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 2013

# INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Finland

Reporting Year: 2013

| 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 |
| 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 2013 .

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

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

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

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

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

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# 1. ANIMAL POPULATIONS

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

# A. Information on susceptible animal population

## Sources of information

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

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

Data on holdings and live animals:
Final data, situation as of 1 May 2013 (cattle, sheep, goats), 1 April (pigs, poultry).

Data on reindeers:
Final data, 2012/2013, reindeer herding year: 1 June-31 May.

Data on slaughtered animals: All animals slaughtered in 2013.

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

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

Ducks and geese are included in the other poultry in Finland in 2013 and due to this they could not be separeted from other poultry species in that category.

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

The number of bovine animals in 2013 was 911 657. During the last ten years there is a decrease of 9%. Main part of the decrease comes from the number of dairy cows. Number of farms having bovine animals has decreased more, 45%. In 2003 there were 41 bovine animals per farm and ten years later number was 68, so there is very large increase in the number of animals per farm.

Number of pigs has been at the level 1.3 million during last ten years. However, number of pigs per farm has doubled. In 2003 there were 379 pigs per farm and ten years later number was 794.

Number of poultry has been at the level 10 million during last ten years and in 2013 it was near 12 million. Number of animals per farm has doubled during last ten years and it was in average 10 thousands per farm in 2013.

Number of sheep in total is increasing. Number of sheep in 2013 was 135 546 and number of animals per farm was 94.

## 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. Main areas for animal production are southern and western parts of the country. Sheep farms are common also in the northern Finland.

## Table Susceptible animal populations

* Only if different than current reporting year

| | | Number of herds or flocks | | Number of slaughtered animals | | Livestock numbers (live animals) | | Number of holdings | |
|---|---|---|---|---|---|---|---|---|---|
| Animal species | Category of animals | Data | Year* | Data | Year* | Data | Year* | Data | Year* |
| Cattle (bovine animals) | meat production animals | | | | | 122427 | | 6167 | |
| | dairy cows and heifers | | | | | 412001 | | 9916 | |
| | calves (under 1 year) | | | | | 299947 | | 12750 | |
| | mixed herds | | | | | 77282 | | 2752 | |
| | - in total | | | 265696 | | 911657 | | 13414 | |
| Deer | farmed - in total | | | 21 | | | | 13 | |
| Ducks | - in total | | | 12596 | | | | | |
| Gallus gallus (fowl) | parent breeding flocks, unspecified - in total | | | 543964 | | 542597 | | 309 | |
| | laying hens | | | 32429 | | 4289741 | | 977 | |
| | broilers | | | 63355407 | | 6861148 | | 135 | |
| | - in total | | | 63931800 | | 11706217 | | 1170 | |
| Geese | - in total | | | 4191 | | | | | |
| Goats | - in total | | | | | 6796 | | 837 | |

## 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* |
| Pigs | breeding animals | | | 46425 | | 127204 | | 902 | |
| | fattening pigs | | | 2115941 | | 1173181 | | 1594 | |
| | - in total | | | 2162366 | | 1300385 | | 1637 | |
| Reindeers | farmed - in total | | | 55595 | | 191599 | | 4532 | |
| Sheep | - in total | | | 44178 | | 135546 | | 1439 | |
| Solipeds, domestic | horses - in total | | | 1921 | | 75000 | | 16000 | |
| Turkeys | - in total | | | 805188 | | 274338 | | 60 | |
| Wild boars | farmed - in total | | | 350 | | | | | |
| Other poultry | - Unknown [1)] | | | | | 12731 | | 131 | |

Comments:

[1)] including ducks, geese, pheasants, mallards etc.

# 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

## 2.1.2 Salmonella in foodstuffs

### A. Salmonella spp. in broiler meat and products thereof

#### Monitoring system

##### Sampling strategy

At slaughterhouse and cutting plant

At slaughterhouses: carcases are sampled according to the requirements of the Regulation 2073/2005. Cutting plants not connected to the slaughterhouses: meat batches are sampled according to the requirements of the Regulation 2073/2005.

At meat processing plant

Minced meat, meat peparations and meat products; according to the Regulation 2073/2005

##### Frequency of the sampling

At slaughterhouse and cutting plant

At slaughterhouses: at least one sampling session (neck skin of 15 birds) much be carried out each week. Small slaughterhouses (less than 150 000 birds slaughtered annually) may reduce sampling frequency.
At cutting plants: according to the Regulation 2073/2005.

At meat processing plant

Minced meat, meat peparations and meat products; according to the Regulation 2073/2005

##### Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse; neck skin
At cutting plant: fresh meat

At meat processing plant

According to the Regulation 2073/2005

##### Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: neck skins from 15 poultry carcases are sampled at random during each sampling session. A piece of approximately 10 g from neck skin shall be obtained from each poultry carcase. The neck skin samples from three poultry carcases from the same flock of origin shall be pooled before examination in order to form 5 x 25 g final samples.
At cutting plants: five samples of at least 25 g of the same batch are be collected and analysed separately.

At meat processing plant

According to the Regulation 2073/2005

##### Definition of positive finding

At slaughterhouse and cutting plant

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

At meat processing plant

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

### Diagnostic/analytical methods used

#### At slaughterhouse and cutting plant

Bacteriological method: ISO 6579:2002 or NMKL No 71:1999 or NMKL No 187/2007

## 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.

### Recent actions taken to control the zoonoses

In 2012, the sampling system at slaughterhouses and cutting plants was totally amended. Before 2012, the sampling was not compulsory at the slaughterhouses, and at the cutting plants samples taken were single crushed meat samples instead of batch based sampling. The reason for this amendment was the amendment of the Regulation 2073/2005. Earlier the Salmonella criterion for broiler meat was a process hygiene criterion, and crushed meat sampling at the cutting plants was assesed to be equivalent to the sampling of neck skin samples at the slaughterhouses. When a food safety criterion based on neck skin samples was introduced, the sampling of crushed meat was not any more cosidered to be equivalent.
In 2012, also the data collection from the samplings by food business operators of batches of minced meat and meat preparation started at the central level.

## Measures in case of the positive findings or single cases

The positive batch is rejected/withdrawn from the market. In addition, after a positive salmonella result increased sampling is carried out in the establishment. The origin of contamination must be traced back, if possible. Effective cleaning and disinfection of the premises and equipment. The measures are the same for all Salmonella serovars.

## 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

Salmonella spp. was not detected in domestic broiler meat in 2013.

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

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

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

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

## B. 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 carried out 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 chilling. 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 or NMKL No 187/2007

### 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

Salmonella spp. was not detected in carcass swab samples (6330 samples) or cutting plant samples (1438) in 2013.

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

Salmonella situation in Finnish pig meat is very favourable.

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

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

## C. 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 carried out 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 chilling. 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 or NMKL N:o 187:2007

### 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

Salmonella spp. was not detected in carcass swab samples (3175 samples) or cutting plant samples (1664) in 2013.

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

Salmonella situation in domestic bovine meat is very favourable.

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

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

## D. Salmonella spp. in turkey meat and products thereof

### Monitoring system

#### Sampling strategy

At slaughterhouse and cutting plant

At slaughterhouses: carcases are sampled according to the requirements of the Regulation 2073/2005. Cutting plants not connected to the slaughterhouses: meat batches are sampled according to the requirements of the Regulation 2073/2005.

At meat processing plant

Minced meat, meat peparations and meat products; according to the Regulation 2073/2005

#### Frequency of the sampling

At slaughterhouse and cutting plant

At slaughterhouses: at least one sampling session (neck skin of 15 birds) much be carried out each week. Small slaughterhouses (less than 150 000 birds slaughtered annually) may reduce sampling frequency.
At cutting plants: according to the Regulation 2073/2005.

At meat processing plant

Minced meat, meat peparations and meat products; according to the Regulation 2073/2005

#### Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse; neck skin
At cutting plant: fresh meat

#### Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: neck skins from 15 poultry carcases are sampled at random during each sampling session. A piece of approximately 10 g from neck skin shall be obtained from each poultry carcase. The neck skin samples from three poultry carcases from the same flock of origin shall be pooled before examination in order to form 5 x 25 g final samples.
At cutting plants: five samples of at least 25 g of the same batch are be collected and analysed separately.

#### Definition of positive finding

At slaughterhouse and cutting plant

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

At meat processing plant

Batch 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 or NMKL No 187/2007

### 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.

### Recent actions taken to control the zoonoses

In 2012, the sampling system at slaughterhouses and cutting plants was totally amended. Before 2012, the sampling was not compulsory at the slaughterhouses, and at the cutting plants samples taken were single crushed meat samples instead of batch based sampling. The reason for this amendment was the amendment of the Regulation 2073/2005. Earlier the Salmonella criterion for turkey meat was a process hygiene criterion, and crushed meat sampling at the cutting plants was assesed to be equivalent to the sampling of neck skin samples at the slaughterhouses. When a food safety criterion based on neck skin samples was introduced, the sampling of crushed meat was not any more cosidered to be equivalent.
In 2012, also the data collection from the samplings by food business operators of batches of minced meat and meat preparation started at the central level.

## Measures in case of the positive findings or single cases

The positive batch is rejected/withdrawn from the market. In addition, after a positive salmonella result increased sampling is carried out in the establishment. The origin of contamination must be traced back, if possible. Effective cleaning and disinfection of the premises and equipment. The measures are the same for all Salmonella serovars.

## 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

Salmonella spp. was not detected in domestic turkey meat in 2013.

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

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

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

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

## Table Salmonella in poultry meat and products thereof

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - Processing plant - Surveillance [1)] | Evira | Unspecified | HACCP and own checks | food sample > meat | Domestic | Batch | 25 Gram | 53 | 0 | | |
| Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - Processing plant - Surveillance [2)] | Evira | Unspecified | HACCP and own checks | food sample > meat | Domestic | Batch | 25 Gram | 48 | 0 | | |
| Meat from turkey - fresh - Processing plant - Surveillance [3)] | Evira | Unspecified | HACCP and own checks | food sample > meat | Domestic | Batch | 25 Gram | 12 | 0 | | |
| Meat from broilers (Gallus gallus) - carcase - Slaughterhouse - Control and eradication programmes [4)] | Evira | Objective sampling | Industry sampling | food sample > neck skin | Domestic | Batch | 25 Gram | 222 | 0 | | |
| Meat from turkey - carcase - Slaughterhouse - Control and eradication programmes [5)] | Evira | Objective sampling | Industry sampling | food sample > neck skin | Domestic | Batch | 25 Gram | 79 | 0 | | |
| Meat from turkey - meat preparation - intended to be eaten cooked - Processing plant - Surveillance [6)] | Evira | Unspecified | HACCP and own checks | food sample > meat | Domestic | Batch | 25 Gram | 27 | 0 | | |
| Meat from turkey - minced meat - intended to be eaten cooked - Processing plant - Surveillance [7)] | Evira | Unspecified | HACCP and own checks | food sample > meat | Domestic | Batch | 25 Gram | 40 | 0 | | |

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified |
|---|---|---|
| Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - Processing plant - Surveillance [1)] | | |

## Table Salmonella in poultry meat and products thereof

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified |
|---|---|---|
| Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - Processing plant - Surveillance [2)] | | |
| Meat from turkey - fresh - Processing plant - Surveillance [3)] | | |
| Meat from broilers (Gallus gallus) - carcase - Slaughterhouse - Control and eradication programmes [4)] | | |
| Meat from turkey - carcase - Slaughterhouse - Control and eradication programmes [5)] | | |
| Meat from turkey - meat preparation - intended to be eaten cooked - Processing plant - Surveillance [6)] | | |
| Meat from turkey - minced meat - intended to be eaten cooked - Processing plant - Surveillance [7)] | | |

Comments:

[1)] One sample consists of 5 x 25 g sample units.

[2)] One sample consists of 5 x 25 g sample units.

[3)] One sample consists of 5 x 25 g sample units.

[4)] One sample consists of 5 x 25 g sample units. Sample units are taken from 15 birds (10 g each).

[5)] One sample consists of 5 x 25 g sample units. Sample units are taken from 15 birds (10 g each).

[6)] One sample consists of 5 x 25 g sample units.

[7)] One sample consists of 5 x 25 g sample units.

Table Salmonella in poultry meat and products thereof

## Table Salmonella in red meat and products thereof

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Meat from bovine animals - carcase - Slaughterhouse - Control and eradication programmes | Evira | Objective sampling | Industry sampling | food sample > carcase swabs | Domestic | Single | 1400 Square centimetre | 3175 | 0 | | |
| Meat from bovine animals - fresh - Cutting plant - Control and eradication programmes | Evira | Objective sampling | Industry sampling | food sample > meat | Domestic | Single | 25 Gram | 1664 | 0 | | |
| Meat from pig - carcase - Slaughterhouse - Control and eradication programmes | Evira | Objective sampling | Industry sampling | food sample > carcase swabs | Domestic | Single | 1400 Square centimetre | 6330 | 0 | | |
| Meat from pig - fresh - Cutting plant - Control and eradication programmes | Evira | Objective sampling | Industry sampling | food sample > meat | Domestic | Single | 25 Gram | 1396 | 0 | | |

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified |
|---|---|---|
| Meat from bovine animals - carcase - Slaughterhouse - Control and eradication programmes | | |
| Meat from bovine animals - fresh - Cutting plant - Control and eradication programmes | | |
| Meat from pig - carcase - Slaughterhouse - Control and eradication programmes | | |
| Meat from pig - fresh - Cutting plant - Control and eradication programmes | | |

Table Salmonella in red meat and products thereof

## 2.1.3 Salmonella in animals

### A. Salmonella spp. in Gallus Gallus - breeding flocks

#### Monitoring system

##### Sampling strategy

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

The Finnish Salmonella Control Programme:

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

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

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

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

##### Frequency of the sampling

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

Every flock is sampled

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

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

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

Egg production line: Every flock is sampled at the holding every third week
Broiler production line: Every flock is sampled at the holding every second week

##### Type of specimen taken

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

Internal linings of delivery boxes

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

Socks/ boot swabs

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

socks/boot swabs and dust sample

##### Methods of sampling (description of sampling techniques)

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

Internal linings are collected from ten delivery boxes. Five papers are pooled together. If papers are not

used swab samples from ten delivery boxes are taken. Five swab samples are pooled together.

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

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

Breeding flocks: Production period

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

#### Case definition

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

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

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

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

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

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

#### Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

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

Bacteriological method: 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.

### 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 in the beginning of the year 2010 for adult flocks of broiler production line and in 2012 for adult flocks of egg production line. Earlier the adult breeding flocks were sampled at the hatcheries, now at the holdings. The sampling method at the holdings is amended. One pair of socks/boot swabs and one swab dust sample are taken instead of five pairs of socks/boot swabs.

### Measures in case of the positive findings or single cases

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

Positive 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. The measures are the same for all Salmonella serovars.

### Notification system in place

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

### Results of the investigation

Salmonella was not detected in Gallus gallus breeding flocks in broiler production line.
One parent flock was positive (S. Typhimurium) in egg production line.

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

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

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

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

## B. Salmonella spp. in Gallus Gallus - broiler flocks

### Monitoring system

#### Sampling strategy

Broiler flocks

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

#### Frequency of the sampling

Broiler flocks: Before slaughter at farm

Within three weeks before slaughter

#### Type of specimen taken

Broiler flocks: Before slaughter at farm

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

#### Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

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

#### Case definition

Broiler flocks: Before slaughter at farm

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

#### Diagnostic/analytical methods used

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002/Amd 1:2007

### Vaccination policy

#### Broiler flocks

Vaccination against Salmonella is not allowed in Finland.

### Other preventive measures than vaccination in place

#### Broiler flocks

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

### Control program/mechanisms

#### The control program/strategies in place

Broiler flocks

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

### Recent actions taken to control the zoonoses

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

## Measures in case of the positive findings or single cases

### Broiler flocks: Before slaughter at farm

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

## Notification system in place

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

## Results of the investigation

Salmonella was detected in one broiler flock in 2013 (S. Livingstone).

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

Salmonella situation has been very favourable in broiler flocks for years.

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

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

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

### Monitoring system

#### Sampling strategy

##### Laying hens flocks

The Finnish Salmonella Control Programme:
Day-old chicks are sampled at the holding after arrived by the food business operator.
Rearing flocks are sampled at the holding two weeks before laying period by the food business operator.
Production flocks are sampled at the holdings every 15 weeks by the food business operator.
Sampling is carried out by the official veterinarian once a year at each rearing and laying holding.
In addition, the flock is sampled by the official veterinarian every time when there is a reason to suspect that the flock is positive for Salmonella spp.
There are spesific national rules also for farms which deliver only small amount of eggs directly to the final consumers. At these farms, the flocks are sampled twice a year by the operator and every second year by the official veterinarian.

#### Frequency of the sampling

##### Laying hens: Day-old chicks

Every flock is sampled

##### Laying hens: Rearing period

Every flock is sampled two weeks before laying period

##### Laying hens: Production period

Every 15 weeks

#### Type of specimen taken

##### Laying hens: Day-old chicks

Internal linings of delivery boxes

##### Laying hens: Rearing period

faeces or sock samples / boot swabs

##### Laying hens: Production period

feaces or sock samples / boot swabs, dust

#### Methods of sampling (description of sampling techniques)

##### Laying hens: Day-old chicks

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

Laying hens: Rearing period

Bacteriological method: ISO 6579:2002/Amd 1:2007

Laying hens: Production period

Bacteriological method: ISO 6579:2002/Amd 1:2007

## Vaccination policy

### Laying hens flocks

Vaccination against Salmonella is not allowed in Finland.

## Other preventive measures than vaccination in place

### Laying hens flocks

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

## Control program/mechanisms

### The control program/strategies in place

Laying hens flocks

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

## Measures in case of the positive findings or single cases

### Laying hens flocks

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

## Notification system in place

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

## Results of the investigation

Salmonella was not detected in flocks of adult laying hens.
Three rearing flocks were positive (S. Typhimurium). The source of infection for these flocks was the same parent flock.
In addition S. Typhmimurium was detected in one backyard holding delivering eggs only directly to the final consumers.

### 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. Usually 0-3 positive flocks have been detected yearly. S. Typhimurium has been the most common serovar.

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

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

## D. Salmonella spp. in bovine animals

### Monitoring system

#### Sampling strategy

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

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

Routine sampling: faeces
Suspect sampling and sampling before restrictions are lifted: faeces and environmental swab samples

Animals at slaughter (herd based approach)

Lymph nodes

#### Methods of sampling (description of sampling techniques)

Animals at farm

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

Sampling of suspected herds:
Faecal sampling is carried out as described above. In addition, 5-50 environmental swab samples are taken from different areas of the premises.
If there is a suspicion that feedstuffs are contaminated with Salmonella swab samples are also taken from the feed systems.

Sampling of salmonella positive herds for lifting the restrictions:
A faecal sample is collected from each animal. Maximum of 20 samples may be pooled together. In addition, 10-100 environmental swab samples are taken from different areas of the premises.

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

Herd is positive if Salmonella spp. has been isolated from one or more feacal or environmental samples.

##### 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

Bacteriological method: ISO 6579:2002/Amd 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.

### Other preventive measures than vaccination in place

Biosecurity and production hygiene measures at holdings. Salmonella control of feedstuffs.

### 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.

#### Recent actions taken to control the zoonoses

National Decree on Salmonella control of cattle was amended in 2011. The sensitivity was improved in samplings of suspected herds and of positive herds before restrictions are lifted. The number of feacal samples was increased and environmental samples were added to the sampling protocol.

### Measures in case of the positive findings or single cases

At slaughterhouse: If a positive lymh node sample is detected in the slaughterhouse, the herd of origin is sampled by the official veterinarian.
At farm: Official restrictions: no trade of live animals except to slaughterhouse (meat is heat treated), milk is allowed to deliver only to an approved establishment for pasteurization. Sanitation and eradication is carried out according to the holding spesific plan. Restrictions are lifted after herd has been negative in two consecutive sampling sessions with interval of 3-4 weeks. Epidemiological investigation is carried out by the official veterinarian. Contact herds are sampled. Feedingstuffs are analysed for Salmonella.

### Notification system in place

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

### Results of the investigation

Lymph node sampling at slaughterhouses: two animals were positive (0,06 %) (S. Typhimurium)
Herds: salmonella was detected in eight herds (6 x S. Typhimurium, 2 x S. Enteritidis)

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

Salmonella situation in cattle has been favourable for years.

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

source of infection)

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

# E. Salmonella spp. in pigs

## Monitoring system

### Sampling strategy

#### Breeding herds

The Finnish Salmonella Control Programme:
- All nucleus and multiplier herds are sampled at the holding once a year by the operators.
- Together 3000 sows are sampled each year randomly from the sow population at the slaughterhouses. Sampling is carried out by the food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at the holding by the official veterinarian.
- After a Salmonella finding herds are sampled several times by the operator during the sanitation and eradication process and at least twice by the official veterinarian before the restrictions are lifted.

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

#### Multiplying herds

#### Fattening herds

The Finnish Salmonella Control Programme:
- Together 3000 fattening pigs are sampled each year randomly from the population at the slaughterhouses. Sampling is carried out by the food business operator under supervision of the official veterinarian.
- Suspected herds (clinical symptoms or positive finding at slaughterhouse or other suspicion) are sampled at the holding by the official veterinarian.
- After a Salmonella finding herds are sampled several times by the operator during the sanitation and eradication process and at least twice by the official veterinarian before the restrictions are lifted.

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

### Frequency of the sampling

#### Breeding herds

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

#### Fattening herds at slaughterhouse (herd based approach)

Sampling distributed evenly throughout the year

### Type of specimen taken

#### Breeding herds

At holding: Routine sampling: faeces
Suspect sampling and sampling before restrictions are lifted: faeces and environmental swab samples
At slaughterhouse: lymph nodes

Fattening herds at farm

Faeces and environmental swab samples

Fattening herds at slaughterhouse (herd based approach)

Lymph nodes

## Methods of sampling (description of sampling techniques)

Breeding herds

At holding:
Routine sampling of nucleus and multiplier herds:
Sows: One composite sample is taken from every 100 sows or part of 100 sows. However, the maximun number of composite samples is ten. Samples are preferably taken from sows with piglets. Faecal samples of maximum of 20 animals may be pooled to one composite sample.
Growers, young breeding animals or weaned piglets (if present): Two faecal samples are taken from a group of 10-15 animals. Maximum of 20 samples may be pooled to one composite sample. The number of composite samples is dependent on the number of sows at the holding. Maximun number of composite samples is 15.

Suspected herds:
Adult animals: Feacal sample is taken from every second sow with piglets. From other adult animals one composite sample is taken from every 100 animals or part of 100 animals. Faecal samples of maximum of 20 animals may be pooled to one composite sample.
Young animals: Two faecal samples are taken from each group of 10-15 animals. Maximum of 20 samples may be pooled.
In addition, 5-50 environmental swab samples are taken from different areas of the premises.
If there is a suspicion that feedstuffs are contaminated with Salmonella swab samples are also taken from the feed systems.

Sampling of salmonella positive herds for lifting the restrictions:
Adult animals: Feacal sample is collected from every animal. Maximum of 20 samples may be pooled.
Young animals: Two faecal samples are collected from each group of 10-15 animals. Maximum of 20 samples may be pooled.
In addition, 10-100 environmental swab samples are taken from different areas of the premises.

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:
One faecal sample is collected from each group of 10-15 animals. Maximum of 20 samples may be pooled. In addition, 5-50 environmental swab samples are taken from different areas of the premises.
If there is a suspicion that feedstuffs are contaminated with Salmonella swab samples are also taken from the feed systems.

Sampling of salmonella positive herds for releasing the restrictions:
Two faecal samples are collected from each group of 10-15 animals. Maximum of 20 samples may be pooled. In addition, 10-100 environmental swab samples are taken from different areas of the premises.

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 Salmonella spp. has been isolated from one or more feacal or environmental samples.

### Fattening herds at farm

Herd is positive if Salmonella spp. has been isolated from one or more feacal or environmental samples.

### 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

Bacteriological method: ISO 6579:2002/Amd 1:2007

### Fattening herds at farm

Bacteriological method: ISO 6579:2002/Amd 1:2007

### Fattening herds at slaughterhouse (herd based approach)

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

## Vaccination policy

### Breeding herds

Vaccination against salmonella is not allowed in Finland.

### Fattening herds

Vaccination against salmonella is not allowed in Finland.

## Other preventive measures than vaccination in place

### Breeding herds

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

### Fattening herds

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

## Control program/mechanisms

### The control program/strategies in place

Breeding herds

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

Fattening herds

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

### Recent actions taken to control the zoonoses

National Decree on Salmonella control of pigs was amended in 2011. The sensitivity was improved in samplings of suspected herds and of positive herds before restrictions are lifted. The number of feacal samples was increased and environmental samples were added to the sampling protocol.

## Measures in case of the positive findings or single cases

At slaughterhouse: If a positive lymh node sample is detected in the slaughterhouse, the herd of origin is sampled by the official veterinarian.
At farm: Official restrictions: no trade of live animals except to slaughterhouse (meat is heat treated). Sanitation and eradication is carried out according to the holding spesific plan. Restrictions are released after herd has been negative in two consecutive sampling sessions with 3-4 weeks intervals. Epidemiological investigation is carried out by the official veterinarian. Contact herds are sampled. Feedingstuffs are analysed for Salmonella.

## Notification system in place

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

## Results of the investigation

Lymph node sampling at slaughterhouses: three breeding animals (0,10 %) and one fattening pig (0,03 %) were positive. The serovar was S. Typhimurium in all cases.
Herds: Salmonella was detected in one herd (S. Mbandaka).

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

Salmonella situation in pigs has been very favourable for years.

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

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

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

### Monitoring system

#### Sampling strategy

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

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

Meat production flocks

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

#### Frequency of the sampling

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

Every flock is sampled

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

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

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

Every flock is sampled at the holding every second week.

Meat production flocks: Before slaughter at farm

Every flock is sampled within three weeks before salughter

#### Type of specimen taken

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

Internal linings of delivery boxes

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

Socks/ boot swabs

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

One pair of socks/boot swabs and one dust sample

Meat production flocks: Before slaughter at farm

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

#### Methods of sampling (description of sampling techniques)

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

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

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

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

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

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

Meat production flocks: Before slaughter at farm

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

### Case definition

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

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

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

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

Meat production flocks: Before slaughter at farm

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

### Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

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

Bacteriological method: ISO 6579:2002/Amd 1:2007

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002/Amd 1:2007

## Vaccination policy

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

Vaccination against salmonella is not allowed in Finland.

### Meat production flocks

Vaccination against salmonella is not allowed in Finland.

## Other preventive measures than vaccination in place

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

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

### Meat production flocks

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

## Control program/mechanisms

### The control program/strategies in place

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

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

#### Meat production flocks

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

### Recent actions taken to control the zoonoses

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

## Measures in case of the positive findings or single cases

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

## Notification system in place

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

## Results of the investigation

Salmonella spp. was not detected in breeding flocks of turkeys.
Two meat production flocks from the same holding were positive for Salmonella (S. Typhmiurium).

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

Salmonella situation in turkey flocks has been favourable for years.

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

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

## Table Salmonella in breeding flocks of Gallus gallus

| | No of flocks under control programme | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Target Verification | Sampling unit | Units tested | Total units positive for Salmonella | S. Enteritidis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult - Farm - Control and eradication programmes | 10 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 10 | 0 | |
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | | | herd/flock | 3 | 0 | |
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 4 | 0 | |
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult - Farm - Control and eradication programmes | 2 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 2 | 0 | |
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | | | herd/flock | 1 | 0 | |
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 1 | 0 | |
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - Farm - Control and eradication programmes | 138 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 138 | 0 | |
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | | | herd/flock | 67 | 0 | |

## Table Salmonella in breeding flocks of Gallus gallus

| | No of flocks under control programme | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Target Verification | Sampling unit | Units tested | Total units positive for Salmonella | S. Enteritidis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 76 | 0 | |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - Farm - Control and eradication programmes | 23 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 23 | 1 | |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | | | herd/flock | 8 | 0 | |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 8 | 0 | |

| | S. Hadar | S. Infantis | S. Typhimurium | S. Virchow | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Typhimurium - DT 41 |
|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - adult - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - day-old chicks - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - grandparent breeding flocks for broiler production line - during rearing period - Farm - Control and eradication programmes | | | | | | | |

## Table Salmonella in breeding flocks of Gallus gallus

| | S. Hadar | S. Infantis | S. Typhimurium | S. Virchow | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Typhimurium - DT 41 |
|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - day-old chicks - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - grandparent breeding flocks for egg production line - during rearing period - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - Farm - Control and eradication programmes | | | | | | | 1 |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - Farm - Control and eradication programmes | | | | | | | |
| Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - Farm - Control and eradication programmes | | | | | | | |

Table Salmonella in breeding flocks of Gallus gallus

## Table Salmonella in other animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium | S. 1,4,[5],12:i:- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - breeding bulls - Farm - Control and eradication programmes (Herds of origin of AI-bulls) | Evira | Census | Industry sampling | animal sample > faeces | Domestic | herd/flock | 122 | 0 | | | |
| Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | Evira | Suspect sampling | Official sampling | | Domestic | herd/flock | 43 | 8 | | | |
| Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes | Evira | Objective sampling | Industry sampling | animal sample > lymph nodes | Domestic | Animal | 3143 | 2 | | | |
| Pigs - breeding animals - Farm - Control and eradication programmes (Nucleus and multiplier herds) | Evira | Census | Industry sampling | animal sample > faeces | Domestic | herd/flock | 64 | 0 | | | |
| Pigs - breeding animals - Slaughterhouse - Control and eradication programmes | Evira | Objective sampling | Industry sampling | animal sample > lymph nodes | Domestic | Animal | 3142 | 3 | | | |
| Pigs - fattening pigs - Slaughterhouse - Control and eradication programmes | Evira | Objective sampling | Industry sampling | animal sample > lymph nodes | Domestic | Animal | 3134 | 1 | | | |
| Pigs - unspecified - Farm - Control and eradication programmes | Evira | Suspect sampling | Official sampling | | Domestic | herd/flock | 54 | 1 | | | |
| Pigs - unspecified - Farm - Monitoring (Breeding herds (other than nucleus and multiplier), mixed herds, fattening pig herds) | Evira, Sikava | Unspecified | Industry sampling | animal sample > faeces | Domestic | herd/flock | 55 | 0 | | | |

## Table Salmonella in other animals

| | Salmonella spp., unspecified | S. Enteritidis - 4 | S. Enteritidis - 8 | S. Mbandaka | S. Typhimurium - DT 1 | S. Typhimurium - DT 135 | S. Typhimurium - DT 195 | S. Typhimurium - DT 41 | S. Typhimurium - RDNC | S. Typhimurium - U 277 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - breeding bulls - Farm - Control and eradication programmes (Herds of origin of AI-bulls) | | | | | | | | | | |
| Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | | 1 | 1 | | 1 | 2 | | 1 | | 2 |
| Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes | | | | | | | | 1 | | 1 |
| Pigs - breeding animals - Farm - Control and eradication programmes (Nucleus and multiplier herds) | | | | | | | | | | |
| Pigs - breeding animals - Slaughterhouse - Control and eradication programmes | | | | | 1 | | 1 | | 1 | |
| Pigs - fattening pigs - Slaughterhouse - Control and eradication programmes | | | | | | | | 1 | | |
| Pigs - unspecified - Farm - Control and eradication programmes | | | | 1 | | | | | | |
| Pigs - unspecified - Farm - Monitoring (Breeding herds (other than nucleus and multiplier), mixed herds, fattening pig herds) | | | | | | | | | | |

## Table Salmonella in other poultry

| | No of flocks under control programme | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Target Verification | Sampling unit | Units tested | Total units positive for Salmonella | S. Enteritidis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - laying hens - adult - Farm - Control and eradication programmes | 844 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 844 | 0 | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | Evira | Unspecified | Official sampling | | Domestic | | herd/flock | 524 | 0 | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | 3439 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 3439 | 1 | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | Evira | Unspecified | Industry sampling | | Domestic | | herd/flock | 2915 | 1 | |
| Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | 324 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 324 | 2 | |
| Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes (Small holdings outside the scope of Regulation 2160/2003, selling eggs only directly to final consumers.) | 31 | Evira | Unspecified | Official and industry sampling | | Domestic | no | herd/flock | 31 | 0 | |
| Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | Domestic | | herd/flock | 176 | 1 | |
| Gallus gallus (fowl) - laying hens - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 331 | 2 | |
| Turkeys - parent breeding flocks - adult - Farm - Control and eradication programmes | 8 | Evira | Census | Official and industry sampling | | Domestic | yes | herd/flock | 8 | 0 | |
| Turkeys - parent breeding flocks - day-old chicks - Farm - Control and eradication programmes | | Evira | Census | Industry sampling | | | | herd/flock | 5 | 0 | |

## Table Salmonella in other poultry

| | No of flocks under control programme | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Target Verification | Sampling unit | Units tested | Total units positive for Salmonella | S. Enteritidis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Turkeys - parent breeding flocks - during rearing period - Farm - Control and eradication programmes | | Evira | Census | Official and industry sampling | | Domestic | | herd/flock | 8 | 0 | |

| | S. Typhimurium | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Livingstone | S. Typhimurium - DT 41 | S. Typhimurium - U 277 |
|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - laying hens - adult - Farm - Control and eradication programmes | | | | | | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | | | | | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | | | 1 | | |
| Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | | | 1 | | |
| Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | | | | | | 2 |
| Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes (Small holdings outside the scope of Regulation 2160/2003, selling eggs only directly to final consumers.) | | | | | | |
| Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Control and eradication programmes | | | | | 1 | |

## Table Salmonella in other poultry

| | S. Typhimurium | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Livingstone | S. Typhimurium - DT 41 | S. Typhimurium - U 277 |
|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - laying hens - during rearing period - Farm - Control and eradication programmes | | | | | 2 | |
| Turkeys - parent breeding flocks - adult - Farm - Control and eradication programmes | | | | | | |
| Turkeys - parent breeding flocks - day-old chicks - Farm - Control and eradication programmes | | | | | | |
| Turkeys - parent breeding flocks - during rearing period - Farm - Control and eradication programmes | | | | | | |

## 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 feed industry has also accepted its responsibility for the safety 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.

Imported feed materials of plant origin are considered particularly risky in terms of Salmonella. During the last years, an average of 370 million kilograms of feed materials of plant origin - mainly soya and rapeseed meals - have been imported into Finland annually, and an average of almost 6 % of it has been found to be contaminated by Salmonella. The most common serotypes established in feed materials of plant origin have been S. Tennessee, S. Agona, S. Senftenberg and S. Mbandaka.

During the last years, Salmonella findings have been relatively rare in feed materials and compound feedingstuffs manufactured in Finland, i.e. on average in less than two samples annually. Salmonella has been found five times in feed materials of plant origin during the last ten years. In feed materials of animal origin, Salmonella was found in two samples of meat-and-bone meal in 2005 and in one sample in 2010. Compound feedingstuffs that have been salmonella-positive have been almost without exception compound feedingstuffs intended for fur animals. Salmonella has not been found in samples taken in connection 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. During the last years in samples taken from dried pig ears and from other similar products intended for dogs, an average of 4 % have been found to be contaminated by salmonella. The contaminated feed has been manufactured outside Finland.

The most common serotypes isolated from dried pig ears and other corresponding products have been S. Typhimurium, S. Derby, S. Anatum and S. Havana.

#### Additional information

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

The decree of the Ministry of Agriculture and Forestry on the pursuit of activities in the animal feed sector (No 548/2012) includes demands about sampling for salmonella testing by official control and by feed business operators. 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 cooperate with Evira when salmonella bacterium is found in feeds, feed materials or manufacturing processes.

- Import from EU or third countries:
For the official salmonella control of imported feed, samples are taken from high-risk feed of plant origin in accordance with the annual risk-based control plan of Evira. Salmonella analyses are made in Evira or in laboratories approved by Evira.

Custom is responsible for the documentary checks and to carring 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.

A feed business operator that imports high-risk feeds of plant origin from the internal market for feeding food-producing animals, fur animals or pets shall take samples of the arriving feed batches or lots in accordance with operator's risk-based sampling plan. For the official salmonella control samples of high-risk feeds of plant origin from the internal market are taken in random inspections.

- 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 strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Compound feedingstuffs for cattle - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 121 | 0 | | |
| Compound feedingstuffs for pigs - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 95 | 0 | | |
| Compound feedingstuffs for poultry (non specified) - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 61 | 0 | | |
| Compound feedingstuffs for cattle - final product - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 2 | 0 | | |
| Compound feedingstuffs for fish - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 2 | 0 | | |
| Compound feedingstuffs for fur animal - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 42 | 1 | | |
| Compound feedingstuffs for horses - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 5 | 0 | | |
| Compound feedingstuffs for horses - final product - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 4 | 0 | | |
| Compound feedingstuffs for reindeers - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Compound feedingstuffs for sheep - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 2 | 0 | | |
| Compound feedingstuffs, not specified - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 21 | 1 | | 1 |

## Table Salmonella in compound feedingstuffs

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified |
|---|---|---|
| Compound feedingstuffs for cattle - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for pigs - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for poultry (non specified) - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for cattle - final product - Retail - Surveillance | | |
| Compound feedingstuffs for fish - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for fur animal - final product - Feed mill - Surveillance | | 1 |
| Compound feedingstuffs for horses - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for horses - final product - Retail - Surveillance | | |
| Compound feedingstuffs for reindeers - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs for sheep - final product - Feed mill - Surveillance | | |
| Compound feedingstuffs, not specified - final product - Feed mill - Surveillance | | |

Table Salmonella in compound feedingstuffs

## Table Salmonella in feed material of animal origin

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Feed material of land animal origin - animal fat - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Feed material of land animal origin - dairy products - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 30 | 0 | | |
| Feed material of land animal origin - meat and bone meal - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 22 | 0 | | |
| Feed material of land animal origin - offal - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 28 | 0 | | |
| Feed material of land animal origin - offal - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 60 | 2 | | |
| Feed material of marine animal origin - other fish products - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 2 | 0 | | |
| Feed material of marine animal origin - other fish products - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 1 | 0 | | |

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Anatum | S. Derby |
|---|---|---|---|---|
| Feed material of land animal origin - animal fat - Processing plant - Surveillance | | | | |
| Feed material of land animal origin - dairy products - Processing plant - Surveillance | | | | |
| Feed material of land animal origin - meat and bone meal - Processing plant - Surveillance | | | | |

## Table Salmonella in feed material of animal origin

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Anatum | S. Derby |
|---|---|---|---|---|
| Feed material of land animal origin - offal - Processing plant - Surveillance | | | | |
| Feed material of land animal origin - offal - Retail - Surveillance | | | 1 | 1 |
| Feed material of marine animal origin - other fish products - Processing plant - Surveillance | | | | |
| Feed material of marine animal origin - other fish products - Retail - Surveillance | | | | |

## Table Salmonella in other feed matter

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Feed material of cereal grain origin - barley derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 1 | 0 | | |
| Feed material of cereal grain origin - barley derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Feed material of cereal grain origin - maize derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 3 | 0 | | |
| Feed material of cereal grain origin - other cereal grain derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 9 | 0 | | |
| Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 9 | 0 | | |
| Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 24 | 0 | | |
| Feed material of cereal grain origin - wheat derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 13 | 0 | | |
| Feed material of oil seed or fruit origin - groundnut derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 1 | 0 | | |
| Feed material of oil seed or fruit origin - linseed derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 1 | 0 | | |
| Feed material of oil seed or fruit origin - linseed derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 2 | 0 | | |

## Table Salmonella in other feed matter

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Feed material of oil seed or fruit origin - other oil seeds derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 2 | 0 | | |
| Feed material of oil seed or fruit origin - rape seed derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 21 | 1 | | |
| Feed material of oil seed or fruit origin - rape seed derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 23 | 1 | | |
| Feed material of oil seed or fruit origin - rape seed derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 23 | 0 | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 11 | 0 | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 22 | 0 | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 4 | 0 | | |
| Feed material of oil seed or fruit origin - sunflower seed derived - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 2 | 0 | | |
| Other feed material - Processing plant - Surveillance [1)] | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 15 | 0 | | |
| Other feed material - Retail - Surveillance [2)] | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 27 | 0 | | |
| Other feed material - forages and roughages - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |

## Table Salmonella in other feed matter

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Salmonella | S. Enteritidis | S. Typhimurium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Other feed material - legume seeds and similar products - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Other feed material - miscellaneous - Processing plant - Surveillance [3)] | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 7 | 0 | | |
| Other feed material - other plants - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Other feed material - tubers, roots and similar products - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Intra EU trade | Batch | 25 g | 3 | 0 | | |
| Other feed material - tubers, roots and similar products - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 23 | 0 | | |
| Other feed material - yeast - Border inspection activities - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Imported from outside EU | Batch | 25 g | 6 | 0 | | |
| Other feed material - yeast - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 1 | 0 | | |
| Pet food - dog snacks (pig ears, chewing bones) - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 12 | 0 | | |
| Pet food - final product - Processing plant - Surveillance | Evira | Selective sampling | Official sampling | feed sample | Domestic | Single | 25 g | 15 | 0 | | |
| Pet food - final product - Retail - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 99 | 0 | | |
| Premixtures - final product - Feed mill - Surveillance | Evira | Selective sampling | Official sampling | feed sample | | Single | 25 g | 1 | 0 | | |

## Table Salmonella in other feed matter

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Agona | S. Mbandaka |
|---|---|---|---|---|
| Feed material of cereal grain origin - barley derived - Border inspection activities - Surveillance | | | | |
| Feed material of cereal grain origin - barley derived - Processing plant - Surveillance | | | | |
| Feed material of cereal grain origin - maize derived - Border inspection activities - Surveillance | | | | |
| Feed material of cereal grain origin - other cereal grain derived - Processing plant - Surveillance | | | | |
| Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Border inspection activities - Surveillance | | | | |
| Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Processing plant - Surveillance | | | | |
| Feed material of cereal grain origin - wheat derived - Processing plant - Surveillance | | | | |
| Feed material of oil seed or fruit origin - groundnut derived - Border inspection activities - Surveillance | | | | |
| Feed material of oil seed or fruit origin - linseed derived - Border inspection activities - Surveillance | | | | |
| Feed material of oil seed or fruit origin - linseed derived - Processing plant - Surveillance | | | | |

## Table Salmonella in other feed matter

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Agona | S. Mbandaka |
|---|---|---|---|---|
| Feed material of oil seed or fruit origin - other oil seeds derived - Processing plant - Surveillance | | | | |
| Feed material of oil seed or fruit origin - rape seed derived - Border inspection activities - Surveillance | | | 1 | |
| Feed material of oil seed or fruit origin - rape seed derived - Border inspection activities - Surveillance | | | | 1 |
| Feed material of oil seed or fruit origin - rape seed derived - Processing plant - Surveillance | | | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Border inspection activities - Surveillance | | | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Border inspection activities - Surveillance | | | | |
| Feed material of oil seed or fruit origin - soya (bean) derived - Processing plant - Surveillance | | | | |
| Feed material of oil seed or fruit origin - sunflower seed derived - Border inspection activities - Surveillance | | | | |
| Other feed material - Processing plant - Surveillance [1)] | | | | |
| Other feed material - Retail - Surveillance [2)] | | | | |
| Other feed material - forages and roughages - Processing plant - Surveillance | | | | |

## Table Salmonella in other feed matter

| | S. 1,4,[5],12:i:- | Salmonella spp., unspecified | S. Agona | S. Mbandaka |
|---|---|---|---|---|
| Other feed material - legume seeds and similar products - Processing plant - Surveillance | | | | |
| Other feed material - miscellaneous - Processing plant - Surveillance [3)] | | | | |
| Other feed material - other plants - Processing plant - Surveillance | | | | |
| Other feed material - tubers, roots and similar products - Border inspection activities - Surveillance | | | | |
| Other feed material - tubers, roots and similar products - Processing plant - Surveillance | | | | |
| Other feed material - yeast - Border inspection activities - Surveillance | | | | |
| Other feed material - yeast - Processing plant - Surveillance | | | | |
| Pet food - dog snacks (pig ears, chewing bones) - Retail - Surveillance | | | | |
| Pet food - final product - Processing plant - Surveillance | | | | |
| Pet food - final product - Retail - Surveillance | | | | |
| Premixtures - final product - Feed mill - Surveillance | | | | |

Comments:

[1)] Feed additives

Table Salmonella in other feed matter

Comments:

[2)] Feed for wild birds

[3)] By-products of food production

## 2.1.5 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 (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

##### Cut-off values used in testing

EUCAST ECOFFs

#### 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

Alltogether 10 bovine salmonella isolates were obtained; 8 were of serotype S. Typhimurium 2 were S. Enteritidis. All isolates were fully sensitive to the antimicrobials tested.

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

The situation continues to be very favourable

## B. 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 (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Preventive measures in place

See Salmonella spp. in pigs.

### Control program/mechanisms

#### The control program/strategies in place

See Salmonella spp. in pigs.

### Results of the investigation

Five salmonella isolates were obtained; four S. Typhimurium and one S. Mbandaka. All isolates were fully sensitive to the antimicrobials tested.

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

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

## C. 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 (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Control program/mechanisms

#### The control program/strategies in place

See Salmonella spp. in Gallus gallus and turkeys.

### Results of the investigation

Five and two S. Typhimurium isolations were made from Gallus gallus and turkeys, respectively. In addition, on S. Livingstone was isolated from broilers. All isolates were fully susceptible.

### 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.

## D. Antimicrobial resistance in Salmonella in foodstuff derived from cattle

### Sampling strategy used in monitoring

#### Frequency of the sampling

See Salmonella spp. in bovine animals.

#### Type of specimen taken

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

#### Methods of sampling (description of sampling techniques)

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

#### Procedures for the selection of isolates for antimicrobial testing

Samples were taken as a part of the National Control Programme, and in HACCP/owns check

#### 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

See Salmonella spp. in bovine animals.

### Laboratory used for detection for resistance

#### Antimicrobials included in monitoring

VetMIC broth microdilution method (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Preventive measures in place

See Salmonella spp. in bovine animals.

### Control program/mechanisms

#### The control program/strategies in place

See Salmonella spp. in bovine animals.

### Results of the investigation

No isolates of domestic origin were obtained.

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

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

## E. 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 (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Preventive measures in place

See Salmonella spp. in pig meat and products thereof.

### Control program/mechanisms

#### The control program/strategies in place

See Salmonella spp. in pig meat and products thereof.

### Results of the investigation

No isolates of domestic origin were obtained.

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

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

## F. 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

#### Type of specimen taken

Samples of turkey meat in cutting plants, in HACCP/owns check

#### 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 (SVA, Sweden); testing performed according to CLSI. Quality control according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, florfenicol, gentamicin, streptomycin, tetracycline, cefotaxime, sulfamethoxazole, trimethoprim, chloramphenicol and kanamycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Results of the investigation

No salmonella isolates of domestic foodstuff origin were isolated

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

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

# Table Antimicrobial susceptibility testing of S. Livingstone in Gallus gallus (fowl) - broilers - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Livingstone | Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Antimicrobials:** | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | |

| S. Livingstone | Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| **Antimicrobials:** | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |

## Table Antimicrobial susceptibility testing of S. Livingstone in Gallus gallus (fowl) - broilers - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Livingstone | Gallus gallus (fowl) - broilers - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| **Antimicrobials:** | lowest | highest |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - fattening pigs - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

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

| S. Typhimurium | Pigs - fattening pigs - Slaughterhouse - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | | |

| S. Typhimurium | Pigs - fattening pigs - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |

## Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - fattening pigs - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

| S. Typhimurium | Pigs - fattening pigs - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - laying hens - during rearing period - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Typhimurium | Gallus gallus (fowl) - laying hens - during rearing period - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 2 | 0 | | | | | | | | | | 1 | 1 | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 2 | 0 | | | | | | | | | | | | 2 | | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 2 | 0 | | | | | | | | | 2 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 2 | 0 | | | | | | | 2 | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 2 | 0 | | | | | | | | | | | 1 | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 2 | 0 | | | | | | | | | | | 2 | | | | | | | | | | | | |
| Trimethoprim | 2 | 2 | 0 | | | | | | | | | 2 | | | | | | | | | | | | | | |

| S. Typhimurium | Gallus gallus (fowl) - laying hens - during rearing period - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - laying hens - during rearing period - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Typhimurium | Gallus gallus (fowl) - laying hens - during rearing period - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

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

| S. Typhimurium | Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 2 | 0 | | | | | | | | | | 1 | 1 | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 2 | 0 | | | | | | | 1 | 1 | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 2 | 0 | | | | | | | 2 | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 2 | 0 | | | | | | | | | | | 2 | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 2 | 0 | | | | | | | | | | | 1 | 1 | | | | | | | | | | | |
| Trimethoprim | 2 | 2 | 0 | | | | | | | | | 1 | 1 | | | | | | | | | | | | | |

| S. Typhimurium | Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

| S. Typhimurium | Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - breeding flocks for egg production line - adult - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Typhimurium | Gallus gallus (fowl) - breeding flocks for egg production line - adult - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | | |

| S. Typhimurium | Gallus gallus (fowl) - breeding flocks for egg production line - adult - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - breeding flocks for egg production line - adult - Farm - Domestic - Control and eradication programmes - Census - Official and industry sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Typhimurium | Gallus gallus (fowl) - breeding flocks for egg production line - adult - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Turkeys - fattening flocks - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official sampling - environmental sample - dust - quantitative data [Dilution method]

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

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | |

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |

## Table Antimicrobial susceptibility testing of S. Typhimurium in Turkeys - fattening flocks - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official sampling - environmental sample - dust - quantitative data [Dilution method]

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Enteritidis in Cattle (bovine animals) - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Enteritidis | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 2 | 0 | | | | | | | | | | 2 | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 2 | 0 | | | | | | | | | | | | | 1 | 1 | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 2 | 0 | | | | | | | | | | | | | 1 | 1 | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 2 | 0 | | | | | | | 1 | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 2 | 0 | | | | | 1 | | 1 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 2 | 0 | | | | | | | | | | | 2 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 2 | 0 | | | | | | | | | | | | 1 | 1 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 2 | 0 | | | | | | | | | | | 2 | | | | | | | | | | | |
| Trimethoprim | 2 | 2 | 0 | | | | | | | | | 2 | | | | | | | | | | | | | |

| S. Enteritidis | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |

Table Antimicrobial susceptibility testing of S. Enteritidis in Cattle (bovine animals) - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Enteritidis | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Mbandaka in Pigs - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Mbandaka | Pigs - unspecified - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | 1 | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | |

| S. Mbandaka | Pigs - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |

Table Antimicrobial susceptibility testing of S. Mbandaka in Pigs - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Mbandaka | Pigs - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Domestic - Control and eradication programmes - Census - Industry sampling - environmental sample - delivery box liner - quantitative data [Dilution method]

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

| S. Typhimurium | Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | 1 | | | | | | | | | | | | | | |

| S. Typhimurium | Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Domestic - Control and eradication programmes - Census - Industry sampling - environmental sample - delivery box liner - quantitative data [Dilution method]

| S. Typhimurium | Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Typhimurium | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 6 | 0 | | | | | | | | | | 4 | 2 | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 6 | 0 | | | | | | | | | | | | 3 | 3 | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 6 | 0 | | | | | | | | | | | | | 6 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 6 | 0 | | | | | | | 5 | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 6 | 0 | | | | | | | 6 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 6 | 0 | | | | | | | | | | | 6 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 6 | 0 | | | | | | | | | | | | | 6 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 6 | 0 | | | | | | | | | | | 6 | | | | | | | | | | | |
| Trimethoprim | 2 | 6 | 0 | | | | | | | | | 1 | 5 | | | | | | | | | | | | |

| S. Typhimurium | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 6 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Farm - Domestic - Control and eradication programmes - Suspect sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Typhimurium | Cattle (bovine animals) - unspecified - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 6 | |
| Antimicrobials: | lowest | highest |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - breeding animals - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

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

| S. Typhimurium | Pigs - breeding animals - Slaughterhouse - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 3 | 0 | | | | | | | | | | | 3 | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 3 | 0 | | | | | | | | | | | | 1 | 1 | 1 | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 3 | 0 | | | | | | | | | | | | | 3 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 3 | 0 | | | | | | | | 3 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 3 | 0 | | | | | | | 3 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 3 | 0 | | | | | | | | | | | 2 | 1 | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 3 | 0 | | | | | | | | | | | | | 3 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 3 | 0 | | | | | | | | | | | 1 | 2 | | | | | | | | | | |
| Trimethoprim | 2 | 3 | 0 | | | | | | | | | 1 | 2 | | | | | | | | | | | | |

| S. Typhimurium | Pigs - breeding animals - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 3 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - breeding animals - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - lymph nodes - quantitative data [Dilution method]

| S. Typhimurium | Pigs - breeding animals - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 3 | |
| Antimicrobials: | lowest | highest |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

# Table Antimicrobial susceptibility testing of S. Typhimurium in Turkeys - fattening flocks - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | 1 | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | 1 | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | 1 | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | | 1 | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | | 1 | | | | | | | | | | | | |

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.25 | 16 |
| Amphenicols - Chloramphenicol | 2 | 64 |

## Table Antimicrobial susceptibility testing of S. Typhimurium in Turkeys - fattening flocks - before slaughter - Farm - Domestic - Control and eradication programmes - Census - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| S. Typhimurium | Turkeys - fattening flocks - before slaughter - Farm - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 1 | |
| Antimicrobials: | lowest | highest |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.06 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 64 |
| Quinolones - Nalidixic acid | 2 | 128 |
| Tetracyclines - Tetracycline | 1 | 64 |
| Trimethoprim | 0.25 | 16 |

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

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

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | EFSA | 2 | |
| | Streptomycin | EFSA | 32 | |
| Amphenicols | Chloramphenicol | EFSA | 16 | |
| Cephalosporins | Cefotaxime | EFSA | 0.5 | |
| | Ceftazidime | EFSA | 2 | |
| Fluoroquinolones | Ciprofloxacin | EFSA | 0.064 | |
| Penicillins | Ampicillin | EFSA | 8 | |
| Quinolones | Nalidixic acid | EFSA | 16 | |
| Sulfonamides | Sulfonamides | EFSA | 256 | |
| Tetracyclines | Tetracycline | EFSA | 8 | |
| Trimethoprim | Trimethoprim | EFSA | 2 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 32 | |
| Amphenicols | Chloramphenicol | | 16 | |
| Cephalosporins | Cefotaxime | | 0.5 | |
| | Ceftazidime | | 2 | |
| Fluoroquinolones | Ciprofloxacin | | 0.064 | |
| Penicillins | Ampicillin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Sulfonamides | Sulfonamides | | 256 | |
| Tetracyclines | Tetracycline | | 8 | |
| Trimethoprim | Trimethoprim | | 2 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 32 | |
| Amphenicols | Chloramphenicol | | 16 | |
| Cephalosporins | Cefotaxime | | 0.5 | |
| | Ceftazidime | | 2 | |
| Fluoroquinolones | Ciprofloxacin | | 0.064 | |
| Penicillins | Ampicillin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Sulfonamides | Sulfonamides | | 256 | |
| Tetracyclines | Tetracycline | | 8 | |
| Trimethoprim | Trimethoprim | | 2 | |

# 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 annual number of human cases has shown a rising overall trend from 1995 to 2008. After 2008 the number of reported human campylobacteriosis has been around 4000 per year. Since 1998 campylobacters have been more commonly reported cause of enteritis than salmonella.
All Finnish broiler slaughterhouses have voluntarily monitored the prevalence of campylobacter in broilers at slaughter as a part of the own-check programme since the 1990's. From 1999 to 2002 the flock prevalence was on average 7.9% between June and September and 1.1% during the other months.

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

Thermophilic campylobacters, especially Campylobacter jejuni, are the most common bacterial cause of human enteric infections in Finland. A strong seasonal variation is typical for the incidence of campylobacteriosis, which is consistently highest in July. A high percentage of human campylobacter infections reported in Finland originate from travel abroad. However, the proportion of domestically acquired infections peaks in the summer season.
The prevalence of campylobacters in broiler slaughter batches peaks in July-August. Since the implementation of a national campylobacter monitoring programme for broilers in 2004, the average prevalence of campylobacters in broiler slaughter batches has been on average 5.8% during June-October and 1.1% during the rest of the year.

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

In late summer thermophilic campylobacters are detected in 20 to 30% of retail poultry meat of domestic origin. Poultry meat is considered as a source of campylobacters in part of the sporadic cases. Contaminated drinking water has caused six large outbreaks in the years 1999 - 2007. Unpasteurized milk, imported turkey meat, chicken and strawberries have been suspected as sources of few small outbreaks. In 2012, consumption of raw milk caused a campylobacteriosis outbreak, and in another farm outbreak raw milk or contact with cattle was suspected as the origin of infection.

#### Recent actions taken to control the zoonoses

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

## 2.2.2 Campylobacter in foodstuffs

### A. Thermophilic Campylobacter in Broiler meat and products thereof

#### Monitoring system

##### Sampling strategy

At retail

A survey on Campylobacter in packed fresh Finnish retail meat was carried out during January -November 2013 using convenience sampling.

##### Frequency of the sampling

At retail

Between 3 and 5 samples of broiler meat were examined weekly from January to November 2013.

##### Type of specimen taken

At retail

Fresh Finnish broiler meat was taken as samples.

##### Methods of sampling (description of sampling techniques)

At retail

Packages of fresh Finnish broiler meat representing different production batches were taken from retail stores. In the laboratory 25 grams of strips of meat was taken for examination.

##### Definition of positive finding

At retail

Biochemically confirmed isolate of Campylobacter jejuni or C. coli isolated from the sample.

##### Diagnostic/analytical methods used

At retail

NMKL 119:2007 (modified: enrichment in Bolton broth 24 h) was used for detection and ISO 10272-2:2006 was used in quantification of campylobacters.

#### Control program/mechanisms

##### The control program/strategies in place

There is no control program for broiler meat in Finland. Control program for campylobacters in broilers at slaughter - sampling of caeca - was implemented in 2004.

#### Results of the investigation

Campylobacter was detected in 21 of 185 broiler meat samples. All isolates were Campylobacter jejuni. In eleven campylobacter-positive samples the concentration of campylobacters was <0,5 cfu/g. In the rest of the positive samples the concentration varied from 0.5 cfu/g to 10 cfu/g.

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

The results of the survey are consistent with the low prevalence of campylobacters in broiler slaughter batches. In addition, they support the results of the the Baseline survey on Campylobacter in Finnish broiler carcasses in 2008, where the concentrations of Campylobacter on carcasses were low. Despite of low prevalence in broilers, the incidence of human cases is high. The number of human cases peaks in July, while most of the campylobacter positive samples in the survey were detected between July and

September.

## B. Thermophilic Campylobacter spp., unspecified in Food Meat from turkey - Retail

### Monitoring system

#### Sampling strategy

A survey on Campylobacter in packed fresh Finnish retail meat was carried out during January -November 2013 using convenience sampling.

#### Frequency of the sampling

Between 2 and 5 samples of turkey meat were examined weekly from January to November 2013.

#### Type of specimen taken

Fresh Finnish turkey meat was taken as samples.

#### Methods of sampling (description of sampling techniques)

Packages of fresh Finnish turkey meat representing different production batches were taken from retail stores. In the laboratory 25 grams of strips of meat was taken for examination.

#### Definition of positive finding

Biochemically confirmed isolate of Campylobacter jejuni or C. coli isolated from the sample.

#### Diagnostic/analytical methods used

NMKL 119:2007 (modified: enrichment in Bolton broth 24 h) was used for detection and ISO 10272-2:2006 was used in quantification of campylobacters.

### Results of the investigation

Campylobacter was detected in 7 of 172 turkey meat samples. Six isolates were Campylobacter jejuni and one C. coli. In all campylobacter-positive samples the concentration of campylobacters was <0,5 cfu/g.

## C. Thermophilic Campylobacter spp., unspecified in Food Meat from bovine animals - Retail

### Monitoring system

#### Sampling strategy

A survey on Campylobacter in packed fresh Finnish retail meat was carried out during January -November 2013 using convenience sampling.

#### Frequency of the sampling

Between 2 and 5 samples of beef were examined weekly from January to November 2013.

#### Type of specimen taken

Fresh Finnish beef was taken as samples.

#### Methods of sampling (description of sampling techniques)

Packages of fresh Finnish beef representing different production batches were taken from retail stores. In the laboratory 25 grams of strips  of meat was taken for examination.

#### Definition of positive finding

Biochemically confirmed  isolate of Campylobacter jejuni or C. coli isolated from the sample.

#### Diagnostic/analytical methods used

NMKL 119:2007 (modified: enrichment in Bolton broth 24 h) was used for detection and ISO 10272-2:2006 was used in quantification of campylobacters.

### Results of the investigation

No campylobacters were detected either by enrichment or by quantitative determination (limit of determination was 0.5 cfu/g) in the 177 beef samples examined.

## D. Thermophilic Campylobacter spp., unspecified in Food Meat from pig - Retail

### Monitoring system

#### Sampling strategy

A survey on Campylobacter in packed fresh Finnish retail meat was carried out during January -November 2013 using convenience sampling.

#### Frequency of the sampling

Between 3 and 5 samples of pork were examined weekly from January to November 2013.

#### Type of specimen taken

Fresh Finnish pork was taken as samples.

#### Methods of sampling (description of sampling techniques)

Packages of fresh Finnish pork representing different production batches were taken from retail stores. In the laboratory 25 grams of strips  of meat was taken for examination.

#### Definition of positive finding

Biochemically confirmed  isolate of Campylobacter jejuni or C. coli isolated from the sample.

#### Diagnostic/analytical methods used

NMKL 119:2007 (modified: enrichment in Bolton broth 24 h) was used for detection and ISO 10272-2:2006 was used in quantification of campylobacters.

### Results of the investigation

No campylobacters were detected either by enrichment or by quantitative determination (the limit of determination was 0.5 cfu/g) in the 183 pork samples examined.

## Table Campylobacter in other food

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Campylobacter | C. coli | C. jejuni |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Meat from bovine animals - fresh - Retail - Survey - national survey (Sampling in January-November) | Evira | Convenience sampling | Not applicable | food sample > meat | Domestic | Batch | 25 Gram | 177 | 0 | | |
| Meat from pig - fresh - Retail - Survey - national survey (Sampling in January-November) | Evira | Convenience sampling | Not applicable | food sample > meat | Domestic | Batch | 25 Gram | 183 | 0 | | |

| | C. lari | C. upsaliensis | Thermophilic Campylobacter spp., unspecified |
|---|---|---|---|
| Meat from bovine animals - fresh - Retail - Survey - national survey (Sampling in January-November) | | | |
| Meat from pig - fresh - Retail - Survey - national survey (Sampling in January-November) | | | |

## Table Campylobacter in poultry meat

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Sample weight | Units tested | Total units positive for Campylobacter | C. coli | C. jejuni |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Meat from broilers (Gallus gallus) - fresh - Retail - Survey - national survey (Sampling in January-November) | Evira | Convenience sampling | Not applicable | food sample > meat | Domestic | Batch | 25 Gram | 185 | 21 | | 21 |
| Meat from turkey - fresh - Retail - Survey - national survey (Sampling in January-November) | Evira | Convenience sampling | Not applicable | food sample > meat | Domestic | Batch | 25 Gram | 172 | 7 | 1 | 6 |

| | C. lari | C. upsaliensis | Thermophilic Campylobacter spp., unspecified |
|---|---|---|---|
| Meat from broilers (Gallus gallus) - fresh - Retail - Survey - national survey (Sampling in January-November) | | | |
| Meat from turkey - fresh - Retail - Survey - national survey (Sampling in January-November) | | | |

## 2.2.3 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 highest, all broiler slaughter batches are sampled at slaughter. From January to May and from November to December, when the prevalence has consistently been low, random sampling of slaughter batches is performed according to a particular sampling scheme. Since 2008 the number of batches sampled is calculated with the following criteria: expected prevalence 1 %, accuracy 1 %, confidence level 95%.

##### Frequency of the sampling

At slaughter

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

##### Type of specimen taken

At slaughter

Caecum samples

##### Methods of sampling (description of sampling techniques)

At slaughter

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

##### Case definition

At slaughter

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

##### Diagnostic/analytical methods used

At slaughter

NMKL No 119 with modifications (no enrichment)

#### Vaccination policy

There is no vaccination against campylobacter in Finland.

#### Other preventive measures than vaccination in place

Strict biosecurity measures and production hygiene in holdings.

#### Control program/mechanisms

##### The control program/strategies in place

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

### Measures in case of the positive findings or single cases

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

### Notification system in place

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

### Results of the investigation

A total of 1522 slaughter batches were examined for thermophilic campylobacters between June and October 2013 in the monitoring programme. Campylobacters were detected in 79 (5.2%) of these slaughter batches. Campylobacter jejuni was detected in 74 slaughter batches and C. coli in 5 batches. In January-May and November-December, the samples were taken from 329 slaughter batches in total. Thermophilic campylobacters (C. jejuni) were detected in 2 (0.6%) of these slaughter batches.

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

The prevalence of campylobacter in Finnish broiler slaughter batches has been consistently low. Since the implementation of a national campylobacter monitoring programme for broilers in 2004, the average prevalence of campylobacters in broiler slaughter batches has been on average 5.8% during June-October and 1.1% during the rest of the year.

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

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

## Table Campylobacter in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Campylobacter | C. coli | C. jejuni | C. lari |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes (Sampling in January-May and in November-December) | Evira | Objective sampling | Industry sampling | animal sample > caecum | Domestic | Slaughter batch | 329 | 2 | | 2 | |
| Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes (Sampling in June-October) | Evira | Census | Industry sampling | animal sample > caecum | Domestic | Slaughter batch | 1522 | 79 | 5 | 74 | |

| | C. upsaliensis | Thermophilic Campylobacter spp., unspecified |
|---|---|---|
| Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes (Sampling in January-May and in November-December) | | |
| Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes (Sampling in June-October) | | |

### 2.2.4 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Laboratory methodology used for identification of the microbial isolates

## B. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

### Sampling strategy used in monitoring

#### Frequency of the sampling

The number of randomly taken samples from each slaughterhouse was proportional to the annual slaughter throughput. The collected samples were evenly distributed between February and December in 2013. The slaughterhouses accounted approximately for 95% of the total number of slaughtered animals in Finland.

#### Type of specimen taken

Faeces from healthy animals

#### Methods of sampling (description of sampling techniques)

The samples were taken aseptically and transported refridgerated to the laboratory within 2 days.

#### Procedures for the selection of isolates for antimicrobial testing

One isolate C. coli from each sample, if available, was tested for antimicrobial susceptibility

#### Methods used for collecting data

Isolation and antimicrobial susceptibility testing was performed by the Finnish Food Safety Authority Evira.

### Laboratory methodology used for identification of the microbial isolates

Modified standard NMKL 119:2007

### Laboratory used for detection for resistance

#### Antimicrobials included in monitoring

The broth microdilution method (VetMIC, National Veterinary Institute SVA, Sweden) was used and the testing was performed according to the CLSI standards; Campylobacter jejuni ATCC 33560 was used as a quality control strain. The following antimicrobials were tested: nalidicix acid, ciprofloxacin, erythromycin, tetracycline, gentamicin and streptomycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Results of the investigation

Resistance was moderate against nalidixic acid and ciprofloxacin, and low against erythromycin. No resistance was found against tetracycline or gentamicin.

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

Resistance to quinolones among C. coli from pigs increased notably from 2007 to 2010. However, resistance did not continue to rise any more in 2013.

## C. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

### Sampling strategy used in monitoring

#### Frequency of the sampling

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

#### Type of specimen taken

10 intact caeca per batch, taken at slaughterhouse

#### Methods of sampling (description of sampling techniques)

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

#### Procedures for the selection of isolates for antimicrobial testing

All isolates were tested for antimicrobial susceptibility. Susceptibility results were obtained for 76 C. jejuni isolates.

#### Methods used for collecting data

Susceptibility testing was performed in Evira.

### Laboratory methodology used for identification of the microbial isolates

Modified standard NMKL 119:2007

### Laboratory used for detection for resistance

#### Antimicrobials included in monitoring

The broth microdilution method (VetMIC, National Veterinary Institute SVA, Sweden) was used and the testing was performed according to the CLSI standards; Campylobacter jejuni ATCC 33560 was used as a quality control strain. The following antimicrobials were tested: nalidicix acid, ciprofloxacin, erythromycin, tetracycline, gentamicin and streptomycin.

#### Cut-off values used in testing

EUCAST ECOFFs

### Control program/mechanisms

#### The control program/strategies in place

According to the MAF Act 10/EEO/2007

### Measures in case of the positive findings or single cases

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

### Results of the investigation

Resistance situation in broilers is favourable; only resistance against nalidixic acid was detected in 2013.

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

No significant trends have been observed due to a very low level of resistance among C. jejuni from broilers. The good resistance situation in broilers can be explained by the rare need of antimicrobial treatments in broiler production.

# Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - caecum - quantitative data [Dilution method]

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

| C. jejuni | Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 2 | 0 | | | | | | | | | | 2 | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 4 | 2 | 0 | | | | | | | | | | | | | 2 | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.5 | 2 | 0 | | | | | | | | 1 | 1 | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 2 | 0 | | | | | | | | | | | | | | 2 | | | | | | | | |
| Tetracyclines - Tetracycline | 1 | 2 | 0 | | | | | | | | 1 | 1 | | | | | | | | | | | | | |
| Macrolides - Erythromycin | 4 | 2 | 0 | | | | | | | | | | 2 | | | | | | | | | | | | |

| C. jejuni | Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 2 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.12 | 16 |
| Aminoglycosides - Streptomycin | 0.5 | 64 |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 8 |
| Quinolones - Nalidixic acid | 1 | 64 |
| Tetracyclines - Tetracycline | 0.12 | 16 |
| Macrolides - Erythromycin | 0.5 | 64 |

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - Slaughterhouse - Domestic - Control and eradication programmes - Objective sampling - Industry sampling - animal sample - caecum - quantitative data [Dilution method]

# Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| C. coli | Pigs - fattening pigs - Slaughterhouse - Monitoring | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 131 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 131 | 0 | | | | | | | | | | 17 | 106 | 8 | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.5 | 131 | 24 | | | | | | | 5 | 49 | 45 | 8 | | | | 24 | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 131 | 25 | | | | | | | | | | | | | 18 | 71 | 17 | | 25 | | | | | |
| Tetracyclines - Tetracycline | 2 | 131 | 0 | | | | | | | | 26 | 47 | 57 | | 1 | | | | | | | | | | |
| Macrolides - Erythromycin | 8 | 131 | 3 | | | | | | | | | | 53 | 35 | 30 | 10 | | | | 3 | | | | | |

| C. coli | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 131 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.12 | 16 |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 8 |
| Quinolones - Nalidixic acid | 1 | 64 |
| Tetracyclines - Tetracycline | 0.12 | 16 |
| Macrolides - Erythromycin | 0.5 | 64 |

# Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - Slaughterhouse - Domestic - Control and eradication programmes - Census - Industry sampling - animal sample - caecum - quantitative data [Dilution method]

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

| C. jejuni | Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 74 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 74 | 0 | | | | | | | | | 8 | 47 | 19 | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 4 | 74 | 0 | | | | | | | | | | | 29 | 42 | 3 | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.5 | 74 | 0 | | | | | | | 1 | 45 | 19 | 9 | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 74 | 7 | | | | | | | | | | | | 1 | 40 | 21 | 5 | | 7 | | | | | |
| Tetracyclines - Tetracycline | 1 | 74 | 0 | | | | | | | | 44 | 29 | 1 | | | | | | | | | | | | |
| Macrolides - Erythromycin | 4 | 74 | 0 | | | | | | | | | | 70 | 4 | | | | | | | | | | | |

| C. jejuni | Gallus gallus (fowl) - broilers - Slaughterhouse - Control and eradication programmes | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 74 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.12 | 16 |
| Aminoglycosides - Streptomycin | 0.5 | 64 |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 8 |
| Quinolones - Nalidixic acid | 1 | 64 |
| Tetracyclines - Tetracycline | 0.12 | 16 |
| Macrolides - Erythromycin | 0.5 | 64 |

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - Slaughterhouse - Domestic - Control and eradication programmes - Census - Industry sampling - animal sample - caecum - quantitative data [Dilution method]

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

| Test Method Used |
| --- |
| Broth dilution |

| Standard methods used for testing |
| --- |
| NCCLS/CLSI |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
| --- | --- | --- | --- | --- |
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | EFSA | 2 | |
| | Streptomycin | EFSA | 4 | |
| Fluoroquinolones | Ciprofloxacin | EFSA | 0.5 | |
| Macrolides | Erythromycin | EFSA | 8 | |
| Quinolones | Nalidixic acid | EFSA | 16 | |
| Tetracyclines | Tetracycline | EFSA | 2 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 4 | |
| Fluoroquinolones | Ciprofloxacin | | 0.5 | |
| Macrolides | Erythromycin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Tetracyclines | Tetracycline | | 2 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 4 | |
| Fluoroquinolones | Ciprofloxacin | | 0.5 | |
| Macrolides | Erythromycin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Tetracyclines | Tetracycline | | 2 | |

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

| Test Method Used |
| --- |
| Broth dilution |

| Standard methods used for testing |
| --- |
| NCCLS/CLSI |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
| --- | --- | --- | --- | --- |
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | EFSA | 2 | |
| | Streptomycin | EFSA | 4 | |
| Fluoroquinolones | Ciprofloxacin | EFSA | 0.5 | |
| Macrolides | Erythromycin | EFSA | 4 | |
| Quinolones | Nalidixic acid | EFSA | 16 | |
| Tetracyclines | Tetracycline | EFSA | 1 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 4 | |
| Fluoroquinolones | Ciprofloxacin | | 0.5 | |
| Macrolides | Erythromycin | | 4 | |
| Quinolones | Nalidixic acid | | 16 | |
| Tetracyclines | Tetracycline | | 1 | |

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 4 | |
| Fluoroquinolones | Ciprofloxacin | | 0.5 | |
| Macrolides | Erythromycin | | 4 | |
| Quinolones | Nalidixic acid | | 16 | |
| Tetracyclines | Tetracycline | | 1 | |

# 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 18-70 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 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 50 cases in 7 different animal species in 2013. Listeriosis was diagnosed in 26 bovine animal, 15 sheep, in 3 goats, in 3 brown hares, in 1 alpaca, in 1 hen and in 1 hare. The increased number of cases is most likely due to increased sampling in connection with a project carried out in 2012-2013 investigating the causes of abortions in bovine animals and small ruminants.

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

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

## Table Listeria in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Listeria | L. monocytogenes | Listeria spp., unspecified |
|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - Farm - Monitoring | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Animal | unknown | 26 | 26 | |
| Sheep - Farm - Monitoring | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Animal | unknown | 15 | 15 | |
| Goats - Farm - Monitoring | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Animal | unknown | 3 | 3 | |
| Pigs - Farm - Monitoring | | | | | Domestic | | | | | |
| Gallus gallus (fowl) - Farm - Monitoring | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Animal | unknown | 1 | 1 | |
| Alpacas - farmed | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Animal | unknown | 1 | 1 | |
| Hares - wild | Evira | Suspect sampling | | animal sample | | Animal | unknown | 4 | 4 | |

Footnote:

The number of tested animals cannot be given as listeriosis diagnosis can be made histopahtologically (brain tissue) and/or by general bacteriological aerobic cultivation as well as by cultivation on selective 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 those species from which listoriosis diagnosis is mad is reported.

# 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 lower than 0.4/100,000 inhabitants in the 2000's. 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 for serotype O157. The total number of bovines sampled in a year is calculated with the following criteria: expected prevalence 1 %, accuracy  0,5 %, confidence level 95 %. The total number is divided between the different slaughterhouses depending on their slaughter capacity. The sampling is evenly distributed throughout the year.

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

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

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

The figures of VTEC cases are relatively low but the disease caused can be severe and lead to death which makes VTEC a serious zoonosis. Cattle seem to be the major reservoir of VTEC. Same PFGE subtypes are detected in strains of human cases and cattle which suggests a common source. More information is needed on the potential control strategies especially on farms and at slaughter level.

In the year 2013, four human VTEC O157 (sorbitol negative) sporadic illnesses related to farm visits and/or consumption of unpasteurized milk were traced back by sampling at the farm level (4 different farms). In all cases, VTEC O157 (sorbitol negative) could be isolated from the samples. In three of these cases, indistinguishable PFGE genotypes of the isolated strains and the patient strain suggested the farm as a source of the infection. The isolates recovered from the samples of the four farms had virulence profile of vtx1+, vtx2+, eae+ and hlyA+. In addition, two human cases of sorbitol fermenting variant of VTEC O157 and one case each of VTEC O26 and O103 led to the trace back sampling on the farm level. These VTEC types could not be isolated from the samples and the origin of these infections remained unknown.  However,  during the trace back investigations of one of the sorbitol fermenting VTEC O157

infections, the farm was found positive for sorbitol negative VTEC O157.

## 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 for serotype O157. 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 relatively constant. However, an increase in the number of reported human cases was observed in 2013.

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

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

## Table VT E. coli in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Analytical Method | Sampling unit | Sample weight | Units tested | Total units positive for Verotoxigenic E. coli (VTEC) | Verotoxigenic E. coli (VTEC) - VTEC O157 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes [1)] | Evira | Objective sampling | Industry sampling | animal sample > faeces | Domestic | ISO 16654:2001 | Animal | 10 Gram | 1560 | 32 | |

| | Verotoxigenic E. coli (VTEC) - VTEC non-O157 | Verotoxigenic E. coli (VTEC) - VTEC, unspecified | Verotoxigenic E. coli (VTEC) - VTEC O157 - eae positive vtx1 and vtx2 positive |
|---|---|---|---|
| Cattle (bovine animals) - unspecified - Slaughterhouse - Control and eradication programmes [1)] | | | 32 |

Comments:

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

# 2.5 TUBERCULOSIS, MYCOBACTERIAL DISEASES

## 2.5.1 General evaluation of the national situation

### A. Tuberculosis general evaluation

#### History of the disease and/or infection in the country

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

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

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

The national situation remains favourable.

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

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

## 2.5.2 Mycobacterium in animals

### A. Mycobacterium bovis in bovine animals

#### Status as officially free of bovine tuberculosis during the reporting year

##### The entire country free

Finland has been granted the officially tuberculosis free status of bovine herds by a Commission Decision 94/959/EC of 28 December 1994, confirmed by Commission Decision 2003/467/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 2013.

265696 bovine animals were slaughtered and subject to a routine post mortem examination. Samples were collected from two suspicious animals during meat inspection and sent to the Finnish Food Safety Authority Evira for examination. All results were negative.

A total of 636 intradermal tuberculin tests were performed on AI bulls.

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

The situation remains favourable.

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

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

## B. Mycobacterium bovis in farmed deer

### Monitoring system

#### Sampling strategy

Post mortem examination is performed on all slaughtered animals and samples are sent for examination if there is a suspicion of tuberculosis.
Deer in the farms that are in the voluntary control program are tested regularly with intradermal comparative test. An official veterinarian is responsible for performing these tests.
Imported deer are tested before import.
Clinically ill deer are killed and tested if tuberculosis is suspected.

#### Frequency of the sampling

In the voluntary control program 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)

At meat inspection, lymph nodes are collected from suspected animals.
When tuberculosis is suspected at farm, a whole animal or its head and organs including lymph nodes from chest, abdomen and groin are sent for examination.

#### Case definition

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

#### Diagnostic/analytical methods used

Histology, Ziehl-Neelsen stain, cultivation.

### Vaccination policy

Vaccination against tuberculosis is prohibited.

### Control program/mechanisms

#### The control program/strategies in place

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

### Measures in case of the positive findings or single cases

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

### Notification system in place

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

### Results of the investigation

No tuberculosis was detected in farmed deer in 2013.
Samples of 4 farmed deer were sent for laboratory examination and they were negative.

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

The situation remains favourable.

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

The relevance seems to be negligible.

## Table Tuberculosis in farmed deer

If present, the row "Total -1" refers to analogous data of the previous year.

| Region | Total number of existing farmed deer | | Free herds | | Infected herds | | Routine tuberculin testing | | Number of tuberculin tests carried out before the introduction into the herds | Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations | Number of animals detected positive in bacteriological examination |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Herds | Animals | Number of herds | % | Number of herds | % | Interval between routine tuberculin tests | Number of animals tested | | | |
| Suomi / Finland | 13 | | 13 | 100 | 0 | 0 | | | | 4 | 0 |
| Total : [1)] | 13 | 0 | 13 | 100 | 0 | 0 | N.A. | 0 | 0 | 4 | 0 |

## Comments:

[1)] N.A.

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

If present, the row "Total -1" refers to analogous data of the previous year.

| Region | Total number of existing bovine | | Officially free herds | | Infected herds | | Routine tuberculin testing | | Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC) | Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological | Number of animals detected positive in bacteriological examination |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Herds | Animals | Number of herds | % | Number of herds | % | Interval between routine tuberculin tests | Number of animals tested | | | |
| Suomi / Finland | 13414 | 911657 | 13414 | 100 | 0 | 0 | no routine test | | 0 | 2 | 0 |
| Total : [1)] | 13414 | 911657 | 13414 | 100 | 0 | 0 | N.A. | 0 | 0 | 2 | 0 |

Comments:

[1)] N.A.

# 2.6 BRUCELLOSIS

## 2.6.1 General evaluation of the national situation

### A. Brucellosis general evaluation

History of the disease and/or infection in the country

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

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

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

The situation remains favourable.

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

Brucellosis has no relevance to public health in Finland.

## 2.6.2 Brucella in animals

### A. Brucella abortus in bovine animals

#### Status as officially free of bovine brucellosis during the reporting year

The entire country free

Finland has been granted the officially brucellosis free status of bovine herds according to Council Directive 64/432/EEC. The disease free status was established by Commission Decision 94/960/EC of 28 December 1994, confirmed by Commission Decision 2003/467/EC.

#### 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

Other: __blood, milk and/or tissue samples due to abortions__

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, ELISA milk. Confirmation: CFT, culture

#### 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 of 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 2013.
670 blood samples from AI bulls and 130 milk samples from farms selling animals to AI were tested for brucellosis, all with negative results. In addition, 306 bacteriological examinations of animals from 261 farms and 402 blood samples of animals from 134 farms were tested by serological methods due to abortion or neonatal death; all also with negative results.

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

The situation remains favourable.

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

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

In 2013 534 random blood samples from healthy animals were tested, all with negative results. Seven clinical suspect cases from six farms were investigated bacteriologically and two from two farms by serology, all due to abortion; all with negative results.

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

The situation remains favourable.

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

source of infection)

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, isolation 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

In 2013, 2709 random blood samples from healthy sheep were tested, all with negative results. In addition 158 samples from 79 farms in clinically suspect cases due to abortion was investigated bacteriologically and 64 sample from 17 farms serologically, all with negative results.

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

The situation remains favourable.

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

source of infection)

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 tested due to abortion are tested also 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 one of the confirmation tests is positive.

#### Diagnostic/analytical methods used

Screening: Rose Bengal test (RB). Confirmation: RB or CF

### 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 2079 serological samples were tested for Brucella suis in 2013, all with negative results. In addition 16 animals from 6 herds were tested microbiologically and 10 animals from one farm were tested serologically due to abortions, all with negative results.

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

The situation remains favourable.

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

The relevance seems to be negligible.

## Table Brucellosis in other animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Brucella | B. abortus | B. melitensis | B. suis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pigs | Evira | Objective sampling | Official sampling | animal sample | Domestic | Animal | 2079 | 0 | | | |

| | Brucella spp., unspecified |
|---|---|
| Pigs | |

Footnote:

Five B. canis positive dogs (one bitch and four puppys) were from the same kennel,

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

If present, the row "Total -1" refers to analogous data of the previous year.

| Region | Total number of existing | | Officially free herds | | Infected herds | | Surveillance | | | Investigations of suspect cases | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Herds | Animals | Number of herds | % | Number of herds | % | Number of herds tested | Number of animals tested | Number of infected herds | Number of animals tested with serological blood tests | Number of animals positive serologically | Number of animals examined microbio logically | Number of animals positive microbio logically | Number of suspended herds |
| Suomi / Finland | 2276 | 142342 | 2276 | 100 | 0 | 0 | | 3243 | 0 | 66 | 0 | 165 | 0 | 0 |
| Total : [1)] | 2276 | 142342 | 2276 | 100 | 0 | 0 | 0 | 3243 | 0 | 66 | 0 | 165 | 0 | 0 |

## Comments:

[1)] N.A.

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

If present, the row "Total -1" refers to analogous data of the previous year.

| Region | Total number of existing bovine | | Officially free herds | | Infected herds | | Surveillance | | | | | | Investigations of suspect cases | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Serological tests | | | Examination of bulk milk | | | Information about | | | Epidemiological investigation | | | | | |
| | Herds | Animals | Number of herds | % | Number of herds | % | Number of bovine herds tested | Number of animals tested | Number of infected herds | Number of bovine herds tested | Number of animals or pools tested | Number of infected herds | Number of notified abortions whatever cause | Number of isolations of Brucella infection | Number of abortions due to Brucella abortus | Number of animals tested with serological blood tests | Number of suspended herds | Number of positive animals | | Number of animals examined microbio logically | Number of animals positive microbio logically |
| | | | | | | | | | | | | | | | | | | Sero logically | BST | | |
| Suomi / Finland | 13414 | 911657 | 13414 | 100 | 0 | 0 | | 670 | 0 | 130 | 130 | 0 | 460 | 0 | 0 | 402 | 134 | 0 | 0 | 306 | 0 |
| Total : [1)] | 13414 | 911657 | 13414 | 100 | 0 | 0 | 0 | 670 | 0 | 130 | 130 | 0 | 460 | 0 | 0 | 402 | 134 | 0 | 0 | 306 | 0 |

## Comments:

[1)] N.A.

# 2.7 YERSINIOSIS

## 2.7.1 General evaluation of the national situation

### A. Yersinia enterocolitica general evaluation

#### History of the disease and/or infection in the country

The number of reported cases of human yersiniosis has been between 400 -600 per year, 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 presumed to be of domestic origin. The number of cases is higher than the number of domestic salmonella infections. A decreasing trend in number of cases caused by Yersinia enterocolitica has been detected.

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

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

# 2.8 TRICHINELLOSIS

## 2.8.1 General evaluation of the national situation

### A. Trichinellosis general evaluation

#### History of the disease and/or infection in the country

In Finland, domestic pork examination for Trichinella was initiated during the 1860s. In 1923, meat inspection including Trichinella examination of swine carcasses became mandatory in municipalities with more than 4000 inhabitants, and later in the entire country. Three cases of human trichinellosis originating from imported pork were diagnosed around 1890. The last autochthonous human cases (three) originated from eating bear meat in 1977. The first diagnosis in domestic swine was made in 1954. There were very few pig cases until 1981 when the number of Trichinella positive pigs started to increase reaching even over one hundred of infected swine a year. In the 2000's, however, the number of diagnosed cases in pigs decreased again to a couple of animals a year, and in 2005-2009 no cases were found. In 2010, only one positive pig was found. The reason for the recent change is not known.
The infection was known in the brown bear and other wildlife during the 1950s, but since the 1980s trichinellosis has been found to be prevalent among wild carnivores especially in the southern part of the country, where all the four European species (Trichinella spiralis, T. nativa, T. britovi and T. pseudospiralis) have been reported. The raccoon dog Nyctereutes procyonoides has been recognised as the central host species harbouring all the four Trichinella species.

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

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

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

Until now meat inspection of swine is mandatory to all commercial pork production. Hunters need to be continuously informed 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 help in controlling of the risk .

## 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 pooled muscle sample and/or a single sample. All positive results have to be sent to national reference laboratory Evira for confirmation and identification of the species.

#### Diagnostic/analytical methods used

##### General

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

### Control program/mechanisms

#### Recent actions taken to control the zoonoses

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

### Measures in case of the positive findings or single cases

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

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

No Trichinella infections were found in pigs in 2013.

#### Fattening pigs raised under controlled housing conditions in integrated production system

No Trichinella infections were found in fattening pigs in 2013.

#### Breeding sows and boars

No Trichinella infections were found in breeding sows and boars in 2013.

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

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

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

The risk of obtaining trichinellosis from pig meat is negligible.

## Table Trichinella in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Trichinella | T. spiralis | Trichinella spp., unspecified | T. pseudospiralis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pigs - fattening pigs - not raised under controlled housing conditions - Slaughterhouse - Surveillance | Evira | Census | Official sampling | animal sample > organ/tissue | Domestic | Animal | 2115941 | 0 | | | |
| Pigs - breeding animals - not raised under controlled housing conditions - sows and boars - Slaughterhouse - Surveillance | Evira | Census | Official sampling | animal sample > organ/tissue | Domestic | Animal | 46425 | 0 | | | |
| Solipeds, domestic - horses - Slaughterhouse - Surveillance | Evira | Census | Official sampling | animal sample > organ/tissue | Domestic | Animal | 1921 | 0 | | | |
| Badgers - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 15 | 1 | | 1 | |
| Bears - wild - Hunting - Surveillance | Evira | Unspecified | HACCP and own checks | animal sample > organ/tissue | Domestic | Animal | 27 | 1 | | 1 | |
| Bears - wild - Slaughterhouse - Surveillance | Evira | Census | Official sampling | animal sample > organ/tissue | Domestic | Animal | 27 | 0 | | | |
| Foxes - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 166 | 60 | | 60 | |
| Lynx - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 448 | 192 | | 192 | |
| Marten - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 27 | 7 | | 7 | |
| Polecats - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 6 | 1 | | 1 | |
| Raccoon dogs - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 484 | 158 | | 158 | |

## Table Trichinella in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Units tested | Total units positive for Trichinella | T. spiralis | Trichinella spp., unspecified | T. pseudospiralis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| White-tailed eagle - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 41 | 1 | | | 1 |
| Wild boars - Hunting - Surveillance | Evira | Unspecified | HACCP and own checks | animal sample > organ/tissue | Domestic | Animal | 13 | 0 | | | |
| Wild boars - farmed - Slaughterhouse - Surveillance | Evira | Census | Official sampling | animal sample > organ/tissue | Domestic | Animal | 350 | 0 | | | |
| Wild boars - farmed - Unknown - Surveillance | Evira | Unspecified | HACCP and own checks | animal sample > organ/tissue | Domestic | Animal | 13 | 0 | | | |
| Wolves - wild - Unknown - Monitoring | Evira | Unspecified | Not applicable | animal sample > organ/tissue | Domestic | Animal | 28 | 11 | | 11 | |

# 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 2013, about 750 small mammals were studied. Generally, small mammals are sampled from high-density habitat patches, preferred by foxes as hunting grounds. Species include bank vole Myodes glareolus (whole Finland), red and grey-sided voles M. rutilus and M. rufocanus (Lapland), field vole Microtus agrestis (whole Finland), sibling vole M. rossiaemeridionalis (south-central Finland), root vole M. oeconomus (Lapland), Norway lemming Lemmus lemmus (Lapland) and water vole Arvicola amphibius. Also common shrews Sorex araneus (whole Finland), masked shrews S. caecutiens (Northern Finland) and pygmy shrews S. minutus were studied.

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

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

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

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

## 2.9.2 Echinococcus in animals

### A. Echinococcus spp. in animal

#### Monitoring system

##### Sampling strategy

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

##### Frequency of the sampling

Continuous sampling

##### Type of specimen taken

Definitive hosts: Faeces and intestine. Intermediate hosts: lungs, liver.

##### Methods of sampling (description of sampling techniques)

Definitive hosts: In connection of post mortem examination, a piece of rectum containing faeces is taken for sample. Intestine is saved in freezer for possible confirmation of infection. Samples are frozen in -80 degrees for a week to inactivate possible Echinococcus eggs.
Intermediate hosts: lungs are inspected during meat inspection, voles are dissected and livers inspected.

##### Case definition

Definitive host: Adult Echinococcus worms found in intestine or faeces positive by E. multilocularis specific PCR.
Intermediate host: positive protoscolex finding in microscopic examination of cyst fluid or typical histology of cysts.

##### Diagnostic/analytical methods used

Definitive hosts: Sedimentation and counting method or PCR for the detection of E. multilocularis egg DNA in faeces.
Intermediate hosts: microscopy of cyst fluid, histology, PCR

#### Other preventive measures than vaccination in place

Imported dogs must be treated against echinococcosis 1-5 days before entering Finland. Alternatively, dogs can be treated regularly every 28 days. Dogs must have a microchip for identification and a pet passport in which treatments are marked.

#### 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 2013, hydatid cysts of Echinococcus granulosus (E. canadensis) were found in five slaughtered reindeer (Rangifer tarandus) and in one moose (Alces alces). Five wolves out of 29 examined were found positive for Echinococcus granulosus (E. canadensis). 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 in the wolves and cervids of eastern Finland. The geographical distribution has apparently not changed during the last decades.

## Table Echinococcus in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Region | Units tested | Total units positive for Echinococcus | E. granulosus | E. multilocularis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - Slaughterhouse - Surveillance | Evira | Census | | | Domestic | Animal | Suomi / Finland | 265696 | 0 | | |
| Sheep - Slaughterhouse - Surveillance | Evira | Census | | | Domestic | Animal | Suomi / Finland | 44178 | 0 | | |
| Pigs - Slaughterhouse - Surveillance | Evira | Census | | | Domestic | Animal | Suomi / Finland | 2162366 | 0 | | |
| Solipeds, domestic - horses - Slaughterhouse - Surveillance | Evira | Census | | | | Animal | Suomi / Finland | 1921 | 0 | | |
| Reindeers - Slaughterhouse - Surveillance | Evira | Census | | | Domestic | Animal | Suomi / Finland | 55595 | 8 | 8 | |
| Raccoon dogs | Evira | Unspecified | Not applicable | animal sample | Domestic | Animal | Suomi / Finland | 418 | 0 | | |
| Foxes - Monitoring | Evira | Unspecified | Not applicable | animal sample | Domestic | Animal | Suomi / Finland | 254 | 0 | | |
| Reindeers - semi-domesticated - Slaughterhouse - Surveillance | Evira | Census | | | Domestic | Animal | Pohjois-Suomi | 55595 | 8 | 8 | |
| Voles - wild (Population monitoring) | Metla | Unspecified | Not applicable | animal sample | Domestic | Animal | Suomi / Finland | 750 | 0 | | |
| Wolves - wild - Monitoring | Evira | Unspecified | Not applicable | animal sample | Domestic | Animal | Suomi / Finland | 29 | 5 | 5 | |

| | Echinococcus spp., unspecified |
|---|---|
| Cattle (bovine animals) - Slaughterhouse - Surveillance | |
| Sheep - Slaughterhouse - Surveillance | |

## Table Echinococcus in animals

| | Echinococcus spp., unspecified |
|---|---|
| Pigs - Slaughterhouse - Surveillance | |
| Solipeds, domestic - horses - Slaughterhouse - Surveillance | |
| Reindeers - Slaughterhouse - Surveillance | |
| Raccoon dogs | |
| Foxes - Monitoring | |
| Reindeers - semi-domesticated - Slaughterhouse - Surveillance | |
| Voles - wild (Population monitoring) | |
| Wolves - wild - Monitoring | |

# 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 in wildlife. The occurence of toxoplasmosis is based on diagnosis at necropsy on animals sent to the Finnish Food Safety Authority Evira for determination of cause of death and/or illness.
There is no active 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 strategy | Sampler | Sample type | Sample origin | Analytical Method | Sampling unit | Units tested | Total units positive for Toxoplasma | T. gondii | Toxoplasma spp., unspecified |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sheep - Farm - Clinical investigations | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Histology | Animal | 324 | 2 | | 2 |
| Dogs - Clinical investigations | Evira | Suspect sampling | Not applicable | animal sample | Domestic | Histology | Animal | 763 | 1 | | 1 |
| Cats - Clinical investigations | Evira | Unspecified | Not applicable | animal sample | Domestic | Histology | Animal | 254 | 4 | | 4 |
| Finches - wild - Natural habitat - Unspecified (Bird found dead and sent for necropsy.) | Evira | Unspecified | Not applicable | animal sample | Domestic | Histology | Animal | 5 | 2 | | 2 |
| Hares - wild - Natural habitat - Unspecified (Animals found dead are randomly sent for necropsy.) | Evita | Unspecified | Not applicable | animal sample | Domestic | Histology | Animal | 60 | 3 | | 3 |
| Rabbits - pet animals - Unspecified (Pet animal sent to determine cause of death.) | Evira | Unspecified | Not applicable | animal sample | Domestic | Histology | Animal | 21 | 1 | | 1 |

Footnote:

PCR and IHC are used for confirmation.

# 2.11 RABIES

## 2.11.1 General evaluation of the national situation

### A. Rabies general evaluation

#### History of the disease and/or infection in the country

Rabies was common in the Finnish dog population at the beginning of the 20th century but the disease was eradicated from the country by vaccinating local dog populations during the 1950's. In April 1988, a local spot of essentially sylvatic rabies was discovered in south-eastern Finland. Between April 1988 and February 1989 a total of 66 virologically verified cases were recorded within a geographical area of 1 700 km2. As a first measure the local dog population in the area, some 8 000 animals, were vaccinated against rabies at the expense of the state. At the same time it was also highly recommended to vaccinate all the other dogs. In co-operation with the WHO surveillance centre in Tübingen, Germany, a field campaign of oral vaccination of raccoon dogs and foxes was started in September 1988. During four distribution operations, the last one in the autumn 1990, a total of 200 000 Tübingen baits were distributed. In accordance with the WHO standards, Finland was declared rabies free in March 1991 after two years with no cases of rabies.
Rabies in bats was suspected for the first time in 1985 when a bat researcher died. He had handled bats in several countries during the previous year and it could not be concluded where the researcher had become infected. Despite an epidemiological study in bats 1986 and subsequent rabies 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 is high and it poses a continuous risk for the reintroduction of the disease. The present control of wildlife rabies appears successful and important. Rabies in bats and the import of animals from endemic areas, however, remains a risk, which can be reduced by increasing public awareness of the disease.

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

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

#### Recent actions taken to control the zoonoses

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

## Suggestions to the European Union 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, sequencing)

#### 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 843/2013 of the Veterinary and Food Department (2 Dec 2013).

## Results of the investigation

In 2013, 30 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 is 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, blood, teeth / bone of the jaw

#### 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 2011, 80 000 bait vaccines were distributed aerially in April-May and 180 000 vaccines in September-October over a 20-40 km wide and 450 km long zone along the south eastern border against Russia. In 2012 and 2013, 180 000 baits were delivered in the spring and 180 000 baits in the autumn.

### 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 843/2013 of the Veterinary and Food Department (2 Dec 2013).

### Results of the investigation

In 2013 a total of 893 wild animals were examined for rabies, rabies was not detected in these samples.

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

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

disease.

## Additional information

Bat rabies surveillance: Altogether, 1156 bats of seven species were examined for lyssaviruses in Finland during 28 years (1985–2012), 898 in active surveillance and 258 in passive surveillance, with only one positive finding of EBLV-2 in a Daubenton’s bat in 2009. In 2010–2011, saliva samples from 774 bats of seven species were analyzed for EBLV viral RNA, and sera from 423 bats were analyzed for the presence of bat lyssavirus antibodies. Antibodies against EBLV-2 were detected in Daubenton’s bats in samples collected from two locations in 2010 and from one location in 2011. All seropositive locations are in close proximity to the place where the EBLV-2 positive Daubenton’s bat was found in 2009. In active surveillance, no EBLV viral RNA was detected.

## Table Rabies in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Region | Units tested | Total units positive for Lyssavirus (rabies) | Rabies virus (RABV) | EBLV-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) | Evira | Suspect sampling | Official sampling | animal sample > brain | Domestic | Animal | Suomi / Finland | 2 | 0 | | |
| Sheep | Evira | Suspect sampling | Official sampling | animal sample > brain | Domestic | Animal | Suomi / Finland | 0 | 0 | | |
| Goats | Evira | Suspect sampling | Official sampling | animal sample > brain | Domestic | Animal | Suomi / Finland | 0 | 0 | | |
| Pigs | Evira | Suspect sampling | Official sampling | animal sample > brain | Domestic | Animal | Suomi / Finland | 0 | 0 | | |
| Solipeds, domestic | Evira | Suspect sampling | Official sampling | animal sample > brain | Domestic | Animal | Suomi / Finland | 1 | 0 | | |
| Bats - wild - Monitoring | Evira | Convenience sampling | Not applicable | animal sample > brain | Domestic | Animal | Suomi / Finland | 14 | 0 | | |
| Foxes - wild - Monitoring | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 170 | 0 | | |
| Raccoon dogs - wild - Monitoring | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 473 | 0 | | |
| Wolves - wild - Monitoring | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 28 | 0 | | |
| Badgers - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 14 | 0 | | |
| Bears - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 5 | 0 | | |

## Table Rabies in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Sampling unit | Region | Units tested | Total units positive for Lyssavirus (rabies) | Rabies virus (RABV) | EBLV-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cats - pet animals | Evira | Suspect sampling | Official sampling | animal sample > brain | | Animal | Suomi / Finland | 10 | 0 | | |
| Dogs - pet animals | Evira | Suspect sampling | Official sampling | animal sample > brain | | Animal | Suomi / Finland | 30 | 0 | | |
| Lynx - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 124 | 0 | | |
| Marten - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 31 | 0 | | |
| Minks - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 4 | 0 | | |
| Other carnivores - wild [1)] | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 1 | 0 | | |
| Otter - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 22 | 0 | | |
| Polecats - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 6 | 0 | | |
| Wolverine - wild | Evira | Census | | animal sample > brain | Domestic | Animal | Suomi / Finland | 1 | 0 | | |

| | EBLV-2 | Lyssavirus (unspecified virus) |
|---|---|---|
| Cattle (bovine animals) | | |

## Table Rabies in animals

| | EBLV-2 | Lyssavirus (unspecified virus) |
|---|---|---|
| Sheep | | |
| Goats | | |
| Pigs | | |
| Solipeds, domestic | | |
| Bats - wild - Monitoring | | |
| Foxes - wild - Monitoring | | |
| Raccoon dogs - wild - Monitoring | | |
| Wolves - wild - Monitoring | | |
| Badgers - wild | | |
| Bears - wild | | |
| Cats - pet animals | | |
| Dogs - pet animals | | |
| Lynx - wild | | |
| Marten - wild | | |
| Minks - wild | | |
| Other carnivores - wild [1)] | | |
| Otter - wild | | |
| Polecats - wild | | |
| Wolverine - wild | | |

Table Rabies in animals

Comments:

[1)] arctic fox

## 2.12 STAPHYLOCOCCUS INFECTION

### 2.12.1 General evaluation of the national situation

## 2.13 Q-FEVER

### 2.13.1 General evaluation of the national situation

#### A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

No domestic human cases have ever been detected in Finland. Testing of farm animals for Q-fever has taken place earlier only in connection with export. Related to export, C. burnetii antibodies were found in Finland for the first time, in 2008, in bovine animals at one dairy farm. No clinical cases were detected at this farm. After that surveys have been conducted to study the prevalence of C. burnetii antibodies in dairy cattle, as well as in the goat and sheep population. There has never been reported suspicion for Q-fever in animals based on disease symptoms. After 2008 passive surveillance has been in place by testing of sheep, goats and bovine animals due to abortion.

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

The relevance seems to be negligible both to humans and animals.

## 2.13.2 Coxiella (Q-fever) in animals

### A. C. burnetii in animal

#### Monitoring system

##### Sampling strategy

1. Clinical suspicion due to abortions: bovine, sheep and goats
2. Export purposes

##### Frequency of the sampling

1. and 2. Continuous;

##### Type of specimen taken

serum

##### Methods of sampling (description of sampling techniques)

1. and 2. Samples are taken from living animals at farm;

##### Case definition

The animal is seropositive if ELISA test is positive

##### Diagnostic/analytical methods used

ELISA-test
Detection of the agent by PCR

#### Control program/mechanisms

##### The control program/strategies in place

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

#### Notification system in place

Immediately notifiable since 1995.

#### Results of the investigation

During year 2013 376 cattle from 120 farms, 65 sheep from 18 farms and 2 goats from 2 farms were tested due to abortion, all animals with negative results. 18 cattle from the same AI farm tested due to export, all with negative results.

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

There is low prevalence (0,2% in 2010) of Q-fever antibodies in bulk milk of dairy cattle, and Q-fever antibodies have never been detected in sheep and goats.
In 2011 a survey for antibodies in sheep and goats was conducted. Around 6,6% of all the sheep and 16,7% of all goat herds in Finland was included in the survey and all tested samples were negative.

#### Additional information

## Table Coxiella burnetii (Q fever) in animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Analytical Method | Sampling unit | Units tested | Total units positive for Coxiella (Q-fever) | C. burnetii | No of clinically affected herds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cattle (bovine animals) - Farm - Clinical investigations | Evira | Suspect sampling | Official sampling | animal sample > blood | Domestic | ELISA | Animal | 376 | 0 | | 0 |
| Sheep - Farm - Clinical investigations | Evira | Suspect sampling | Official sampling | animal sample > blood | Domestic | ELISA | Animal | 65 | 0 | | 0 |
| Goats - Farm - Clinical investigations | Evira | Suspect sampling | Official sampling | animal sample > blood | Domestic | ELISA | Animal | 2 | 0 | | 0 |

# 2.14 WEST NILE VIRUS INFECTIONS

## 2.14.1 General evaluation of the national situation

## 2.14.2 West Nile Virus in animals

### A. West Nile Virus in Animals

#### Monitoring system

##### Sampling strategy

National survey, objective sampling, imported horses.

##### Frequency of the sampling

The survey was started in October 2012 and continued for the year 2013.

##### Type of specimen taken

Serum

##### Methods of sampling (description of sampling techniques)

The samples were taken at farms by the samplers of the Finnish Horse Breeding Association.

##### Case definition

The animal is seropositive if the ELISA test is positive.
The animal is acutely infected if the IgM ELISA test is positive.

##### Diagnostic/analytical methods used

IgM ELISA test and IgG ELISA test

#### Results of the investigation

During the year 2013 193 horses from intra EU trade and 8 horses imported from outside EU were tested negative for IgM WNV antibodies (acute infection). IgG antibodies were found in 29 horses from intra EU trade and 6 horses imported from outside EU (from US). The vaccination status for WNV was known only in one horse in intra EU trade.

#### Additional information

The survey of imported horses was part of a research project "Control of infectious diseases in support of equine husbandry" with an aim to establish the incidence of equine diseases in Finland. The project was done in co-operation with Evira, the Finnish Trottind and Breeding Association (Suomen Hippos) and University of Helsinki, and it was financed by the Ministry of Agriculture and Forestry, Development Fund for Agriculture and Forestry (Makera) and Evira.

## Table West Nile Virus in Animals

| | Source of information | Sampling strategy | Sampler | Sample type | Sample origin | Vaccination status | Analytical Method | Sampling unit | Region | Units tested | Total units positive for West Nile Virus |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Imported from outside EU | Unknown | IgG ELISA | Animal | | 8 | 6 |
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Imported from outside EU | Unknown | IgM-capture ELISA (MAC-ELISA) | Animal | | 8 | 0 |
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Intra EU trade | Unknown | IgG ELISA | Animal | | 192 | 28 |
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Intra EU trade | Unknown | IgM-capture ELISA (MAC-ELISA) | Animal | | 192 | 0 |
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Intra EU trade | yes | IgG ELISA | Animal | | 1 | 1 |
| Solipeds, domestic - horses - Farm - Survey - national survey | Evira | Objective sampling | Official sampling | animal sample > blood | Intra EU trade | yes | IgM-capture ELISA (MAC-ELISA) | Animal | | 1 | 0 |

# 3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

# 3.1 ESCHERICHIA COLI, NON-PATHOGENIC

## 3.1.1 General evaluation of the national situation

## 3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

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

#### Sampling strategy used in monitoring

##### Frequency of the sampling

The number of randomly taken samples from each slaughterhouse was proportional to the annual slaughter throughput. The collected samples were evenly distributed between February and December in 2013. The slaughterhouses accounted approximately for 95% of the total number of slaughtered animals in Finland.

##### Type of specimen taken

Faeces from healthy animals

##### Methods of sampling (description of sampling techniques)

The samples were taken aseptically and transported refridgerated to the laboratory within 2 days.

##### Procedures for the selection of isolates for antimicrobial testing

One E. coli isolate from each sample, if available, was tested for antimicrobial susceptibility. Each sample represented different epidemiological units (pig holdings).

##### Methods used for collecting data

Isolation and antimicrobial susceptibility testing was performed by the Finnish Food Safety Authority Evira.

#### Laboratory methodology used for identification of the microbial isolates

Intestinal content was directly spread on Brialliance E. coli/coliform selective agar plates (Oxoid) and incubated overnight at 37 C. Typical colonies were selected for susceptibility testing.

#### Laboratory used for detection for resistance

##### Antimicrobials included in monitoring

The broth microdilution method was used (VetMIC, National Veterinary Institute SVA, Sweden). The susceptibility testing was performed according to the CLSI standards; Escherichia coli ATCC 25922 was used as a quality control strain. The following antimicrobials were tested: ampicillin, ciprofloxacin, nalidixic acid, gentamicin, streptomycin, tetracycline, florfenicol, colistin, sulfamethoxazole, trimethoprim, chloramphenicol, kanamycin, cefotaxime and ceftazidime.

##### Cut-off values used in testing

EUCAST ECOFFs

#### Preventive measures in place

No preventive measures are applied to indicator bacteria from healthy animals.

#### Results of the investigation

The antimicrobial resistance levels in indicator E. coli in pigs varied from low to moderate. The most common resistance traits were seen against tetracycline, streptomycin, sulfamethoxazole, trimethoprim

and ampicillin (in descending order).

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

The resistance has been quite stable compared to the years 2007 and 2010.

# Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| E.coli, non-pathogenic, unspecified | Pigs - fattening pigs - Slaughterhouse - Monitoring | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 315 | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 2 | 315 | 3 | | | | | | | | | 1 | 81 | 194 | 36 | 2 | 1 | | | | | | | | | |
| Aminoglycosides - Kanamycin | 8 | 315 | 9 | | | | | | | | | | | | | | 306 | 9 | | | | | | | | |
| Aminoglycosides - Streptomycin | 16 | 315 | 58 | | | | | | | | | | | | 2 | 30 | 180 | 45 | 5 | 11 | 17 | 25 | | | | |
| Amphenicols - Chloramphenicol | 16 | 315 | 3 | | | | | | | | | | | | 20 | 207 | 81 | 4 | 1 | 2 | | | | | | |
| Amphenicols - Florfenicol | 16 | 315 | 0 | | | | | | | | | | | | | 176 | 131 | 8 | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.25 | 315 | 2 | | | | | | 23 | 189 | 100 | 1 | 1 | 1 | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 315 | 6 | | | | | 7 | 150 | 152 | 3 | 2 | 1 | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 315 | 30 | | | | | | | | | | | 77 | 176 | 30 | 2 | | | 2 | 28 | | | | | |
| Quinolones - Nalidixic acid | 16 | 315 | 4 | | | | | | | | | | | 6 | 180 | 118 | 7 | | 1 | 1 | 2 | | | | | |
| Tetracyclines - Tetracycline | 8 | 315 | 74 | | | | | | | | | | | 201 | 38 | 2 | | 1 | 25 | 32 | 16 | | | | | |
| Trimethoprim | 2 | 315 | 39 | | | | | | | | 8 | 62 | 153 | 52 | 1 | | 2 | 37 | | | | | | | | |
| Cephalosporins - Ceftazidime | 0.5 | 315 | 2 | | | | | | | | | 262 | 51 | | 1 | 1 | | | | | | | | | | |
| Polymyxins - Colistin | 2 | 315 | 0 | | | | | | | | | | 235 | 72 | 8 | | | | | | | | | | | |
| Sulfonamides - Sulfamethoxazole | 64 | 315 | 43 | | | | | | | | | | | | | | 148 | 64 | 50 | 10 | | | | 43 | | |

## Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| E.coli, non-pathogenic, unspecified | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 315 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 0.12 | 16 |
| Aminoglycosides - Kanamycin | 8 | 16 |
| Aminoglycosides - Streptomycin | 2 | 256 |
| Amphenicols - Chloramphenicol | 2 | 64 |
| Amphenicols - Florfenicol | 4 | 32 |
| Cephalosporins - Cefotaxime | 0.016 | 2 |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 1 |
| Penicillins - Ampicillin | 1 | 128 |
| Quinolones - Nalidixic acid | 1 | 128 |
| Tetracyclines - Tetracycline | 1 | 128 |
| Trimethoprim | 0.12 | 16 |
| Cephalosporins - Ceftazidime | 0.25 | 16 |
| Polymyxins - Colistin | 0.5 | 4 |
| Sulfonamides - Sulfamethoxazole | 8 | 1024 |

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

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

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | EFSA | 2 | |
| | Streptomycin | EFSA | 16 | |
| Amphenicols | Chloramphenicol | EFSA | 16 | |
| Cephalosporins | Cefotaxime | EFSA | 0.25 | |
| | Ceftazidime | EFSA | 0.5 | |
| Fluoroquinolones | Ciprofloxacin | EFSA | 0.064 | |
| Penicillins | Ampicillin | EFSA | 8 | |
| Quinolones | Nalidixic acid | EFSA | 16 | |
| Sulfonamides | Sulfonamides | NON-EFSA | | |
| | Sulfamethoxazole | EFSA | 64 | |
| Tetracyclines | Tetracycline | EFSA | 8 | |
| Trimethoprim | Trimethoprim | EFSA | 2 | |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 16 | |
| Amphenicols | Chloramphenicol | | 16 | |
| Cephalosporins | Cefotaxime | | 0.25 | |
| | Ceftazidime | | 0.5 | |
| Fluoroquinolones | Ciprofloxacin | | 0.064 | |
| Penicillins | Ampicillin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Sulfonamides | Sulfonamides | | 256 | |
| | Sulfamethoxazole | | 64 | |
| Tetracyclines | Tetracycline | | 8 | |
| Trimethoprim | Trimethoprim | | 2 | |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

| | | | Concentration (microg/ml) | Zone diameter (mm) |
|---|---|---|---|---|
| | | Standard | Resistant > | Resistant <= |
| Aminoglycosides | Gentamicin | | 2 | |
| | Streptomycin | | 16 | |
| Amphenicols | Chloramphenicol | | 16 | |
| Cephalosporins | Cefotaxime | | 0.25 | |
| | Ceftazidime | | 0.5 | |
| Fluoroquinolones | Ciprofloxacin | | 0.064 | |
| Penicillins | Ampicillin | | 8 | |
| Quinolones | Nalidixic acid | | 16 | |
| Sulfonamides | Sulfonamides | | 256 | |
| | Sulfamethoxazole | | 64 | |
| Tetracyclines | Tetracycline | | 8 | |
| Trimethoprim | Trimethoprim | | 2 | |

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

# 3.2 ENTEROCOCCUS, NON-PATHOGENIC

## 3.2.1 General evaluation of the national situation

## 3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

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

#### Sampling strategy used in monitoring

##### Frequency of the sampling

The number of randomly taken samples from each slaughterhouse was proportional to the annual slaughter throughput. The collected samples were evenly distributed between February and December in 2013. The slaughterhouses accounted approximately for 95% of the total number of slaughtered animals in Finland.

##### Type of specimen taken

Faeces from healthy animals

##### Methods of sampling (description of sampling techniques)

The samples were taken aseptically and transported to the laboratory within 2 days.

##### Procedures for the selection of isolates for antimicrobial testing

One Enterococcus faecium and Enterococcus faecalis isolate from each sample, if available, was tested for antimicrobial susceptibility. Each sample represented different epidemiological units (pig holdings).

##### Methods used for collecting data

Isolation and antimicrobial susceptibility testing was performed by the Finnish Food Safety Authority Evira.

#### Laboratory methodology used for identification of the microbial isolates

Intestinal content was directly spread on Slanetz-Bartley agar and incubated at 37 C for 48 ± 4 h. One or two randomly chosen typical colonies were sub-cultured on bile-esculine agar and blood agar (37 C / overnight). Colonies with a positive esculine reaction were further identified as E. faecium or E. faecalis with a mannitol plate test and by PCR (Dutka-Malen et al. 1996).

#### Laboratory used for detection for resistance

##### Antimicrobials included in monitoring

VetMIC broth microdilution method (Department of Antibiotics, National Veterinary Institute, Sweden) was used and the testing was performed according to the CLSI standards; Enterococcus faecalis ATCC 29212 was used as a quality control strain. The following antimicrobials were included: ampicillin, erythromycin, virginiamycin, gentamicin, streptomycin, kanamycin, tetracycline, chloramphenicol, vancomycin, narasin, basitracin and linezolide.

##### Cut-off values used in testing

EUCAST ECOFFs

#### Preventive measures in place

No preventive measures are applied to indicator bacteria from healthy animals.

#### Results of the investigation

The resistance was very high against tetracycline in E. faecalis and high against erythromycin in both E. faecalis and E. faecium. Otherwise, resistance levels in enterococci varied from rare to low.

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

The resistance situation has been quite stable among enterococci isolates from pigs.

# Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| E. faecalis | Pigs - fattening pigs - Slaughterhouse - Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 53 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 32 | 53 | 1 | | | | | | | | | | | | | | 7 | 40 | 5 | | | 1 | | | | |
| Aminoglycosides - Streptomycin | 512 | 53 | 4 | | | | | | | | | | | | | | | | | 2 | 39 | 8 | | 4 | | |
| Amphenicols - Chloramphenicol | 32 | 53 | 1 | | | | | | | | | | | | | 1 | 39 | 12 | | 1 | | | | | | |
| Penicillins - Ampicillin | 4 | 53 | 0 | | | | | | | | | | 3 | 49 | 1 | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 4 | 53 | 38 | | | | | | | | | | 1 | 14 | | | 1 | | 11 | 26 | | | | | | |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 32 | 53 | 2 | | | | | | | | | | | | | 4 | 33 | 14 | | | 2 | | | | | |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 4 | 53 | 0 | | | | | | | | | | | 35 | 18 | | | | | | | | | | | |
| Ionophores - Narasin | 2 | 53 | 0 | | | | | | | | | 11 | 42 | | | | | | | | | | | | | |
| Macrolides - Erythromycin | 4 | 53 | 18 | | | | | | | | | | 5 | 16 | 9 | 5 | 1 | | | 17 | | | | | | |
| Oxazolidines - Linezolid | 4 | 53 | 0 | | | | | | | | | | | 2 | 38 | 13 | | | | | | | | | | |
| Streptogramins - Virginiamycin | 32 | 53 | 0 | | | | | | | | | | | | 2 | 1 | 11 | 38 | 1 | | | | | | | |

| E. faecalis | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 53 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 2 | 256 |

## Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| E. faecalis | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 53 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Streptomycin | 8 | 1024 |
| Amphenicols - Chloramphenicol | 0.5 | 64 |
| Penicillins - Ampicillin | 0.25 | 32 |
| Tetracyclines - Tetracycline | 0.5 | 64 |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 1 | 128 |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 1 | 128 |
| Ionophores - Narasin | 0.12 | 16 |
| Macrolides - Erythromycin | 0.5 | 64 |
| Oxazolidines - Linezolid | 0.5 | 16 |
| Streptogramins - Virginiamycin | 0.5 | 64 |

# Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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

| E. faecium | Pigs - fattening pigs - Slaughterhouse - Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isolates out of a monitoring program (yes/no) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of isolates available in the laboratory | 41 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >4096 |
| Aminoglycosides - Gentamicin | 32 | 41 | 0 | | | | | | | | | | | | | 7 | 26 | 8 | | | | | | | | |
| Aminoglycosides - Streptomycin | 128 | 41 | 1 | | | | | | | | | | | | | | | | 8 | 26 | 6 | | | 1 | | |
| Amphenicols - Chloramphenicol | 32 | 41 | 0 | | | | | | | | | | | | | 9 | 32 | | | | | | | | | |
| Penicillins - Ampicillin | 4 | 41 | 0 | | | | | | | | | 4 | 3 | 25 | 5 | 4 | | | | | | | | | | |
| Tetracyclines - Tetracycline | 4 | 41 | 4 | | | | | | | | | | 21 | 16 | | | | | | 4 | | | | | | |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 32 | 41 | 1 | | | | | | | | | | | | 2 | | 5 | 23 | 10 | | 1 | | | | | |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 4 | 41 | 0 | | | | | | | | | | | 37 | 2 | 2 | | | | | | | | | | |
| Ionophores - Narasin | 4 | 41 | 0 | | | | | | | | | 3 | 21 | 17 | | | | | | | | | | | | |
| Macrolides - Erythromycin | 4 | 41 | 15 | | | | | | | | | | 4 | 1 | 3 | 18 | 8 | 3 | 3 | 1 | | | | | | |
| Oxazolidines - Linezolid | 4 | 41 | 0 | | | | | | | | | | | | 27 | 14 | | | | | | | | | | |
| Streptogramins - Virginiamycin | 4 | 41 | 0 | | | | | | | | | | 12 | 5 | 23 | 1 | | | | | | | | | | |

| E. faecium | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 41 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Gentamicin | 2 | 256 |

## Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - Slaughterhouse - Domestic - Monitoring - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

| E. faecium | Pigs - fattening pigs - Slaughterhouse - Monitoring | |
|---|---|---|
| Isolates out of a monitoring program (yes/no) | | |
| Number of isolates available in the laboratory | 41 | |
| Antimicrobials: | lowest | highest |
| Aminoglycosides - Streptomycin | 8 | 1024 |
| Amphenicols - Chloramphenicol | 0.5 | 64 |
| Penicillins - Ampicillin | 0.25 | 32 |
| Tetracyclines - Tetracycline | 0.5 | 64 |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 1 | 128 |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 1 | 128 |
| Ionophores - Narasin | 0.12 | 16 |
| Macrolides - Erythromycin | 0.5 | 64 |
| Oxazolidines - Linezolid | 0.5 | 16 |
| Streptogramins - Virginiamycin | 0.5 | 64 |

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

| Test Method Used |
| --- |
| Broth dilution |

| Standard methods used for testing |
| --- |
| NCCLS/CLSI |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

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

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

| Test Method Used |
| --- |
| Broth dilution |

| Standard methods used for testing |
| --- |
| NCCLS/CLSI |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

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

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

| Test Method Used | Standard methods used for testing |
|---|---|
| | |

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

# 4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

## 4.1 CRONOBACTER

### 4.1.1 General evaluation of the national situation

## 4.2 HISTAMINE

### 4.2.1 General evaluation of the national situation

## 4.3 STAPHYLOCOCCAL ENTEROTOXINS

### 4.3.1 General evaluation of the national situation

# 5. FOODBORNE

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

## A. Foodborne outbreaks

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

Systematic collection of information about foodborne outbreaks in Finland began in 1975. The local food control and health officials are responsible for investigating and reporting foodborne outbreaks in their area. Collection of 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 (1365/2011) concerning the follow-up and reporting of food poisoning and foodborne infections and the Communicable Diseases Decree (786/86). Physicians have to notify all cases of communicable diseases to the National Institute for Health and Welfare (THL). The data is recorded in the National Infectious Diseases Register in Finland. The local municipal outbreak investigation group has to notify THL in case an outbreak is suspected. The local municipal outbreak investigation groups are responsible for the investigation of every suspected food- and waterborne outbreak in their area and for its reporting to the Finnish Food Safety Authority Evira. The notification and final investigation reports are submitted by an electronic reporting system, which provides the data simultaneously to all relevant authorities involved in or supporting the outbreak investigation, e.g. the National Supervisory Authority for Welfare and Health (Valvira) which is the central coordinating authority in waterborne outbreaks.

The system also stores the data in the National Food Poisoning Register (NFPR). The system has been in use since the beginning of 2010. Evira evaluates each final municipal report in co-operation with THL in order to classify the outbreaks based on the strength of evidence. The data is recorded in the National Food Poisoning Register and a national summary report on outbreaks is published by Evira every third year. There were no major differences in the reporting activity at the national level in 2013 compared to previous years. By the introduction of the electronic reporting system, the pick lists used for the collection of data into the National Food Poisoning Register have been harmonized with data collection on EU level by EFSA.

### Description of the types of outbreaks covered by the reporting:

All general domestic food- and waterborne outbreaks must be reported in Finland. Illness of more than two persons with similar symptoms from a single source is considered a cluster and a suspected outbreak. Sporadic cases (except for botulism) and infections acquired abroad are not included in the NFPR, whereas they are included in the infectious disease register. Family outbreaks are reported if commercial foodstuffs are suspected of being the source of illness or several persons are at risk. Obligatory reporting includes definite communicable diseases and traditional foodborne agents such as those causing intoxications. Foodborne outbreaks caused by chemical agents other than toxins and biological amines produced by microorganisms are included in the national register though they are not reported to EFSA.

### National evaluation of the reported outbreaks in the country:

#### Trends in numbers of outbreaks and numbers of human cases involved

In 2013, the municipal food control authorities notified 43 food- and waterborne outbreaks, of which 41 were associated with food and two with drinking water. The total number of outbreaks was almost the same as in year 2012. Since 2001, the annual number of reported outbreaks has fluctuated between 32 and 58 with a few year intervals. The lowest number so far, 32 outbreaks, was recorded in 2007. Most of the reported outbreaks are foodborne (95 % in 2013). The number of human cases follows the number of outbreaks usually varying from about 800 to 2000 disease cases annually. Usually about 50 % of the reported outbreaks have been medium size when evaluated by number of cases per outbreak (11-100 persons infected). A few large waterborne outbreaks with a very large number of human cases have been reported. E.g. due to contaminated drinking water, a total of >8000 persons became ill in an outbreak in 2007.

### 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 2013 norovirus caused 14 (33%) foodborne outbreaks. Finland was part of the Nordic Hepatitis A outbreak with 15 cases out of a total of 114 cases. EHEC caused two severe but quite small outbreaks. Classic food poisoning bacteria like Bacillus cereus (3), and Salmonella (2) from different sources caused 5 foodborne outbreaks. Histamine caused one foodborne outbreak. In 18 (42 %) of the foodborne outbreaks the causative agent remained unknown. In these cases however, the investigations showed descriptive epidemiological association between eating a certain food, meal or drinking water and becoming ill. The most common vehicle (60%) reported in 2013 was a buffet meal where no specific food item was determined as the cause of the outbreak. The investigations revealed a specific food to be the vehicle in only 14 (33 %) outbreaks. Of these, the most common vehicles (6; 14 %) were vegetables and juices and other products thereof.

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

In 23 (53 %) outbreaks 2013, the place of exposure was a restaurant. In 22 (51 %) outbreaks the place of origin of problem was in a restaurant.

### Evaluation of the severity and clinical picture of the human cases

Altogether 767 persons were reported to fall ill in food- and waterborne outbreaks in 2013. The number of patients afflicted by food poisoning was 553persons (72 %), while 214 persons (28 %) were infected through contaminated drinking water. According to the reports, 36 persons were hospitalized in 11 outbreaks. The HAV outbreak (11/15) and the EHEC outbreaks (11/12 and 4/8) had the highest number of cases admitted to hospital.

### Descriptions of single outbreaks of special interest

In May - June, more than 170 people in 10 different customer groups fell ill with gastroenteritis after visiting a remote hotel. Prolonged outbreak concerned several visiting groups at the hotel. One of the suggested causes for the outbreak, among foodstuff and human to human contacts, was drinking water. The symptoms, incubation time and duration of the disease pointed to norovirus, but patient samples analyzed by conventional PCR diagnostic methods were negative for norovirus or sapoviruses. Further molecular biological analyses conducted by the National Institute for Health and Welfare found an unusual genotype 1 norovirus. The same type of virus was then found in a repeat analysis of a water sample taken in May and from swab samples taken from surfaces at the hotel. Drinking water abstracted from the hotels' own borehole well was not treated before consumption. The outbreak was brought under control by setting boiling instructions for water, cleaning and disinfecting the household water system, and by enhancing the cleaning of the hotel premises to prevent secondary infections. The causative reason for the contamination of water remained unsolved.

### Control measures or other actions taken to improve the situation

In general, all food- and waterborne outbreaks are investigated by local food control and health officials. In widespread outbreaks, the central administration is in charge of coordinating the investigations. An investigation comprises an epidemiological investigation, detection of contributing factors, sampling and revision of the in-house control system. Information received about foodborne outbreaks, contributory factors and causative agents are analyzed and actively used in the education and training of food control officials and food business operators. Since 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 obtaining a hygiene proficiency certificate or a certificate of vocational qualification. Independent Proficiency Examiners accredited by the Finnish Food Safety Authority Evira organize hygiene proficiency examinations in different parts of the country. Information and recommendations about identified causative agents, risk foods or raw material are given to entrepreneurs, producers and consumers. The Finnish Salmonella control program has successfully ensured salmonella free foodstuffs on the market and only a small number of human salmonellosis infections are domestically acquired.

Other control programs have been established and other measures taken in order to control outbreaks caused by the most important zoonoses. The prevailing national system for monitoring and surveillance of zoonoses covers Campylobacter, Listeria and the EHEC bacterium in production animals and foodstuffs. The Finnish Strategy on Zoonoses was revised in 2013, highlighting Campylobacter, Yersinia, Listeria, the EHEC bacterium and norovirus as the main foodborne agents that the key actions are targeted on. The network-like Finnish Zoonosis Centre between the national organizations; the Finnish Food Safety Authority Evira and the National Institute for Health and Welfare, have ensured the collaborative efforts of both the veterinary and the health sector for monitoring and prevention of diseases transmitted between animals and people, since 2007.

## Suggestions to the European Union for the actions to be taken

Possible measures or legal proposals on foodborne viruses.

## Table Foodborne Outbreaks: summarised data

| | Weak evidence or no vehicle outbreaks | | | | | |
|---|---|---|---|---|---|---|
| | Number of outbreaks | Human cases | Hospitalized | Deaths | Strong evidence Number of Outbreaks | Total number of outbreaks |
| Salmonella - S. Typhimurium | 0 | unknown | unknown | unknown | 1 | 1 |
| Salmonella - S. Enteritidis | 0 | unknown | unknown | unknown | 0 | 0 |
| Salmonella - Other serovars | 1 | 4 | 0 | 0 | 0 | 1 |
| Campylobacter | 0 | unknown | unknown | unknown | 0 | 0 |
| Listeria - Listeria monocytogenes | 0 | unknown | unknown | unknown | 0 | 0 |
| Listeria - Other Listeria | 0 | unknown | unknown | unknown | 0 | 0 |
| Yersinia | 0 | unknown | unknown | unknown | 0 | 0 |
| Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC) | 2 | 20 | 15 | 0 | 0 | 2 |
| Bacillus - B. cereus | 1 | 5 | 0 | 0 | 2 | 3 |
| Bacillus - Other Bacillus | 0 | unknown | unknown | unknown | 0 | 0 |
| Staphylococcal enterotoxins | 0 | unknown | unknown | unknown | 0 | 0 |
| Clostridium - Cl. botulinum | 0 | unknown | unknown | unknown | 0 | 0 |
| Clostridium - Cl. perfringens | 0 | unknown | unknown | unknown | 0 | 0 |

| | Weak evidence or no vehicle outbreaks | | | | | |
|---|---|---|---|---|---|---|
| | Number of outbreaks | Human cases | Hospitalized | Deaths | Strong evidence Number of Outbreaks | Total number of outbreaks |
| Clostridium - Other Clostridia | 0 | unknown | unknown | unknown | 0 | 0 |
| Other Bacterial agents - Brucella | 0 | unknown | unknown | unknown | 0 | 0 |
| Other Bacterial agents - Shigella | 0 | unknown | unknown | unknown | 0 | 0 |
| Other Bacterial agents - Other Bacterial agents | 0 | unknown | unknown | unknown | 0 | 0 |
| Parasites - Trichinella | 0 | unknown | unknown | unknown | 0 | 0 |
| Parasites - Giardia | 0 | unknown | unknown | unknown | 0 | 0 |
| Parasites - Cryptosporidium | 0 | unknown | unknown | unknown | 0 | 0 |
| Parasites - Anisakis | 0 | unknown | unknown | unknown | 0 | 0 |
| Parasites - Other Parasites | 0 | unknown | unknown | unknown | 0 | 0 |
| Viruses - Norovirus | 7 | 170 | 2 | 0 | 7 | 14 |
| Viruses - Hepatitis viruses | 0 | unknown | unknown | unknown | 1 | 1 |
| Viruses - Other Viruses | 0 | unknown | unknown | unknown | 0 | 0 |
| Other agents - Histamine | 0 | unknown | unknown | unknown | 3 | 3 |
| Other agents - Marine biotoxins | 0 | unknown | unknown | unknown | 0 | 0 |
| Other agents - Other Agents | 0 | unknown | unknown | unknown | 0 | 0 |

| | Weak evidence or no vehicle outbreaks | | | | | |
|---|---|---|---|---|---|---|
| | Number of outbreaks | Human cases | Hospitalized | Deaths | Strong evidence Number of Outbreaks | Total number of outbreaks |
| Unknown agent | 17 | 158 | 3 | 0 | 1 | 18 |

## Table Foodborne Outbreaks: detailed data for Bacillus

Please use CTRL for multiple selection fields

### B. cereus

| | Value |
|---|---|
| FBO Code | 287 |
| Number of outbreaks | 1 |
| Number of human cases | 4 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Herbs and spices |
| More food vehicle information | |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Restaurant or Cafe or Pub or Bar or Hotel or Catering service |
| Origin of food vehicle | Unknown |
| Contributory factors | Storage time/temperature abuse;Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## B. cereus

| | Value |
|---|---|
| FBO Code | 291 |
| Number of outbreaks | 1 |
| Number of human cases | 2 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Vegetables and juices and other products thereof |
| More food vehicle information | Mixed salad |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Restaurant or Cafe or Pub or Bar or Hotel or Catering service |
| Origin of food vehicle | Unknown |
| Contributory factors | Storage time/temperature abuse |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Table Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

### Histamine

| | Value |
|---|---|
| FBO Code | 271 |
| Number of outbreaks | 1 |
| Number of human cases | 9 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Fish and fish products |
| More food vehicle information | Tuna sauce |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent |
| Outbreak type | General |
| Setting | School or kindergarten |
| Place of origin of problem | Unknown |
| Origin of food vehicle | Unknown |
| Contributory factors | Unknown |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Histamine

| | Value |
|---|---|
| FBO Code | 303 |
| Number of outbreaks | 1 |
| Number of human cases | 16 |
| Number of hospitalisations | 1 |
| Number of deaths | 0 |
| Food vehicle | Buffet meals |
| More food vehicle information | |
| Nature of evidence | Descriptive epidemiological evidence |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Unknown |
| Origin of food vehicle | Unknown |
| Contributory factors | Unknown |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Histamine

| | Value |
|---|---|
| FBO Code | 296 |
| Number of outbreaks | 1 |
| Number of human cases | 2 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Fish and fish products |
| More food vehicle information | Tuna |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent |
| Outbreak type | Household |
| Setting | Household |
| Place of origin of problem | Unknown |
| Origin of food vehicle | Imported from outside EU |
| Contributory factors | Unknown |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Table Foodborne Outbreaks: detailed data for Salmonella

Please use CTRL for multiple selection fields

### S. Typhimurium

| | Value |
|---|---|
| FBO Code | 326 |
| Number of outbreaks | 1 |
| Number of human cases | 9 |
| Number of hospitalisations | 1 |
| Number of deaths | 0 |
| Food vehicle | Milk |
| More food vehicle information | Unpasteurized milk |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans |
| Outbreak type | Household |
| Setting | Household |
| Place of origin of problem | Farm |
| Origin of food vehicle | Domestic |
| Contributory factors | Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Table Foodborne Outbreaks: detailed data for Unknown agent

Please use CTRL for multiple selection fields

### Unknown

| | Value |
|---|---|
| FBO Code | 312 |
| Number of outbreaks | 1 |
| Number of human cases | 40 |
| Number of hospitalisations | 1 |
| Number of deaths | 0 |
| Food vehicle | Tap water, including well water |
| More food vehicle information | |
| Nature of evidence | Descriptive epidemiological evidence |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Water treatment plant |
| Origin of food vehicle | Domestic |
| Contributory factors | Water treatment failure |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Table Foodborne Outbreaks: detailed data for Viruses

Please use CTRL for multiple selection fields

### Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 315 |
| Number of outbreaks | 1 |
| Number of human cases | 174 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Tap water, including well water |
| More food vehicle information | |
| Nature of evidence | Analytical epidemiological evidence;Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Water treatment plant |
| Origin of food vehicle | Unknown |
| Contributory factors | Water treatment failure |
| Mixed Outbreaks (Other Agent) | |
| Additional information | In May - June, more than 170 people in 10 different customer groups fell ill with gastroenteritis after visiting a remote hotel. Prolonged outbreak concerned several visiting groups at the hotel. One of the suggested causes for the outbreak, among foodstuff and human to human contacts, was drinking water. The symptoms, incubation time and duration of the disease pointed to norovirus, but patient samples analyzed by conventional PCR diagnostic methods were negative for norovirus or sapoviruses. Further molecular biological analyses conducted by the National Institute for Health and Welfare found an unusual genotype 1 norovirus. The same type of virus was then found in a repeat analysis of a water sample taken in May and from swab samples taken from surfaces at the hotel. Drinking water abstracted from the hotels' own borehole well was not treated before consumption. The outbreak was brought under control by setting boiling instructions for water, cleaning and disinfecting the household water system, and by enhancing the cleaning of the hotel premises to prevent secondary infections. The causative reason for the contamination of water remained unsolved. |

## Hepatitis virus - Hepatitis A virus

| | Value |
|---|---|
| FBO Code | HAV |
| Number of outbreaks | 1 |
| Number of human cases | 15 |
| Number of hospitalisations | 11 |
| Number of deaths | 0 |
| Food vehicle | Fruit, berries and juices and other products thereof |
| More food vehicle information | Strawberries |
| Nature of evidence | Analytical epidemiological evidence;Descriptive epidemiological evidence |
| Outbreak type | General |
| Setting | Disseminated cases |
| Place of origin of problem | Farm |
| Origin of food vehicle | Imported from outside EU |
| Contributory factors | Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | These 15 patients are the Finnish cases that were part of the food-borne outbreak of hepatitis A in four Nordic countries (Denmark, Finland, Norway and Sweden). Frozen strawberries was the suspected food vehicle. http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20520 |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 348 |
| Number of outbreaks | 1 |
| Number of human cases | 4 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Crustaceans, shellfish, molluscs and products thereof |
| More food vehicle information | Oysters |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Farm |
| Origin of food vehicle | Intra EU trade |
| Contributory factors | Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 293 |
| Number of outbreaks | 1 |
| Number of human cases | 30 |
| Number of hospitalisations | 2 |
| Number of deaths | 0 |
| Food vehicle | Eggs and egg products |
| More food vehicle information | |
| Nature of evidence | Analytical epidemiological evidence;Descriptive epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans |
| Outbreak type | General |
| Setting | Unknown |
| Place of origin of problem | Restaurant or Cafe or Pub or Bar or Hotel or Catering service |
| Origin of food vehicle | Unknown |
| Contributory factors | Infected food handler |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 272 |
| Number of outbreaks | 1 |
| Number of human cases | 35 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Buffet meals |
| More food vehicle information | |
| Nature of evidence | Analytical epidemiological evidence;Descriptive epidemiological evidence |
| Outbreak type | General |
| Setting | Canteen or workplace catering |
| Place of origin of problem | Canteen or workplace catering |
| Origin of food vehicle | Unknown |
| Contributory factors | Infected food handler |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 305 |
| Number of outbreaks | 1 |
| Number of human cases | 33 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Buffet meals |
| More food vehicle information | |
| Nature of evidence | Analytical epidemiological evidence;Descriptive epidemiological evidence;Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans |
| Outbreak type | General |
| Setting | Canteen or workplace catering |
| Place of origin of problem | Canteen or workplace catering |
| Origin of food vehicle | Unknown |
| Contributory factors | Infected food handler |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 308 |
| Number of outbreaks | 1 |
| Number of human cases | 32 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Fruit, berries and juices and other products thereof |
| More food vehicle information | Raspberries |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans |
| Outbreak type | General |
| Setting | Canteen or workplace catering |
| Place of origin of problem | Farm |
| Origin of food vehicle | Intra EU trade |
| Contributory factors | Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |

## Calicivirus - norovirus (Norwalk-like virus)

| | Value |
|---|---|
| FBO Code | 265 |
| Number of outbreaks | 1 |
| Number of human cases | 5 |
| Number of hospitalisations | 0 |
| Number of deaths | 0 |
| Food vehicle | Crustaceans, shellfish, molluscs and products thereof |
| More food vehicle information | Oysters |
| Nature of evidence | Descriptive epidemiological evidence;Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans |
| Outbreak type | Household |
| Setting | Household |
| Place of origin of problem | Farm |
| Origin of food vehicle | Intra EU trade |
| Contributory factors | Unprocessed contaminated ingredient |
| Mixed Outbreaks (Other Agent) | |
| Additional information | |