0	0	3	0	
Total : [1)]	2042	132115	2042	100	0	0	255	2410	0	0	0	3	0	0

Comments:

[1)] N.A.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/or infection in the country

In the years 1995- 2010 the number of reported cases of human yersiniosis has been on average ca. 600, most of which are caused by Yersinia enterocolitica.

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

Most of the reported human cases are of domestic origin. The number of cases is higher than the number of domestic salmonella infections. A decreasing trend in number of cases caused by Yersinia enterocolitica has been detected.

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

In Finland the most common bio/serotype is 4/O:3, which is found in human cases as well as in pigs and pork. Pathogenic Y. enterocolitica biotypes have also been detected in faeces of cats and dogs in Finland.

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

In Finland, domestic pork examination for Trichinella was initiated during the 1860s. In 1923, meat inspection including Trichinella examination of swine carcasses became mandatory in municipalities with more than 4000 inhabitants, and later in the entire country. Three cases of human trichinellosis originating from imported pork were diagnosed around 1890. The last autochthonous human cases (three) originated from eating bear meat in 1977. The first diagnosis in domestic swine was made in 1954. There were very few pig cases until 1981 when the number of Trichinella positive pigs started to increase reaching even over one hundred of infected swine a year. In the 2000's, however, the number of diagnosed cases in pigs decreased again to a couple of animals a year and in 2005-2009 no cases were found. In 2010, only one positive pig was found. The reason for the recent change is not known.

The infection was known in the brown bear and other wildlife during the 1950s, but since the 1980s trichinellosis has been found to be prevalent among wild carnivores especially in the southern part of the country, where all the four European species (Trichinella spiralis, T. nativa, T. britovi and T. pseudospiralis) have been reported. The raccoon dog Nyctereutes procyonoides has been recognised as the central host species harbouring all the four Trichinella species.

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

It appears that the Trichinella situation in Finland may be changing with decreasing incidence in swine. However, no sign of such change in wildlife has been seen. The apparent change in swine may be due to the pig production becoming more intensive with bigger industrialized units. In wildlife, a big proportion of infections are caused by T. nativa, the arctic species, which does not readily infect swine.

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

Because meat inspection of swine is mandatory to all commercial pork production, no human infection derived from domestic swine has been diagnosed even though swine have been infected. Therefore, pig meat inspection for Trichinella is essential. Moreover, hunters need to be continuously educated about the risks of eating undercooked bear, badger, lynx, wild boar or other carnivore or omnivore meat.

Recent actions taken to control the zoonoses

The Trichinella species present in Finland have been identified and the work on the epidemiology of different Trichinella species will continue. Understanding the epidemiology of the various Trichinella species will aid in managing their human health risks.

2.8.2 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy

Every single slaughtered horse is examined for trichinella at meat inspection.

Frequency of the sampling

Trichinella examination is mandatory for horses at meat inspection. All slaughtered horses are introduced to official meat inspection.

Type of specimen taken

Muscle sample of 10 grams from tongue, masseters or diaphragm.

Methods of sampling (description of sampling techniques)

Sampling and analysing is done according to 2075/2005 EU.

Case definition

Positive result from examination according to 2075/2005 EU.

Diagnostic/analytical methods used

Methods in use are the magnetic stirrer method for pooled sample digestion and mechanically assisted pooled sample digestion method, accordant with regulation 2075/2005.

Results of the investigation including the origin of the positive animals

Equine trichinellosis has never been found in Finland.

Control program/mechanisms

The control program/strategies in place

Trichinella examination at meat inspection is mandatory.

Notification system in place

Positive result in Trichinella examination at meat inspection has to be notified and confirmed at National Reference Laboratory in Evira. The trichinella testing has been included in meat inspection of horses since 1990.

B. Trichinella in pigs

Monitoring system

Sampling strategy

General

Every single pig is examined for trichinellosis at obligatory, official meat inspection in slaughterhouse. The sampling is 100%.

Frequency of the sampling

General

All pigs are sampled at meat inspection.

Type of specimen taken

General

The sample for trichinella test from pigs is taken primarily from diaphragm muscle and secondarily from tongue, masseter or abdominal muscles.

Methods of sampling (description of sampling techniques)

General

Muscle sample is taken according to 2075/2005 at meat inspection.

Case definition

General

Positive case is a pig from which the trichinella test (2075/2005) is positive i.e. trichinella larva has been detected at test from a muscle sample. All positive results have to be confirmed at national reference laboratory Evira.

Diagnostic/analytical methods used

General

Diagnostic methods used are in accordance with 2075/2005. In Finland the methods used are the magnetic stirrer method with pooled samples and mechanically assisted pooled sample digestion method (Stomacher).

Control program/mechanisms

Recent actions taken to control the zoonoses

No recent action has been taken. Current routine meat inspection eliminates infected carcasses from human consumption.

Measures in case of the positive findings or single cases

If a pig is found infected with Trichinella, the carcass will be destroyed. The competent authority will investigate the farm of origin, source and possible spread of infection and decide about further action.

Results of the investigation including description of the positive cases and the verification of the Trichinella species

One case of Trichinella spiralis infection in a pooled sample of 22 pigs was found in 2010. Re-examinations of individual samples were negative and the identity and number of infected pigs could not be confirmed. Trichinella species was identified by multiplex-PCR at the Finnish Food Safety Authority Evira.

Fattening pigs raised under controlled housing conditions in integrated production system

One case of Trichinella spiralis infection in a pooled sample of 22 pigs was found in 2010. Re-examinations of individual samples were negative and the identity and number of infected pigs could not

be confirmed. Trichinella species was identified by multiplex-PCR .

Breeding sows and boars

No cases.

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

It appears that Trichinella infection incidence and prevalence in swine in Finland may be decreasing in spite of its persisting abundance in wildlife. This may be caused by the change in swine husbandry, which has become more industrialized. Therefore, the number of small family farms with old pighouses has decreased.

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

The risk of obtaining trichinellosis from pig meat is negligible.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified	T. britovi	T. nativa	T. pseudospiralis
Bears [1)]	Evira	Animal	84	10			1	10	
Foxes	Evira	Animal	146	44		37		7	
Pigs - breeding animals - unspecified - sows and boars	Evira	Animal	52092	0					
Pigs - fattening pigs - not raised under controlled housing conditions	Evira	Animal	2199696	1	1				
Solipeds, domestic - horses	Evira	Animal	201	0					
Wild boars - farmed	Evira	Animal	332	4					4
Wild boars - wild	Evira	Animal	9	1				1	
Badgers - wild	Evira	Animal	10	1		1			
Lynx - wild	Evira	Animal	92	37		33		4	
Otter	Evira	Animal	11	2		1		1	
Raccoon dogs - wild	Evira	Animal	167	52		52			
Seals - wild (78 grey seals, 21 ringed seals)	Evira	Animal	99	1				1	
White-tailed eagle - wild	Evira	Animal	4	1		1			
Wild animals (Goshawk Accipiter gentilis)	Evira	Animal	11	1					1
Wolverine	Evira	Animal	1	1		1			
Wolves - wild	Evira	Animal	38	11		11			

Comments:

[1)] One bear had a mixed infection of T. nativa and T. britovi.

Table Trichinella in animals

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

Echinococcus granulosus was endemic in reindeer husbandry (reindeer -reindeer herding dog -cycle) but disappeared because of control action by authorities, and because of the changes in reindeer husbandry rendering herding dogs redundant.
In the early 1990's, echinococcosis started to re-emerge, then in the southeastern part of the Finnish reindeer husbandry area. The cycle involves reindeer, elk (moose) and wolves. Hitherto, no other definitive hosts have been identified although dogs, red foxes and raccoon dogs have been examined in hundreds during the last few years.

Echinococcus multilocularis has never been diagnosed in Finland.
The rodent scientists at Finnish Forest Research Institute (METLA) perform long-term surveys twice a year at least on 50 locations to detect fluctuations of small mammal populations. Longest data sets cover more than 50 years. All animals are dissected, and their gross parasitological conditions checked. In addition, other researches send liver samples from small mammals if they find something suspicious (usually Taenid cysts) to the METLA rodent scientists. In the METLA survey in 2010, about 2600 small mammals were studied which is indicates a fairly high population density. Animals are mostly sampled from high-density habitat patches, preferred by foxes as hunting grounds. Species include bank vole Myodes glareolus (whole Finland), red and grey-sided voles M. rutilus and M. rufocanus (Lapland), field vole Microtus agrestis (whole Finland), sibling vole M. rossiaemeridionalis (south-central Finland), root vole M. oeconomus (Lapland), Norway lemming Lemmus lemmus (Lapland) and water vole Arvicola amphibius. Also common shrews Sorex araneus (whole Finland), masked shrews S. caecutiens (Northern Finland) and pygmy shrews S. minutus were studied.

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

The low endemic E. granulosus strain in Finland has been described as G10 (Fennoscandian cervid strain). Its host spectrum is not well-known. It can be assumed that if the wolf population in Finland grows and expands its distribution, the parasite will benefit. New intermediate hosts may be identified in new biotopes. So far the zoonotic infection risk is to be characterized as very low, but if dogs get infected, the situation may change. Therefore, active surveillance is needed.
Surveillance is also needed for E. multilocularis, which is known to occur in neighbouring Estonia and was recently diagnosed in southern Sweden.

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

Human infection risk from wildlife (wolf faeces) is regarded as very low. In any case, not much can be done to reduce the prevalence in wildlife. However, it is recommended to treat hunting dogs with anticestodal drugs both prior to and after hunting season. Moreover, it is recommended that cervid offals are only given to dogs following thorough cooking.

2.9.2 Echinococcus in animals

A. Echinococcus spp. in animal

Monitoring system

Sampling strategy

- Mandatory meat inspection covers all known potential intermediate hosts slaughtered. In post mortem inspection, lungs are palpated and incised to discover hydatid cysts. The cysts are sent to Evira for confirmation.
- METLA performs long-term surveys of small mammal populations (see text in general evaluation chapter)
- Evira performs surveillance of possible definitive hosts (dogs, foxes, wolves, raccoon dogs)

Frequency of the sampling

Continuous sampling

Type of specimen taken

Faeces

Methods of sampling (description of sampling techniques)

In connection of post mortem examination, a piece of rectum containing faeces is taken for sample. Intestine is saved in freezer (-80 degrees Celsius) for possible confirmation of infection.

Case definition

Definitive host: adult Echinococcus worms found in intestine.
Intermediate host: positive protoscolex finding in microscopic examination of cyst fluid or typical histology of cysts.

Diagnostic/analytical methods used

Sedimentation / flotation

Other preventive measures than vaccination in place

Imported dogs, cats and ferrets must be treated against echinococcosis within 30 days before entering Finland.

Control program/mechanisms

The control program/strategies in place

Mandatory official meat inspection.

Measures in case of the positive findings or single cases

Organs with cystic echinococcosis are condemned in meat inspection.

Notification system in place

Echinococcosis is a notifiable disease in all animals.

Results of the investigation

In 2010, hydatid cysts of Echinococcus granulosus were found in three slaughtered reindeer in Northeast Finland. Three wolves out of 39 examined were found positive for Echinococcus granulosus. No echinococcus infections were found in foxes or raccoon dogs.

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

Echinococcus granulosus persists at seemingly low prevalences in the wolves and cervids of eastern Finland.

Table Echinococcus in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals)	Evira	Animal		264233	0			
Foxes	Evira	Animal		144	0			
Reindeers	Evira	Animal		84893	3	3		
Sheep	Evira	Animal		35464	0			
Raccoon dogs - wild	Evira	Animal		166	0			
Voles - wild	METLA	Animal		2600	0			
Wolves - wild	Evira	Animal		39	3	3		

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

From 30 to 50 human cases have been reported yearly.

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

Toxoplasma gondii is endemic in Finland, although the prevalence seems to be lower than in central Europe.

Additional information

Toxoplasma gondii can cause a severe disease in children whose mother has been infected during pregnancy. Also immunocompromised persons, like AIDS patients, may develop a severe disease. Screening of pregnant women is currently not done in Finland.

2.10.2 Toxoplasma in animals

A. T. gondii in animal

Monitoring system

Sampling strategy

Toxoplasma gondii is a notifiable disease in all animals except hares, rabbits and rodents. The occurence of toxoplasmosis is based on diagnosis at necropsy on animals sent to the Finnish Food Safety Auhority Evira for determination of cause of death.
There is no monitoring programme at present.

Type of specimen taken

Organs/tissues: brain, muscle, heart, liver, lung, kidneys, spleen, adrenal glands, thyroid glands, placenta

Case definition

Laboratory diagnosis is based on demonstration of typical cysts in tissues examined histologically during routine necropsy, when necessary other methods are used for confirmation (immunohistochemistry, PCR).

Diagnostic/analytical methods used

Laboratory diagnosis is based on demonstration of typical cysts in tissues examined histologically during routine necropsy, when necessary other methods are used for confirmation (immunohistochemistry, PCR).

Measures in case of the positive findings or single cases

None

Notification system in place

Toxoplasma gondii is a notifiable disease in all animals except hares, rabbits and rodents.

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii
Cats	Evira	Animal	318	1	1
Cattle (bovine animals)	Evira	Animal	422	0	0
Dogs	Evira	Animal	636	0	0
Goats	Evira	Animal	5	0	0
Pigs	Evira	Animal	511	0	0
Sheep	Evira	Animal	83	3	3
Solipeds, domestic	Evira	Animal	93	0	0
Hares - wild - unspecified	Evira	Animal	32	5	5
Zoo animals, all - at zoo - Clinical investigations	Evira	Animal	33	1	1

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 was common in the Finnish dog population at the beginning of the 20th century but the disease was eradicated from the country by vaccinating local dog populations during the 1950's. In April 1988, a local spot of essentially sylvatic rabies was discovered in south-eastern Finland. Between April 1988 and February 1989 a total of 66 virologically verified cases were recorded within a geographical area of 1 700 km2. As a first measure the local dog population in the area, some 8 000 animals, were vaccinated against rabies at the expense of the state. At the same time it was also highly recommended to vaccinate all the other dogs. In co-operation with the WHO surveillance centre in Tübingen, Germany, a field campaign of oral vaccination of raccoon dogs and foxes was started in September 1988. During four distribution operations, the last one in the autumn 1990, a total of 200 000 Tübingen baits were distributed. In accordance with the WHO standards, Finland was declared rabies free in March 1991 after two years with no cases of rabies.

Rabies in bats was suspected for the first time in 1985 when a bat researcher died. He had handled bats in several countries during the previous year and it could not be concluded where the researcher had become infected. Despite an epidemiological study in bats 1986 and subsequent reabies surveillance, bat rabies was not detected until 2009. The European Bat Lyssavirus-2 (EBLV-2) was isolated from the bat.

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

Finland is rabies-free country since 1991, except two import cases (a horse from Estonia in 2003 and a dog from India in 2007) and rabies in bats, but those cases do not affect to the rabies-free status of Finland. However, the infection pressure in wild carnivores species in Russia and Baltic countries is high and it poses a continuous risk for the reintroduction of the disease. The present control of wildlife rabies appears successful and important. Rabies in bats and the import of animals from endemic areas, however, remains a risk, which can be reduced by increasing public awareness of the disease.

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

Two cases of EBLV-2 infection in humans have been confirmed, one in Finland and one in the UK, both were bat researchers. However, the health risk to the general public, which has little contact with bats, is low. As no sylvatic rabies cases were detected, the risk for humans is very low at this moment. Currently the infection pressure in wild carnivores species in Russia and in Baltic countries is, however, high and it poses a continuous risk for the reintroduction of the disease. There might be a risk for the introduction of rabies through imported animals which could also pose a risk for humans.

Recent actions taken to control the zoonoses

Rabies bait vaccination campaigns for wildlife have been continued along the south eastern border against Russia. Since 2004 distribution is carried out biannually, in spring and in autumn. Continuous surveillance and monitoring for rabies is carried out by Evira in Finland. Dogs that are used in hunting, guide dogs, sniffer dogs, and dogs that are used by the police, the frontier guard and the army must be vaccinated against rabies.

Suggestions to the Community for the actions to be taken

Oral vaccination campaigns and control program should be continued annually

2.11.2 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

The monitoring of rabies in pets is based on the detection of clinical signs, background information, and laboratory testing.

Frequency of the sampling

On suspicion

Type of specimen taken

brains

Methods of sampling (description of sampling techniques)

Thalamus, pons and medulla

Case definition

When the cell culture and/or RT-PCR test is positive.

Diagnostic/analytical methods used

FAT, cell culture and RT-PCR

Vaccination policy

Vaccination against rabies is recommended for all dogs and cats. Dogs that are used in hunting, guide dogs, sniffer dogs, and dogs that are used by the police, the frontier guard and the army must be vaccinated against rabies (Decision No 9/EEO/1999, 12.5.1999). Dogs, cats and ferrets entering Finland shall be vaccinated against rabies in accordance with the Regulation (EC) No 998/2003 of the European Parliament and of the Council.

Other preventive measures than vaccination in place

Infected animals will be destroyed.

Control program/mechanisms

The control program/strategies in place

The measures for control of rabies are in the Decision No 9/EEO/1999 of the Veterinary and Food Department (12 May 1999) including investigation of all suspected cases by the veterinary authorities, notification procedures and vaccination. In case of suspicion the animal must be isolated for two weeks or killed and sent to Evira for laboratory analysis.

Measures in case of the positive findings or single cases

Epidemiological studies and information campaigns will be started. Infected animals will be destroyed and measures taken to prevent further cases.

Notification system in place

According to the Finnish legislation rabies has been notifiable and controlled since 1922 (Act 338/22, 29 Dec 1922). Rabies is classified as a dangerous animal disease according to Decision No 1346/1995 of the Veterinary and Food Department (28 Nov 1995).

Results of the investigation

In 2010, 26 dogs were investigated, all with negative results.

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

Indigenous rabies has not been detected in dogs since 1988. Illegal import of pet animals could pose a risk for the introduction of rabies.

B. Rabies virus in animal - Wildlife

Monitoring system

Sampling strategy

Sampling in a part of permanent monitoring scheme. Wild animals that are found dead in the nature and suspected animals are sent to the Finnish Food Safety Authority Evira for examination free of charge. The tests carried out include an examination for rabies. Samples are send by local veterinarians, hunters etc. The efficacy of rabies oral vaccination campaigns are evaluated by measuring the antibody response and bait uptake after vaccination in small carnivores, which are sent to Evira from the vaccination area.

Frequency of the sampling

Random, about 500 animals per year.

Type of specimen taken

brains

Methods of sampling (description of sampling techniques)

Thalamus, pons and medulla

Case definition

Samples are considered positive if the cell culture and/or RT-PCR test is positive.

Diagnostic/analytical methods used

FAT, cell culture and RT-PCR if the animal has bitten a human or other animal or is suspected.

Vaccination policy

An annual programme for the immunisation of wild carnivores is carried out since 1989 in the south eastern border area. In 2010, 80 000 bait vaccines were distributed aerially in May and in September over a 20-25 km wide and 250 km long zone along the south eastern border against Russia.

Control program/mechanisms

The control program/strategies in place

The measures for control of rabies are in the Decision No 9/EEO/1999 of the Veterinary and Food Department (12 May 1999) including post mortem examination of wildlife found dead in the nature and investigations of all suspected cases in Evira.

Recent actions taken to control the zoonoses

Since 2004 bait vaccine distribution is carried out biannually, in spring and in autumn.

Measures in case of the positive findings or single cases

Epidemiological studies and information campaigns will be started. Infected animals will be destroyed and measures taken to prevent further cases.

Notification system in place

According to the Finnish legislation rabies has been notifiable and controlled since 1922 (Act 338/22, 29 Dec 1922). Rabies is classified as a dangerous animal disease according to Decision No 1346/1995 of the Veterinary and Food Department (28 Nov 1995).

Results of the investigation

In 2010 a total of 445 wild animals were examined for rabies, rabies was not detected in these samples.

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

No indigenous sylvatic rabies cases (genotype 1) have been found after February 1989. The infection pressure in wild carnivores in Russia and in Baltic countries is however high and it poses a risk for the

reintroduction of the disease.

Table Rabies in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Badgers - wild	Evira	Animal		10	0			
Bats - wild	Evira	Animal		8	0			
Cats	Evira	Animal		15	0			
Cats - stray cats		---						
Cattle (bovine animals)	Evira	Animal		2	0			
Dogs	Evira	Animal		26	0			
Foxes - wild	Evira	Animal		148	0			
Marten - wild	Evira	Animal		24	0			
Raccoon dogs - wild	Evira	Animal		164	0			
Solipeds, domestic	Evira	Animal		2	0			
Wolves - wild	Evira	Animal		9	0			
Bears - wild	Evira	Animal		2	0			
Hedgehogs - wild	Evira	Animal		1	0			
Lynx - wild	Evira	Animal		47	0			
Minks - wild	Evira	Animal		8	0			
Muskrats - wild	Evira	Animal		1	0			
Other carnivores - wild	Evira	Animal		1	0			
Otter	Evira	Animal		10	0			
Polecats - wild	Evira	Animal		11	0			

Table Rabies in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Wolverine	Evira	Animal		1	0			

Footnote:

Other carnivores - wild = Ermine

2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.12.2 Staphylococcus in animals

A. Staphylococcus in Animals

Monitoring system

Sampling strategy

animals from holdings sampled at slaughterhouse + piglets sent to Evira for pathological anatomical diagnosis

Frequency of the sampling

survey 5 animals / randomly chosen holding, 38 holdings + piglets for PAD, 36 holdings

Methods of sampling (description of sampling techniques)

nasal swabs taken before scalding in slaughterhouse, or from piglets at necropsy

Diagnostic/analytical methods used

MRSA isolation and typing according to the EU-RL recommendations

Vaccination policy

no vaccination

Other preventive measures than vaccination in place

no preventive measures (not notifiable disease)

Control program/mechanisms

The control program/strategies in place

biosecurity measures in animal sheds

Measures in case of the positive findings or single cases

Information of the owners, respective municipal and district veterinarians, and slaughterhouse

Results of the investigation

11 of 74 holdings (14.8%) positive for MRSA

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

The prevalence of MRSA positive holdings is substantially higher than indicated by the EU baseline survey in 2008

Table Staphylococcus in Animals

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Staphylococcus	Total units positive for S. aureus, methicillin resistant (MRSA)	S. aureus, methicillin resistant (MRSA) - spa-type t011	S. aureus, methicillin resistant (MRSA) - spa-type t108	S. aureus, methicillin resistant (MRSA) - spa-type t034	S. aureus, methicillin resistant (MRSA) - MRSA, unspecified	S. aureus, methicillin resistant (MRSA) - spa-type t127
Pigs - Survey - national survey	Evira	Holding		74	11	11		5		1	5

2.12.3 Antimicrobial resistance in Staphylococcus isolates

Table Antimicrobial susceptibility testing of Staphylococcus in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey

Staphylococcus	S. aureus, methicillin resistant (MRSA) - MRSA, unspecified		S. aureus, methicillin resistant (MRSA) - spa-type t108		S. aureus, methicillin resistant (MRSA) - spa-type t127	
Isolates out of a monitoring program (yes/no)	yes		yes		yes	
Number of isolates available in the laboratory	1		5		5	
Antimicrobials:	N	n	N	n	N	n
Amphenicols - Chloramphenicol	1	0	5	0	5	0
Tetracyclines - Tetracycline	1	1	5	5	5	5
Fluoroquinolones - Ciprofloxacin	1	0	5	0	5	0
Fluoroquinolones - Enrofloxacin	1	0	5	0	5	0
Trimethoprim	1	0	5	0	5	0
Aminoglycosides - Gentamicin	1	0	5	0	5	0
Aminoglycosides - Kanamycin	1	0	5	0	5	0
Trimethoprim + Sulphonamides	1	0	5	0	5	0
Penicillins - Ampicillin	1	1	5	5	5	5
Cephalosporins - Cefoxitin	1	1	5	5	5	5
Penicillins - Oxacillin	1	1	5	5	5	5

Table Antimicrobial susceptibility testing of S. aureus, methicillin resistant (MRSA) - spa-type t127 in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey - quantitative data [Dilution method]

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

spa-type t127	Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	5																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	5	0										1	4										4	8
Tetracyclines - Tetracycline	8	5	5												4	1								16	32
Fluoroquinolones - Enrofloxacin	1	5	0						5															0.25	0.25
Cephalosporins - Cefoxitin	4	5	5												4	1								16	32
Lincosamides - Clindamycin	2	5	0					5																0.125	0.125
Macrolides - Erythromycin	4	5	0							4	1													0.5	1
Penicillins - Oxacillin	2	5	5												3	2								16	32
Penicillins - Penicillin	0.125	5	5											5										8	8

Table Antimicrobial susceptibility testing of S. aureus, methicillin resistant (MRSA) - spa-type t108 in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey - quantitative data [Dilution method]

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

spa-type t108	Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	5																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	5	0										5											4	4
Tetracyclines - Tetracycline	8	5	5													4	1							32	64
Fluoroquinolones - Enrofloxacin	1	5	0				1		4															0.06	0.25
Cephalosporins - Cefoxitin	4	5	5												3	2								16	32
Lincosamides - Clindamycin	2	5	0					5																0.12	0.12
Macrolides - Erythromycin	4	5	0							5														0.5	0.5
Penicillins - Oxacillin	2	5	5												5									16	16
Penicillins - Penicillin	0.125	5	5										1	4										4	8

Table Antimicrobial susceptibility testing of S. aureus, methicillin resistant (MRSA) - MRSA, unspecified in Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey - quantitative data [Dilution method]

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

MRSA, unspecified	Pigs - fattening pigs - raised under controlled housing conditions - at slaughterhouse - animal sample - mucosal swab (rectum-anal) - Survey - national survey																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	0										1											4	4
Tetracyclines - Tetracycline	8	1	1													1								32	32
Fluoroquinolones - Enrofloxacin	1	1	0						1															0.25	0.25
Cephalosporins - Cefoxitin	4	1	1													1								32	32
Lincosamides - Clindamycin	2	1	0					1																0.12	0.12
Macrolides - Erythromycin	4	1	0							1														0.5	0.5
Penicillins - Oxacillin	2	1	1												1									16	16
Penicillins - Penicillin	0.125	1	1											1										8	8

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

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Enrofloxacin		1	
Cephalosporins	Cefoxitin		4	
Penicillins	Amoxicillin / Clavulanic acid			19
	Oxacillin		2	
	Penicillin		0.125	
Lincosamides	Clindamycin		2	
Macrolides	Erythromycin		4	

2.13 Q-FEVER

2.13.1 General evaluation of the national situation

A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

One bovine animal tested for export purposes was seropositive in 2008. The occurrence of seropositive animals at this farm was monitored in blood, milk and bulk milk samples during 2008-2009, and also samples were taken in relation to trade in that farm. Also six sheep were tested at this farm with negative results. No clinical cases were detected at this farm.

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

Testing for Q-fever has taken place earlier only in connection with export. C. burnetii was found in Finland for the first time in 2008 in a dairy farm. In 2009 a surveillance for antibodies in dairy cows was conducted. Around 14 % of all the dairy herds in Finland was included in the surveillance and antibodies was found in about 0,2 % of the herds. In comparison to the neighbouring countries, this rate is very low. There is no information about prevalence of Q-fever antibodies in other animal species than cattle. There has never been reported suspicion for Q-fever based on disease symptoms.

2.13.2 Coxiella (Q-fever) in animals

A. C. burnetii in animal

Monitoring system

Sampling strategy

1.Clinical suspicion due to abortions: bovine, sheep and goats
2. Export purposes
3. Monitoring survey objective sampling, sheep and goats, using random sampling

Frequency of the sampling

1 and 2 Continuous
3. The survey was stated in 2010 and will be continued in 2011.

Type of specimen taken

Other: _serum and milk___

Methods of sampling (description of sampling techniques)

1 and 2 Samples are taken from living animals at farm
3. Serum samples from sheep at farm; serum and milk samples from goats at farm

Case definition

The animal is seropositive if ELISA test is positive

Diagnostic/analytical methods used

ELISA-test
Detection of the agent by PCR

Control program/mechanisms

The control program/strategies in place

Q-fever is classified as immediately notifiable other disease under zoonosis in the national legislation

Notification system in place

Immediately notifiable since 1995.

Results of the investigation

During year 2010 48 cattle from 11 farms, 3348 sheep from 98 farms and 143 goats from 4 farms were tested with negative results.

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

Additional information

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)	Evira	Animal	48	0	
Goats	Evira	Animal	143	0	
Sheep	Evira	Animal	3374	0	

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

A. Escherichia coli general evaluation

History of the disease and/or infection in the country

Monitoring of antimicrobial resistance in indicator Escherichia coli from cattle, pigs and broilers is a part of the FINRES-Vet monitoring programme (Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents). One animal species per year is included in the programme. In 2010, isolates were from healthy pigs.

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

According to the results of the FINRES-Vet programme prevalence of antimicrobial resistance in indicator E. coli from pigs has been low or moderate. The resistance detected can be explained by current or previous use of the respective antimicrobials in the antimicrobial treatment of pigs.

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

A. Antimicrobial resistance of E.coli, non-pathogenic, unspecified in Animals Pigs - at slaughterhouse - animal sample - Monitoring

Sampling strategy used in monitoring

Frequency of the sampling

Samples (approx. 300) originate from the FINRES-Vet programme (Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents). In 2010, E. coli were isolated from healthy pigs.

Type of specimen taken

Faecal samples from healthy pigs

Methods of sampling (description of sampling techniques)

The samples were collected at slaughter. Approx. 50 g fresh sample was taken with a disposable glove and delivered refrigerated to the laboratory. One sample per herd was included.

Procedures for the selection of isolates for antimicrobial testing

If obtained, one isolate from each sample was tested for antimicrobial susceptibility.

Methods used for collecting data

Isolation and susceptibility testing was performed in Evira

Laboratory methodology used for identification of the microbial isolates

Faecal samples were directly spread on BrillianceTM E. coli / Coliform Selective Agar (Oxoid) and incubated overnight at 37 C. One purple colony per sample was randomly selected for susceptibility testing.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (Department of Antibiotics, National Vetrinary Institute, Sweden) was used and the testing performed according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The antimicrobials tested are listed in the tables.

Cut-off values used in testing

If available, cut-off values recommended by the EUCAST were primarily used. For ciprofloxacin, a higher cut-off value was used.

Preventive measures in place

No preventive measures are in place regarding indicator bacteria from healthy animals.

Results of the investigation

Overall prevalence of resistance was very low or low to many of the examined antimicrobials. Resistance to trimethoprim, sulfamethoxazole, streptomycin and tetracycline was moderate. No resistance was detected to cefotaxime.

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

According to the results of the FINRES-Vet programme, the resistance levels in indicator E. coli from pigs in 2010 have remained at the same level than in previous years.

Table Antimicrobial susceptibility testing of E. coli in Pigs

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	250	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	250	2
Amphenicols - Florfenicol	250	1
Fluoroquinolones - Ciprofloxacin	250	4
Quinolones - Nalidixic acid	250	4
Trimethoprim	250	27
Sulphonamides - Sulfonamide	250	31
Aminoglycosides - Streptomycin	250	37
Aminoglycosides - Gentamicin	250	2
Aminoglycosides - Kanamycin	250	9
Penicillins - Ampicillin	250	18
Tetracyclines - Tetracycline	250	47
Fully sensitive	250	171
Resistant to 1 antimicrobial	250	36
Resistant to 2 antimicrobials	250	17
Resistant to 3 antimicrobials	250	7
Resistant to 4 antimicrobials	250	9
Resistant to >4 antimicrobials	250	10
Cephalosporins - Cefotaxim	250	0

Table Antimicrobial susceptibility testing of E. coli in Pigs

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	250																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	250	2									6	119	119	4		1	1					2	64
Amphenicols - Florfenicol	16	250	1										72	166	11	1							4	32
Tetracyclines - Tetracycline	8	250	47								102	96	5		1	13	18	12	3				1	128
Fluoroquinolones - Ciprofloxacin	0.06	250	4		20	194	32	2	1	1													0.008	1
Quinolones - Nalidixic acid	16	250	4								10	55	170	11			2	1	1				1	128
Trimethoprim	2	250	27					7	26	112	72	6	1			26							0.12	16
Sulphonamides - Sulfonamide	256	250	31											210	7	2						31	8	1024
Aminoglycosides - Streptomycin	16	250	37									1	47	139	26	7	7	7	11	5			2	256
Aminoglycosides - Gentamicin	2	250	2						1	87	130	30	2										0.12	16
Aminoglycosides - Kanamycin	8	250	9											241	6	3							8	16
Penicillins - Ampicillin	8	250	18								36	160	34	2				1	17				1	128
Cephalosporins - Cefotaxim	0.25	250	0		1	25	181	42	1														0.015	2

Footnote:

Broth dilution method was used.

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

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Amphenicols	Chloramphenicol	EUCAST	16	
	Florfenicol	EUCAST	16	
Tetracyclines	Tetracycline	EUCAST	8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid	EUCAST	16	
Trimethoprim	Trimethoprim	EUCAST	2	
Sulphonamides	Sulfonamide		256	
Aminoglycosides	Streptomycin	EUCAST	16	
	Gentamicin	EUCAST	2	
	Kanamycin	EUCAST	8	
Cephalosporins	Cefotaxim	EUCAST	0.25	
Penicillins	Ampicillin	EUCAST	8	

Footnote:
Ciprofloxacin cut-off value for VetMIC procedure.

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of Enterococcus spp., unspecified in Animals Pigs - at slaughterhouse - animal sample - Monitoring

Sampling strategy used in monitoring

Frequency of the sampling

Samples (approx. 300) originate from the FINRES-Vet monitoring programme (Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents). In 2010, Enterococcus faecium and Ent. faecalis were isolated from healthy pigs.

Type of specimen taken

Faecal samples from healthy pigs

Methods of sampling (description of sampling techniques)

The samples were collected at slaughter. Approx. 50 g fresh sample was taken with a disposable glove and delivered refrigerated to the laboratory. One sample per herd was included.

Procedures for the selection of isolates for antimicrobial testing

If obtained, one Ent. faecium and Ent. faecalis isolate from each sample was included in susceptibility testing. The total number of Ent. faecium isolates was 36, and of Ent. faecalis was 46.

Methods used for collecting data

Isolation and susceptibility testing was performed in Evira

Laboratory methodology used for identification of the microbial isolates

Faecal samples were directly spread on Slanetz-Bartley agar and incubated at 37.0 ± 1.0ºC / 48 ± 4 h. One or two randomly chosen typical colonies were sub-cultured on bile-esculine agar and blood agar (37.0 ± 1.0ºC / overnight). Colonies with a positive esculine reaction were further identified as Ent. faecium or Ent faecalis with the following tests: motility, arginine dihydrolase, mannitol, melibiose, arabinose, raffinose, sorbitol and ribose.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

VetMIC broth microdilution method (Department of Antibiotics, National Vetrinary Institute, Sweden) was used and the testing performed according to the CLSI standards; Enterococcus faecalis ATCC 29212 was used as a quality control strain. The antimicrobials tested are listed in the tables.

Cut-off values used in testing

If available, cut-off values recommended by the EUCAST were used.

Preventive measures in place

No preventive measures are in place regarding indicator bacteria from healthy animals.

Results of the investigation

Overall, resistance among Ent. facium and Ent faecalis was in favourable level. No or low resistance was found to the majority of the antimicrobials tested. Resistance to tetracycline was the most common

resistant trait in both Ent. faecium (33%) and Ent. faecalis (74%). Resistance to erythromycin was also high in both Ent. faecium (22%) and Ent. faecalis (37%).

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

According to the results of the FINRES-Vet programme, the resistance levels in indicator enterococci from pigs in 2010 have remained at the same level than in previous years.

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling

Enterococcus, non-pathogenic	E. faecalis		E. faecium	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	46		36	
Antimicrobials:	N	n	N	n
Amphenicols - Chloramphenicol	46	2	36	0
Tetracyclines - Tetracycline	46	34	36	12
Aminoglycosides - Streptomycin	46	2	36	2
Aminoglycosides - Gentamicin	46	4	36	0
Aminoglycosides - Kanamycin	46	4	36	0
Penicillins - Ampicillin	46	0	36	2
Fully sensitive	46	10	36	16
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	46	0	36	2
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	46	0	36	0
Ionophores - Narasin	46	0	36	0
Macrolides - Erythromycin	46	17	36	8
Oxazolidines - Linezolid	46	0	36	0
Resistant to 1 antimicrobial	46	21	36	13
Resistant to 2 antimicrobials	46	10	36	6
Resistant to 3 antimicrobials	46	3	36	1
Resistant to 4 antimicrobials	46	1	36	0
Resistant to >4 antimicrobials	46	1	36	0
Streptogramins - Virginiamycin	46	0	36	2

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling

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

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

E. faecalis	Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	46																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	46	2										5	33	6		1	1					0.5	64
Tetracyclines - Tetracycline	4	46	34							3	8	1			1	6	27						0.5	64
Aminoglycosides - Streptomycin	512	46	2											1			4	28	11			2		8	1024
Aminoglycosides - Gentamicin	32	46	4									1		3	27	11	1			3				2	256
Aminoglycosides - Kanamycin	1024	46	4												1		16	22	2		1		4	16	2048
Penicillins - Ampicillin	4	46	0							1	42	3												0.25	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	46	0									1		26	16	3								1	128
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	46	0								3	39	4											1	128
Ionophores - Narasin	2	46	0						11	21	14													0.12	16
Macrolides - Erythromycin	4	46	17							4	10	13	2			1	1	15						0.5	64
Oxazolidines - Linezolid	4	46	0								2	34	10											0.5	16
Streptogramins - Virginiamycin	32	46	0							1		1	1	1	30	12								0.5	64

Footnote:

Broth dilution method was used. Bacitracin MIC in U/ml.

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

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

E. faecium	Pigs - mixed herds - unspecified - at slaughterhouse - animal sample - faeces - Monitoring - official sampling																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	36																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	32	36	0										2	34									0.5	64
Tetracyclines - Tetracycline	4	36	12							8	15	1					12						0.5	64
Aminoglycosides - Streptomycin	128	36	2														21	13	1		1		8	1024
Aminoglycosides - Gentamicin	32	36	0											18	16	2							2	256
Aminoglycosides - Kanamycin	1024	36	0														4	21	8	3			16	2048
Penicillins - Ampicillin	4	36	2						3	2	15	7	7	2									0.25	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	36	2									1	3	8	14	8			2				1	128
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	36	0								27	6	3										1	128
Ionophores - Narasin	4	36	0						1	5	24	4	2										0.12	16
Macrolides - Erythromycin	4	36	8							3	1	6	18	4	2	1		1					0.5	64
Oxazolidines - Linezolid	4	36	0									4	32										0.5	16
Streptogramins - Virginiamycin	4	36	2							3	9	4	18		1	1							0.5	64

Footnote:

Broth dilution method was used. Bacitracin MIC in U/ml.

Table Cut-off values for antibiotic resistance of E. faecium in Animals

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin	EUCAST	128	
	Gentamicin	EUCAST	32	
	Kanamycin		1024	
Amphenicols	Chloramphenicol	EUCAST	32	
Penicillins	Ampicillin	EUCAST	4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	EUCAST	4	
	Bacitracin	EUCAST	32	
Macrolides	Erythromycin	EUCAST	4	
Streptogramins	Virginiamycin		4	
Tetracyclines	Tetracycline	EUCAST	4	
Oxazolidines	Linezolid	EUCAST	4	
Ionophores	Narasin	EUCAST	4	

Footnote:
Bacitracin MIC in U/ml.

Table Cut-off values for antibiotic resistance of E. faecium in Food

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		128	
	Gentamicin		32	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	

Table Cut-off values for antibiotic resistance of E. faecium in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin		128	
	Gentamicin		32	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	

Table Cut-off values for antibiotic resistance of E. faecalis in Animals

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Streptomycin	EUCAST	512	
	Gentamicin	EUCAST	32	
	Kanamycin		1024	
Amphenicols	Chloramphenicol	EUCAST	32	
Penicillins	Ampicillin	EUCAST	4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	EUCAST	4	
	Bacitracin	EUCAST	32	
Macrolides	Erythromycin	EUCAST	4	
Streptogramins	Virginiamycin		32	
Tetracyclines	Tetracycline	EUCAST	4	
Oxazolidines	Linezolid	EUCAST	4	
Ionophores	Narasin	EUCAST	2	

Footnote:
Bacitracin MIC in U/ml.

Table Cut-off values for antibiotic resistance of E. faecalis in Food

Test Method Used	Standard methods used for testing

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

Table Cut-off values for antibiotic resistance of E. faecalis in Feed

Test Method Used	Standard methods used for testing

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

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

5. FOODBORNE

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

A. Foodborne outbreaks

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

Systematic collection of information about foodborne outbreaks in Finland began in 1975. The local food control and health officials are responsible for investigating and reporting food poisoning outbreaks in their area. Collection of the information takes place on the basis of the Food Act (23/2006), the Health Protection Act (763/1994), the Communicable Disease Act (583/86), the Decree (251/2007) concerning the follow-up and reporting of food poisoning and foodborne infections and the Communicable Diseases Decree (786/86). Physicians have to notify all cases of communicable diseases to the National Institute for Health and Welfare (THL). The data is recorded in the National Infectious Diseases Record in Finland.
The municipality local outbreak investigation group has to notify THL in case an outbreak is suspected. The municipality local outbreak investigation groups are responsible for investigation of every suspected food- and waterborne outbreak and its reporting to the Finnish Food Safety Authority Evira. The notification and final investigation reports are submitted by an electronic reporting system, which provides the data simultaneously to all relevant authorities involved in or supporting the outbreak investigation. The system also stores the data in the National Food Poisoning Register. The system has been in use from the beginning of year 2010. Evira in co-operation with THL evaluates each final municipal report in order to classify the outbreaks as regards to the strength of evidence. The data is recorded in the National Food Poisoning Register and a national summary report on outbreaks is published by Evira.
There has not been any major differences in the reporting at the national level compared to previous years. By the introduction of the new electronic reporting system, the pick lists used for the collection of data into the National Food Poisoning Register have been harmonized according to data collection on EU level by EFSA. Compared to the previous reporting specifications to EU, approximately 8 out of the 25 outbreaks classified as strong evidence in 2010 would have been classified as “possible” outbreaks according to the 2009 classification.

Description of the types of outbreaks covered by the reporting:

All general domestic food- and waterborne outbreaks are reported in Finland. Illness of more than two persons from single source is considered a cluster and a suspected outbreak. Sporadic cases and infections acquired abroad are not included in the food poisoning register, whereas they are included in the infectious disease register. Family outbreaks are reported if commercial foodstuffs are supposed to be a source of illness or several persons are at risk. Obligatory reporting involves definite communicable diseases and traditional foodborne agents such as those causing intoxications.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

In 2010, the municipal food control authorities notified 44 food- and water borne outbreaks, of which 42 were associated with food and two with drinking water. The total number of outbreaks decreased 25 % compared to the previous year. The food poisoning notification and reporting system was revised in Finland in 1997. In 1997, twice the number of outbreaks was reported, and in 1998 three times the number, compared to previous years throughout the 1990s. The number of reported outbreaks in 1997 and 1998 was 68 and 95, respectively. This has improved food poisoning reporting, which has in effect caused an increase in the number of outbreaks recorded. However, when the criteria for classification have been developed based on the strength of the evidence the number of the recorded outbreaks has constantly decreased beginning from 1999. In 2003 the number of outbreaks was 33, being almost 60% less than in 1998. In 2004 the number of outbreaks slightly increased first time in five years and the number still continued to increase in 2005. In 2006 and 2007 the number of outbreaks has slightly decreased but increased again after that until 2009. Most of the reported outbreaks are foodborne (95 % in 2010). The number of human cases follows the number of outbreaks varying from 1000 to 2000 cases

annually. More than 50 % of the reported outbreaks were middle size by number of cases per outbreak (10-100 persons infected). A few large waterborne outbreaks with increased number of human cases have been reported. Due to contaminated drinking water a total of 5350, 6809, 6445, and >8000 persons became ill in outbreaks in 1989, 1998, 2000, and 2008, respectively.

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

During the last ten years the most common reported causative agent was norovirus. In 2010 norovirus caused 15 (34%) foodborne outbreaks. Due to the recommendation to proper heating of imported frozen raspberries before consumption, only two outbreaks due to berries occurred in 2010, when there were over 20 outbreaks in 2009. The most common vehicle (23%) reported in 2010 was vegetables including 7 outbreaks related to raw beetroot. Classic food poisoning bacteria as Bacillus cereus (4), Clostridium perfringens (2) and Campylobacter (3) from different sources caused nine foodborne outbreaks. Only one Salmonella and one Yersinia outbreak was notified in 2010. Also some chemical agents (histamine, monosodium glutamate and wax esters) were reported to cause three foodborne outbreaks.
In 8 (18 %) of the foodborne outbreaks the causative agent remained unknown in 2010. In these cases however, the investigations showed descriptive epidemiological association between eating a certain food or meal and becoming ill. The investigations revealed a certain food to be the vehicle in 28 (63 %) outbreaks. In 2010 vegetables was the most common vehicle in food borne outbreaks (10; 23%), whereas the second most common vehicle was meat and meat products (7; 16 %). A total of two outbreaks spread by drinking water were reported in 2010. They were caused through drinking water contaminated with leakage of sewage and using lake water as drinking water.

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

In 20 (45 %) outbreaks the place of exposure was a restaurant followed by 9 (20 %) workplace caterings and 7 (16%) households. Also in 20 (45 %) outbreaks the place of origin of problem was in a restaurant followed by 7 (16%) workplace caterings and 6 (14 %) farms. In 34% of the outbreaks the factors contributing to food poisonings were connected with temperature including inadequate cooling, inadequate heating or reheating and improper storage temperature of food in 2010. Unprocessed contaminated ingredients were contributing factor also in 34% of the outbreaks. Infected food handler caused nine (20%) of the norovirus outbreaks.

Evaluation of the severity and clinical picture of the human cases

Altogether only 960 persons were reported to get ill in food- and waterborne outbreaks in 2010. The number of patients suffering from food poisonings was about 920 persons (96 %) while about 40 persons (4 %) were infected through contaminated drinking water. According to the reports, 7 persons were hospitalized in 5 outbreaks. 4 (57 %) of the cases were related to two Campylobacter outbreaks where 31 % of the cases were hospitalized. No deaths were reported due to food- or waterborne outbreaks in 2010.

Descriptions of single outbreaks of special interest

Most of the cases were quite classic ones, but there were some interesting outbreaks due to eating raw beetroot. Caterings bought ready peeled beetroot in 5 kg sacs that were packed moist after rinsing. The beetroot was stored cold for 2 – 9 days before serving. It was served raw and shredded as salad.
The symptoms occurred almost immediately, within 15 minutes to 1 hour, after eating. The most common symptoms were vomiting, nausea and abdominal pain. Some cases got diarrhea later. In six of the seven outbreaks there was strong analytical epidemiological evidence showing that beetroot was the food vehicle to blame. A total of 142 cases were reported that represent 15 % of all cases in 2010.
Except for a high total count, nothing was found in the laboratory analyses at first. No Staphylococcus or Bacillus toxins were found. Then, approximately 10^5 -10^6 cfu/g of a hemolytic, oxidase positive, Gram negative rod was found, and identified as Pseudomonas fluorescens. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing.

Control measures or other actions taken to improve the situation

To prevent the food poisoning risk from raw beetroot, a proper heating of the beetroot before consumption has been recommended in Finland by the Finnish Food Safety Authority Evira.

In general, all food- and waterborne outbreaks are investigated by local food control and health officials. In case of widespread epidemics central administrations are in charge of coordinating investigations. An investigation comprises an epidemiological investigation, detection of contributing factors, revision in-house control system and sampling. Information received about foodborne outbreaks, contributory factors and causative agents is analyzed and actively used in food handler education and training. Since at the beginning of January 2005 all food handlers whose work entails special risks related to food hygiene or who handle unpacked, perishable foodstuffs have to demonstrate their proficiency either by a hygiene proficiency certificate or a certificate of vocational qualification. Independent Proficiency Examiners accredited by the Finnish Food Safety Authority Evira organize examinations in the different parts of the country. On the basis of identified causative agents, risk foods or raw material information and recommendations are distributed to the entrepreneurs, producers, and consumers. The network-like Finnish Zoonosis Centre between the national organizations (Finnish Food Safety Authority Evira, National Institute for Health and Welfare, Ministry of Agriculture and Forestry and Ministry of Social Affairs and Health) started in spring 2007 to prevent and control the risks of most significant zoonoses in Finland in an efficient and cost-effective manner. New control programs are established and other measures taken in order to control epidemics caused by the most important zoonoses. Creating a national system for monitoring and surveillance of Campylobacter, Yersinia, Listeria and the EHEC bacterium of production animals and foodstuffs are one of the key actions to be taken by the Finnish Strategy on Zoonoses. The Finnish Salmonella control program successfully ensures salmonella free foodstuffs to market and only a minor part of human salmonellosis are domestically acquired.

Suggestions to the community for the actions to be taken

Possible measures or legal proposals on foodborne viruses.

Table Foodborne Outbreaks: summarised data

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Salmonella - S. Typhimurium	0	0	0	0	0	0
Salmonella - S. Enteritidis	0	0	0	0	0	0
Salmonella - Other serovars	1	10	1	0	0	1
Campylobacter	2	10	4	0	1	3
Listeria - Listeria monocytogenes	0	0	0	0	0	0
Listeria - Other Listeria	0	0	0	0	0	0
Yersinia	1	42	0	0	0	1
Escherichia coli, pathogenic -	0	0	0	0	0	0
Bacillus - B. cereus	0	0	0	0	4	4
Bacillus - Other Bacillus	0	0	0	0	0	0
Staphylococcal enterotoxins	0	0	0	0	0	0
Clostridium - Cl. botulinum	0	0	0	0	0	0
Clostridium - Cl. perfringens	1	8	0	0	1	2
Clostridium - Other Clostridia	0	0	0	0	0	0
Other Bacterial agents - Brucella	0	0	0	0	0	0

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Other Bacterial agents - Shigella	0	0	0	0	0	0
Other Bacterial agents - Other Bacterial	0	0	0	0	7	7
Parasites - Trichinella	0	0	0	0	0	0
Parasites - Giardia	0	0	0	0	0	0
Parasites - Cryptosporidium	0	0	0	0	0	0
Parasites - Anisakis	0	0	0	0	0	0
Parasites - Other Parasites	0	0	0	0	0	0
Viruses - Norovirus	7	189	1	0	8	15
Viruses - Hepatitis viruses	0	0	0	0	0	0
Viruses - Other Viruses	0	0	0	0	0	0
Other agents - Histamine	0	0	0	0	1	1
Other agents - Marine biotoxins	0	0	0	0	0	0
Other agents - Other Agents	0	0	0	0	2	2
Unknown agent	7	102	0	0	1	8

Table Foodborne Outbreaks: detailed data for Bacillus

Please use CTRL for multiple selection fields

B. cereus

	Value
FBO Code	8
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Cereal products including rice and seeds/pulses (nuts, almonds)
More food vehicle information	kisir
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

B. cereus

	Value
FBO Code	9
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	salad
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	

B. cereus

	Value
FBO Code	20
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	chinese cabbage
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Take-away or fast-food outlet
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

B. cereus

	Value
FBO Code	34
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Bakery products
More food vehicle information	meat&rice pie
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Camp, picnic
Place of origin of problem	Transport of food
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Campylobacter

Please use CTRL for multiple selection fields

Thermophilic Campylobacter spp., unspecified

	Value
FBO Code	54
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Other, mixed or unspecified poultry meat and products thereof
More food vehicle information	dove
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Cross-contamination
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Clostridium

Please use CTRL for multiple selection fields

C. perfringens

	Value
FBO Code	26
Number of outbreaks	1
Number of human cases	60
Number of hospitalisations	1
Number of deaths	0
Food vehicle	Other or mixed red meat and products thereof
More food vehicle information	venison roast
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Inadequate chilling
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Other Bacterial agents

Please use CTRL for multiple selection fields

Other

	Value
FBO Code	10
Number of outbreaks	1
Number of human cases	10
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic market
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	72
Number of outbreaks	1
Number of human cases	18
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	42
Number of outbreaks	1
Number of human cases	43
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	53
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	7
Number of outbreaks	1
Number of human cases	13
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	78
Number of outbreaks	1
Number of human cases	14
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Other

	Value
FBO Code	41
Number of outbreaks	1
Number of human cases	36
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	raw beetroot
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Storage time/temperature abuse;Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	Toxin of Pseudomonas fluorescens?
Additional information	Pseudomonas fluorescens was found in frozen samples investigated further afterward in November. It is uncertain whether the findings are relevant. Further research to identify possible toxin of the bacteria is ongoing. See “Descriptions of single outbreaks of special interest”

Table Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

Wax esters (from fish)

	Value
FBO Code	47
Number of outbreaks	1
Number of human cases	5
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	Escolar
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Imported from outside EU
Contributory factors	Inadequate heat treatment;Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	

Monosodium glutamate

	Value
FBO Code	32
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	chicken portion
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Household / domestic kitchen
Place of origin of problem	Take-away or fast-food outlet
Origin of food vehicle	Intra EU trade
Contributory factors	Other contributory factor
Mixed Outbreaks (Other Agent)	
Additional information	

Histamine

	Value
FBO Code	23
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	tuna
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Household / domestic kitchen
Place of origin of problem	Processing plant
Origin of food vehicle	Imported from outside EU
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Unknown agent

Please use CTRL for multiple selection fields

Unknown

	Value
FBO Code	17
Number of outbreaks	1
Number of human cases	11
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	School, kindergarten
Origin of food vehicle	Unknown
Contributory factors	Unknown
Mixed Outbreaks (Other Agent)	
Additional information	11 out of 14 persons fell ill within an hour from eating

Table Foodborne Outbreaks: detailed data for Viruses

Please use CTRL for multiple selection fields

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	48
Number of outbreaks	1
Number of human cases	17
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	52
Number of outbreaks	1
Number of human cases	17
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Tap water, including well water
More food vehicle information	well water
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Household / domestic kitchen
Place of origin of problem	Water source
Origin of food vehicle	Domestic market
Contributory factors	Water treatment failure
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	16
Number of outbreaks	1
Number of human cases	149
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Mixed or buffet meals
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Canteen or workplace catering
Origin of food vehicle	Domestic market
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	86
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	broiler meat salad
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Household / domestic kitchen
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	29
Number of outbreaks	1
Number of human cases	2
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	oysters
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	30
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	oysters
Nature of evidence	Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	61
Number of outbreaks	1
Number of human cases	90
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fruit, berries and juices and other products thereof
More food vehicle information	frozen raspberries
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	25
Number of outbreaks	1
Number of human cases	43
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fruit, berries and juices and other products thereof
More food vehicle information	frozen raspberries
Nature of evidence	Analytical epidemiological evidence;Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	