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 2009

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 2009 .

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

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

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

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

---

* 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

List of Contents

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:
Information Centre of the Ministry of Agriculture and Forestry, Farm Register 2009
Data on sheep:
Animal register of Finnish Food Safety Authority Evira
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 2009 (cattle), 1 April (pigs), 1 June (sheep), 1 April (poultry).

Data on reindeers:
Final data, 2008/2009, reindeer herding year: 1 June-31 May.

Data on slaughtered animals: All animals slaughtered in 2009.

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

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 2009 only 37 per cent of farms reared livestock. The number of dairy cows in 2009 was about 290000 and in 2000 they were 364000. There is a decrease of 20 per cent in the number of dairy cows. Number of pigs has varied 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 2009, farms with dairy cows had 23 dairy cows per farm on average. 24% of all milk farms had at least 30 heads and 8% of farms at least 50 heads. Pig farms had 252 fattening pigs over 50 kg per farm on average. 27% 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 2629 hens per farm on average. 46% of farms with laying hens had less than 50 heads and 30% at least 2000 heads and 8% at least 10000 heads.

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*
Cattle (bovine animals)	meat production animals					118699		7567	
	mixed herds					73738		2766	
	dairy cows and heifers					421485		12915	
	calves (under 1 year)					304346		15538	
	- in total			268056		918268		16420	
Deer	farmed - in total							7	
Ducks	- in total					2409		70	
Gallus gallus (fowl)	mixed flocks/holdings					259		25	
	parent breeding flocks, unspecified - in total					344076		224	
	broilers			51867498		4918452		103	
	laying hens					3785009		1135	
	breeding flocks for meat production line - in total			452727					
	- in total			52320225		9047796		1269	
Geese	- in total					1144		59	

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*
Goats	- in total					5924		414	
Pigs	breeding animals			54943		156044		1435	
	fattening pigs			2276769		1225163		2202	
	- in total			2331712		1381207		2266	
Reindeers	farmed - in total			77653		192917		4695	
Sheep	mixed herds					34133		1541	
	milk ewes					201		24	
	meat production animals					35133		961	
	animals under 1 year (lambs)					52048		1162	
	- in total			25687		121515		1884	
Solipeds, domestic	horses - in total			1049		72300		15000	
Turkeys	- in total			954197		306113		66	
Wild boars	farmed - in total			267					
Ostriches	farmed					193		11	

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*
Pheasants	- in total					6218		26	

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 was exceptional in the year 2009 due to the feed borne Salmonella Tennessee outbreak in pigs and laying hens. One production line of one feed mill was contaminated by S. Tennessee. The official veterinarians sampled 550 pig holdings and 290 laying hen holdings that had recieved possible contaminated feed from the feed mill. In addition, the industry organised feed environmental sampling at the suspected holdings. S. Tennessee was detected in faecal, environmental or feed samples at 50 pig holdings and 40 laying hen holdings. This is about 2 % of the pig holdings and 4 % of the laying hen holdings in the country. Some of the infected or contaminated holdings were amongst the biggest in the country, thus about 10 % of the animals in both sectors were in positive holdings.

It was remarkable that although the sampling was more intensive than in usual years, no other serovars were detected in pig holdings and only few other serovars in laying hen holdings. This indicates that the basic Salmonella situation in the animal populations is very good.

S. Tennessee was not detected in human population or in foodstuffs during the outbreak. The reason for this is that effective restricitive, sanitation and eradication measures were carried out during the outbreak. The cooperation between the authorities and the operators was excellent. The role of the industrial Association for Animal Diseases Prevention (ETT) was remarkable during the outbreak.

Recent actions taken to control the zoonoses

The Finnish Salmonella Control Programme for poultry was amended from the beginning of the year 2007.

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

See table Salmonella in read meat and products thereof

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

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

See Table Salmonella in red meat.

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

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

Bacterilogical 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

See table Salmonella in poultry meat.

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

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

See table Salmonella in poultry meat.

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

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

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 (crushed meat)	Evira	Single	25 g	802	0			
Meat from turkey - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling (crushed meat)	Evira	Single	25 g	325	0			

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	3163	0			
Meat from bovine animals - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling (crushed meat)	Evira	Single	25 g	2040	0			
Meat from pig - carcass - at slaughterhouse - Control and eradication programmes - industry sampling - objective sampling	Evira	Single	1400 cm2	6479	0			
Meat from pig - fresh - at cutting plant - Control and eradication programmes - industry sampling - objective sampling (crushed meat)	Evira	Single	25 g	1838	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.
Adult breeding flocks are sampled at the hatcheries every second week by food business operator and every 16 weeks by official veterinarians. Every flock is sampled twice during the production cycle at the holding by official veterinarian. Official sampling is also carried out at the holding if salmonella spp. is detected from the sampling at the hatchery.
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 four weeks and two weeks before moving to laying unit

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

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

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 of hatching baskets or egg shells / At holding: socks/boot swabs

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 is taken. Five swab samples are pooled together.

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

Five pairs of boot swabs/socks samples are taken and pooled to two.

Breeding flocks: Production period

At hatchery: five internal linings paper from hatching baskets or 25 x 10 g of broken egg shells are collected and pooled together. If hatching eggs from a breeding flock occupy more than one incubator, one composite sample is taken from each incubator.
At holding: five pairs of boot swabs/ sock samples are taken and pooled to two.

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 taken at the holding.

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 2007. The major amendments concerned routine sampling schemes and sampling and analysing methods. Boot swabs or socks samples are taken instead of faecal samples collection. The analysing method is ISO 6579:2002/Amendment 1:2007.

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

see table Salmoenlla in Gallus Gallus breeding flocks

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

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 by the food business operator.
Sampling is carried out by the official veterinarian once a year at each holding.
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

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

Five pairs of boot swabs/sock samples are taken and pooled to two.

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 2007. The major amendments concerned routine sampling schemes and sampling and analysing methods. Boot swabs or socks samples are taken instead of faecal samples collection. The analysing method is ISO 6579:2002/Amendment 1:2007.

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

See table Salmonella in other poultry. In 2009, Salmonella was detected in 12 broiler flocks. Ten flocks were positive for S. Montevideo. The source of the outbreak could not been identified although plenty of samples were taken from feedingstuffs, hatchery, breeding flocks and transport vehicles.

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

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 food business operator.
Raering 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 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

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 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

Recent actions taken to control the zoonoses

Salmonella control programme for laying flocks was amended from the beginning of the year 2007. The major amendments concerned routine sampling schemes and sampling and analysing methods. Boot swabs or socks samples are taken instead of faecal samples collection. The analysing method is ISO 6579:2002/Amendment 1:2007.

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

See table Salmonella in other poultry. In 2009, the number of official suspect sampling was much higher than usual. Together 288 holdings (309 production and 38 rearing flocks) that had recieved feed possible contaminated by Salmonella Tennessee were sampled by official veterinarians. 25 production flocks and 15 rearing flocks were positive for S. Tennessee.

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. In 2009, the situation was worse due to the feedborne Salmonella Tennessee outbreak. The sampling was more intensive than in usual years. Despite of the intensified sampling only few other serovars than Tennessee were detected. This indicates that the basic salmonella situation in laying hen population is very good.

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

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 slaughterhouses. Sampling is carried out by food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at farm by an official veterinarian
- Herds of origin of AI-bulls are sampled at farm before transfer by 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:
Adult animals: individual faecal samples are colected from 30 animals and analysed individually.
Young animals: all animals are sampled by composite faecal sample. One sample represent the group of 5-10 animals.

Sampling of salmonella positive herds for releasing the restrictions:
Adult animals: individual feacal samples from all animals.
Young animals: all animals are sampled by composite faecal sample. One sample represent the group of 5-10 animals.

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 an 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 establishment for pasteurasitation. Sanitation and eradication is carried out according to 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

Laboratory has to notify positive result to competent authority and to 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

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 herds are sampled at farm once a year by operators.
- Together 3000 sows are sampled each year randomly from the sow population at slaughterhouses. Sampling is carried out by food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at farm by an official veterinarian.

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

Multiplying herds

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

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

Fattening herds

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

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

Frequency of the sampling

Breeding herds

At slaughterhouses: sampling distibuted evenly throughout the year. At farm: nucleus herds once a year

Multiplying herds

At slaughterhouses: sampling distibuted evenly throughout the 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

Multiplying 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 herds:
From each department composite samples are collected from five pens of weaned piglets, growers or young breeding animals. The samples are analysed as two pools.

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

Sampling of salmonella positive herds for releasing the restrictions:
Adult animals: feacal sample is collected from every animal. 10-20 samples are pooled together.
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.

Multiplying herds

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

Sampling of salmonella positive herds for releasing the restrictions:
Adult animals: feacal sample is collected from every animal. 10-20 samples are pooled together.
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

Suspected herds:
two faecal samples are collected from a group of 10-15 animals. 20 samples are pooled together.

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.

Multiplying 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.

Multiplying herds

Vaccination against salmonella is not allowed in Finland.

Fattening herds

Vaccination against salmonella is not allowed in Finland.

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.

Multiplying 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.

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 an 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 positive result to competent authority and to food business operator

Results of the investigation

See Table Salmonella in other animals. In 2009, official veterinarians took faecal samples from 550 pig holdings that had recieved feed possible contaminated by Salmonella Tennessee. Ten holdings and two contact holdings were positive for S. Tennessee in faecal sampling. In addition, environmental samples were taken from the feed systems at all suspected holdings by industry. Also official feed samples were taken at part of the holdings. S. Tennessee was detected in more cases in environmental or feed samples than in faecal samples. If all different samplings are taken into account together 50 pig holdings were infected or contaminated by S. Tennessee.

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

Salmonella situation in pigs has been very favourable for years. The situation in 2009 was worse than usual due to the feedborne Salmonella Tennessee outbreak. However, it was remarkable that no other serovars were detected in pig holdings althoug the sampling was much more intensive than in usual years. This shows that the basic Salmonella situation in the pig population is extremely good.

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

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 hatchery every two weeks by food business operators and every 16 weeks by 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.
In addition, a 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 holdings within three weeks before slaughter. At each holding sampling is carried out by an official veterinarian once a year, otherwise sampling is carried out by a food business operator.
In addition, a 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

At the age of 4 weeks and 2 weeks before transfer

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

At hatchery: every 2 weeks, at holding: twice

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

At hatchery: internal linings of hatching baskets, at holding: socks/boot swabs

Meat production flocks: Before slaughter at farm

Socks/ boot swabs

Methods of sampling (description of sampling techniques)

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

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

Five pairs of boot swabs/sock samples are taken and pooled to two.

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

At hatchery: five internal linings paper from hatching baskets or 25 x 10 g of broken egg shells are collected and pooled together. If hatching eggs from a breeding flock occupy more than one incubator, one composite sample is taken from each incubator.
At holding: five pairs of boot swabs/sock samples are taken and pooled to two.

Meat production flocks: Before slaughter at farm

Five pairs of boot swabs/sock samples are taken and pooled to two.

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 taken at the holding.

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 94/968/EC of 28 December 1994.

Meat production flocks

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

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 2007. The major amendments concerned routine sampling schemes and sampling and analysing methods. Boot swabs or sock samples are taken instead of feacal samples collection. The analysing method is ISO 6579:2002/Amendment 1:2007.

Measures in case of the positive findings or single cases

Breeding flocks: 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.
Meat production flocks: 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

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

See table Salmonella in other poultry.

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

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

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks	8	Evira	Flock	8	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period	13	Evira	Flock	13	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult	20	Evira	Flock	20	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks	72	Evira	Flock	72	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period	87	Evira	Flock	87	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult	145	Evira	Flock	145	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult	5	Evira	Flock	5	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - day-old chicks	3	Evira	Flock	3	0						
Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period	4	Evira	Flock	4	0						
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult	2	Evira	Flock	2	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						

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	Salmonella spp., unspecified	S. II 6,8:m,t:e,n,x	S. Infantis	S. Livingstone
Gallus gallus (fowl) - laying hens - during rearing period [1)]	120	Evira	Flock	120	15						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling [2)]	900	Evira	Flock	900	29		2		1		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	900	Evira	Flock	900	5		1		1		
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	900	Evira	Flock	319	2						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling	900	Evira	Flock	309	22		1				
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling	2972	Evira	Flock	2972	12					1	1
Gallus gallus (fowl) - laying hens - day-old chicks - at farm		Evira	Flock	54	0						
Gallus gallus (fowl) - laying hens - day-old chicks - at hatchery		Evira	Flock	79	0						
Turkeys - meat production flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling - census sampling	394	Evira	Flock	394	1						
Turkeys - parent breeding flocks - adult - at hatchery - Control and eradication programmes - official and industry sampling - census sampling (All flocks also sampled at farm)	12	Evira	Flock	12	0						

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. II 6,8:m,t:e,n,x	S. Infantis	S. Livingstone
Turkeys - parent breeding flocks - day-old chicks - at farm - Control and eradication programmes - industry sampling - census sampling	15	Evira	Flock	15	0						
Turkeys - parent breeding flocks - during rearing period - at farm - Control and eradication programmes - official and industry sampling - census sampling	11	Evira	Flock	11	0						

	S. Montevideo	S. Plymouth	S. Tennessee
Gallus gallus (fowl) - laying hens - during rearing period [1)]			15
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling [2)]		1	25
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry		1	2
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling			2
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling			21
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling	10		

Table Salmonella in other poultry

	S. Montevideo	S. Plymouth	S. Tennessee
Gallus gallus (fowl) - laying hens - day-old chicks - at farm			
Gallus gallus (fowl) - laying hens - day-old chicks - at hatchery			
Turkeys - meat production flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling - census sampling			1
Turkeys - parent breeding flocks - adult - at hatchery - Control and eradication programmes - official and industry sampling - census sampling (All flocks also sampled at farm)			
Turkeys - parent breeding flocks - day-old chicks - at farm - Control and eradication programmes - industry sampling - census sampling			
Turkeys - parent breeding flocks - during rearing period - at farm - Control and eradication programmes - official and industry sampling - census sampling			

Comments:

[1] The number of existing flocks and units tested is an estimate

[2] The number of existing flocks and units tested is an estimate

The following amendments were made:

Date of Modification	Row name	Column name	Old value	New value
2010-11-23	Turkeys - meat production flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling - census sampling	Units tested	304	394
	Turkeys - meat production flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling - census sampling	Number of existing flocks	304	394

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Goldcoast	S. Tennessee
Cattle (bovine animals) - at farm - animal sample - faeces - Control and eradication programmes - official sampling - suspect sampling	Evira	Herd	83	7		6		1	
Cattle (bovine animals) - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3097	0					
Cattle (bovine animals) - breeding bulls - at farm - animal sample - faeces - Control and eradication programmes - industry sampling - census sampling (Sampling of herds of origin of AI-bulls)	Evira	Herd	235	0					
Pigs - at farm - animal sample - faeces - Control and eradication programmes - official sampling - suspect sampling	Evira	Herd	550	12					12
Pigs - breeding animals - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3143	4					4
Pigs - fattening pigs - at slaughterhouse - animal sample - lymph nodes - Control and eradication programmes - industry sampling - objective sampling	Evira	Animal	3344	1					1

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 21st century, an average of 340 million kilograms of plant-derived feedingstuffs has been imported into Finland annually, and an average of almost 8% of it has been found to be contaminated by Salmonella. The majority - approximately 73% - of plant-derived feedingstuffs has been oil plant seed products or by-products, such as post-extraction soya and rapeseed meal. Almost 10% 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 21st century, 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 in the 21st century. In feed materials of animal origin, Salmonella was found in two samples of meat-and-bone meal in 2005. 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 3,5 % 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 10/2008) 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, 27.5.2010). 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 compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Derby	S. Goldcoast	S. Havana
Compound feedingstuffs for cattle - final product	Evira	Single	25 g	281	0						
Compound feedingstuffs for pigs - final product	Evira	Single	25 g	834	19						
Compound feedingstuffs for poultry (non specified) - final product	Evira	Single	25 g	379	22						
Compound feedingstuffs for poultry - broilers - final product	Evira	Single	25 g	113	0						
Pet food - dog snacks (pig ears, chewing bones)	Evira	Single	25 g	197	8		1		4	1	1
Complementary feedingstuffs - final product [1)]	Evira	Single	25 g	51	0						
Compound feedingstuffs for fish - final product	Evira	Single	25 g	39	0						
Compound feedingstuffs for fur animal - final product	Evira	Single	25 g	64	0						
Compound feedingstuffs for horses - final product	Evira	Single	25 g	30	0						
Compound feedingstuffs for reindeers - final product	Evira	Single	25 g	10	0						
Compound feedingstuffs for sheep - final product	Evira	Single	25 g	3	0						
Compound feedingstuffs, not specified - final product	Evira	Single	25 g	265	0						
Pet food - final product	Evira	Single	25 g	235	1						

Table Salmonella in compound feedingstuffs

	S. London	S. Meleagridis	S. Tennessee
Compound feedingstuffs for cattle - final product			
Compound feedingstuffs for pigs - final product			19
Compound feedingstuffs for poultry (non specified) - final product			22
Compound feedingstuffs for poultry - broilers - final product			
Pet food - dog snacks (pig ears, chewing bones)	1		
Complementary feedingstuffs - final product [1)]			
Compound feedingstuffs for fish - final product			
Compound feedingstuffs for fur animal - final product			
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		1	

Comments:

[1)] Mixed mineral feeds (11 units tested) and feed additiveproducts (40 units tested)

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. Aarhus	S. Agona	S. Anatum
Feed material of cereal grain origin - barley derived	Evira	Single	25 g	10	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	25	1						1
Feed material of cereal grain origin - other cereal grain derived	Evira	Single	25 g	30	0						
Feed material of cereal grain origin - wheat derived	Evira	Single	25 g	28	0						
Feed material of oil seed or fruit origin - groundnut derived	Evira	Single	25 g	1	0						
Feed material of oil seed or fruit origin - linseed derived	Evira	Single	25 g	1	0						
Feed material of oil seed or fruit origin - other oil seeds derived	Evira	Single	25 g	1	0						
Feed material of oil seed or fruit origin - rape seed derived	Evira	Single	25 g	78	0						
Feed material of oil seed or fruit origin - soya (bean) derived	Evira	Single	25 g	22	0						
Feed material of oil seed or fruit origin - sunflower seed derived	Evira	Single	25 g	39	0						
Other feed material - forages and roughages	Evira	Batch	25 g	1	0						
Other feed material - other plants	Evira	Single	25 g	3	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. Aarhus	S. Agona	S. Anatum
Other feed material - tubers, roots and similar products	Evira	Single	25 g	24	0						
Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - at feed mill - imported	Evira	Batch	25 g	143	0						
Feed material of cereal grain origin - wheat derived - at feed mill - imported	Evira	Batch	25 g	31	0						
Feed material of oil seed or fruit origin - groundnut derived - at feed mill - imported	Evira	Batch	25 g	3	0						
Feed material of oil seed or fruit origin - linseed derived - at feed mill - imported	Evira	Batch	25 g	19	0						
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - imported	Evira	Batch	25 g	85	3					2	
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - imported [1)]	Evira	Batch	25 g	80	4				1		
Feed material of oil seed or fruit origin - sunflower seed derived - at feed mill - imported	Evira	Batch	25 g	16	0						
Other feed material - other plants - at feed mill - imported	Evira	Batch	25 g	5	0						
Other feed material - tubers, roots and similar products - at feed mill - imported	Evira	Batch	25 g	11	0						
Other feed material - tubers, roots and similar products - in total	Evira	Batch	25 g	11	0						

Table Salmonella in other feed matter

	S. Mbandaka	S. Senftenberg	S. Thompson	Salmonella spp.
Feed material of cereal grain origin - barley derived				
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				

Table Salmonella in other feed matter

	S. Mbandaka	S. Senftenberg	S. Thompson	Salmonella spp.
Other feed material - tubers, roots and similar products				
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 - groundnut 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 [1)]	1	1		2
Feed material of oil seed or fruit origin - sunflower seed derived - at feed mill - imported				
Other feed material - other plants - at feed mill - imported				
Other feed material - tubers, roots and similar products - at feed mill - imported				
Other feed material - tubers, roots and similar products - in total				

Comments:

[1)] In one positive batch 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
Feed material of land animal origin - animal fat	Evira	Single	25 g	1	0			
Feed material of land animal origin - dairy products	Evira	Single	25 g	62	0			
Feed material of land animal origin - meat and bone meal	Evira	Single	25 g	22	0			
Feed material of marine animal origin - fish meal	Evira	Batch	25 g	7	0			
Feed material of marine animal origin - other fish products	Evira	Single	25 g	2	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	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical
Number of isolates in the laboratory	170	0	95	0	95	0	1	0
Number of isolates serotyped	170	0	95	0	95	0	1	0
Number of isolates per serovar								
S. Typhimurium - DT 1	9							
S. Typhimurium - DT 104	158							
S. Typhimurium - DT 2					1			
S. Typhimurium - DT 41					1			
S. Goldcoast	3							
S. II 6,8:m,t:e,n,x					2			
S. Infantis					2			

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical
Number of isolates in the laboratory	170	0	95	0	95	0	1	0
Number of isolates serotyped	170	0	95	0	95	0	1	0
Number of isolates per serovar								
S. Livingstone					1			
S. Montevideo					23			
S. Plymouth					1			
S. Tennessee			95		64		1	

Footnote:

Due the feed-borne S. Tennessee outbreak 12 pig farms and 30 laying hens holdings were contaminated by S. Tennessee year 2009. Cattle isolates are from 7 herds.

Table Salmonella Typhimurium phagetypes in animals

Phage-Type	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical	Monitoring	Clinical
Number of isolates in the laboratory	6	0	0	0	2	0	0	0
Number of isolates phagetyped	6	0	0	0	2	0	0	0
Number of isolates per type								
DT 1	1							
DT 104	5							
DT 2					1			
DT 41					1			

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.

Breakpoints 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

Only seven bovine salmonella isolates were isolated in the control programme; six S. Typhimurium and one S. Goldcoast.

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

The number of isolates was small, but three S. Typhimurium isolates were multiresistant. Number of isolates was small, but resistance percentages for some antimicrobials were high.

B. 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.

Breakpoints 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

In 2009 there were two isolations of salmonella from domestic foodstuffs derived from pigs. The isolates were susceptible to the antimicrobials included.

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.

C. 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.

Breakpoints used in testing

Epidemiological cut-off values were used.

Results of the investigation

There were only two isolates of domestic origin; the isolates were susceptible to all tested antimicrobials.

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

The situation in domestic poultry meat production is favourable. All isolates originated from one epidemic, and the strain was sensitive to most antimicrobials.

D. 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.

Breakpoints 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

All isolates originated from a feed epidemic caused by S. Tennessee.

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

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

E. 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.

Breakpoints 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

Most isolates were fully sensitive to the antimicrobials included in testing.The turkey isolate and 33/39 isolates from laying hens originated from a feed epidemic caused by S. Tennessee; the strain was sensitive to most antimicrobials.

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.

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella		S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Tennessee	
Isolates out of a monitoring program (yes/no)								yes	
Number of isolates available in the laboratory								18	
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin							18	0
	Streptomycin							18	1
Amphenicols	Chloramphenicol							18	0
Cephalosporins	3rd generation cephalosporins							18	0
Fluoroquinolones	Ciprofloxacin							18	0
Fully sensitive	Fully sensitive							18	17
Penicillins	Ampicillin							18	0
Quinolones	Nalidixic acid							18	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial							18	1
Sulfonamides	Sulfonamide							18	0
Tetracyclines	Tetracycline							18	0
Trimethoprim	Trimethoprim							18	0

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

Salmonella		S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Infantis		S. Livingstone		S. Montevideo	
Isolates out of a monitoring program (yes/no)								yes		yes		yes	
Number of isolates available in the laboratory								1		1		9	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin							1	0	1	0	9	0
	Streptomycin							1	0	1	0	9	0
Amphenicols	Chloramphenicol							1	0	1	0	9	0
Cephalosporins	3rd generation cephalosporins							1	0	1	0	9	0
Fluoroquinolones	Ciprofloxacin							1	0	1	0	9	0
Fully sensitive	Fully sensitive							1	1	1	1	9	9
Penicillins	Ampicillin							1	0	1	0	9	0
Quinolones	Nalidixic acid							1	0	1	0	9	0
Sulfonamides	Sulfonamide							1	0	1	0	9	0
Tetracyclines	Tetracycline							1	0	1	0	9	0
Trimethoprim	Trimethoprim							1	0	1	0	9	0

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

Salmonella		S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Plymouth		S. Tennessee		S. enterica subsp. salamae	
Isolates out of a monitoring program (yes/no)				yes				yes		yes		yes	
Number of isolates available in the laboratory				2				1		33		1	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin			2	0			1	0	33	0	1	0
	Streptomycin			2	0			1	0	33	1	1	1
Amphenicols	Chloramphenicol			2	0			1	0	33	0	1	0
Cephalosporins	3rd generation cephalosporins			2	0			1	0	33	0	1	0
Fluoroquinolones	Ciprofloxacin			2	0			1	0	33	0	1	0
Fully sensitive	Fully sensitive			2	2			1	1	33	32		
Penicillins	Ampicillin			2	0			1	0	33	0	1	0
Quinolones	Nalidixic acid			2	0			1	0	33	0	1	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial									33	1	1	1
Sulfonamides	Sulfonamide			2	0			1	0	33	0	1	0
Tetracyclines	Tetracycline			2	0			1	0	33	0	1	0
Trimethoprim	Trimethoprim			2	0			1	0	33	0	1	0

Table Antimicrobial susceptibility testing of Salmonella in Turkeys

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

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

Salmonella		S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Goldcoast	
Isolates out of a monitoring program (yes/no)				yes				yes	
Number of isolates available in the laboratory				6				1	
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Gentamicin			6	0			1	0
	Streptomycin			6	3			1	0
Amphenicols	Chloramphenicol			6	3			1	0
Cephalosporins	3rd generation cephalosporins			6	0			1	0
Fluoroquinolones	Ciprofloxacin			6	3			1	0
Fully sensitive	Fully sensitive			6	1			1	1
Number of multiresistant S. Typhimurium	resistant to other antimicrobials			6	3				
	with penta resistance			6	0				
Penicillins	Ampicillin			6	5			1	0
Quinolones	Nalidixic acid			6	3			1	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial			6	0				
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials			6	2				
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials			6	0				
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials			6	0				
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials			6	3				
Sulfonamides	Sulfonamide			6	5			1	0
Tetracyclines	Tetracycline			6	3			1	0
Trimethoprim	Trimethoprim			6	0			1	0

Table Antimicrobial susceptibility testing of Salmonella in meat from broilers (Gallus gallus)

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

Table Antimicrobial susceptibility testing of Salmonella in meat from pig

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

Table Antimicrobial susceptibility testing of Salmonella spp. in Cattle (bovine animals) - in total - Control and eradication programmes - quantitative data [Dilution method]

Salmonella spp.		Cattle (bovine animals) - in total - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		1																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	1	0							1														0.5	64
	Streptomycin	32	1	0											1										2	256
Amphenicols	Chloramphenicol	16	1	0										1											1	128
Cephalosporins	Cefotaxim	0.5	1	0					1																0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	1	0			1																		0.008	1
Penicillins	Ampicillin	4	1	0							1														0.25	32
Quinolones	Nalidixic acid	16	1	0										1											1	128
Sulfonamides	Sulfonamides	256	1	0												1									16	2048
Tetracyclines	Tetracycline	8	1	0								1													0.5	64
Trimethoprim	Trimethoprim	2	1	0						1															0.25	32

Table Antimicrobial susceptibility testing of Salmonella spp. in Gallus gallus (fowl) - broilers - unspecified - in total - Control and eradication programmes - quantitative data [Dilution method]

Salmonella spp.		Gallus gallus (fowl) - broilers - unspecified - in total - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		11																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	11	0								9	2												0.5	64
	Streptomycin	32	11	0												10	1								2	256
Amphenicols	Chloramphenicol	16	11	0										11											1	128
Cephalosporins	Cefotaxim	0.5	11	0				2	9																0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	11	0			1	10																	0.008	1
Penicillins	Ampicillin	4	11	0							9	2													0.25	32
Quinolones	Nalidixic acid	16	11	0										11											1	128
Sulfonamides	Sulfonamides	256	11	0												10	1								16	2048
Tetracyclines	Tetracycline	8	11	0								8	3												0.5	64
Trimethoprim	Trimethoprim	2	11	0						10	1														0	32

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

S. Typhimurium		Cattle (bovine animals) - unspecified - in total - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		6																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	6	0								6													0.5	64
	Streptomycin	32	6	3											1	2			2	1					2	256
Amphenicols	Chloramphenicol	16	6	3										3						3					1	128
Cephalosporins	Cefotaxim	0.5	6	0				1	4	1															0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	6	3			2	1		1	2														0.008	1
Penicillins	Ampicillin	4	6	5								1						5							0.25	32
Quinolones	Nalidixic acid	16	6	3										3						3					1	128
Sulfonamides	Sulfonamides	256	6	5												1								5	16	2048
Tetracyclines	Tetracycline	8	6	3									3			1	2								0.5	64
Trimethoprim	Trimethoprim	2	6	0						1	5														0	32

Table Antimicrobial susceptibility testing of S. Montevideo in Meat from broilers (Gallus gallus) - in total - quantitative data [Dilution method]

S. Montevideo		Meat from broilers (Gallus gallus) - in total																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		3																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	3	0								2	1												0.5	64
	Streptomycin	32	3	0												3									2	256
Amphenicols	Chloramphenicol	16	3	0										2	1										1	128
Cephalosporins	Cefotaxim	0.5	3	0				1	2																0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	3	0			1	2																	0.008	1
Penicillins	Ampicillin	4	3	0							3														0.25	32
Quinolones	Nalidixic acid	16	3	0										3											1	128
Sulfonamides	Sulfonamides	256	3	0												3									16	2048
Tetracyclines	Tetracycline	8	3	0								3													0.5	64
Trimethoprim	Trimethoprim	2	3	0						3															0.25	32

Table Antimicrobial susceptibility testing of S. Enteritidis in Meat from pig - quantitative data [Dilution method]

S. Enteritidis		Meat from pig																							
Isolates out of a monitoring program (yes/no)		no																							
Number of isolates available in the laboratory		2																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	2	0								2													0.5	64
	Streptomycin	32	2	0											2										2	256
Amphenicols	Chloramphenicol	16	2	0										2											1	128
Cephalosporins	Cefotaxim	0.5	2	0					1	1															0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	2	0				2																	0.008	1
Penicillins	Ampicillin	4	2	0								1	1												0.25	32
Quinolones	Nalidixic acid	16	2	0										1	1										1	128
Sulfonamides	Sulfonamides	256	2	0													1	1							16	2048
Tetracyclines	Tetracycline	8	2	0									2												0.5	64
Trimethoprim	Trimethoprim	2	2	0						1	1														0.25	32

Table Antimicrobial susceptibility testing of S. Tennessee in Pigs - Control and eradication programmes - quantitative data [Dilution method]

S. Tennessee		Pigs - Control and eradication programmes																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		18																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	18	0							6	10	2												0.5	64
	Streptomycin	32	18	1												10	7	1							2	256
Amphenicols	Chloramphenicol	16	18	0										13	5										1	128
Cephalosporins	Cefotaxim	0.5	18	0					15	3															0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	18	0			7	11																	0.008	1
Penicillins	Ampicillin	4	18	0							8	10													0.25	32
Quinolones	Nalidixic acid	16	18	0										16	2										1	128
Sulfonamides	Sulfonamides	256	18	0												18									16	2048
Tetracyclines	Tetracycline	8	18	0								9	9												0.5	64
Trimethoprim	Trimethoprim	2	18	0							16	2													0.25	32

Table Antimicrobial susceptibility testing of S. Tennessee in Turkeys - Control and eradication programmes - quantitative data [Dilution method]

S. Tennessee		Turkeys - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		1																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	1	0								1													0.5	64
	Streptomycin	32	1	0												1									2	256
Amphenicols	Chloramphenicol	16	1	0										1											1	128
Cephalosporins	Cefotaxim	0.5	1	0					1																0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	1	0				1																	0.008	1
Penicillins	Ampicillin	4	1	0							1														0.25	32
Quinolones	Nalidixic acid	16	1	0										1											1	128
Sulfonamides	Sulfonamides	256	1	0												1									16	2048
Tetracyclines	Tetracycline	8	1	0								1													0.5	64
Trimethoprim	Trimethoprim	2	1	0							1														0.25	32

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - laying hens - Control and eradication programmes - quantitative data [Dilution method]

S. Typhimurium		Gallus gallus (fowl) - laying hens - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		2																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	2	0								2													0.5	64
	Streptomycin	32	2	0												2									2	256
Amphenicols	Chloramphenicol	16	2	0									1	1											1	128
	Florfenicol	64																								
Cephalosporins	Cefotaxim	0.5	2	0				2																	0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	2	0			1	1																	0.008	1
Penicillins	Ampicillin	4	2	0								2													0.25	32
Quinolones	Nalidixic acid	16	2	0										2											1	128
Sulfonamides	Sulfonamides	256	2	0												2									16	2048
Tetracyclines	Tetracycline	8	2	0								1	1												0.5	64
Trimethoprim	Trimethoprim	2	2	0						2															0.25	32

Table Antimicrobial susceptibility testing of Salmonella spp. in Gallus gallus (fowl) - laying hens - Control and eradication programmes - quantitative data [Dilution method]

Salmonella spp.		Gallus gallus (fowl) - laying hens - Control and eradication programmes																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		35																								
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	35	0							3	29	3												0.5	64
	Streptomycin	32	35	2												15	18	2							2	256
Amphenicols	Chloramphenicol	16	35	0										18	17										1	128
Cephalosporins	Cefotaxim	0.5	35	0					30	5															0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	35	0			4	31																	0.008	1
Penicillins	Ampicillin	4	35	0							16	19													0.25	32
Quinolones	Nalidixic acid	16	35	0										34	1										1	128
Sulfonamides	Sulfonamides	256	35	0												35									16	2048
Tetracyclines	Tetracycline	8	35	0								13	22												0.5	64
Trimethoprim	Trimethoprim	2	35	0						1	33	1													0.25	32

Table Breakpoints for antibiotic resistance testing of Salmonella in Animals

Test Method Used
Broth dilution

Standard methods used for testing
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	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

Table Breakpoints for antibiotic resistance testing of Salmonella in Food

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	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

Table Breakpoints for antibiotic resistance testing of Salmonella in Feed

Test Method Used	Standard methods used for testing

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

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

The number of reported cases of campylobacteriosis in Finland increased from the beginning of the 1990's to the year 2001. From 2002 to 2003 the number of cases decreased, but after that the trend has been increasing again. 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.

Since 2004, when the campylobacter control programme was implemented, the prevalence of campylobacters in broiler slaughterbatches has been between 6.2 and 7.3% during June-October and below 1% during the rest of the year.

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

Thermophilic campylobacters are the most common bacterial cause of human enteric infections in Finland. The annual average proportion of domestic cases is about 30%, and most of them are caused by Campylobacter jejuni.

There is a clear seasonal trend: both the number of human cases and the campylobacter prevalence in broiler flocks peak in July-August. Up to 70% of campylobacter infections detected in July-August in Finland are domestically acquired. Still, the percentage of campylobacter positive broiler flocks has been constantly at a low level even during the summer months.

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

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

A 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 at slaughter. From November to May random samples are taken.

If campylobacters are detected in two consecutive flocks from the same holding, all the flocks from the holding will be slaughtered at the end of the day until two consecutive flocks are negative. Special attention to the production hygiene in the holding will be paid.

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%.

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 flocks from the same holding, all the flocks from the holding will be slaughtered at the end of the day until two consecutive flocks are negative. Special attention to the production hygiene in the holding will be paid together 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 1389 slaughter batches were examined for thermophilic campylobacters between June and October 2009 in the monitoring programme. Campylobacters were detected in 81(5.8%) of these slaughter batches. Campylobacter jejuni was detected in 79 and C. coli in 2 slaughter batches. In January-May and November-December, the samples were taken from 331 slaughter batches in total. Thermophilic campylobacters were detected in 1 (0.3%)of these slaughter batches.

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

The results of the campylobacter monitoring programme in 2009 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

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	1389	81	2	79			
Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - caecum - Control and eradication programmes - industry sampling - objective sampling (Random sampling in January-May and November-December)	Evira	Slaughter batch	331	1	0	1			

2.2.3 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Sampling strategy used in monitoring

Frequency of the sampling

350 samples per year

Type of specimen taken

faecal sample, taken at slaughterhouse

Methods of sampling (description of sampling techniques)

approx. 50 g fresh sample is taken with a disposable glove and delivered refrigerated to the laboratory

Procedures for the selection of isolates for antimicrobial testing

modified standard NMKL 119:2007

Methods used for collecting data

filled delivery form

Laboratory methodology used for identification of the microbial isolates

modified standard NMKL 119:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

tet, cip, nal, gen, ery, str

Breakpoints used in testing

2, 1, 16, 1, 4, 2 (respectively)

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 appropriate table; in general the level is very favourable

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

annual evaluation of the FINRES-Vet programme

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

relevance to be determined; however, the 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

Type of specimen taken

10 intact caeca per batch, taken at slaughterhouse

Methods of sampling (description of sampling techniques)

pooled sample delivered refrigerated to the laboratory

Procedures for the selection of isolates for antimicrobial testing

modified standard NMKL 119:2007

Methods used for collecting data

filled delivery form

Laboratory methodology used for identification of the microbial isolates

modified standard NMKL 119:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

tet, cip, nal, gen, ery, str

Breakpoints used in testing

2, 1, 16, 1, 4, 2 (respectively)

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

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

Resistance situation in broilers still very favourable; max proportion of resistant strains 3.8%, to streptomycin

Table Antimicrobial susceptibility testing of Campylobacter in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - industry sampling - selective sampling

Campylobacter		C. jejuni - C. jejuni subsp. jejuni	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		48	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	48	0
	Streptomycin	48	4
Fluoroquinolones	Ciprofloxacin	48	1
Fully sensitive	Fully sensitive	48	43
Macrolides	Erythromycin	48	0
Quinolones	Nalidixic acid	48	1
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	48	4
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	48	1
Tetracyclines	Tetracycline	48	0

Table Antimicrobial susceptibility testing of Campylobacter in Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - faeces - Monitoring - industry sampling - selective sampling

Campylobacter		C. jejuni - C. jejuni subsp. jejuni	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		78	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	78	1
	Streptomycin	78	3
Fluoroquinolones	Ciprofloxacin	78	1
Fully sensitive	Fully sensitive	78	73
Macrolides	Erythromycin	78	0
Quinolones	Nalidixic acid	78	1
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	78	3
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	78	1
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	78	1
Tetracyclines	Tetracycline	78	2

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

C. jejuni subsp. jejuni		Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		78																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	1	78	1						1	41	35	1												0.12	16
	Streptomycin	2	78	3								7	68	2	1										0.5	64
Fluoroquinolones	Ciprofloxacin	1	78	1				3	57	15	2					1									0.06	8
Macrolides	Erythromycin	4	78	0							68	7	3												0.5	64
Quinolones	Nalidixic acid	16	78	1										44	31	2			1						1	64
Tetracyclines	Tetracycline	2	78	2					67	8			1			1	1								0.12	16

Table Antimicrobial susceptibility testing of C. jejuni - C. jejuni subsp. jejuni in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling - quantitative data [Dilution method]

C. jejuni subsp. jejuni		Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		48																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	1	48	0						2	41	5													0.12	16
	Streptomycin	2	48	4								15	29	1					3						0.5	64
Fluoroquinolones	Ciprofloxacin	1	48	1				15	26	5	1					1									0.06	8
Macrolides	Erythromycin	4	48	0							44	4													0.5	64
Quinolones	Nalidixic acid	16	48	1									2	19	20	6			1						1	64
Tetracyclines	Tetracycline	2	48	0					44	4															0.12	16

Table Breakpoints used for antimicrobial susceptibility testing of Campylobacter 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		2	
Fluoroquinolones	Ciprofloxacin		1	
Quinolones	Nalidixic acid		16	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

Table Breakpoints used for antimicrobial susceptibility testing of Campylobacter 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	

Table Breakpoints used for antimicrobial susceptibility testing of Campylobacter in Feed

Test Method Used	Standard methods used for testing

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

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Since 1995 18-53 human listeriosis cases have been recorded annually.

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

National survey, which was started in April 2008 and continued till the end of March 2009 was carried out by Evira to investigate the occurrence and levels of Listeria monocytogenes in vacuum and modified atmosphire packaged, gravad and cold-salted fishery products. The samples were collected from retail shops in the Southern part of Finland, which was assessed to represent the whole country. The products available in the shops were sampled focusing to take 1-2 products from small producers monthly. The samples of the year 2009 originated from nine producers.

Frequency of the sampling

At retail

Sampling distributed evenly throughout the study period January-March

Type of specimen taken

At retail

Sliced and unsliced, vacuum and modified atmosphire packaged products, weight 100-800g. One sample per batch and product was taken at a sampling time.

Methods of sampling (description of sampling techniques)

At retail

The samples were stored in lab at max 4 C and were analysed 2-3 days before the best before date. 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. The rest of the sample stored in refrigerator max 4 C for quantitative analysis. Quantitave analysis was started immediately after the presumptive positive result was obtained by qualitative method, i.e. start 2-3 days later than the qualitative analysis, or simultaneously with the qualitative analysis in case the best before date was too close to start later.

Definition of positive finding

At retail

L. monocytogenes detected in 25 g sample using qualitative analysis. Positive samples were quantitatively analysed using 10 g samples.

Diagnostic/analytical methods used

At retail

Bacteriological method: ISO 11290- 1 and 2:1996, 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

In the survey carried out in 2008-2009, establishments repeatedly found to have products in which listeria was detected, or products with listeria levels >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. In the survay, findings >100 cfu/g leaded to re-sampling and withdrawal, if levels >100 occured.

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 detected in 9/49 cold-smoked and in 18/64 gravad fishery products. All the samples detected to be positive contained L. monocytogenes < 100 cfu/g.

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

The occurence of levels <100 cfu/g in the survey 2008-2009 was increased since the former survey carried out by the NCA 2004.

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 Listeria	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - gravad /slightly salted - at retail - Survey - national survey [1)]	Evira	Single	25 g	64	18	64	18	18	18	0
Fish - smoked - cold-smoked - at retail - Survey - national survey [2)]	Evira	Single	25 g	49	9	49	9	9	9	0

Comments:

[1)] The samples positive by the detection method were analysed by the enumeration method.

[2)] The samples positive by the detection method were analysed by the enumeration method.

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 21 cases in 9 different animal species in 2009. Listeriosis was diagnosed in 10 bovine animals, in 2 sheep, in 2 wild hares, in 1 alpacka, in 2 goats, in 1 pig, in 1 hen, in 1 roe deer and in 1 white tailed deer.

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

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	999999999	11	10	1
Gallus gallus (fowl)		Animal	999999999	1	1	
Goats		Animal	999999999	2	2	
Pigs		Animal	999999999	1	1	
Sheep		Animal	999999999	2	2	
Alpacas - farmed		Animal	999999999	1	1	
Deer - wild		Animal	999999999	2	2	
Hares - wild		Animal	999999999	2	2	

Footnote:

The number of tested animals cannot be given because listeriosis diagnosis can be made histopathologically (brain tissue) or by general bacteriological aerobic cultivation on blood agar as well as by cultivation on selective agar media. So all animal species from which samples are examined histopathologically and/or by cultivation on blood agar or on selective media should be counted. For the same reason only the data of the species from which listeriosis diagnosis is made is reported. As the table in its present form is not possible to be saved without filling the column "Units tested" the column is filled with imaginary numbers 999999999.

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 1998-2008. 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

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.

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

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	1538	9	9		

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

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 2009.

268056 bovine animals were slaughtered and subject to a routine post mortem examination. Samples from 7 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 827 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

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

There is a compulsory health control programme for farmed deer. Detailed instructions are included in the Decision No 16/1997 of the Veterinary and Food Department (6 June 1997) as amended by 11/EEO/2006.

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 2009.

No samples of farmed deer were sent for laboratory examination.

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

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			
FINLAND	7		7	100			every two years			0	0
Total :	7	0	7	100	0	0	N.A.	0	0	0	0

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
FINLAND	16420	918268	16420	100	0	0	no routine test			7	0
Total :	16420	918268	16420	100	0	0	N.A.	0	0	7	0

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

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 2009.

1301 blood samples from AI bulls were tested for brucellosis. In addition, 93 bacteriological examinations

and 110 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

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 2009.
1541 random blood samples from healthy animals 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

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 2009.
1961 random blood samples from healthy sheep were tested. In addition 14 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

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 2395 serological samples were tested for Brucella suis in 2009, all with negative results. In addition 141 serum 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

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	2395	0	0	0	0	0

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

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
FINLAND	2298	127439	2298	100	0	0	293	3502	0	0	0	17	0	0
Total :	2298	127439	2298	100	0	0	293	3502	0	0	0	17	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		
FINLAND	16420	918268	16420	100	0	0		1301	0				110	0	0	110	0	0		93	0
Total :	16420	918268	16420	100	0	0	0	1301	0	0	0	0	110	0	0	110	0	0	0	93	0

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- 2009 the number of reported cases of human yersiniosis has been on average ca. 700, 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 ca

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

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 hundreds 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. 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

Because meat inspection of swine is mandatory to all commercial swine 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 source and possible spread of infection and decide about further action.

Results of the investigation including description of the positive cases and the

No positive cases were found in 2009.

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

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. nativa	T. pseudospiralis
Bears		Animal	63	4			4	
Foxes		Animal	200	38		37	1	
Pigs		Animal	0	0				
Pigs - breeding animals - unspecified - sows and boars		Animal	54943	0				
Solipeds, domestic		Animal	0	0				
Solipeds, domestic - horses		Animal	1049	0				
Wild boars - farmed		Animal	267	5				5
Wild boars - wild		Animal	19	0				
Badgers - wild		Animal	10	2		2		
Lynx - wild		Animal	240	107		105	2	
Other mustelides - wild (Wolverine Gulo gulo)		Animal	2	1		1		
Pigs - fattening pigs - unspecified		Animal	2276769	0				
Raccoon dogs - wild		Animal	190	61		61		
Wolves - wild		Animal	25	7		6	1	

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 2009, about 800 small mammals were studied which is less than average due to a cyclic vole population crash in southern Finland. Animals are mostly sampled from high-density habitat patches, preferred by foxes as hunting grounds. Species include bank vole Clethrionomys glareolus (whole Finland), red and grey-sided voles C. rutilus and C. 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 terrestris. 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 has never been diagnosed in Fennoscandia, but is known from neighbouring areas.

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

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: 1) positive reaction in copro-ELISA test, 2) taeniid eggs in faeces (faecal flotation) and 3) eggs positive in Echinococcus PCR OR 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

Copro Elisa test

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 2009, hydatid cysts of Echinococcus granulosus were found in one slaughtered reindeer in Northeast Finland. A small-scale survey of moose lungs conducted in the endemic area of eastern Finland (North Karelia) revealed 5 cases in 35 moose. Later in 2009, further two cases were found from the same region and one from a more northern region (Kainuu). Two wolves out of 27 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	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals)		Animal	268056	0			
Foxes		Animal	189	0			
Reindeers [1)]		Animal	77663	1	1		
Sheep		Animal	25687	0			
Moose - wild		Animal	62	8	8		
Raccoon dogs - wild		Animal	177	0			
Voles - wild	Metla	Animal	800	0			
Wolves - wild		Animal	27	2	2		

Comments:

[1)] 10 reindeer tested specifically, 77 653 tested in meat inspection

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		Animal	312	0	0
Cattle (bovine animals)		Animal	463	0	0
Dogs		Animal	726	0	0
Goats		Animal	7	0	0
Pigs		Animal	1144	0	0
Sheep		Animal	85	0	0
Solipeds, domestic		Animal	94	0	0
Hares - wild - from hunting - Surveillance		Animal	57	8	8

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 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

Two cases of EBLV-2 infection in humans have been confirmed, 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.

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 2009 16 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 2009, 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 2009 a total of 518 wild animals were examined for rabies, including 1 positive bat (EBLV-2).

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	Units tested	Total units positive for Lyssavirus (rabies)	Unspecified Lyssavirus	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Badgers - wild	Evira	Animal	10	0			
Bats - wild [1)]	Evira	Animal	24	1			1
Cats	Evira	Animal	12	0			
Cattle (bovine animals)	Evira	Animal	1	0			
Dogs	Evira	Animal	16	0			
Foxes - wild	Evira	Animal	198	0			
Marten - wild	Evira	Animal	6	0			
Raccoon dogs - wild	Evira	Animal	181	0			
Sheep	Evira	Animal	1	0			
Solipeds, domestic	Evira	Animal	2	0			
Wolves - wild	Evira	Animal	9	0			
Lynx - wild	Evira	Animal	70	0			
Minks - wild	Evira	Animal	12	0			
Otter	Evira	Animal	3	0			
Polecats - wild	Evira	Animal	3	0			
Rats - pet animal	Evira	Animal	1	0			
Wolverine (wild)	Evira	Animal	2	0			

Comments:

[1)] EBLV-2

2.12 Q-FEVER

2.12.1 General evaluation of the national situation

2.12.2 Coxiella (Q-fever) in animals

A. C. burnetii in animal

Monitoring system

Sampling strategy

1.Clinical suspicion or for export purposes(n=25)

2. Monitoring survey objective sampling, dairy cow herds, using random sampling(n=1283)

3. Monitoring survey selective sampling, dairy cow herds,the herds which were supposed to have increased number of abortions according to milk recording health statistics, were selected in the study. 253 of these herds were included also in the above mentioned study (n=851)

Frequency of the sampling

1. Continuous

2.and 3. The survey was done once in 2009

Type of specimen taken

Milk

Methods of sampling (description of sampling techniques)

1. Serum or milk samples

2. and 3. Bulk milk samples at farm

Case definition

ELISA test positive was regarded as positive

Diagnostic/analytical methods used

Detection of antibodies from serum, milk and bulk milk: ELISA-test

Detection of the agent from milk samples by PCR

Notification system in place

Immediately notifiable since 1995.

Results of the investigation

1. C. burnetii was not detected

2. Two herds were seropositive

3. Two herds were seropositive

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

No clinical Q fever cases have been reported in any animal species in Finland.The seropositive and PCR-positive bovine animals were clinically healthy.

Additional information

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.

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) [1)]	Evira	Herd	1882	5	5
Sheep	Evira	Animal	6	0	0
Cattle (bovine animals) - adult cattle over 2 years	Evira	Animal	25	0	0

Comments:

[1)] one positive herd was the one first detected in 2008

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 programme. One animal species per year is included in the programme. In 2009 the target species was cattle.

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 cattle has been low.

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

A. Antimicrobial resistance of E. coli in Animals Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - industry

Sampling strategy used in monitoring

Frequency of the sampling

350 samples per year

Type of specimen taken

faeces

Methods of sampling (description of sampling techniques)

approx 50 g sample collected into disposable glove and delivered refrigerated into lab

Procedures for the selection of isolates for antimicrobial testing

according to Evira laboratory procedure 3502/3

Methods used for collecting data

filled delivery form

Laboratory methodology used for identification of the microbial isolates

according to Evira laboratory procedure 3502/3

Laboratory used for detection for resistance

Antimicrobials included in monitoring

antimicrobials included in the VETMIC (SVA Sweden)Gram-negatives panel

Breakpoints used in testing

epidemiological cut-off values given by EUCAST were used

Control program/mechanisms

The control program/strategies in place

no existing control programs for indicator bacteria

Recent actions taken to control the zoonoses

see above

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

Situation in general very favourable. Max proportion of resistant strains 1.8%, to streptomycin and kanamycin

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

Escherichia coli, non-pathogenic		E. coli	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		272	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	272	3
	Kanamycin	272	5
	Streptomycin	272	5
Amphenicols	Chloramphenicol	272	2
	Florfenicol	272	2
Cephalosporins	3rd generation cephalosporins	272	0
Fluoroquinolones	Ciprofloxacin	272	3
Fully sensitive	Fully sensitive	272	257
Penicillins	Ampicillin	272	1
Quinolones	Nalidixic acid	272	1
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	272	9
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	272	4
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	272	2
Sulfonamides	Sulfonamide	272	2
Tetracyclines	Tetracycline	272	3
Trimethoprim	Trimethoprim	272	1

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling - quantitative data [Dilution method]

E. coli		Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		272																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	2	272	3							12	228	29	3											0.5	64
	Kanamycin	8	272	5									30	169	68	5									2	16
	Streptomycin	16	272	5										32	192	43	1	1	3						2	256
Amphenicols	Chloramphenicol	16	272	2									3	98	161	8	2								1	128
	Florfenicol	16	272	2										35	198	37	1	1							4	32
Cephalosporins	3rd generation cephalosporins	1	272	0					4	86	174	8													0.016	2
	Cefotaxim	0.25	272	0				188	78	6															0.06	2
Fluoroquinolones	Ciprofloxacin	0.06	272	3		8	197	64	2	1															0.008	1
Penicillins	Ampicillin	8	272	1							4	37	172	56	2			1							1	128
Quinolones	Nalidixic acid	16	272	1								5	72	185	9					1					1	128
Sulfonamides	Sulfonamide	256	272	2												270							2		16	2048
Tetracyclines	Tetracycline	8	272	3								83	170	15	1		1	1	1						0.5	64
Trimethoprim	Trimethoprim	2	272	1						62	99	90	20	1											0.25	32

Table Breakpoints used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

Test Method Used
Disc diffusion Broth dilution

Standard methods used for testing
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	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

Table Breakpoints 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	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulfonamides	Sulfonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

Table Breakpoints used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Feed

Test Method Used	Standard methods used for testing

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

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of E. faecalis in Animals Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - industry

Sampling strategy used in monitoring

Frequency of the sampling

350 samples per year

Type of specimen taken

faeces

Methods of sampling (description of sampling techniques)

approx 50 g sample collected into disposable glove and delivered refrigerated into lab

Procedures for the selection of isolates for antimicrobial testing

according to Evira laboratory procedure 3501/3

Methods used for collecting data

filled delivery form

Laboratory methodology used for identification of the microbial isolates

according to Evira laboratory procedure 3501/3

Laboratory used for detection for resistance

Antimicrobials included in monitoring

antimicrobials included in the Enterococcus VETMIC (SVA Sweden) panel

Breakpoints used in testing

Epidemiological cut-off values given by EUCAST were used

Control program/mechanisms

The control program/strategies in place

No existing control programs for indicator bacteria

Recent actions taken to control the zoonoses

see above

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

Situation in general favourable. Max proportion of resistant strain 20%, to erythromycin

B. Antimicrobial resistance of E. faecium in Animals Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - industry

Sampling strategy used in monitoring

Frequency of the sampling

350 samples per year

Type of specimen taken

faeces

Methods of sampling (description of sampling techniques)

approx 50 g sample collected into disposable glove and delivered refrigerated into lab

Procedures for the selection of isolates for antimicrobial testing

according to Evira laboratory procedure 3501/3

Methods used for collecting data

filled delivery form

Laboratory methodology used for identification of the microbial isolates

according to Evira laboratory procedure 3501/3

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Antimicrobials included in the Enterococcus VETMIC (SVA Sweden) panel

Breakpoints used in testing

Epidemiological cut-off values given by EUCAST were used

Control program/mechanisms

The control program/strategies in place

No existing control programs for indicator bacteria

Recent actions taken to control the zoonoses

see above

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

Situation in general favourable. Max proportion of resistant strains 38.2%, to erythromycin. Proportion of VRE 2.2%

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - industry sampling - selective 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		50		89	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	50	0	89	0
	Kanamycin	50	0	89	1
	Streptomycin	50	2	89	1
Amphenicols	Chloramphenicol	50	0	89	0
Fully sensitive	Fully sensitive	50	35	89	49
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	50	0	89	3
	Vancomycin	50	0	89	2
Ionophores	Narasin	50	0	89	1
Macrolides	Erythromycin	50	10	89	34
Oxazolidines	Linezolid	50	0	89	0
Penicillins	Ampicillin	50	0	89	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	50	12	89	36
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	50	3	89	3
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	50	0	89	1
Streptogramins	Virginiamycin	50	0	89	2
Tetracyclines	Tetracycline	50	6	89	3

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling - quantitative data [Dilution method]

E. faecalis		Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		50																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	32	50	0										1	6	28	15								2	256
	Kanamycin	1024	50	0												2	5	27	13	2	1				16	2048
	Streptomycin	512	50	2													2	11	31	4			2		8	1024
Amphenicols	Chloramphenicol	32	50	0									8	28	13	1									0.5	64
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	32	50	0								1	1	3	15	29	1								1	128
	Vancomycin	4	50	0								13	25	12											1	128
Ionophores	Narasin	2	50	0					3	24	19	4													0.12	16
Macrolides	Erythromycin	4	50	10							11	4	14	11	9	1									0.5	64
Oxazolidines	Linezolid	4	50	0							3	25	20	2											0.5	16
Penicillins	Ampicillin	4	50	0						1	14	35													0.25	32
Streptogramins	Virginiamycin	32	50	0									4	12	25	8	1								0.5	64
Tetracyclines	Tetracycline	2	50	6							40	4					1	5							0.5	64

Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling - quantitative data [Dilution method]

E. faecium		Cattle (bovine animals) - adult cattle over 2 years - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - selective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		89																							
Antimicrobials:		Break Point	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	32	89	0									4	9	43	29	4								2	256
	Kanamycin	1024	89	1												3	10	12	36	18	8	1	1		16	2048
	Streptomycin	128	89	1												4	17	61	6				1		8	1024
Amphenicols	Chloramphenicol	32	89	0									11	55	23										0.5	64
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	32	89	3									3	5	27	43	8			3					1	128
	Vancomycin	4	89	2								67	11	9	2										1	128
Ionophores	Narasin	4	89	1						3	56	29			1										0.12	16
Macrolides	Erythromycin	4	89	34							10	5	12	28	19	14			1						0.5	64
Oxazolidines	Linezolid	4	89	0								20	59	10											0.5	16
Penicillins	Ampicillin	4	89	0						3	16	57	13												0.25	32
Streptogramins	Virginiamycin	4	89	2							37	5	41	4	2										0.5	64
Tetracyclines	Tetracycline	2	89	3							83	3						3							0.5	64

Table Breakpoints for antibiotic resistance of Enterococcus, 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 <=
Aminoglycosides	Streptomycin		512	
	Gentamicin		32	
	Kanamycin		1024	
Amphenicols	Chloramphenicol		32	
Penicillins	Ampicillin		4	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
	Bacitracin		32	
Macrolides	Erythromycin		4	
Streptogramins	Virginiamycin		32	
Tetracyclines	Tetracycline		2	
Oxazolidines	Linezolid		4	
Ionophores	Narasin		2	

Footnote:

The breakpoint values in the table apply to E. faecalis. Values for narasin, streptomycin and virginiamycin for E. faecium are 4, 128 and 4 mg/l, respectively

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic 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 Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic in Feed

Test Method Used	Standard methods used for testing

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

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

5. FOODBORNE

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

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of

Systematic collection of information about food-borne 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 food-borne 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 groups are responsible for investigation of every suspected food and waterborne outbreak and its reporting to the Finnish Food Safety Authority Evira. Final reports are sent immediately by Evira to THL. 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 an annual report of outbreaks is published by Evira.

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 food-borne 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 2009, the municipal food control authorities notified 58 suspected or verified food and water borne outbreaks, of which 55 were associated with food and three with drinking water. The total number of outbreaks increased 29 % 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 from 2008. Most of the reported outbreaks are food-borne (95 % in 2009). 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 2009 norovirus caused 32 (58%) food borne outbreaks. The most common vehicle (84%) reported was imported contaminated frozen raspberries. Only one salmonella outbreaks (S. Bovismorbificans) were notified in 2009. The vehicle was alfalfa sprouts. One foodborne outbreak caused by Clostridium botulinum from vacuum packed hot-smoked whitefish (Coregonus lavaretus)was reported. Clostridium perfringens from different sources, mostly meat products caused four foodborne outbreaks.

In 17 (31 %) of the foodborne outbreaks the causative agent and the vehicle remained unknown in 2009 In these cases however, the investigations showed descriptive epidemiological association between eating

certain meal and becoming ill. The investigations revealed a certain food to be the vehicle in 45 (82%) outbreaks. In 2009 fresh produce (raspberries) was the most common vehicle in food borne outbreaks (30; 55%), whereas the second most common vehicle was meat and meat products (8; 15%).

A total of three outbreaks spread by drinking water were reported in 2009. All of the waterborne outbreaks were caused through drinking water contaminated with leakage of sewage.

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

In 38%, the factors causing food poisonings were connected with temperature including inadequate cooling, inadequate heating or reheating and improper storage temperature of food at restaurants and catering service in 2009. Substandard kitchen and poor hand hygiene in restaurants were suspected being the cause in 11% of the outbreaks. Infected food handler caused six norovirus outbreaks (23%) in catering service and in a bakery. In norovirus outbreaks the most common reason (81%) was contaminated frozen raspberries used without heating in restaurants, hotels, cafes, catering services, canteens, schools and households. Raw materials were altogether responsible for 30% of the foodborne outbreaks including one Salmonella outbreak from industrially processed iceberg salad and one C. botulinum outbreak from industrially processed, hot-smoked white fish delivered from Finland to France.

Evaluation of the severity and clinical picture of the human cases

Altogether 1871 persons were reported to get ill in food and water borne outbreaks in 2009. The number of patients suffering from food poisonings was about 1661 persons (89%) while about 210 persons (11%) were infected trough contaminated drinking water. About 14 persons were hospitalized, 10 (71%) of them in norovirus outbreaks and 3 (21%) in a C. botulinum –outbreak. The most severe case in the C. botulinum - outbreak rapidly developed tetraplegia and required intubation and mechanical ventilation for 17 days before gradual recovery. No deaths were reported due to food or water borne outbreaks in 2009.

Descriptions of single outbreaks of special interest

Large number of norovirus outbreaks via frozen raspberries:

During the period of March to November in 2009 a great number of norovirus outbreaks were reported in Finland. The outbreaks occurred in restaurants, hotels, cafes, canteens, day care centres, schools, catering services and households in different parts of the country. In these outbreaks more than 1 100 persons were infected. In the largest outbreak in a school more than 550 persons, mostly young children become ill. Berries were served without heating in breakfast, deserts and fine bakery products such as layer cakes. Based on the results of epidemiological, trace-back and laboratory investigations altogether 23 norovirus outbreaks were linked to frozen raspberries, the origin of which was Poland.

In all these outbreaks the berries were grown, deep-frozen and packed in Poland. Norovirus was detected and confirmed in three batches of frozen raspberries, but at least seven different batches were linked to the outbreaks. Raspberries were from two different importers and originated from different parts and different farms in Poland.

Three of the outbreaks were reported in Eurosurveillance (Maunula et al. 2009; http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19435.).

Control measures or other actions taken to improve the situation

To prevent the norovirus risk from imported frozen raspberries, a proper heating of the berries before consumption has been recommended in Finland. The Finnish Food Safety Authority Evira has issued three alerts concerning the confirmed positive batches through the Rapid Alert System for Food and Feed (RASFF) since June 2009. The confirmed and suspected positive batches of raspberries have been traced

back and withdrawn from the market. The Polish authorities, importers and the European Commission/Sanco was informed and ask to make appropriate measures to in order to avoid in the future similar outbreaks.

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 food-borne 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 organise 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 organisations (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 zoonooses. 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

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	0	0	unknown	unknown	unknown	0
Campylobacter	0	0	unknown	unknown	unknown	0
Clostridium	5	1	16	1	0	4
Escherichia coli, pathogenic	0	0	unknown	unknown	unknown	0
Foodborne viruses	34	9	174	7	0	25
Listeria	0	0	unknown	unknown	unknown	0
Other agents	0	0	unknown	unknown	unknown	0
Parasites	0	0	unknown	unknown	unknown	0
Salmonella	1	0	unknown	unknown	unknown	1
Staphylococcus	0	0	unknown	unknown	unknown	0
Unknown	18	15	94	0	0	3
Yersinia	0	0	unknown	unknown	unknown	0

Table Verified Foodborne Outbreaks: detailed data for Clostridium

C. perfringens

	Value
Code	A2009
Outbreaks	1
Human cases	5
Hospitalized	0
Deaths	0
Foodstuff implicated	Mixed or buffet meals
More Foodstuff information	burrito with minced meat
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Not relevant
Contributory factors	Inadequate chilling;Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	

C. perfringens

	Value
Code	122009
Outbreaks	1
Human cases	45
Hospitalized	0
Deaths	0
Foodstuff implicated	Bovine meat and products thereof
More Foodstuff information	beef stroganoff
Type of evidence	Analytical epidemiological evidence;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Household, domestic kitchen
Origin of foodstuff	Not relevant
Contributory factors	Inadequate chilling;Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	Bacillus; B. cereus
Comment	

C. perfringens

	Value
Code	372009
Outbreaks	1
Human cases	25
Hospitalized	0
Deaths	0
Foodstuff implicated	Broiler meat (Gallus gallus) and products thereof
More Foodstuff information	chicken curry
Type of evidence	Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Not relevant
Contributory factors	Inadequate chilling;Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	

C. botulinum

	Value
Code	762009
Outbreaks	1
Human cases	3
Hospitalized	3
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff information	cold smoked white fish
Type of evidence	Laboratory detection in human cases
Outbreak type	Household
Setting	Household
Place of origin of problem	Household, domestic kitchen
Origin of foodstuff	Domestic
Contributory factors	Storage time/temperature abuse
Other Agent (Mixed Outbreaks)	
Comment	The C. botulinum outbreak has been reported in Eurosurveillance: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19394 Classificy as verified outbreak is based on laboratory detection in human cases, strong descriptive epidemiological evidence with contributory factors. The oubreak should consider verified, even without analytical epidemiological evidence.

Table Verified Foodborne Outbreaks: detailed data for Foodborne viruses

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	622010
Outbreaks	1
Human cases	52
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	raw, chopped onion in salad
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Other setting
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Not relevant
Contributory factors	Infected food handler
Other Agent (Mixed Outbreaks)	
Comment	

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	042010
Outbreaks	1
Human cases	77
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	lettuce
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Farm (primary production)
Origin of foodstuff	unknown
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	712020
Outbreaks	1
Human cases	128
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	822010
Outbreaks	1
Human cases	21
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Other setting
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	272010
Outbreaks	1
Human cases	5
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cake)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	812010
Outbreaks	1
Human cases	13
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in
Outbreak type	General
Setting	Other setting
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	212010
Outbreaks	1
Human cases	525
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (mixed in curd cheese as a snack)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	602010
Outbreaks	1
Human cases	74
Hospitalized	0
Deaths	0
Foodstuff implicated	Tap water, including well water
More Foodstuff information	untreated well water
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Household
Place of origin of problem	Water source
Origin of foodstuff	Not relevant
Contributory factors	Water treatment failure
Other Agent (Mixed Outbreaks)	
Comment	

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	672010
Outbreaks	1
Human cases	11
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	792010
Outbreaks	1
Human cases	20
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries
Type of evidence	Analytical epidemiological evidence;Laboratory detection in implicated food
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	472010
Outbreaks	1
Human cases	30
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries(mixed in curd cheese)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Other setting
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	462010
Outbreaks	1
Human cases	22
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in implicated food
Outbreak type	General
Setting	Hospital or medical care facility
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	942010
Outbreaks	1
Human cases	117
Hospitalized	0
Deaths	0
Foodstuff implicated	Tap water, including well water
More Foodstuff information	waste water leakage
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases;Laboratory detection in implicated food
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Water distribution system
Origin of foodstuff	Not relevant
Contributory factors	Water treatment failure
Other Agent (Mixed Outbreaks)	Staphylococcus; S. aureus
Comment	

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	702010
Outbreaks	1
Human cases	13
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	raspberry (mixed in curd cheese)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	852010
Outbreaks	1
Human cases	8
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	412010
Outbreaks	1
Human cases	50
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	502010
Outbreaks	1
Human cases	11
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries or strawberries
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	532010
Outbreaks	1
Human cases	32
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in dessert sauce)
Type of evidence	Analytical epidemiological evidence;Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	512010
Outbreaks	1
Human cases	10
Hospitalized	1
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	832010
Outbreaks	1
Human cases	10
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	422010
Outbreaks	1
Human cases	65
Hospitalized	2
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries (in layer cakes)
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	842010
Outbreaks	1
Human cases	40
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	562010
Outbreaks	1
Human cases	12
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries
Type of evidence	Analytical epidemiological evidence;Laboratory detection in human cases
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	902010
Outbreaks	1
Human cases	11
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries(mixed in curd cheese)
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Calicivirus - norovirus (Norwalk-like virus)

	Value
Code	802010
Outbreaks	1
Human cases	56
Hospitalized	0
Deaths	0
Foodstuff implicated	Fruit, berries and juices and other products thereof
More Foodstuff information	frozen raspberries(mixed in curd cheese)
Type of evidence	Analytical epidemiological evidence;Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	raspberries originated from Poland

Table Verified Foodborne Outbreaks: detailed data for Salmonella

S. Bovismorbificans

	Value
Code	K2009
Outbreaks	1
Human cases	28
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	raw alfalfa sprouts
Type of evidence	Analytical epidemiological evidence;Laboratory characterization of food and human isolates;Laboratory detection in human cases;Laboratory detection in
Outbreak type	General
Setting	Other setting
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Other Agent (Mixed Outbreaks)	
Comment	

Table Verified Foodborne Outbreaks: detailed data for Unknown

Unknown

	Value
Code	52009
Outbreaks	1
Human cases	18
Hospitalized	0
Deaths	0
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff information	raw, grated beetroot
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Canteen or workplace catering
Place of origin of problem	unknown
Origin of foodstuff	Domestic
Contributory factors	Unknown
Other Agent (Mixed Outbreaks)	
Comment	

Unknown

	Value
Code	442009
Outbreaks	1
Human cases	28
Hospitalized	0
Deaths	0
Foodstuff implicated	Mixed or buffet meals
More Foodstuff information	fried chicken or raw lettuce
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	unknown
Origin of foodstuff	unknown
Contributory factors	Unknown
Other Agent (Mixed Outbreaks)	
Comment	

Unknown

	Value
Code	752009
Outbreaks	1
Human cases	32
Hospitalized	0
Deaths	0
Foodstuff implicated	Cereal products including rice and seeds/pulses (nuts, almonds)
More Foodstuff information	hot barley cereal/barley porridge
Type of evidence	Analytical epidemiological evidence
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	unknown
Origin of foodstuff	Domestic
Contributory factors	Unknown
Other Agent (Mixed Outbreaks)	
Comment	