ZOONOSES MONITORING

SWEDEN

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 2007

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **Sweden**
Reporting Year: **2007**

PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/ 99/ EC[1]. 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 Sweden during the year 2007. 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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[1] Directive 2003/ 99/ EC of the European Parliament and of the Council of 12 December 2003 on the monitoring of zoonoses and zoonotic agents, amending Decision 90/ 424/ EEC and repealing Council Directive 92/ 117/ EEC, OJ L 325, 17.11.2003, p. 31

LIST OF CONTENTS

1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information:

Most information about numbers of animals or herds is derived from the Yearbook of Agricultural Statistics 2007, Swedish Board of Agriculture, including data from 2006. Some information about the number of slaughtered animals has been collected by the National Food Administration.

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

Most data relates to 2006.

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

The definitions used in EU legislation are also used in Sweden.

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

The dairy sector plays a central role in Swedish agriculture. The number of dairy cows has, however, been decreasing over a long period of time. The number of farms with livestock is decreasing whereas those that remain increase their number of animals. In 2006, there were dairy cows in around 8000 farms. This is a decrease with 6 % compared with 2005. On the same time, herd size increased from 46 cows/ herd to 48 cows/ herd.
In 2006 there were roughly 2400 pig farms in Sweden. This is a decrease by around 90% since 1980. Also, the number of pigs are falling, and the decrease was greatest during the 1980's. Around 98 % of the fattening pigs are found in herds with at least 100 animals.
The number of sheep herds are increasing. Despite a decreasing of avarage herd size the total number of animals have slightly increased. Egg production is dominated by few but large flocks. Around 93 % of the hens of laying breed are found in herds with at least 5 000 hens. The number of hens increased during the 1980's but have now reached the lowest level in many years.

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

Most farms are located in the south and central parts of Sweden and animal husbandry is the dominant line of production. In the north of Sweden there are mostly small farms.

Table Susceptible animal populations

* Only if different than current reporting year

Animal species	Category of animals	Number of herds or flocks	Year*	Number of slaughtered animals	Year*	Livestock numbers (live animals)	Year*	Number of holdings	Year*
Cattle (bovine animals)	dairy cows and heifers (1)					387530	2006	8027	2006
	mixed herds (2)								
	meat production animals					177522	2006	12447	2006
	calves (under 1 year)			30174	2007	495510	2006	21752	2006
	in total			450366	2007	1590409	2006	25054	2006
Deer	farmed - in total (3)			3636		18416			
Ducks	grandparent breeding flocks	0	2007						
	elite breeding flocks	0	2007						
	meat production flocks	7	2007						
	in total			13552	2007				
Gallus gallus (fowl)	parent breeding flocks for egg production line	33	2007						
	grandparent breeding flocks for egg production line	0	2007						
	elite breeding flocks, unspecified - in total	0	2007						
	parent breeding flocks, unspecified - in total			522702	2007				
	elite breeding flocks for egg production line	0	2007						
	grandparent breeding flocks for meat production line	22	2007						
	parent breeding flocks for meat production line	214	2007						
	breeding flocks for meat production line - in total	236	2007						
	laying hens	778	2007	3155052	2007				
	elite breeding flocks for meat production line	0	2007						
	broilers	2428	2007	74665854	2007				
	breeding flocks for egg production line - in total	33	2007						
Geese	grandparent breeding flocks	0	2007						
	elite breeding flocks	0	2007						
	parent breeding flocks	0	2007						
	meat production flocks	7	2007						

	breeding flocks, unspecified - in total	0	2007						
	in total			19865	2007				
Goats	in total			516	2007	5509	2003		
Ostriches	farmed	41	2007	852	2006				
Pigs	breeding animals					186944	2006	2793	2006
	fattening pigs					1001947	2006	2025	2006
	in total			3015991	2007	1680535	2006	2414	2006
Reindeers	farmed - in total (4)			74775		244579			
Sheep	animals over 1 year					242627	2006	9141	2006
	animals under 1 year (lambs)					261838	2006	7527	2006
	in total			229612	2007	505466	2006	9152	2006
Solipeds, domestic	horses - in total			2987	2007	283100	2004	56000	2004
Turkeys	grandparent breeding flocks	0	2007						
	meat production flocks	115	2007						
	elite breeding flocks	0	2007						
	parent breeding flocks	9	2007						
	in total			429516	2007				
Wild boars	farmed - in total (5)			189	2007				

(1): Only beef cows
(2): Only dairy cows
(3): 2006/ 2007
(4): Reindeer slaughtering period 2006/ 2007
(5): slaughtered at slaughterhouse

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 Swedish Salmonella control programme was initiated in 1961. In 1995, the parts of the programme that covered cattle, pigs, poultry and eggs, were approved by the EU (95/ 50/ EC) and extended surveillance was initiated. The results showed that Swedish red and white meat and eggs virtually are free from Salmonella.
Of the reported human cases, only about 20% are reported as domestic acquired salmonella infection. This figure has been stable throughout the years and is based on information reported from the physicians.

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

The national situation has been very favourable. The last four years the annual incidence of Salmonella in humans has been approximately 40/ 100 000, including domestic and imported cases, and about 9/ 100 000 for the domestic cases. However, there seems to be an increase in domestic cases. In food producing animals, only a few cattle, farms are put under restriction following reported salmonella infection per year but the number of Salmonella infected pig and poultry farms has increased.

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

If Salmonella is diagnosed in a food-producing animal, measures are always taken to trace and eliminate the infection. All food contaminated with Salmonella is deemed unfit for human consumption.

Recent actions taken to control the zoonoses

The Swedish Salmonella control programme has been shown to be an efficient tool to identify Salmonella early in the production chain to keep domestically produced food free from contamination.

2.1.2. Salmonellosis in humans

A. Salmonellosis in humans

Reporting system in place for the human cases

Surveillance is mainly based on passive case findings. Also, contact persons are sampled when there are cases/ outbreaks of salmonellosis. In this report the total number of cases is based on reports from both the laboratories and the physicians. Information about country of origin is available only in the reports from the physicians. Investigations to trace the source of the infection are always performed.

Case definition

A case is defined as a person from whom Salmonella, of any serotype, has been isolated, including subclinical infections. Furthermore, a case is considered to be of domestic origin if the person has been infected in Sweden, thereby domestic cases will also include secondary cases to people infected abroad, as well as people infected by food items of non-domestic origin. A case is considered to be of foreign origin if the person has been abroad during the incubation period for salmonellosis.

Diagnostic/ analytical methods used

Cultivation of Salmonella. Since 2005 serotyping of strains is undertaken at the national reference laboratory only as routine procedure in cases suspected to be infected in Sweden. Phagetyping of S. Typhimurium and S. Enteritidis. PFGE when needed.

Notification system in place

Salmonellosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

The total number of cases between 1995 and 2007 ranged from 3562 to 3933. During the same period, the number of domestic cases varied from 453 to 937. Around 80% of all reported cases were infected abroad.

Results of the investigation

During 2007 the number of reported cases of Salmonella was 3933. That is a little less than the previous year (4056). The number of domestic cases was 937 which is almost as high as last year. 2006 had the highest number of domestic cases (1013 cases) reported since 1999 (947 cases) but not as high as seen in 1991 (1215 cases). The increase seems to be continueing and can be partly explained by several outbreaks reported in both 2006 and 2007 and more complete information on country of infection.
Eleven outbreaks of Salmonellosis were reported in 2007 involving about 330 reported cases in total. The largest outbreak was during the summer and it also continued more sporadically until december. It finally involved at least 179 persons in Sweden and many others in other European countries. The serotype was S. Java and the suspected vehicle of infection in this outbreak was fresh baby-spinach. The source could however never be confirmed.
That summer there was another outbreak involving 51 cases. The serotype was S. Stanley and the

suspected source was sprouts. That could not be confirmed either.

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

The number of domestic cases in 2007 (937) was almost as high as last year (1013). 2006 had the highest number of domestic cases reported since 1999 (947 cases). The increase seems to be continueing and can be partly explained by several outbreaks reported in both 2006 and 2007 and more complete information on country of infection.
Mainly food but also water are the most commonly cited sources of infections at the clinical reports.

Relevance as zoonotic disease

There is a very low risk of contracting domestic salmonellosis. As Swedish red and white meat basically is free from Salmonella, it may be considered that the vast majority of cases are due to consumption of imported contaminated food, contact with reptiles and turtles and some secondary cases to imported cases.

2.1.3. Salmonella in foodstuffs

A. Salmonella spp. in eggs and egg products

Monitoring system

Sampling strategy

The salmonella control of table eggs is based on control of all commercial egg laying flocks from establishments placing table eggs on the market and all commercial egg laying flocks of more than 200 hens from establishments not placing table eggs on the market.
There is no control programme for packing centers or for eggs at retail.

B. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Swedish Salmonella control programme:
Sampling strategies are described in the Swedish Salmonella control programme approved by teh EU (95/ 50/ EC). The programme is supervised by the SJV and the SLV, and sampling in the programme by the competent authority, that is official veterinarians. They are responsible for the sampling in the herds, flocks, hatcheries, cuttingplants and in the slaughter houses.
Within the programme, neck skin samples at slaughter and crushed meat from equipment etc in cutting plants are collected. Samples from neck skin and crushed meat include all poultry, not only broilers.
Sampling of necks skin:
Slaughter houses are divided into two categories A and B. Category A slaughter houses annually slaughter 150 000 to 15 000 000 birds, Category B slaughter houses slaughter < 150 000 birds annually. The sampling frame is all poultry slaughtered in Sweden. Enough samples are taken to detect a prevalence of 0.1% Salmonella.
Sampling in Category A: Enough samples are collected at each slaughter house to detect a prevalence of at least 5%. A systematic sampling is performed and samples are collected daily.
Sampling in Category B: Enough samples are collected to detect a prevalence of 5% Salmonella. Samples are evenly spread over the slaughtering days.
Cutting plants:
The control programme is based on production hygiene. The sampling sheme is designed to detect a prevalence of 5% with a confidence level of 95%.

At meat processing plant

According to in-house control plans and decisions by the competent authority.

At retail

According to in-house control plans and decisions by the competent authority.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: Category A: daily; Category B: spread out evenly over the year; cutting plants: once/ day in plants producing >100 tons/ week, once/ week in plants producing >20 tons/ week, once/ month in plants producing >5 tons/ week, twice/ year in plants producing <5 tons/ week.

At retail

Other: decided by the local authorities

Type of specimen taken

At slaughterhouse and cutting plant

Other: Neck skin samples at slaughter houses. Crushed meat from equipment etc or from trimmings at cutting plants.

At meat processing plant

Other: According to in-house control plans and decisions by the competent authority.

At retail

Other: According to in-house control plans and decisions by the competent authority.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: 10 neckskin samples are pooled and analyzed as 1 sample. From each carcass at least 10g, approx. 3 x 3 cm of neck skin is cut off and put into a plastic bag. Each sample shall be marked with the category of poultry, identity of the flock, slaughterhouse, time and date of the sampling and stored individually at 4 C until it is sent to the laboratory. At the lab; Each neckskin is divided into two equal parts. One part is pooled. The other part is separately stored until the examination is completed. One pool may consist of neckskin from 10-15 birds. The pooled sample is mixed well and pre-enriched in buffered peptone water and examined for salmonella according to NMKL. If salmonella is isolated from a pooled sample each individually stored neck-skin are examined.
Crushed meat: Each sample of 25 g of crushed meat from equipment etc or from trimmings is individually analysed according to NMKL.

Definition of positive finding

At slaughterhouse and cutting plant

A confirmed positive sample.

At meat processing plant

A confirmed positive sample.

At retail

A confirmed positive sample.

Diagnostic/ analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

At meat processing plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

At retail

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

Preventive measures in place

The salmonella control programme. Zero-tolerance for salmonella in processed food as well as in raw products.

Control program/ mechanisms

The control program/ strategies in place

National Salmonella Control Programme (Comm. Decision 95/ 50).

Recent actions taken to control the zoonoses

The prevalence of Salmonella in products of Swedish origin is low although there seems to be an increase in Salmonella infections in poultry flocks.

Measures in case of the positive findings or single cases

All positive findings are followed by corrective actions directed against product and process.
If any serotype of salmonella is found in meat samples, the origin of contamination must be traced back to the slaughter house or holding whenever possible. Effective cleaning and disinfection of the premises and equipment must begin in the establishment immediately. This also shall be done on suspicion of salmonella contamination.
Following confirmation of the result by the SVA an increased level of sampling is carried out. This involves taking at least 59 samples (each sample consists of 25 gr of meat or 10 gr neck skins) during the next five working days following the confirmation of the result.

Notification system in place

Any positive finding has to be reported to the competent authority.

Results of the investigation

Salmonella prevalence in animal products of Swedish origin is low. The local municipalities reported 40 samples from broiler meat or products thereof. All of these were negative for salmonella.
From Cat A slaughter houses 3873 neck skins were analysed and 34 from Cat B slaughter houses. These figures include also other poultry. Salmonella was not isolated from any of the samples taken from neckskins of broilers but from one turkey neck skin taken at a category B abattoir. At cutting plants 1 334 samples were collected. All these samples were negative.

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

Salmonella prevalence in animal products of Swedish origin is low (see "additional information"). Regarding poultry meat and products thereof, reports from the local authorities vary greatly between years. The number of samples as well as the number and percentage of positive samples differ to a large extent from year to year. These variations are explained by factors such as varying degree of reporting, special projects that are reported for a special year, special focus on imported products etc. The reports from the local authorities must therefore not be taken too seriously and they are not statistically representative for the country.
The most worrying factor at present is salmonella-positive consignments from other member states that enter the country. This is true not only for meat-preparations but also for consignments covered by the salmonella guarantees.
It should be mentioned that at present 40 % of poultry meat preparations on the market are of foreign origin and for these products there are no Salmonella guarantees.

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

As the prevalence of Salmonella in Swedish produced red and white meat, and eggs is very low, the risk of contracting salmonella from domestic produced animal products is small.

Additional information

In the surveillance described in the salmonella control programme, approximately 4000 neck skin sample from the slaughter houses are analysed yearly. Between 1995 and 2007, 49515 neck skin samples were collected and of those, 17 (0.03%) were positive.

C. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Turkey production is included in the Swedish Salmonella control programme and the same applies for turkeys as for broilers.
However the turkey production in Sweden is very small. The turkeys are thus included in the figures reported for broilers. They represent a very small part of the numbers

reported.

Results of the investigation

Salmonella Typhimurium NST was isolated from one turkey neck skin taken at a category B abattoir.

D. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Sampling strategies are described in the Swedish Salmonella control programme approved by EU (95/ 50/ EC). The programmes are supervised by the SJV and the SLV. All sampling in the control programme is supervised by the competent authority, that is official veterinarians. They are responsible for the sampling in the herds, flocks, hatcheries, cutting plants and in the slaughter houses.
Within the programme, lymph nodes and carcass swabs are systematically collected from pigs at slaughter to ensure that the samples are representative of the population of slaughtered pigs at each slaughterhouse. Sampling of lymph nodes is described under "Salmonella in pigs".
Slaughter houses have been divided into two categories: Category A slaughtering 90% of all pigs and Category B slaughtering 10% of all pigs.
Category A: At each slaughterhouse a sufficient number of samples is collected to detect at least 5% salmonella infected/ contaminated carcasses with 95% confidence interval (CI) in the annual slaughter. Sampling is performed daily in Category A. Samples are collected evenly distributed over the day and if slaughter is performed on separate lines, each will be sampled separately.
Category B: These slaughterhouses are controlled as one unit. Enough samples to detect a prevalence of 1% salmonella infected carcases with 90% CI will be taken. Sampling wil be spread out over the slaughter days to avoid periodical sampling.
Carcass swabs are sampled as a quantitative monitoring of the slaughter hygiene at normal slaughter. The sample size will detect a prevalence of salmonella contaminated carcases of 0.1% with a 95% confidence interval.
Cutting plants: sampling is designed to detect a prevalence of 5% salmonella (95% CI). Samples are taken from crushed meat on equipment etc. or from trimmings.

At meat processing plant

Sampling is according to each plants in-house control.

At retail

Random sampling according to the local competent authorities.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: Carcass swabs: representative sampling spread out evenly over the year; cutting plants: once/ day in plants producing >100 tons/ week, once/ week in plants producing >20 tons/ week, once/ month in plants producing >5 tons/ week, twice/ year in plants producing <5 tons/ week.

At meat processing plant

Other: According to each in-house control plan and decisions by the competent authority.

At retail

Other: According to in-house control plans and decisions by the competent authority.

Type of specimen taken

At slaughterhouse and cutting plant

Other: Carcass swabs: Approx. 1400 square cm/ carcass is swabbed. Cuttingplants: crushed meat

At meat processing plant

Other: Varies according to in-house control plan and decisions by the local inspector.

At retail

Other: Varies according to in-house control plan and decisions by the local inspector.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Carcass swabs: The carcasses are sampled before the carcass is refrigerated. The upper inner part of the hind legs including the pelvic entrance will be tested. A total of 30 cm x 20-25 cm will be swabbed. The cut surface area of the abdomen and the chest including approximately 5 cm of the skin surface will be tested. Approx. 70-80 cm x 8-10 cm will be swabbed. In total approx 1400 cm2 will be swabbed. Two sterile swabs moistured with PBS are used. The swabs from one carcass will be placed in a plastic bag in 100 ml of PBS. Samples are kept refrigerated until they are sent to the laboratory.
One drop off pre-enrichment broth from each of 10 to 15 animals is pooled in RV broth and examined according to NMKL. Each pre-enrichment broth is stored at 4o C until results are ready. In case of a positive result each broth will be analysed separately.
Crushed meat: each sample of 25 g is individually analysed according to NMKL.

At meat processing plant

According to in-house control plans and decisions by the competent authority.

At retail

According to in-house control plans and decisions by the competent authority.

Definition of positive finding

At slaughterhouse and cutting plant

A confirmed positive sample.

At meat processing plant

A confirmed positive sample.

At retail

A confirmed positive sample.

Diagnostic/ analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

At meat processing plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

At retail

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

Preventive measures in place

The salmonella control programme. Zero-tolerance for salmonella in processed food as well as in raw products.

Control program/ mechanisms

The control program/ strategies in place

National Salmonella Control Programme (Comm. Decision 95/ 50). See "Salmonella spp. in pigs".

Recent actions taken to control the zoonoses

The prevalence of Salmonella in products of Swedish origin is low. No special actions have been taken.

Measures in case of the positive findings or single cases

All positive findings are followed by corrective actions directed against product and process.
If salmonella is isolated from a carcass, trace-back investigation is sometimes performed at the farm

of origin. If salmonella is re-isolated at the farm, measures described in section "Salmonella spp. in pigs" are implemented.

Notification system in place

Any positive finding has to be reported to the competent authority.

Results of the investigation

Salmonella prevalence in animal products of Swedish origin is low. Results from sampling of fresh meat or meat products from cattle and pig are reported under "Salmonella spp in bovine meat and products thereof".
Also, 6239 carcass swabs from pigs (2869 from breeding pigs and 3370 from fattening pigs) were analysed. Salmonella was detected from five carcass swabs (S. Infantis from one breeding pig, S. Infantis from three slaughter pigs and S. Typhimurium NST from one slaughter pig).
From cutting plants, 3571 samples from both cattle and pigs were collected, all were negative. In the total number reported from cutting plants species are not differentiated.

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

Salmonella prevalence in animal products of Swedish origin is low (see "additional information"). However, there seems to be an increase in Salmonella infections in swine. In 2007, the number of Salmonella positive swine carcasses was higher (5 positive carcasses) than any year since 1996.
The most worrying factor at present is salmonella-positive consignments from other MS that enter the country. This is true not only for meat-preparations but also for consignments covered by the salmonella guarantees.

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

As the prevalence of Salmonella in Swedish red and white meat, and eggs is low, the risk of contracting salmonella from domestically produced food is very small.

Additional information

Between 1996 and 2007, 69 292 lymph nodes from fattening- and adult pigs have been sampled in total. Of those, 101 (0.15%) were positive for salmonella. Similarly, 69 312 swabs have been analysed and of those 10 (0.01%) have been positive.

E. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Sampling strategies are described in the Swedish Salmonella control programme (95/ 50/ EC). The programmes are supervised by the SJV and the SLV and All sampling is supervised by the competent authority, that is the official veterinarian. Official veterinarians are responsible for the sampling in the herds, flocks, hatcheries,

cuttingplants and in the slaughter houses.
Within the programme, lymph nodes and carcass swabs are systematicly collected from cattle at slaughter to ensure that the samples are representative of the population of slaughtered cattle at each slaughterhouse. Description of sampling of lymph nodes is presented under "Salmonella spp. in bovines".
Slaughter houses: Slaughter houses have been divided into two categories. Category A slaughtering 90% of all cattle and category B slaughtering 10% of all cattle.
Cat.A: At each slaughterhouse a sufficient number of samples is collected to detect at least 5% salmonella infected/ contaminated carcases with 95% Confidence Interval (CI) in the annual slaughter. At these slaughter houses samples are collected evenly distributed over the day and if slaughter is performed on separate lines, each will be sampled separately.
Cat.B: These slaughterhouses are controlled as one unit. Enough samples to detect a prevalence of 1% salmonella- infected carcases with 90% CI will be taken. Sampling is spread out over the slaughter days to avoid periodical sampling.
Carcass swabs are collected as a quantitative monitoring of the slaughter hygiene at normal slaughter. The sample size will detect a prevalence of salmonella contaminated carcases of 0.1 % with 95% CI. Samples consist of carcass swabs.
Cutting plants: sampling is designed to detect a prevalence of 5% salmonella (95% CI). Samples are taken from crushed meat on equipment etc. or from trimmings.

At meat processing plant

Sampling is according to each plants in-house control.

At retail

Random sampling according to the local competent authorities.

Frequency of the sampling

At meat processing plant

Other: According to each in-house control plan and decisions by the competent authority.

At retail

Other: According to in–house control plans and decisions by the competent authority.

Type of specimen taken

At slaughterhouse and cutting plant

Other: carcass swabs: aprrox.1400 square cm/ carcass, cuttingplants: crushed meat

At meat processing plant

Other: Varies according to in-house control plan and decisions by the local inspector.

At retail

Other: Varies according to in-house control plan and decisions by the local inspector.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Carcass swabs: The carcasses are sampled before the carcass is refrigerated.
The upper inner part of the hind legs including the pelvic entrance will be tested. A total of 30x20-25 cm will be swabbed. The cut surface area of the abdomen and the chest including approximately 5 cm of the skin surface will be tested. Approx. 70-80 cm x 8-10 cm will be swabbed. In total approx 1400 cm2 will be swabbed. Two sterile swabs moistured with PBS are used. The swabs from one carcass will be placed in a plastic bag in 100 ml of PBS. Samples are kept refrigerated until they are sent to the laboratory.
To each sample of two swabs 100 ml of buffered peptone water is added. The sample is incubated overnight. One drop of pre-enrichment broth from each of 10 to 15 animals is pooled in RV broth and examined according to NMKL. Each pre-enrichment broth is stored at 4o C until results are ready. In case of a positive result each broth will be analysed separately.
Crushed meat: each sample of 25 g is individually analysed according to NMKL.

At meat processing plant

According to in-house control plans and decisions by the competent authority.

At retail

According to in-house control plans and decisions by the competent authority.

Definition of positive finding

At slaughterhouse and cutting plant

A confirmed positive sample.

At meat processing plant

A confirmed positive sample.

At retail

A confirmed positive sample.

Diagnostic/ analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

At meat processing plant

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods

according to Comm. Decision 2003/ 470

At retail

Bacteriological method: NMKL 71, ISO 6579 or any other of the approved methods according to Comm. Decision 2003/ 470

Preventive measures in place

The salmonella control programme. Zero-tolerance for salmonella in processed food as well as in raw products.

Control program/ mechanisms

The control program/ strategies in place

National Salmonella Control Programme (Comm. Decision 95/ 50). See "Salmonella spp in bovine animals".

Recent actions taken to control the zoonoses

The prevalence of Salmonella in products of domestic origin is so low that no special actions have had to be taken for many years.

Measures in case of the positive findings or single cases

All positive findings are followed by corrective actions directed against product and process.
If salmonella is isolated from a lymph node trace-back investigation is always performed at the farm of origin. If salmonella is re-isolated at the farm, measures described in section "Salmonella in bovine animals" are implemented.

Notification system in place

Any positive finding has to be reported to the competent authority.

Results of the investigation

Salmonella prevalence in animal products of Swedish origin is very low. At retail, 1445 samples from fresh meat or meat products (including pork and pork products; domestic or imported not specified) were reported from the local municipalities, one of these was positive.
In the surveillance in the control programme 3782 carcass swabs were analysed. Of those, 2 were positive (S. Infantis and S. Typhimurium NT).
From cutting plants, 3571 samples from both cattle and pigs were analysed, all samples were negative for Salmonella. Animal species are not distinguished in the reports from the cutting plants.

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

Salmonella prevalence in animal products of Swedish origin is very low (see "additional information"). The most worrying factor at present is salmonella-positive consignments from other MS that enter the country. This is true not only for meat-preparations but also for consignments covered by the salmonella guarantees.

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

As Swedish red and white meat, and eggs, are virtually free from Salmonella the risk of contracting salmonella from Swedish produced food is small.

Additional information

Between 1996 and 2007, 38937 lymph nodes from cattle have been sampled at category A slaughterhouses. Of those, 28 (0.07%) were positive for salmonella. Furthermore, 38881 swabs have been analysed and of those 10 (0,02%) have been positive. Furthermore, only in a few cases when salmonella was isolated from lymph nodes or swabs the same serotype was isolated at farm level leading to restrictions on the farm.
Other food products analysed for salmonella in 2006 and reported by local competent authorities:
The local municipalities reported 1774 samples of ready-to-eat foods, all but one negative. In herbs and spices, 23 reported samples were all negative. One out of 233 fruits and vegetables was positive. One out of 60 samples of crustaceans was Salmonella positive. Finally, 28 samples from table eggs at retail and 151 fishery products were negative for Salmonella. It should be observed that the reporting from the local authorities is far from complete.

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from broilers (Gallus gallus)								
fresh								
- at retail	Local Health Authorities	single	25 g	23	0			
meat products								
raw but intended to be eaten cooked								
- at retail	local Health Authorities	single	25 g	17	0			
Meat from poultry, unspecified								
carcass								
- at slaughterhouse - animal sample - neck skin - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoir)	National Food Administration	slaughter batch	10 g	3873	0			
- at slaughterhouse - animal sample - neck skin - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)		slaughter batch	10 g	34	1		1	
fresh								
- Control or eradication programmes - national programmes (no Community co-financing) - official sampling		single	25 g (crushed meat)	1334	0			

Table Salmonella in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Milk, cows'								
pasteurised milk								
- at retail	Local Health authorities	single	25 g	3	0			

Footnote

Local Health Authorities report 3 samples from Consumers milk, 12 samples of cheese and 16 samples of other milkproducts. none of these samples were positive for Salmonella. There is no information available on any more details regarding these samples.

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Infantis	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from pig									
fresh									
- at slaughterhouse	national food administratio	animal	see footnote	6239	5	4		1	
- at processing plant	national food administratio	single	25 g	3571	0				
- at retail	local health authorities	single	25g	1238	0				
Meat from bovine animals									
fresh									
- at slaughterhouse	National food administratio	animal	see footnote	3782	2	1		1	

Footnote

The samples reported under pig meat slaughterhouse consists of carcass swabs. a total area of approx. 1400 cm2 are swabbed. The same applies for bovine meat sampled at the slaughterhouse. Samples reported in pig meat processing and retail also contains samples from bovine meat. There is no differentiation between pigs and cattle in the reports sent to the National Food Administration. The local health authorities report 207 meatproducts including both pig and cattle (not specified which). These samples may be meat preparations, meat products and they may be eaten raw or cooked, that level of information is not available. One of these samples was positive for Salmonella, serotype not specified.
A baseline study of cattle carcasses were performed during sept 2006-sept 2007. 753 carcasses were swabbed in four places before chilling. 1 sample was positive for Salmonella.

Table Salmonella in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Fishery products, unspecified								
- at retail	local health auth.	single	25 g	80	0			
Crustaceans								
- at retail	local health auth.	single	25 g	60	0			
Fruits and vegetables								
precut								
ready-to-eat	local health auth.	single	25 g	342	8			8

Footnote

Local health authorities report 13 samples of eggs and eggproducts - no further specification, all negative.
Crustaceans include molluscs as well , they are not reported separately and whether sampled at processing plant or at retail and raw or cooked is not specified .
Fruits and vegetables are not specified as precut or ready-to-eat and includes sprouted seeds but number of sprouted seed samples are not specified.

2.1.4. Salmonella in animals

A. Salmonella spp. in Gallus gallus - breeding flocks for egg production and flocks of laying hens

Monitoring system

Sampling strategy

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

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC), in the Zoonosis Directive (2003/ 99/ EG) and in the Swedish regulation on control of Salmonella in poultry (SJVFS 2007:19). The salmonella control programme is supervised by the SJV and the SLV.
Official veterinarians are responsible for sampling in holdings, hatcheries, cuttingplants and slaughterhouses. Samples are either taken by the official veterinarian or sampling is delegated to farmers/ companies.
The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. The official veterinarian takes samples for salmonella once a year during rearing and three times during the production period, the other samples are taken by the food business operator. The aim is to detect a prevalence of salmonella of at least 5% with a confidence interval of 95% on flock level each time sampling is done.
Breeders and hatchery:
Sampling of breeding flocks is carried out according to Regulation SJVFS 2007:19. Sampling is mandatory at holdings with more than 250 breeders.
There were no elite or grand parent flocks in 2007.

Laying hens flocks

See "Breeding flocks"
Samples are taken from holdings with more than 200 pullets or layers. Sampling methods are sufficient to demonstrate freedom within a flock at a confidence level of 95%, if the estimated prevalence of salmonella is 5%.

Frequency of the sampling

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

Every flock is sampled

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

Other: 4 weeks and 2 weeks before moving

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

Every 2nd weeks

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

2 weeks prior to moving

Laying hens: Production period

Every 15th after the age of 22-25 weeks weeks

Laying hens: Before slaughter at farm

2 weeks prior to slaughter

Laying hens: At slaughter

Other: see Salmonella in broiler meat and products thereof

Type of specimen taken

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

Meconium

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

Laying hens: Day-old chicks

Meconium

Laying hens: Rearing period

Other: socks in freerange, faeces in cages

Laying hens: Production period

Other: socks in freerange, faeces in cages

Laying hens: Before slaughter at farm

Other: socks or faeces

Laying hens: At slaughter

Other: neck skin, see Salmonella in broiler meat and products thereof

Methods of sampling (description of sampling techniques)

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

Meconium from 250 newly hatched chickens from every breeder group is collected and pooled into one sample.

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

Two paired sock samples are taken and pooled into one sample. Samples are taken at the age of 4 weeks and 2 weeks before moving or before hatching.

Breeding flocks: Production period

Five sock samples are taken every second week and pooled into two samples. Veterinarian takes sock samples three times during the production period, other samples are taken by the food business operator.

Laying hens: Day-old chicks

see "Breeding flocks: Day-old chicks"

Laying hens: Rearing period

Samples are taken 2 weeks prior to moving. In freeranging holdings samples are taken as two pairs of sock samples pooled into one sample. In holdings with cages 2 faecal samples of 75 g are pooled into one sample. This sampling is taken once a year by an official veterinarian, other samples by the food business operator. The result of this examination must be known before moving the birds.

Laying hens: Production period

During the laying phase egg laying flocks are sampled every 15 week from the age of 22-26 weeks. In freeranging holdings samples are taken as two pairs of sock samples pooled into one sample. In holdings with cages 2 faecal samples of 75 g are pooled into one sample. This sampling is taken once a year by veterinarian, other samples by the food business operator.

Laying hens: Before slaughter at farm

Layeing hens are sampled 2 weeks before slaughter. In freeranging holdings samples are taken as two pairs of sock samples pooled into one sample. In holdings with cages

2 faecal samples of 75 g are pooled into one sample. This sampling is taken once a year by veterinarian, other samples by the food business operator. The result of the last examination must be notified to the poultry meat inspection veterinarian before sending the flock to the slaughterhouse.

Laying hens: At slaughter

see "Salmonella in broiler meat and products thereof"

Case definition

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

If salmonella is isolated from an individual animal, the whole flock is considered infected with salmonella. In poultry, the flock is the epidemiological unit.

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

See "Breeding flocks: Day-old chicks"

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

See "Breeding flocks: Day-old chicks"

Laying hens: Day-old chicks

See "Breeding flocks: Day-old chicks"

Laying hens: Rearing period

See "Breeding flocks: Day-old chicks"

Laying hens: Production period

See "Breeding flocks: Day-old chicks"

Laying hens: Before slaughter at farm

See "Breeding flocks: Day-old chicks"

Laying hens: At slaughter

The pooled neckskin sample is traced back to the farm of origin. The farm is put under restrictions and an official veterinarian is assigned for official sampling. If these are negative - no further measures. If positive - the farm (or only the epidemiological unit if there are more than one separate units at the holding) is considered infected.

Diagnostic/ analytical methods used

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

necessary): Day-old chicks

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

Laying hens: Day-old chicks

Bacteriological method: ISO 6579:2002

Laying hens: Rearing period

Bacteriological method: ISO 6579:2002

Laying hens: Production period

Bacteriological method: ISO 6579:2002

Laying hens: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Laying hens: At slaughter

Bacteriological method: NMKL No 71:1999

Vaccination policy

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

Vaccination is not allowed.

Laying hens flocks

See "Breeding flocks"

Other preventive measures than vaccination in place

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

In food-producing animals salmonella control in feed- and feed production (HACCP based approach) is integrated in the salmonella control.
Strict hygiene rules are enforced through the whole production chain as preventive measures for salmonella. These rules are implemented by the Prophylactic volontary salmonella control programme and includes: a)Rules for feed production and transport, b) hygienic rules to protect the birds from salmonella infection from the surroundings, c) salmonella free newly hatched

chickens are delivered from the hatcheries, d) precaution to stop spread of salmonella from an infected flock, and e) all- in - all out principle in all categories of poultry production.

Laying hens flocks

See "Breeding flocks"

Control program/ mechanisms

The control program/ strategies in place

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

In food-producing animals salmonella control in feed- and feed production (HACCP based approach) is integrated in the control.
Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC). The control programme for live poultry covers laying hens, broilers, turkeys, ducks and geese from elite flocks to commercial stock. Sampling strategies for other species of live poultry is covered by SJVFS 2007:19. All serotypes of salmonella are covered.
The control consitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. The official veterinarian visits every poultry holding with breeders, layers and meat production establishment as required according to the control programme. All categories of poultry are sampled for bacteriological examination as described above.

Laying hens flocks

See "Breeding flocks"

Measures in case of the positive findings or single cases

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

The infected farm is put under restriction and the flock is culled and either sent for destruction (in case of invasive serotype) or heat-treated (the latter is never practised in Sweden). An investigation in order to trace the source of infection is conducted by the official veterinarian. The premises/ contaminated houses are cleaned and disinfected and manure and feeding stuffs left on the farm are destroyed or decontaminated. Restrictions are not lifted until environmental samples from within the house are taken and analyzed with negative results.

Laying hens flocks

See "Breeding flocks"
In laying hens flocks, finding of invasive salmonella serotype results in destruction of the flock and all eggs in storage.
Finding of non invasive salmonella serotypes results in destruction or sanitary slaughter of the flock. In those cases: a)The meat may be used for human consumption after heat treatment in the processing plant. b)Eggs from a flock infected with non invasive salmonella may be used for human consumption after pasteurization. However,this is not practised in Sweden.

Notification system in place

Any finding of salmonella is compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

In 2007, Salmonella was detected in four holdings: S. Livingstone in one and S. Typhimurium NST U277 in two holdings with laying hens. A different subtype of S. Typhimurium NST was detected in a rearing holding.
Results from sampling of neck skins and crushed meat in the control programme is presented under the section "Salmonella in broiler meat and products thereof".

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

Since 1996, the situation has remained stable with only 3 to 4 infected flocks per year. The favourable situation is also reflected in the yearly sampling of approximately 4000 neck skin samples at the slaughter houses. Between 1995 and 2007, 49 481 poultry neck skin samples were collected at major abattoirs and 16 (0,03%) of those were positive.

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

As the prevalence of Salmonella in Swedish produced red and white meat, and eggs is low, the risk of contracting salmonella from domestic produced food of animal origin is small.

Additional information

In poultry, the flock is the epidemiological unit. This is important concerning breeders as several flocks may be raised in separate units in the holding at the same. Measures, in case of positive findings, are taken at each epidemiological unit since the strict hygiene rules that are implemented according to the Swedish Salmonella control programme makes it possible to define the flocks as strictly separated units.

B. Salmonella spp. in Gallus gallus - breeding flocks for meat production and broiler flocks

Monitoring system

Sampling strategy

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

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC), in the Zoonosis Directive (2003/ 99/ EG) and in the Swedish regulation on control of Salmonella in poultry (SJVFS 2007:19). The salmonella control programme is supervised by the SJV and the SLV.
All sampling according to the salmonella programme is supervised by the competent authority. Official veterinarians are responsible for sampling in holdings, hatcheries,

cuttingplants and slaughterhouses.
The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. The official veterinarian takes samples for salmonella once a year and three times during the production period, the other samples are taken by the food business operator. The aim is to detect a prevalence of salmonella of at least 5% with a confidence interval of 95% on flock level each time sampling is done.
Breeders and hatchery:
Sampling of breeding flocks is carried out according to Regulation SJVFS 2007:19. Sampling is mandatory at holdings with more than 250 breeders.
There are no Elite broiler flocks in Sweden.

Broiler flocks

Mandatory sampling if >500 broilers are raised for slaughter per year.
Every flock is sampled 2 weeks prior to slaughter. Once a year this sampling is done by an official veterinarian - usually the veterinarian responsible at the slaughterhouse where the broilers are admitted for slaughter. If thinning is practised an additional sampling has to be done 10 days before slaughter. The result must be notified to the veterinarian before sending the flock to the slaughterhouse.
All commercial meat-producing establishments have an official veterinarian assigned for salmonella control. The veterinarian is usually employed by the National Food Administration and stationed at the slaughterhouse where the flock is destined for slaughter.

Frequency of the sampling

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

Every flock is sampled

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

Other: at 4 weeks and 2 weeks before moving

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

Every 2nd weeks

Broiler flocks: Before slaughter at farm

1-2 weeks prior to slaughter

Broiler flocks: At slaughter (flock based approach)

Other: see Salmonella in broiler meat and products thereof

Type of specimen taken

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

Meconium

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

Broiler flocks: Day-old chicks

Meconium

Broiler flocks: Before slaughter at farm

Other: Socks or faeces

Broiler flocks: At slaughter (flock based approach)

Other: neck skins, see Salmonella in broiler meat and products thereof

Methods of sampling (description of sampling techniques)

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

Meconium from 250 newly hatched chickens is collected from each breeder group at the hatchery and pooled into one sample.

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

Two paired sock samples are taken and pooled into one sample. Samples are taken at the age of 4 weeks and 2 weeks before moving or before hatching. Official veterinarian takes these samples once a year, other samples are taken by the food business operator.

Breeding flocks: Production period

Five sock samples are taken every second week and pooled into two samples. Veterinarian takes sock samples three times during the production period, other samples are taken by the food business operator.

Broiler flocks: Day-old chicks

See Breeding flocks: day-old chicks

Broiler flocks: Before slaughter at farm

Sampling is mandatory at holdings with >500 broilers slaughtered during the year.
Two paired sock samples are taken and pooled into one sample two weeks before slaughter. Instead of sock samples it is also possible to take 2 faecal samples of 75 g and pool them into one sample. Official veterinarian takes samples once a year, the other samples are taken by the food business operator.

Broiler flocks: At slaughter (flock based approach)

see "Salmonella in broiler meat and products thereof"

Case definition

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

If salmonella is isolated from an individual animal, the whole flock is considered salmonella infected. In poultry, the flock is the epidemiological unit.

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

See "Breeding flocks: Day-old chicks"

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

See "Breeding flocks: Day-old chicks"

Broiler flocks: Day-old chicks

See "Breeding flocks: Day-old chicks"

Broiler flocks: Rearing period

See "Breeding flocks: Day-old chicks"

Broiler flocks: Before slaughter at farm

See "Breeding flocks: Day-old chicks"

Broiler flocks: At slaughter (flock based approach)

A positive neck skin sample at slaughter initiates an investigation back at the holding of origin. The farm is put under restrictions and official sampling is conducted. If these samples are positive the holding/ flock is considered infected.

Diagnostic/ analytical methods used

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Broiler flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

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

Vaccination is not allowed.

Broiler flocks

See "Breeding flocks"

Other preventive measures than vaccination in place

Broiler flocks

In food-producing animals salmonella control in feed- and feed production (HACCP based approach) is integrated in the salmonella control.
Strict hygiene rules are enforced through the whole production chain as preventive measures for salmonella. These rules are implemented by the Prophylactic volontary salmonella control programme and includes: a)Rules for feed production and transport, b) hygienic rules to protect the birds from salmonella infection from the surroundings, c) salmonella free newly hatched chickens are delivered from the hatcheries, d) precaution to stop spread of salmonella from an infected flock, and e) all- in - all out principle in all categories of poultry production.

Control program/ mechanisms

The control program/ strategies in place

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

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC). The control programme for live poultry covers laying hens, broilers, turkeys, ducks and geese from parent flocks to commercial stock. Other species of live poultry as defined in article 2 (1) of the Council Directive 90/ 539/ EEC are excluded from this control programme. All

serotypes of salmonella are covered. The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. The official veterinarian visits every poultry holding with breeders, layers and meat production establishment as required according to the control programme. All categories of poultry are sampled for bacteriological examination as described above.

Broiler flocks

see "Breeding flocks"

Measures in case of the positive findings or single cases

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

The chicks are traced, culled and sent for destruction. The premises where the chicks were sent to and the hatchery is cleaned and disinfected. The farm/ flock of origin is traced and put under restrictions. Official sampling is conducted and if the flock is positive, it is culled and either sent for destruction (in case of invasive serotype) or heat-treated (the latter is never practised in Sweden). An investigation in order to trace the source of infection is conducted by the official veterinarian. The premises/ contaminated houses are cleaned and disinfected and manure and feeding stuffs left on the farm are destroyed or decontaminated. Restrictions are not lifted until environmental samples from within the house are taken and analyzed with negative results.

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

The infected farm is put under restriction and the flock is culled and either sent for destruction (in case of an invasive serotype) or heat-treated (the latter is never practised in Sweden). An investigation in order to trace the source of infection and destination of hatching eggs delivered from the holding is conducted by the official veterinarian. The premises/ contaminated houses are cleaned and disinfected and manure and feeding stuffs left on the farm are destroyed or decontaminated. Restrictions are not lifted until environmental samples from within the house are taken and analyzed with negative results.

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

See "Breeding flocks: Rearing period"

Broiler flocks: Day-old chicks

See "Breeding flocks: Rearing period"

Broiler flocks: Rearing period

See "Breeding flocks: rearing period"

Broiler flocks: Before slaughter at farm

See "Breeding flocks: rearing period"

Broiler flocks: At slaughter (flock based approach)

see "Salmonella in broiler meat and products thereof"

Notification system in place

Any finding of salmonella is compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

In 2007, Salmonella was detected in 13 flocks. An outbreak of S. Typhimurium NST was detected in late 2006 and continued in 2007. Five flocks were detected in 2007 as part of this outbreak: one GP hatchery, two parent flocks in rearing and two broiler production flocks.
In addition, Salmonella was detected in seven other flocks with meat production broilers and in one parent production flock. S. Typhimurium was detected in six meat production flocks and S. Agona in two meat production flocks. S. Agona was detected in two subsequent flocks of one holding.
S. Typhimurium was detected in a parent production flock.
The results from the surveillance of neck skins are presented un der the section "Salmonella in broiler meat and products thereof".

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

Between 1996-2005, the situation was stable with only 1 to 2 infected flocks per year. In 2006 and 2007 the number of infected flocks has increased. Five of the 13 infected flocks could be traced to one outbreak but the source of the outbreak is still unclear. Between 1995 and 2007, 49 481 poultry neck skin samples were collected at major abattoirs and 16 (0.03%) of those were positive.

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

As the prevalence of Salmonella in Swedish produced red and white meat, and eggs is low, the risk of contracting salmonella from domestic produced animal products is small.

Additional information

In poultry, the flock is the epidemiological unit. This is important concerning broilers as several flocks may be raised at the same time in different units within the same house/ holding. When measures are taken in case of positive findings the strict hygiene rules that are implemented according to the Swedish Salmonella control programme makes it possible to define the broiler flock as the epidemiological unit.

C. 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)

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC), in the Zoonosis Directive (2003/ 99/ EG) and in the Swedish regulation on control of Salmonella in poultry (SJVFS 2007:19). The salmonella control programme is supervised by the SJV and the SLV.
All sampling according to the salmonella programme is supervised by the competent authority. Official veterinarians are responsible for sampling in holdings, hatcheries, cuttingplants and slaughterhouses. Samples are either taken by the official veterinarian or under his/ her supervision if sampling is delegated to farmers/ companies.
The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme where an official veterinarian visits turkey farms once a year. The official veterinarian takes samples for salmonella once a year and three times during the production period, the other samples are taken by the food business operator. The aim is to detect a prevalence of salmonella of at least 5% with a confidence interval of 95% on flock level each time sampling is done.
Breeders and hatchery:
Sampling of breeding flocks is carried out according to Regulation SJVFS 2007:19. Sampling is manadatory at holdings with more than 250 breeding turkeys.
There are no elite and grand parent turkeys in Sweden. The breeding stock is imported as Parents.

Meat production flocks

Mandatory sampling if >500 turkeys are raised for slaughter per year.
Every flock is sampled 2 weeks prior to slaughter. If thinning is practised an additional sampling has to be done 10 days before slaughter. Once a year this sampling is done by an official veterinarian.

Frequency of the sampling

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

Every flock is sampled

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

Other: at 4 weeks and 2 weeks prior to moving

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

Every second weeks

Meat production flocks: Day-old chicks

Every flock is sampled

Meat production flocks: Before slaughter at farm

2 weeks prior to slaughter

Meat production flocks: At slaughter (flock based approach)

Other: see Salmonella in broiler meat and products thereof

Type of specimen taken

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

Meconium

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

Meat production flocks: Day-old chicks

Meconium

Meat production flocks: Before slaughter at farm

Other: socks or faeces

Meat production flocks: At slaughter (flock based approach)

Other: neck skin; see Salmonella in broiler meat and products thereof

Methods of sampling (description of sampling techniques)

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

Meconium from 250 newly hatched turkeys from each breeder group at the hatchery is pooled into one sample.

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

Two paired sock samples are taken and pooled into one sample. Samples are taken at the age of 4 weeks and 2 weeks before moving or hatching.

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

Five sock samples are taken every second week and pooled into two samples. Official veterinarian takes samples three times during the production period, the other samples are taken by the food business operator.

Meat production flocks: Day-old chicks

See Breeding flocks: day-old chicks

Meat production flocks: Before slaughter at farm

Two paired sock samples are taken and pooled into one sample two weeks before slaughter. Instead of sock samples it is also possible to take 2 faecal samples of 75 g and pool them into one sample. Official veterinarian takes samples once a year, the other samples are taken by the food business operator.

Meat production flocks: At slaughter (flock based approach)

see Salmonella in broiler meat and products thereof

Case definition

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

If salmonella is isolated from an individual animal, the whole flock is considered salmonella infected. In poultry, the flock is the epidemiological unit.

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

See "Breeding flocks: Rearing period"

Meat production flocks: Day-old chicks

See "Breeding flocks: Rearing period"

Meat production flocks: Rearing period

See "Breeding flocks: Rearing period"

Meat production flocks: Before slaughter at farm

See "Breeding flocks: Rearing period"

Meat production flocks: At slaughter (flock based approach)

A positive neck skin sample at slaughter initiates an investigation back at the holding of origin. The farm is put under restrictions and official sampling is conducted. If these samples are positive the holding/ flock is considered infected.

Diagnostic/ analytical methods used

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

necessary): Day-old chicks

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999

Case definition

If salmonella is isolated from an individual animal, the whole flock is considered salmonella infected. In poultry, the flock is the epidemiological unit.

Vaccination policy

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

Vaccination is not allowed.

Meat production flocks

See "Breeding flocks"

Other preventive measures than vaccination in place

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

Strict hygiene rules are enforced through the whole production chain as preventive measures for salmonella. These rules are implemented by the Prophylactic volontary salmonella control programme and includes: a)Rules for feed production and transport, b) hygienic rules to protect the birds from salmonella infection from the surroundings, c) salmonella free newly hatched chickens are delivered from the hatcheries, d) precaution to stop spread of salmonella from an infected flock, and e) all- in - all out principle in all categories of poultry production.

Meat production flocks

see "Breeding flocks"

Control program/ mechanisms

The control program/ strategies in place

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

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC). The control programme for live poultry covers laying hens, broilers, turkeys, ducks and gees from elite flocks to commercial stock. Other species of live poultry as defined in article 2 (1) of the Council Directive 90/ 539/ EEC are excluded from this control
programme. All serotypes of salmonella are covered. The control consitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. The official veterinarian
visits every poultry holding with breeders, layers and meat production establishment as required according to the control programme. All categories of poultry are sampled for bacteriological examination as described above.

Meat production flocks

see "Breeding flocks"

Measures in case of the positive findings or single cases

The infected farm is put under restriction and the flock is culled and either sent for destruction (in case of invasive serotype) or heat-treated (the latter is never practised in Sweden). An investigation in order to trace the source of infection is conducted by the official veterinarian. The premises/ contaminated houses are cleaned and disinfected and manure and feeding stuffs left on the farm are destroyed or decontaminated. Restrictions are not lifted until environmental samples from within the house are taken and analyzed with negative results.

Notification system in place

Any finding of salmonella is compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

S. Worthington was detected in one turkey holding. Ducks infected with the same serotype had been raised in the same holding earlier in the year.

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

Since 1996, the situation has remained stable with none to a few infected flocks per year.

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

As the prevalence of Salmonella in Swedish produced red and white meat, and eggs is low, the risk of contracting salmonella from food products of domestic animal origin is small.

Additional information

In poultry, the flock is the epidemiological unit. This is important also concerning turkey breeders and turkeys for slaughter as several flocks may be raised in separate units in the house/ holding at the same. Measures, in case of positive findings, are taken at each epidemiological unit since the strict hygiene rules that are implemented according to the Swedish Salmonella control programme makes it possible to define the flocks as strictly separated units.

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

Monitoring system

Sampling strategy

Breeding flocks

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC), in the Zoonosis Directive (2003/ 99/ EG) and in the Swedish regulation on control of Salmonella in poultry (SJVFS 2007:19). The salmonella control programme is supervised by the SJV and the SLV.
Official veterinarians are responsible for sampling in holdings, hatcheries, cuttingplants and slaughterhouses. Samples are either taken by the official veterinarian or delegated to farmers/ companies.
The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme where an official veterinarian visits breeding farms three times during egg production and otherwise once a year. The aim is to detect a prevalence of salmonella of at least 5% with a confidence interval of 95% on flock level each time sampling is done.
Breeders and hatchery:
Sampling of breeding flocks is carried out according to Regulation SJVFS 2007:19. Sampling is mandatory at holdings with more than 250 breeding geese.
There are no elite and grand parent geese in Sweden. The parent stock is imported as day-old chicks.

Type of specimen taken

Imported feed material of animal origin

see "Salmonella spp in feed"

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

Meconium

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

Meat production flocks: Day-old chicks

Meconium

Meat production flocks: Before slaughter at farm

Other: socks or faeces

Meat production flocks: At slaughter (flock based approach)

Other: neck skin, see Salmonella in broiler meat and products thereof

Frequency of the sampling

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

Every flock is sampled

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

Other: at 4 weeks and 2 weeks prior to moving

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

Every 2nd weeks

Meat production flocks: Before slaughter at farm

1-2 weeks prior to slaughter

Meat production flocks: At slaughter (flock based approach)

Other: see Salmonella in broiler meat and products thereof

Methods of sampling (description of sampling techniques)

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

Meconium from 250 chicken from each breeder group at the hatchery is pooled into one sample.

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

Two paired sock samples are taken and pooled into one sample. Samples are taken at the age of 4 weeks and 2 weeks before any movement or before hatching.

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

Five sock samples are taken every second week and pooled into two samples. Official veterinarian takes samples three times during production period, the other samples are taken by the food business operator.

Meat production flocks: Day-old chicks

See "Breeding flocks: Day-old chicks

Meat production flocks: Before slaughter at farm

Sampling is mandatory at holdings with >500 geese slaughtered yearly.
Two paired sock samples are taken and pooled into one sample two weeks before slaughter. Instead of sock samples it is also possible to take 2 faecal samples of 75 g and pool them into one sample. Official veterinarian takes samples once a year, the other samples are taken by the food business operator.

Meat production flocks: At slaughter (flock based approach)

see "Salmonella in broiler meat and products thereof"

Case definition

Breeding flocks: Day-old chicks

If salmonella is isolated from an individual animal, the whole flock is considered salmonella infected. In poultry, the flock is the epidemiological unit.

Breeding flocks: Rearing period

See "Breeding flocks: Day-old chicks"

Breeding flocks: Production period

See "Breeding flocks: Day-old chicks"

Meat production flocks: Day-old chicks

See "Breeding flocks: Day-old chicks"

Meat production flocks: Rearing period

See "Breeding flocks: Day-old chicks"

Meat production flocks: Before slaughter at farm

See "Breeding flocks: Day-old chicks"

Meat production flocks: At slaughter (flock based approach)

A positive neck skin sample at slaughter results in restriction on the holding of origin

and additional official sampling at the holding. If the official samples are positive the farm is considered infected.

Diagnostic/ analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Breeding flocks: Rearing period

Bacteriological method: ISO 6579:2002

Breeding flocks: Production period

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Breeding flocks

Vaccination against salmonellosis is not allowed.

Meat production flocks

See "Breeding flocks"

Other preventive measures than vaccination in place

Breeding flocks

High bio-security rules at the same level as for other breeding stocks. These flocks are raised indoors.

Meat production flocks

Controlled feed, salmonella free chicks.

Control program/ mechanisms

The control program/ strategies in place

Breeding flocks

At some breeding establishments where geese are kept indoors the same strict hygiene rules are enforced as in the preventive volontary salmonella control programme even though geese farms

are not accepted within the programme. It includes: a)Rules for feed production and transport, b)hygienic rules to protect the birds from salmonella infection from the surroundings, c) salmonella free newly hatched geeslings are delivered from the hatcheries, d) precaution to stop spread of salmonella from an infected flock, and e) all- in - all out principle in all houses.
At some holdings no preventive measures are applied.

Meat production flocks

These are raised outdoors. Following rules are applied at some establishments: a)Rules for feed production and transport, b) salmonella free newly hatched geeslings are delivered from the hatcheries, c)precaution to stop spread of salmonella from an infected flock. At some holdings no preventive measures are applied.

Measures in case of the positive findings or single cases

Breeding flocks

Restrictions to and from the farm, culling of infected animals, destruction, cleaning and desinfection and finally environmental negative samples before restrictions are lifted.

Meat Production flocks

See "Breeding flocks"

Notification system in place

Any finding of salmonella is compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

Salmonella was isolated from two holdings: S. Typhimurium NST from one holding and DT 40 from another.
Results from surveillance of neck skins is presented under the section Salmonella in broiler meat and products thereof.

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

Since 1996, the situation has remained stable with no to a few infected flocks per year. The Swedish geese meat production in very small but the few holdings struggle with Salmonella.

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

As the prevalence of Salmonella in Swedish produced red and white meat, and eggs is low and the existence of the Salmonella control program, the risk of contracting salmonella from domestic produced animal products is small.

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

Monitoring system

Sampling strategy

Breeding flocks

Sampling strategies are outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC), in the Zoonosis Directive (2003/ 99/ EG) and in the Swedish regulation on control of Salmonella in poultry (SJVFS 2007:19). The salmonella control programme is supervised by the SJV and the SLV.
Official veterinarians are responsible for sampling in holdings, hatcheries, cuttingplants and slaughterhouses. Samples are either taken by the official veterinarian or sampling is delegated to farmers/ companies.
The control constitutes of clinical surveillance and sampling. The clinical surveillance includes general surveillance and surveillance related to the control programme. Veterinarian takes samples once a year during rearing and three times a year under production. The other samples are taken by the food business operator. The aim is to detect a prevalence of salmonella of at least 5% with a confidence interval of 95% on flock level each time sampling is done.
Breeders and hatchery:
Sampling of breeding flocks is carried out according to Regulation SJVFS 2007:19. Sampling is mandatory at holdings with more than 250 breeding ducks.
There are no Elite and Grand Parent ducks in Sweden. The breeding stock is imported as parents.

Meat production flocks

Mandatory sampling if >500 ducks are raised for slaughter per year.
Every flock is sampled 2 weeks prior to slaughter. If thinning is practised an additional sampling has to be done 10 days before slaughter. Once a year this sampling is done by an official veterinarian - usually the veterinarian responsible at the slaughterhouse where the ducks are admitted for slaughter.

Frequency of the sampling

Breeding flocks: Day-old chicks

Every flock is sampled

Breeding flocks: Rearing period

Other: at the age of 4 weeks and 2 weeks before moving

Breeding flocks: Production period

Every every second week weeks

Meat production flocks: Before slaughter at farm

2 weeks prior to slaughter

Meat production flocks: At slaughter (flock based approach)

Other: see Salmonella in broiler meat and products thereof

Type of specimen taken

Breeding flocks: Day-old chicks

Meconium

Breeding flocks: Rearing period

Socks/ boot swabs

Breeding flocks: Production period

Socks/ boot swabs

Meat production flocks: Day-old chicks

Meconium

Meat production flocks: Before slaughter at farm

Other: socks or faeces

Meat production flocks: At slaughter (flock based approach)

Other: : neck skins, see Salmonella in broiler meat and products thereof

Methods of sampling (description of sampling techniques)

Breeding flocks: Day-old chicks

Meconium from 250 newly hatched ducklings from each breeder group at the hatchery is pooled into one sample.

Breeding flocks: Rearing period

Two paired sock samples are taken and pooled into one sample. Samples are taken at the age of 4 weeks and 2 weeks before moving or before hatching.

Breeding flocks: Production period

Five sock samples are taken every second week and pooled into two samples.

Meat production flocks: Day-old chicks

See Breeding ducks: day-old chicks

Meat production flocks: Before slaughter at farm

Two paired sock samples are taken and pooled into one sample two weeks before slaughter. Instead of sock samples it is also possible to take 2 faecal samples of 75 g and pool them into one sample. Official veterinarian takes samples once a year, the other samples are taken by the food business operator.

Meat production flocks: At slaughter (flock based approach)

see "Salmonella in broiler meat and products thereof"

Case definition

Breeding flocks: Day-old chicks

If salmonella is isolated from an individual animal, the whole flock is considered salmonella infected. In poultry, the flock is the epidemiological unit.

Breeding flocks: Rearing period

See "Breeding flocks: Day-old chicks"

Breeding flocks: Production period

See "Breeding flocks: Day-old chicks"

Meat production flocks: Day-old chicks

See "Breeding flocks: Day-old chicks"

Meat production flocks: Rearing period

See "Breeding flocks: Day-old chicks"

Meat production flocks: Before slaughter at farm

See "Breeding flocks: Day-old chicks"

Meat production flocks: At slaughter (flock based approach)

A positive neck skin sample at slaughter results in restriction on the holding of origin and additional official sampling at the holding. If the official samples are positive the farm is considered infected

Diagnostic/ analytical methods used

Breeding flocks: Day-old chicks

Bacteriological method: ISO 6579:2002

Breeding flocks: Rearing period

Bacteriological method: ISO 6579:2002

Breeding flocks: Production period

Bacteriological method: ISO 6579:2002

Meat production flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Breeding flocks

Vaccination is prohibited

Meat production flocks

See "Breeding flocks"

Other preventive measures than vaccination in place

Breeding flocks

High bio-security rules at the same level as for other breeding stocks. These flocks are raised indoors.

Meat production flocks

Controlled feed, salmonella free ducklings.

Control program/ mechanisms

The control program/ strategies in place

Breeding flocks

Strict hygiene rules are enforced on breeding stock which is kept indoors with the same preventive measures implemented as for other breeding poultry. The rules are in line with what is required within the prophylactic volontary salmonella control programme even though duck farms are not accepted within the programme. It includes: a)Rules for feed production and transport, b) hygienic rules to protect the birds from salmonella infection from the surroundings, c) salmonella free newly hatched
ducklings are delivered from the hatcheries, d) precaution to stop spread of salmonella from an infected flock, and e) all- in - all out principle in all houses. At some of the breeding duck farms no preventive measures are implemented.

Meat production flocks

These are raised outdoors. Following rules may be applied at some holdings: a)Rules for feed production and transport, b) salmonella free newly hatched ducklings from the hatcheries, c)precaution to stop spread of salmonella from an infected flock.

Measures in case of the positive findings or single cases

Restrictions, culling of infected animals, destruction, cleaning and desinfection and finally environmental negative samples before restrictions are lifted.

Notification system in place

All findings of salmonella are compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

S. Paratyphi Java was isolated from one meat production flock and S. Reading from another meat production flock. S. Worthington was detected at one breeding holding.

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

Although the Swedish duck meat production is very small the few holdings struggle with Salmonella.

F. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

Sampling strategies are described in the Swedish Salmonella control programme (95/ 50/ EC). The programmes are supervised by the SJV and the SLV. All sampling according to the salmonella programme is performed or supervised by the competent authority, that is official veterinarians.
Sampling is divided into routine sampling and targeted sampling. Routine sampling consists of faecal samples from herds, lymph nodes and carcass swabs at slaughter. Targeted sampling consists of faecal, environmental and feed samples from herds.
ROUTINE SAMPLING
Within the programme, lymph nodes from the ileo-caecal region are systematically collected from fattening and adult pigs at slaughter to ensure that the samples are representative of the population of slaughtered pigs at each slaughterhouse. Sampling of lymph nodes in the programme is described here, whereas sampling of carcass swabs is described under "Salmonella spp. in pig meat and products thereof".
Sampling of lymph nodes at slaughter houses:
Slaughter houses have been divided into two categories: Category A slaughtering 90% of all pigs and Category B slaughtering 10% of all pigs.
Category A: At each slaughterhouse a sufficient number of samples is collected to detect at least 5% salmonella infected/ contaminated carcasses with 95% confidence interval (CI) in the annual slaughter. Sampling is performed daily in Category A. Samples are collected evenly distributed over the day and if slaughter is performed on separate lines, each will be sampled separately.
Category B: These slaughterhouses are controlled as one unit. Enough samples to detect a prevalence of 1% salmonella infected carcases with 90% CI will be taken. Sampling wil be spread out over the slaughter days to avoid periodical sampling.
Breeding herds are sampled once a year and multiplying herds twice a year.
All imported animals are sampled.
TARGETED SAMPLING
Sampling at farms and abattoirs is performed whenever there is a clinical suspicion.

Multiplying herds

see "breeding herds"

Fattening herds

see "breeding herds"

Frequency of the sampling

Breeding herds

Other: 1) lymph nodes at Category A: daily, Category B: spread out evenly over the year, 2) sampling at suspicion/ outbreak, 3) faecal samples once a year, 4) all imported animals

Multiplying herds

Other: 1) lymph nodes at Category A: daily, Category B: spread out evenly over the year , 2) sampling at suspicion/ outbreak, 3) sow pools twice a year, 4) all imported animals

Fattening herds at farm

Other: 1) lymph nodes at Category A: daily, Catergory B: spread out evenly over the year , 2) sampling at suspicion/ outbreak

Fattening herds at slaughterhouse (herd based approach)

Other: The sampling unit is the pig, not the herd

Type of specimen taken

Breeding herds

Other: Lymph nodes and feaces

Multiplying herds

Other: Lymph nodes and feaces

Fattening herds at farm

Other: Lymph nodes and feaces

Fattening herds at slaughterhouse (herd based approach)

Other:

Methods of sampling (description of sampling techniques)

Breeding herds

1)Faecal sampling

1.1 Sampling procedure in clinical suspicion:
For individual sampling, at least 10 g faeces from each animal is collected. From pens with growers/ finisher pigs pooled faecal samples of at least 50g (10g from each of at least 5 animals/ pen) is collected. For sampling at suspicion or in outbreak investigations feacal samples are only pooled for fattening pigs and not for adult pigs.
1.2 Sampling procedure in routine sampling:
50 faecal samples are taken from each breeding and multiplying herds and pooled to 10 samples.
1.3 Bacteriological examination:
All samples should be analysed within 24-48 h after collection.
From individual samples, 5 g faeces is examined while the remaining part is stored at +4C until examination is completed. Material from at most 15 animals is pooled. If salmonella is isolated from a pooled sample, each of the individually stored samples can be examined for salmonella separately.
2)Lymph nodes at slaughter:
At least 5 lymph nodes from the ileo-caecal region are aseptically removed and put in a plastic bag. The samples are kept refrigerated until sent to the laboratory. At the laboratory all lymph nodes from one sample are divided into two equal parts. One half is placed in a mortar and the other part is kept at +4 C. In the mortar, lymph nodes from 15 animals are pooled and homogenised. If salmonella is isolated from a pooled sample of lymph nodes each of the individually stored samples will be analysed separately.

Multiplying herds

See "breeding herds"

Fattening herds at farm

For sampling of lymph nodes and feacal sampling at suspicion or at outbreak investigation, see "Breeding herds".

Fattening herds at slaughterhouse (herd based approach)

For sampling of lymph nodes, see "breeding herds".

Case definition

Breeding herds

If salmonella is isolated from a pig, then the whole herd is considered infected with salmonella. The herd is the epidemiological unit.

Multiplying herds

see under "breeding herd"

Fattening herds at farm

see under "breeding herd"

Fattening herds at slaughterhouse (herd based approach)

see under "breeding herd"

Diagnostic/ analytical methods used

Breeding herds

Other: ISO 6579:2002 or NMKL No 71:1999

Multiplying herds

Other: ISO 6579:2002 or NMKL No 71:1999

Fattening herds at farm

Other: ISO 6579:2002 or NMKL No 71:1999

Fattening herds at slaughterhouse (herd based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Breeding herds

Vaccination is not allowed in Sweden.

Multiplying herds

see under "breeding herd"

Fattening herds

see under "breeding herd"

Other preventive measures than vaccination in place

Breeding herds

In pigs and other food-producing animals salmonella control in feed- and feed production (HACCP based approach) is integrated with the control programme to ensure that feed to food producing animals is free from Salmonella.
Apart from this, there is also a voluntary hygiene programme in herds since 2002 run by the industry and supervised by the SJV. In this programme, certain rules of hygiene and standardised preventive measures have to be implemented. Affiliation to the the voluntary control programme implies a higher level of economic compensation in case salmonella infection.

Multiplying herds

see "breeding herds"

Fattening herds

see "breeding herds"

Control program/ mechanisms

The control program/ strategies in place

Breeding herds

The control programme is outlined in the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC). The programme is nation-wide, thus it covers all herds in Sweden, also those that may deliver their animals abroad.
The salmonella control programme is officially supervised and includes:
a) Compulsory notification of all findings of salmonella in all animals, food, feed (including environmental sampling) and humans, as well as suspicion of Salmonella, regardless of serotype
b) Compulsory action if Salmonella is isolated see "Measures in case of positive findings"
c) Examination for Salmonella in animals slaughtered under special conditions (e.g diseased animals or when salmonella is suspected)
d) Control programme at slaughter houses and in herds, and clinical surveillance in herds.
As breeding herds and multiplying herds constitute the top of the breeding pyramide, a complementary monitoring is performed in these herds at farm level.

Multiplying herds

see "breeding herds"

Fattening herds

see "breeding herds"

Measures in case of the positive findings or single cases

1) Isolated salmonella strains have to be sent in to the SVA for typing and testing of antimicrobial resistance.
2) If Salmonella is isolated from pigs and other food-producing animals, indicating a herd infection, restrictions are put on the farm/ herd. Such restrictions include a ban of transport (unless transport to sanitary slaughter), collection of bacteriological samples of the whole herd, and institution of a sanitation plan, i.e. involving elimination of infected animals, cleaning and disinfection, treatment of manure and sludge, and destruction of feeding stuffs. Trace-back and trace-forward investigations are also performed. Also, the feed supplier is investigated. Restrictions are lifted when faecal samples from all animals in the epidemiological unit (usually the herd) taken at two consecutive samplings one month apart are negative.
3)If salmonella is found from any lymph node collected in the control programme the farm of origin is always performed except for cases when Salmonella is only isolated from the pooled sample but not from the individual pig.
4) If salmonella is isolated from other animals, humans, food or feed and connections can be made to pigs, investigation of the farm/ farms is always performed.

Notification system in place

Any finding of salmonella in animals, feed (and environmenatl samples), food and humans, irrespective of serotype, is compulsory notifiable. Notification of salmonella findings has been in force since 1961. Suspicion of salmonella is also notifiable.

Results of the investigation

1) In the control programme, 6197 lymph nodes were analysed from category A slaughterhouses (2884 adult swine, 3313 fattening pigs) and 47 lymph nodes at category B abattoirs (6 adult swine, 41 slaughter pigs). Of these, 21 were positive. Salmonella was isolated from 11 samples taken from adult swine: S. Infantis (n=4), S. Typhimurium DT 40 (n=2), S. Typhimurium DT 104, S. Typhimurium DT 99, S. Typhimurium NST (n=2) and S. subspecies I. S. Typhimurium DT 104 and S. subspecies I could only be isolated from the pooled sample, not from the individual pigs.
Salmonella was isolated from ten fattening pigs: S. Typhimurium NST (n=4), S. Infantis (n=2), S. Typhimurium DT 40 (n=2), S. Typhimurium NT and S. Typhimurium DT 120. In two cases, S. Typhimurium NST could only be isolated from the pooled sample but not from the individual pig.
2) In the EU baseline survey on the prevalence of Salmonella in slaughter swine Salmonella was isolated from five swine in 2007 (S. Infantis from two swine, S. Typhimurium DT 40 from two swine and S. Typhimurium U277 from one swine) and from one swine in 2006 (S. Typhimurium DT 41).
3) Salmonella was detected in animals at 10 new farms in 2007.
3.1) Salmonella was detected at nine farms of origin after an isolation in the Salmonella control program but two of these farms were sampled in January 2008 after a positive detection in late December in the control program. Hence, the two farms are not included in the number of new farms in 2007. Those included in the prevalence of infected farms of 2007 had the following serotypes: S. Infantis (3 farms), S. Typhimurium (4 farms, phagetypes DT 40, DT 120, NST U277 and another subtype of NST).
3.2) Multiresistant S. Typhimurium DT 104 was isolated from a pool of lymph nodes at slaughter but the individual animal could not be identified. All farms with animals included in the pool were sampled with negative results but one of these farms was a sow pool. All the satellites to this sow pool were sampled. A similar isolate was detected from one of the satellites. This satellite farm had both swine and cattle and Salmonella was detected from both species.
3.3) S. Typhimurium DT 40 was detected at one farm and S. Infantis at one farm after an isolation in the baseline study.
4) One feed borne outbreak affecting one pig farm, caused by S. Putten. S. Putten was only isolated from the feeding system. In access, two cattle farms were also affected (See Salmonella in bovine animals).
5) One farm infected with S. Typhimurium DT 104 in 2006 was declared free in 2007.
6) Salmonella was not detected in the routine samples from the breeding or multiplying farms.

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

The situation in Sweden has been favourable. From the beginning of the 80's there were, in general, less than 5 infected herds per year. However, there seems to be an increase in Salmonella infections in swine. Control of feed and infected herds is extremely important in order to prevent Salmonella infections.
See also "Salmonella spp. in pig meat and products".

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

source of infection)

Since 1996 the percentage of Swedish pigs infected with salmonella has varied from 0,04 (2004) to 0,38 (2007). There seems to be an increase in infections in 2007. However, the number of Swedish pigs infected with Salmonella is still low.

Additional information

Apart from sampling of animals in the mandatory salmonella programme at herd- and slaughter level, there is extensive sampling at feed mills at critical control points to ensure production of feed virtually free from salmonella contamination.

G. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

Sampling strategies are described in the Swedish Salmonella control programme (95/ 50/ EC). The programmes are supervised by the SJV and the SLV. All sampling according to the salmonella programme is supervised by the competent authority, that is official veterinarians. Sampling can be divided into routine sampling and targeted sampling.
Routine sampling
Within the programme lymph nodes are systematically collected from cattle at slaughter to ensure that the samples are representative of the population of slaughtered cattle at each slaughterhouse. Sampling of lymph nodes in the programme is described here, wheras sampling of carcass swabs is described under "Salmonella spp. in bovine meat and products thereof".
Cat.A: At each slaughterhouse a sufficient number of samples is collected to detect at least 5% salmonella infected/ contaminated carcasses with 95% Confidence Interval (CI) in the annual slaughter. Sampling is performed daily in Cat.A. and samples consist of lymph nodes from the ileo-caecal region. At these abattoirs samples are collected evenly distributed over the day and if slaughter is performed on separate lines, each will be sampled separately.
Cat.B: These slaughterhouses are controlled as one unit. Enough samples to detect a prevalence of 1% salmonella infected carcasses with 90% CI will be taken. These samples consist of lymph nodes from the ileo-caecal region. Sampling is spread out over the slaughter days to avoid periodical sampling.
Animals that are bought to a farm under certain defined criteria are also sampled.
Targeted sampling
Sampling at farms is performed whenever there is a clinical suspicion. Calves up to six months are sampled at necropsy, other animals when considered necessary.

Frequency of the sampling

Animals at farm

Other: 1) lymph nodes at Category A: daily, category B: spread out evenly over the year, 2) sampling at suspicion / outbreak/ sanitary slaughter

Animals at slaughter (herd based approach)

Other: see lymph nodes at "Animals at farms"

Type of specimen taken

Animals at farm

Other: faeces

Animals at slaughter (herd based approach)

Other: lymph nodes

Methods of sampling (description of sampling techniques)

Animals at farm

FAECAL SAMPLING:
Sampling procedure:
For individual sampling, at least 10 g faeces from each animal is collected. From pens with calves/ young stock pooled faecal samples of at least 50g (10g from each of at least 5 animals/ pen) is collected. All samples should be analysed within 24-48 h after collection.
Bacteriological examination:
From individual samples, 5 g faeces is examined while the remaining part is stored at +4C until examination is completed. Material from at most 15 animals are pooled. If salmonella is isolated from a pooled sample, each of the individually stored samples can be examined for salmonella separately.
LYMPH NODES AT SLAUGHTER:
The lymph nodes are aseptically removed and put in a plastic bag. The samples are kept refrigerated until sent to the laboratory. At the laboratory all lymph nodes from one sample are divided into two equal parts. One half is placed in a mortar and the other part is kept at 4o C. In the mortar lymph nodes from 15 animals are pooled and homogenised. If salmonella is isolated from a pooled sample of lymph nodes each of the individually stored samples will be analysed separately.

Animals at slaughter (herd based approach)

For information about lymph nodes, see "Animals at farm". For information about carcass swabs and cutting plants, see "Salmonella spp. in bovine meat and products thereof".

Case definition

Animals at farm

If salmonella is isolated from a bovine animal, the whole herd is considered infected with salmonella. The herd is the epidemiological unit.

Animals at slaughter (herd based approach)

see "Animals at farm"

Diagnostic/ analytical methods used

Animals at farm

Other: NMKL No 71:1999 or ISO 6579:2002

Animals at slaughter (herd based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Vaccination is not allowed.

Other preventive measures than vaccination in place

In food-producing animals salmonella control in feed and in feed production (HACCP based approach) is integrated in the salmonella control.
Apart from this, there is also a voluntary hygiene programme since 2002 run by the industry and supervised by the SJV. In this programme, certain rules of hygiene and standardised preventive measures have to be implemented. Affiliation to the the voluntary control programme imply a higher level of economic compensation in case salmonella infection.

Control program/ mechanisms

The control program/ strategies in place

Control strategies follow the Swedish Salmonella control programme, approved by the EU in 1995 (95/ 50/ EC).
The control programme is nation-wide, thus it covers all herds in Sweden, also those that may deliver their animals abroad. The salmonella control programme is officially supervised and includes:
a) Compulsory notification of all findings of salmonella in all animals, food, feed (environmental sampling included) and humans as well as suspicions of salmonella, regardless of serotype
b) Compulsory action if salmonella is isolated, see "Measures in case of positive findings"
c) Examination for salmonella in animals slaughtered under special conditions (e.g diseased animals or when salmonella is suspected)
d) Control programme at slaughter houses and clinical surveillance in herds.

Measures in case of the positive findings or single cases

1) Isolated salmonella strains have to be sent in to the SVA for typing and testing of antimicrobial resistance.
2)If Salmonella is isolated from cattle and other food-producing animals, indicating a herd infection, restrictions are put on the farm/ herd. Such restrictions may include a ban of transport (unless transport to sanitary slaughter), collection of bacteriological samples of the whole herd, and institution of a sanitation plan, i.e. involving elimination of infected animals, cleaning and disinfection, treatment of manure and sludge, and destruction of feeding stuffs. Trace-back and trace-forward investigations are also performed. Also, the feed supplier is investigated. Restrictions are lifted when faecal samples from all animals in the epidemiological unit (usually the herd) taken at two consecutive samplings one

month apart are negative.
3)If salmonella is found from any lymph node collected in the control programme the farm of origin is always performed except for cases when Salmonella is only isolated from the pooled sample but cannot be traced to an individual animal.
4) If salmonella is isolated from other animals, humans or feed and connections can be made to cattle, investigation is always performed.

Notification system in place

All findings of salmonella are compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961. Suspicion of salmonella infection is also notifiable.

Results of the investigation

1) A total of 3853 lymph nodes were analysed in the Salmonella control programme: 3650 at category A slaughterhouses and 203 at category B. Salmonella was isolated from five lymph nodes at category A slaughterhouses (S. Agona, S. Duesseldorf, S. Reading and S. Typhimurium NST U277 and another subtype of NST). The individual animal could be identified for all except for the case of S. Duesseldorf. The farms of origin of these four cases were sampled.
2) Salmonella was also isolated from two individual animals at necropsy (S. Duesseldorf and S. Typhimurium NST U277) but the bacterium was not detected at farm.
3) In 2007, Salmonella was isolated from five new farms. The following serotypes were isolated:
a) 3 farms with S. Dublin: necropsy of a calf, abortions and meat inspection, respectively.
b) 1 S. Reading (Salmonella control program)
c) 1 S. Typhimurium DT 104 (trace-back of Salmonella)
4) In addition, Salmonella Putten was isolated in the feeding system of two cattle farms.
5) Eight additional farms were under restrictive measures in 2007 after an infection of Salmonella in 2005 and 2006. Five of these farms were infected with S. Dublin, one with S. Agona, one with S. Typhimurium DT 104 and one with S. Typhimurium NT. At the end of 2007, only three of these farms were under restrictive measures.

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

The situation remains very favourable with few infected farms each year. During the 1980s' the number of salmonella infected cattle farms declined rapidly. Since the end of the 1990's the number of farms with new infections varied from 4 to 13 per year.

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

The risk of contracting salmonella from Swedish produced food of cattle origin is negligible as the number of Swedish cattle infected with salmonella is low.

H. Salmonella spp. in animal

Monitoring system

Sampling strategy

Described here is salmonella in other animal species (such as horses, pets and wild life) than

the ones covered by the salmonella control programme.
Sampling at farms/ holdings or of individual animals is performed whenever there is a clinical suspicion. Sampling may also be performed at autopsy. Wild life sent to the SVA for autopsy may be tested for salmonella.

Case definition

Animals at farm

If salmonella is isolated from an individual sheep, goat, dog, horse or cat, the whole farm/ kennel/ holding/ stable etc. is considered positive. However, if salmonella is isolated from other animal species, each animal is regarded positive.

Vaccination policy

Vaccination is not used in Sweden.

Measures in case of the positive findings or single cases

If Salmonella is isolated from food-producing animals (including horses), indicating a herd infection, restrictions are put on the farm/ herd according to Swedish legislation. For other domestic animal species, proper actions are taken in order to eliminate the infection and prevent spread of salmonella.

Notification system in place

All findings of salmonella are compulsory notifiable. The obligation to notify all salmonella findings has been in force since 1961.

Results of the investigation

Early in 2007, there was an outbreak of S. Typhimurium in cats and 184 cases were reported. In addition, Salmonella that not serotyped was isolated from 10 cats. It is suspected that the cats acquire the infection by wild birds.
Furthermore, Salmonella was isolated from 7 dogs, 2 horses, 1 sheep, 1 reindeer, 1 pet bird, 4 reptile pets, 38 wild birds and 13 wild mammals and one ostrich. The various serotypes are shown in the table "Salmonella in other animals".

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

The situation remains stable.

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

It has been reported that findings of salmonella in reptiles kept as pets pose a risk for transmission of salmonella to humans. For other animal species, transmission to humans is regarded to be very limited.

Additional information

Since 2003, there have been yearly outbreaks of Salmonella Typhimurium in cats during late winter/ early spring. In 2003, 114 cats were reported, followed by 31 in 2004. Phage type 40 has been the

dominating type among the samples that were phagetyped. In 2005, 138 cats with S. typhimurium were reported. In 2006, 77 cats with S. Typhimurium were reported. In 2007, 151 cats with S. Typhimurium was reported.

Table Salmonella in breeding flocks of Gallus gallus

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	S. Hadar	S. Infantis	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl)										
parent breeding flocks for egg production line										
during production period	SJV	flock	24	0						
during rearing period	SJV	flock	9	0						
parent breeding flocks for meat production line										
during rearing period (1)	SJV	flock	100	2		2				
during production period (2)	SJV	flock	114	1		1				
grandparent breeding flocks for meat production line (3)	SJV	flock	22	0						

(1) : 26 flocks were in rearing already in 2006.
(2) : 48 of these flocks were in production already in 2006.
(3) : Seven of these GP flocks were already in 2006.

Table Salmonella in other poultry

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Livingstone	S. Agona	S. Paratyphi B var. Java	S. Reading	S. Worthington
Gallus gallus (fowl)												
laying hens												
during rearing period	SJV	flock	188	1		1						
during production period	SJV	flock	590	3		2		1				
unspecified												
during production period (1)	SJV	flock	2428	8		6			2			
Ducks												
breeding flocks (2)	SJV	flock		1								1
meat production flocks	SJV	flock	7	2						1	1	
Geese												
meat production flocks	SJV	flock	7	2		2						
Turkeys												
breeding flocks	SJV	flock	9	0								
meat production flocks	SJV	flock	115	1								1

(1) : One of the Salmonella positive samples was from a hatchery.
(2) : The number duck breeding flocks tested is missing.

Table Salmonella in other birds

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Ostriches	SJV	flock	41	1		1	

Table Salmonella in other animals (Part A)

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Bredeney	S. London	S. Hessarek	S. Infantis	S. Dublin	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Muenster	Salmonella spp.	S. Agona	S. Duesseldorf	S. Reading	S. Braenderup	S. Oranienburg	S. Louisiana
Cattle (bovine animals) (1)	SIV	herd	23	13					8		3				1		1			
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A slaughterhouse)	SLV	animal	3650	5							2				1	1	1			
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoir)	SLV	animal	203	0																

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoir)	SLV	animal	3580	2			1			1										
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)	SLV	animal	202	0																
Sheep (2)	SJV	animal		1																
Pigs (4)	SJV	herd	26	11			4			7										
breeding animals	Swedish Animal Health Service	herd	115	0																
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)	SLV	animal	2884	11			4			6	1									
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)	SLV	animal	6	0																

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)	SLV	animal	2863	1			1												
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)	SLV	animal	6	0															
fattening pigs (3)																			
- at slaughterhouse - animal sample - lymph nodes - Survey (EU baseline study) (6)	SVA	animal	396	6			2					4							
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)	SLV	animal	3313	9			2					7							
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)	SLV	animal	41	1								1							

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)	SLV	animal	3331	3			3																		
	SLV	animal	39	1								1													
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)																									
baseline survey																									
- at slaughterhouse - animal sample - carcass swabs	SVA	animal	396	0																					
Solipeds, domestic (5)	SJV	animal		2												2									
Cats (7)	SJV	animal		184												184									
Dogs (8)	SVA	animal	237	7	1	1											1	1		1					
Birds																									
wild (9)	SJV	animal		38		1										35									
pet animals (10)	SJV	animal		1																					
Foxes																									
wild	SVA	animal	146	13												11									
Hares																									
wild (11)	SVA	animal	12	1												1									
Hedgehogs (12)	SJV	animal		2												2									
Reindeers																									
semi-domesticated (13)	SJV	animal		1				1																	

Reptiles (14)	SJV	animal		4														1	1	1
Deer																				
wild																				
roe deer (15)	SJV	animal	15	1							1									

(1) : Prevalence in 2007. Seven of these farms were detected in 2006 and one in 2005. Five new farms in 2007.
(2) : The total number of sheep tested is not available.
(3) : At abattoir, lymph nodes, salmonella control program
(4) : One of these herds was detected in 2006, 11 in 2007.
(5) : The total number of solipeds tested is not available.
(6) : The numbers include also samples analysed in 2006.
(7) : The total number of cats tested is not available.
(8) : Only analyses performed at the SVA.
(9) : The total number of wild birds tested is not available.
(10) : The total number of pet birds tested is not available.
(11) : The number of tested includes only analyses performed at the SVA.
(12) : The total number of analyses is not known.
(13) : The total number of tested is not available.
(14) : The total number of reptiles tested is not known.
(15) : The total number of tested performed at the SVA.

Footnote

In addition, 2 arctic foxes, 4 badgers, 15 bears, 1 beaver, 21 grey seals, 14 elks, 105 lynxes, 1 musk ox, 14 otters, 1 raccoon dog, 1 red deer, 2 squirrels, 1 water vole, 4 wild rabbits, 1 wild swine, 13 wolves, 6 wolverines and 3 wood lemmings were tested negative for Salmonella.

Table Salmonella in other animals (Part B)

	S. enterica subsp. enterica	S. enterica subsp. arizonae	S. Newport	S. Livingstone	S. Indiana	S. Derby
Cattle (bovine animals) (1)						
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A slaughterhouse)						
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoir)						

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoir)								
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)								
Sheep (2)	1							
Pigs (4)								
breeding animals								
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)								
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)								

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)						
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)						
fattening pigs (3)						
- at slaughterhouse - animal sample - lymph nodes - Survey (EU baseline study) (6)						
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)						
- at slaughterhouse - animal sample - lymph nodes - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)						

- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category A abattoirs)						
- at slaughterhouse - animal sample - carcass swabs - Control or eradication programmes - national programmes (no Community co-financing) - official sampling (Category B abattoirs)						
baseline survey						
- at slaughterhouse - animal sample - carcass swabs						
Solipeds, domestic (5)						
Cats (7)						
Dogs (8)			1	1		
Birds						
wild (9)					1	1
pet animals (10)		1				
Foxes						
wild			2			
Hares						
wild (11)						
Hedgehogs (12)						
Reindeers						
semi-domesticated (13)						

Reptiles (14)				1		
Deer						
wild						
roe deer (15)						

(1) : Prevalence in 2007. Seven of these farms were detected in 2006 and one in 2005. Five new farms in 2007.
(2) : The total number of sheep tested is not available.
(3) : At abattoir, lymph nodes, salmonella control program
(4) : One of these herds was detected in 2006, 11 in 2007.
(5) : The total number of solipeds tested is not available.
(6) : The numbers include also samples analysed in 2006.
(7) : The total number of cats tested is not available.
(8) : Only analyses performed at the SVA.
(9) : The total number of wild birds tested is not available.
(10) : The total number of pet birds tested is not available.
(11) : The number of tested includes only analyses performed at the SVA.
(12) : The total number of analyses is not known.
(13) : The total number of tested is not available.
(14) : The total number of reptiles tested is not known.
(15) : The total number of tested performed at the SVA.

Footnote

In addition, 2 arctic foxes, 4 badgers, 15 bears, 1 beaver, 21 grey seals, 14 elks, 105 lynxes, 1 musk ox, 14 otters, 1 raccoon dog, 1 red deer, 2 squirrels, 1 water vole, 4 wild rabbits, 1 wild swine, 13 wolves, 6 wolverines and 3 wood lemmings were tested negative for Salmonella.

2.1.5. Salmonella in feedingstuffs

A. Salmonella spp. in feed

History of the disease and/ or infection in the country

(Note from the editors: Parts of the text below does not fit the premade text form, therefore text has been entered under "History of the disease...", "National evaluation..." and "Additional information". We include this text as Salmonella control in feed is integrated in the Swedish Salmonella control programme.
Current situation:
All sampling follow the legislation on feeding stuffs and animal by-products and is supervised by the SJV. In addition to the compulsory testing, a large number of voluntary samples are taken. All Salmonella findings are sent to the SVA for confirmation and serotyping.
Analytical method used:
The bacteriological method used is NMKL method No 71 (5th ed., 1999). Serotyping is performed by slide agglutination. Certain serotypes are subtyped by molecular methods. The compulsory samples taken at the feed mills are analysed at the SVA. Also, samples taken by official feed inspectors and "hygiene groups", consisting of the county veterinarian and an official feed inspector, are analysed at the SVA. Other samples may be analysed at other accredited laboratories. Most analysing laboratories are accredited according to EN/ 150/ 17025.

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

Sampling at feed mills:
At the feed mills, samples are taken mainly according to Hazard Analysis Critical Control Point (HACCP) principles, both on the premises and along the production line. The HACCP system was initiated in 1991 and has proven to be effective for detecting and preventing Salmonella in feeding stuffs. Feed mills that produce feeding stuffs for poultry are obliged to take a minimum of five samples per week from specified critical control points. Feed mills that produce feeding stuffs for ruminants, pigs or horses, are obliged to take two samples a week. The producer often takes additional voluntary samples. Official feed inspectors sample at specified points at the feed mills, one to five times a year, depending on production volume. Also, a so-called hygiene group makes yearly inspections at feed mills that produce more than 1000 tons of feeding stuffs annually. Feed mills that produce less are visited less frequently. At these inspections, samples are taken at critical points - especially in connection with coolers, aspirators and elevators.
Sampling of feed materials:
Feed materials are classified according to the Salmonella risk they may present: feed materials of animal origin (S1), high risk feed materials of vegetable origin (S2, e.g. soy bean meal and some products deriving from rape seed), and low risk feed materials of vegetable origin (S3, e.g. rice). Production of these classified feed materials has to follow a hygiene programme, containing routines for Salmonella sampling, should be approved by the SJV.
All consignments of feed materials classified as S1, S2 and S3 that is traded into Sweden have to be sampled, either in Sweden or in the country of origin. If the consignment was sampled outside Sweden, it must be proved that the required samples have been taken.
Feed material of animal origin has to be sampled according to regulation (EC) No 1774/ 2002. If the production is continuous, the number of samples to be taken is decided by the SJV. In addition to this, many voluntary samples are collected.

Sampling of compound feeding stuffs traded into Sweden:
All compound feeding stuffs (S1, S2 or S3) traded into Sweden and produced for ruminants, pigs or poultry, are tested for Salmonella following the same principles as feed raw materials.
Processing plants for animal by-products and feed material of animal origin: Feed materials of animal origin are sampled in accordance with the EU legislation. Many voluntary samples are also taken.
Pet food: Every company producing pet food is regularly inspected and the feed is sampled for Salmonella once a year by an official feed inspector. In addition to this, voluntary samples are taken. Every consignment of dog chews from a third country is sampled at the border inspection, even though it must be accompanied by a certificate showing that the pet food has been tested negative for Salmonella in compliance with the EU legislation. Dog chews that are found positive for Salmonella are rejected. Pet food produced by animal by-products have to be sampled for Salmonella according to regulation (EC) No 1774/ 2002.
Measures in case of positive findings: No feed materials containing, or suspected of containing, Salmonella may be used in the production of feeding stuffs. Positive Salmonella findings always give rise to further testing and decontamination.

Additional information

Heat treatment: All compound feeding stuffs for poultry have to be heat treated to >75°C. In practice, a great amount of feeding stuffs for ruminants and pigs are also heat treated. Non heat-treated feed grains for sale, aimed for poultry on farm, have to originate from a storage plant that has been approved by the SJV. All storage facilities must fulfil certain requirements regarding sampling.
RESULTS FROM 2007 In the tables, the compulsory samples, the sample staken in the official control and the voluntary samples that have been reported to the SJV are presented. There is no obligation to report negative results from voluntary samples.
FEED MILLS AND COMPUND FEEDING STUFFS In the HACCP control of feed mills, 8612 samples were taken by the industry and 332 by the authorities. Of these 51 were positive. The positive samples belonged to 28 serotypes (Table Salmonella in compound feeding stuffs). The most commonly isolated serotypes (n=9) was S. Senftenberg.
FEED MATERIAL OF VEGETABLE ORIGIN In total, 3291 samples from derived material of soybean, maize, palm kernel and rape seed were analysed. Of those, 28 were positive. The most common serotype was S. Senftenberg (n=8). Furthermore, 2273 environmental samples from domestic rape seed processing plants were analysed. Of those, 6 were positive and five were of the serotype Senftenberg. (Table Salmonella in other feed materials)
PROCESSING PLANTS FOR ANIMAL BYPRODUCTS AND FEED MATERIALS OF ANIMAL ORIGIN Out of 2784 samples from feed materials of land animal origin, 6 were positive. (Table Salmonella in feed material of animal origin).
SALMONELLA OUTBREAK IN FEED, 2007
In 2007, there was an outbreak related to feed. Salmonella was detected in the feeding system of 2 cattle farms and one pig farm.

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Mbandaka	S. Senftenberg	S. Montevideo
Feed material of land animal origin											
meat and bone meal (2)	SJV	batch		44	0						
bone meal (3)	SJV	single		667	5				4	1	
greaves (4)	SJV	single		1195	0						
poultry offal meal (5)	SJV	batch		768	0						
egg powder											
- at feed mill - imported	SJV	batch		52	0						
Feed material of marine animal origin											
fish meal	SJV	batch		58	1						1
fish oil (8)	SJV										
fish silage (9)	SJV										

(1) : The number of units tested is not available.
(2) : Imported
(3) : Domestic production and environmental samples
(4) : Domstic production and environmental samples
(5) : Imported, figures include also feather meal
(6) : The number of units tested is not available.
(7) : The number of units tested is not available.
(8) : The number of units tested is not available.
(9) : The number of units tested is not available.

Footnote

The weight of the samples varies.

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Cerro	S. Senftenberg	S. Livingstone	S. Mbandaka	S. Agona
Feed material of cereal grain origin													
maize derived (5)	SJV	batch		160	3			2					1
Feed material of oil seed or fruit origin													
rape seed derived (1)	SJV	batch		1183	15			6			6	2	1
- at feed mill - environmental sample (Domestic)	SJV	single		727	6					5		1	
- at feed mill - domestic production	SJV	single		1546	0								
palm kernel derived (2)	SJV	batch		380	1								1
soya (bean) derived (3)	SJV	batch		1536	9				1	8			
Other feed material													
other plants (4)	SJV	batch		32	0								

(1) : Imported (2) : Imported (3) : Imported (4) : Imported (5) : Imported

Table Salmonella in compound feedingstuffs (Part A)

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Tennessee	S. Yoruba	S. Eppendorf	S. Lexington	S. Livingstone	S. Muenster	S. Reading	S. Rissen	S. Senftenberg	S. Typhimurium	S. Enteritidis	Salmonella spp., unspecified	S. Ouakam	S. Putten	S. Soerenga
Compound feedingstuffs, not specified																				
process control																				
- at feed mill - Monitoring - official sampling (HACCP - compund feedingstuffs for livestock)	SJV	single		332	1						1									
- at feed mill - Monitoring - sampling by industry (mandatory weekly sampling)	SJV	single		8612	50	1	1	1	2	4	1	1	1	9	2		1	2	4	1

Table Salmonella in compound feedingstuffs (Part B)

	S. Agona	S. Anatum	S. Banana	S. Cerro	S. Corvallis	S. Cubana	S. Dublin	S. Duesseldorf	S. Emek	S. Infantis	S. Paratyphi B var. Java	S. Mbandaka	S. Meleagridis	S. Panama
Compound feedingstuffs, not specified														
process control														
- at feed mill - Monitoring - official sampling (HACCP - compund feedingstuffs for livestock)														
- at feed mill - Monitoring - sampling by industry (mandatory weekly sampling)	2	1	1	3	1	1	1	1	1	2	1	2	1	1

2.1.6. Salmonella serovars and phagetype distribution

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

Table Salmonella serovars in animals

Serovars		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry		Sheep		Birds - wild	
Sources of isolates (*)		M	C	M	C	M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=	7	16	31	2	16		7			38	49	
Number of isolates serotyped	N=	7	16	31	2	16	0	7	0	0	0	38	0
Number of isolates per type													
S. Agona (1)		1	1			2							
S. Derby												1	
S. Dublin (2)			8										
S. Duesseldorf		1	1										
S. Indiana												1	
S. Infantis		1		12									
S. Livingstone						1							
S. London												1	
S. Putten			2		1								
S. Reading		1						1					
S. Typhimurium (3)		3	4	18	1	13		3				35	
S. Worthington								2					
S. Paratyphi B var. Java								1					
Salmonella spp.				1									

(1) : Isolate from a farm infected in 2006.
(2) : 3 isolates from new infections in 2007, 4 isolates from farms detected in 2006 and 1 isolate from farm detected in 2005
(3) : 2 cattle isolates from new infected herds, 2 from herds detected in 2006

Footnote (*) M : Monitoring, C : Clinical

Table Salmonella serovars in feed

Serovars		Compound feedingstuffs for pigs		Compound feedingstuffs for pigs - final product - non-pelleted/ meal	
Sources of isolates (*)		M	C	M	C
Number of isolates in the laboratory	N=				
Number of isolates serotyped	N=	0	0	0	0
Number of isolates per type					
Salmonella spp., unspecified					

Footnote

(*) M : Monitoring, C : Clinical

Table Salmonella Typhimurium phagetypes in animals

Phagetype		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Other poultry	
Sources of isolates (*)		M	C	M	C	M	C	M	C
Number of isolates in the laboratory	N=	3	4			8	5	4	
Number of isolates phagetyped	N=	3	4	15	2	8	4	4	0
Number of isolates per type									
DT 104 (1)			2		2				
DT 120				1			1		
Not typable		1	1				1		
DT 40 (2)				6				2	
DT 99				1					
U 277 (3)		1	1	5		2			
other		1		2		6	2	2	

(1) : One isolate is from a farm detected in 2006.
(2) : 2 isolates from the baseline study
(3) : One isolate is from the baseline study

Footnote

(*) M : Monitoring, C : Clinical
Isolates included in an outbreak investigation are categorised as clinical.

2.1.7. Antimicrobial resistance in Salmonella isolates

Antimicrobial resistance is the ability of certain microorganisms to survive or grow in the presence of a given concentration of antimicrobial agent that usually would kill or inhibit the microorganism species in question. Antimicrobial resistant Salmonella strains may be transferred from animals or foodstuffs to humans.

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling

Antimicrobial susceptibility of Salmonella is monitored yearly within the Swedish Veterinary Antimicrobial Resistance Monitoring programme, SVARM. Isolates included derive from both active and passive salmonella monitoring programmes and from both clinical and non-clinical cases.

Type of specimen taken

For details on sampling see "Salmonella spp. in bovine animals".

Procedures for the selection of isolates for antimicrobial testing

It is mandatory that at least one isolate from each notified incident of Salmonella is confirmed at SVA. From these isolates, the first from each warm-blooded animal species from each notified incident is tested for antimicrobial susceptibility at SVA.

Methods used for collecting data

All susceptibility tests are performed at SVA and the results are stored in an appropriate database.

Laboratory methodology used for identification of the microbial isolates

For details on culture see "Salmonella spp. in bovine animals".

Laboratory used for detection for resistance

Antimicrobials included in monitoring

For antimicrobials and ranges tested see Table "Breakpoints for antibiotic resistance testing of Salmonella in Animals".
Antimicrobial susceptibility was tested by a dilution method in cation adjusted Mueller-Hinton broth (CAMBH). The tests were performed following the standards for microdilution of the National Committee of Clinical Laboratory Standards (NCCLS, 2002) using VetMIC panels produced at the Dept. of Antibiotics, SVA. As quality control, Escherichia coli ATCC 25922 was included. The Dept. of Antibiotics is accredited to perform the analyses by the
Swedish Board for Accreditaion and Conformity Assesment (SWEDAC) according to SS-EN ISO/ IEC 17025 and regularly participates in external quality assurance.

Breakpoints used in testing

For cut-off values (breakpoints) for resistance see Table "Breakpoints for antibiotic resistance testing of Salmonella in Animals".
Microbiological cut-off values recommended by the European Committee on Antimicrobial Susceptibility Testing (EUCAST) and EFSA were used (http:/ / www.escmid.org).

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

Of the 20 incidents of Salmonella in cattle 2007, four incidents involved strains resistant to one or more antimicrobials.
Two incidents involved S.Typimurium DT104 resistant to ampicillin and sulphonamides and one incident involved S.Typhimurium NT resistant to ampicillin, sulphonamides, streptomycin and tetracyclines. One incident involved S. Agona resistant to streptomycin.

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

The overall situation of antimicrobial resistance in Salmonella in cattle is favourable. There are few incidents each year and multiresistant clones are rarely involved. Furthermore there is no indication of spread of such clones among other animal species including wildlife.

B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

See "Antimicrobial resistance in Salmonella in cattle" for details.

Type of specimen taken

For details on sampling see "Salmonella spp. in pigs".

Laboratory methodology used for identification of the microbial isolates

For details on culture see "Salmonella spp. in pigs".

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See "Antimicrobial resistance in Salmonella in cattle" for details.

Breakpoints used in testing

See "Antimicrobial resistance in Salmonella in cattle" for details.

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

Of the 29 incidents of Salmonella in pigs 2007 two incidents involved resistant strains. One incident involved S. Typhimurium DT 104 with the typical pentaresistance and the other incident S. Typhimurium DT 120 resistant to ampicillin, streptomycin, sulphonamides and tetracycline.

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

The overall situation of antimicrobial resistance in Salmonella in pigs is favourable. Since the start of the monitoring programme SVARM year 2000, there have been 132 incidents in pigs, of which 68 involved S. Typhimurium. Of the latter incidents, only six involved resistant strains and of these, three involved strains resistant to four or more antimicrobials.

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

See "Antimicrobial resistance in Salmonella in cattle" for details.

Type of specimen taken

For details on sampling see "Salmonella spp. in poultry".

Methods of sampling (description of sampling techniques)

For details on sampling see "Salmonella spp. in poultry".

Procedures for the selection of isolates for antimicrobial testing

See "Antimicrobial resistance in Salmonella in cattle" for details.

Laboratory methodology used for identification of the microbial isolates

For details on culture see "Salmonella spp. in poultry".

Laboratory used for detection for resistance

Antimicrobials included in monitoring

See "Antimicrobial resistance in Salmonella in cattle" for details.

Breakpoints used in testing

See "Antimicrobial resistance in Salmonella in cattle" for details.

Preventive measures in place

See "Salmonella spp. in poultry".

Control program/ mechanisms

The control program/ strategies in place

See "Salmonella spp. in poultry".

Recent actions taken to control the zoonoses

See "Salmonella spp. in poultry".

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

The overall situation of antimicrobial resistance in Salmonella in poultry is favourable. Of 70 reported incidents since the start of the monitoring programme SVARM year 2000, 37 have involved S. Typhimurium. Of these incidents only two have involved strains resistant to four or more antimicrobials.

Table Antimicrobial susceptibility testing in S. Dublin

n = Number of resistant isolates	S. Dublin	
	Cattle (bovine animals)	
Isolates out of a monitoring programme		yes
Number of isolates available in the laboratory		5
Antimicrobials:	**N**	**n**
Aminoglycosides		
Gentamicin	5	0
Kanamycin	5	0
Streptomycin	5	0
Amphenicols		
Chloramphenicol	5	0
Florfenicol	5	0
Cephalosporins		
Cefotaxim	5	0
Fluoroquinolones		
Ciprofloxacin	5	0
Fully sensitive	5	5
Penicillins		
Ampicillin	5	0
Quinolones		
Nalidixic acid	5	0
Resistant to 1 antimicrobial	5	0
Resistant to 2 antimicrobials	5	0
Resistant to 3 antimicrobials	5	0
Resistant to 4 antimicrobials	5	0
Resistant to >4 antimicrobials	5	0
Sulfonamides		
Tetracyclines		
Tetracyclin	5	0
Trimethoprim	5	0

Table Antimicrobial susceptibility testing of S. Dublin in Cattle (bovine animals) - at farm - Control or eradication programmes - quantitative data [Dilution method]

S. Dublin

Cattle (bovine animals) - at farm - Control or eradication programmes

Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	5

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	5	0					5														0.25	32
Kanamycin	16	5	0							5												0.5	16
Streptomycin	32	5	0									1	4									2	256
Amphenicols																							
Chloramphenicol	16	5	0							3	2											2	128
Florfenicol	16	5	0								5											2	32
Cephalosporins																							
Cefotaxim	0.5				4	1																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			5																		0.008	8
Penicillins																							
Ampicillin	4	5	0					5														0.5	64
Quinolones																							
Nalidixic acid	16	5	0								4	1										2	256
Sulfonamides																							
Sulfonamide	256	5	0											3	2							8	1024
Tetracyclines																							
Tetracyclin	8	5	0						5													0.5	64
Trimethoprim	2	5	0					5														0.25	32

Table Antimicrobial susceptibility testing of S.Enteritidis in animals

n = Number of resistant isolates	S. Enteritidis											
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**		**Gallus gallus (fowl) - laying hens**		**Gallus gallus (fowl) - broilers**	
Isolates out of a monitoring programme												
Number of isolates available in the laboratory												
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**

Footnote

No isolates of S. Enteritidis available for testing.

Table Antimicrobial susceptibility testing of S.Typhimurium in animals

n = Number of resistant isolates	S. Typhimurium											
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**		**Gallus gallus (fowl) - laying hens**		**Gallus gallus (fowl) - broilers**	
Isolates out of a monitoring programme		yes		yes		yes						
Number of isolates available in the laboratory		8		15		12						
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Aminoglycosides												
Gentamicin	8	0	15	0	12	0						
Kanamycin	8	0	15	0	12	0						
Streptomycin	8	1	15	2	12	0						
Amphenicols												
Chloramphenicol	8	0	15	1	12	0						
Florfenicol	8	0	15	1	12	0						
Cephalosporins												
Cefotaxim	8	0	15	0	12	0						
Fluoroquinolones												
Ciprofloxacin	8	0	15	0	12	0						
Fully sensitive	8	5	15	13	12	12						
Number of multiresistant S. Typhimurium DT104												
with penta resistance			15	1	12	0						
Penicillins												
Ampicillin	8	3	15	2	12	0						
Quinolones												
Nalidixic acid	8	0	15	0	12	0						
Resistant to 1 antimicrobial	8	0	15	0	12	0						
Resistant to 2 antimicrobials	8	2	15	0	12	0						
Resistant to 3 antimicrobials	8	0	15	0	12	0						
Resistant to 4 antimicrobials	8	1	15	1	12	0						
Resistant to >4 antimicrobials	8	0	15	1	12	0						
Sulfonamides												
Tetracyclines												
Tetracyclin	8	1	15	2	12	0						
Trimethoprim	8	0	15	0	12	0						

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

	S. Typhimurium
	Gallus gallus (fowl) - in total - Control or eradication programmes
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	12

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	12	0					1	9	2												0.25	32
Kanamycin	16	12	0							2	9	1										0.5	16
Streptomycin	32	12	0										12									2	256
Amphenicols																							
Chloramphenicol	16	12	0								12											2	128
Florfenicol	16	12	0								12											2	32
Cephalosporins																							
Cefotaxim	0.5				6	6																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			11	1																	0.008	8
Penicillins																							
Ampicillin	4	12	1						11							1						0.5	64
Quinolones																							
Nalidixic acid	16	12	0								12											2	256
Sulfonamides																							
Sulfonamide	256	12	0											4	7	1						8	1024
Tetracyclines																							
Tetracyclin	8	12	0						11	1												0.5	64
Trimethoprim	2	12	0				7	5														0.25	32

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - in total - Control or eradication programmes - quantitative data [Dilution method]

S. Typhimurium

Pigs - in total - Control or eradication programmes

Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	15

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	15	0					7	8													0.25	32
Kanamycin	16	15	0							7	8											0.5	16
Streptomycin	32	15	2									4	9		1		1					2	256
Amphenicols																							
Chloramphenicol	16	15	1							2	12						1					2	128
Florfenicol	16	15	1							2	12			1								2	32
Cephalosporins																							
Cefotaxim	0.5				7	8																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			12	3																	0.008	8
Penicillins																							
Ampicillin	4	15	2					3	10							2						0.5	64
Quinolones																							
Nalidixic acid	16	15	0							1	13	1										2	256
Sulfonamides																							
Sulfonamide	256	15	2										1	2	8	2				2		8	1024
Tetracyclines																							
Tetracyclin	8	15	2						11	2			1			1						0.5	64
Trimethoprim	2	15	0				8	6	1													0.25	32

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

	S. Typhimurium
	Cattle (bovine animals) - at farm - Control or eradication programmes
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	8

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	8	0						8													0.25	32
Kanamycin	16	8	0							1	7											0.5	16
Streptomycin	32	8	1										7				1					2	256
Amphenicols																							
Chloramphenicol	16	8	0								3	5										2	128
Florfenicol	16	8	0							3	5											2	32
Cephalosporins																							
Cefotaxim	0.5				5	3																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			7	1																	0.008	8
Penicillins																							
Ampicillin	4	8	3					3	2							3						0.5	64
Quinolones																							
Nalidixic acid	16	8	0							1	7											2	256
Sulfonamides																							
Sulfonamide	256	8	3											2	3					3		8	1024
Tetracyclines																							
Tetracyclin	8	8	1						7							1						0.5	64
Trimethoprim	2	8	0				5	3														0.25	32

Table Antimicrobial susceptibility testing of S. Species in Cattle (bovine animals) - at farm - Control or eradication programmes - quantitative data [Dilution method]

	S. Species
	Cattle (bovine animals) - at farm - Control or eradication programmes
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	7

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	7	0					1	6													0.25	32
Kanamycin	16	7	0							3	4											0.5	16
Streptomycin	32	7	1									4	1	1	1							2	256
Amphenicols																							
Chloramphenicol	16	7	0								7											2	128
Florfenicol	16	7	0								6	1										2	32
Cephalosporins																							
Cefotaxim	0.5				3	4																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			6	1																	0.008	8
Penicillins																							
Ampicillin	4	7	0					4	3													0.5	64
Quinolones																							
Nalidixic acid	16	7	0							1	6											2	256
Sulfonamides																							
Sulfonamide	256	7	0											3	2	2						8	1024
Tetracyclines																							
Tetracyclin	8	7	0						7													0.5	64
Trimethoprim	2	7	0				4	3														0.25	32

Table Antimicrobial susceptibility testing of Salmonella spp. in Pigs - in total - Control or eradication programmes - quantitative data [Dilution method]

	Salmonella spp.
	Pigs - in total - Control or eradication programmes
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	14

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	14	0					4	10													0.25	32
Kanamycin	16	14	0							5	9											0.5	16
Streptomycin	32	14	0									9	5									2	256
Amphenicols																							
Chloramphenicol	16	14	0							1	13											2	128
Florfenicol	16	14	0								14											2	32
Cephalosporins																							
Cefotaxim	0.5				1	13																0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			13	1																	0.008	8
Penicillins																							
Ampicillin	4	14	0						14													0.5	64
Quinolones																							
Nalidixic acid	16	14	0								14											2	256
Sulfonamides																							
Sulfonamide	256	14	0											3	11							8	1024
Tetracyclines																							
Tetracyclin	8	14	0						11	3												0.5	64
Trimethoprim	2	14	0				8	6														0.25	32

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

	Salmonella spp.
	Gallus gallus (fowl) - in total - Control or eradication programmes
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	3

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	3	0					1	2													0.25	32
Kanamycin	16	3	0							1	2											0.5	16
Streptomycin	32	3	0										3									2	256
Amphenicols																							
Chloramphenicol	16	3	0							1		1	1									2	128
Florfenicol	16	3	0								1		2									2	128
Cephalosporins																							
Cefotaxim	0.5					1	2															0.06	8
Fluoroquinolones																							
Ciprofloxacin	0.06			1	2																	0.008	8
Penicillins																							
Ampicillin	4	3	0						3													0.5	64
Quinolones																							
Nalidixic acid	16	3	0							1		2										2	256
Sulfonamides																							
Sulfonamide	256	3	0										1	2								8	1024
Tetracyclines																							
Tetracyclin	8	3	0						1	2												0.5	64
Trimethoprim	2	3	0					3														0.25	32

Table Antimicrobial susceptibility testing of Salmonella in animals

n = Number of resistant isolates

Salmonella spp.

	Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers	
Isolates out of a monitoring programme	yes		yes		yes							
Number of isolates available in the laboratory	7		14		3							
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Aminoglycosides												
Gentamicin	7	0	14	0	3	0						
Kanamycin	7	0	14	0	3	0						
Streptomycin	7	1	14	0	3	0						
Amphenicols												
Chloramphenicol	7	0	14	0	3	0						
Florfenicol	7	0	14	0	3	0						
Cephalosporins												
Cefotaxim	7	0	14	0	3	0						
Fluoroquinolones												
Ciprofloxacin	7	0	14	0	3	0						
Fully sensitive	7	6	14	14	3	3						
Penicillins												
Ampicillin	7	0	14	0	3	0						
Quinolones												
Nalidixic acid	7	0	14	0	3	0						
Resistant to 1 antimicrobial	7	1	14	0	3	0						
Resistant to 2 antimicrobials	7	0	14	0	3	0						
Resistant to 3 antimicrobials	7	0	14	0	3	0						
Resistant to 4 antimicrobials	7	0	14	0	3	0						
Resistant to >4 antimicrobials	7	0	14	0	3	0						
Sulfonamides												
Tetracyclines												
Tetracyclin	7	0	14	0	3	0						
Trimethoprim	7	0	14	0	3	0						

Table Breakpoints for antibiotic resistance testing in Animals

Test Method Used

Broth dilution

Standards used for testing

NCCLS

Salmonella	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	EUCAST	16		16	2	128				
Florfenicol	EUCAST	16		16	2	32				
Tetracyclines										
Tetracyclin	EUCAST	8		8	0.5	64				
Fluoroquinolones										
Ciprofloxacin	EUCAST	0.06		0.06	0.008	32				
Enrofloxacin										
Quinolones										
Nalidixic acid	EUCAST	16		16	2	256				
Trimethoprim	EUCAST	2		2	0.25	32				
Sulfonamides										
Sulfonamide	EFSA	256		256	8	1024				
Aminoglycosides										
Streptomycin	EFSA	32		32	2	256				
Gentamicin	EUCAST	2		2	0.25	32				
Neomycin										
Kanamycin	EFSA	16		16	0.5	16				
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim	EUCAST	0.5		0.5	0.06	8				
3rd generation cephalosporins										
Penicillins										
Ampicillin	EUCAST	4		4	0.5	64				

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

From 1991 to June 2001, a voluntary Campylobacter programme was run. During this period the prevalence varied between 9 and 16%. Between July 2001 and Dec 2005, a new and more sampling intensive programme was implemented. In this programme the flock prevalence increased up to 20%.
It is likely that the increase was due changes in sampling strategy and bacteriological analyses. However, between 2001 and 2005 there was a decreasing trend of positive slaughter groups from 20 to 14%.
From 1995 to 2006, the number of reported domestic cases varied between 1781 and 2839, with the lowest number reported in 2006. Approximately 30 to 45% of the total number of cases are of domestic origin.

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

Campylobacteriosis is the most commonly reported zoonotic infection in Sweden, as in the rest of the EU. As 30 to 45% of the cases in Sweden are of domestic origin it is important to implement measures to reduce the incidence, an example of this is the Campylobacter programme. Since 2003, there has been a decreasing trend of reported human cases with the lowest number of notifications in 2006 during the last decade however there was an increase in 2007.
During the campylobacter programme 2001-2005, there was a decreasing trend in number of positive slaughter groups.
There is a marked seasonal variation both in broilers and human cases, although the peak in human campylobacteriosis precedes the peak reported in broilers.

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

Consumption of poultry meat is regarded as an important source of infection for human campylobacteriosis. However, case-control studies have also shown other risk factors for domestic campylobacteriosis, for example consumption of unpasteurised milk, barbeque and contact with dogs. Several waterborne outbreaks have also been reported in Sweden.

Suggestions to the Community for the actions to be taken

One important action is to implement a harmonized monitoring programme in poultry. The work that has started in this area should proceed. With an increasing trade within the EU, Campylobacter appears to be a Community problem, requiring a Community solution.

2.2.2. Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Reporting system in place for the human cases

Surveillance is based on passive case findings.

Case definition

A positive case is defined as a person from whom Campylobacter has been isolated.

Diagnostic/ analytical methods used

Cultivation from stool sample and blood.

Notification system in place

Campylobacteriosis is notifiable under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

Infection with Campylobacter became notifiable in 1989. From 1995 to 2007, the total number of cases reported have varied between 5119 to 8578, with the highest figure in 2001. During the same time period the number of reported domestic cases varied between 1781 and 2839. Since 2003, there has been a decreasing trend of reported domestic cases with the lowest number of notifications during the last decade in 2006 but during 2007 the domestic cases increased by 20 %. Approximately 30-45% of the total number of cases are of domestic origin.

Results of the investigation

During 2007, a total of 7106 cases of campylobacteriosis were reported, which was an increase compared to 2006 (17%). Also among the domestic cases the increase was considerable, 20%. The increase was evenly distributed throughout the country.
Of the domestic cases 10% were reported in the age group 0-4 years and in most age groups men dominated.

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

There is a peak of cases (both among domestic cases and cases acquired abroad) during the summer months. Reasons for this are unknown, but it can be speculated that increased outdoor activities play a role. Increased travelling also leads to increased number of cases acquired abroad.
Food and water are the most commonly cited sources of infections at the clinical reports.

Relevance as zoonotic disease

A significant part (30-45 %) of the cases of campylobacteriosis are domestic. It is unknown how many of those that are caused by consumption of poultry. It needs to be investigated how effective it would be to implement measures in order to reduce the prevalence of Campylobacter in broilers, and which measure that would be most effective.

Table Campylobacter in humans - Seasonal distribution

Month	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp., unspecified
	Cases	Cases	Cases	Cases
January				502
February				397
March				418
April				410
May				478
June				581
July				1074
August				1031
September				595
October				556
November				550
December				514
not known				
Total :	0	0	0	7106

2.2.3. Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Industry decides. No reporting to the authorities is requested.

At meat processing plant

See above.

At retail

No special sampling strategy is used by the local authorities.<br/ >Sampling is very infrequent.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: Infrequent sampling.

At meat processing plant

Other: Infrequent sampling.

At retail

Other: Infrequent sampling.

Type of specimen taken

At slaughterhouse and cutting plant

Other: No information available.

At meat processing plant

Other: No information available.

At retail

Other: Varies, mostly meat products.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

No information available.

At meat processing plant

No information available.

At retail

No information available.

Definition of positive finding

At retail

Campylobacter identified in the sample.

Diagnostic/ analytical methods used

At retail

Bacteriological method: NMKL 119: 1990

Control program/ mechanisms

Suggestions to the Community for the actions to be taken

A food safety objective (FSO) should be established, e.g. <1000 Camp./ g.

Measures in case of the positive findings or single cases

Campylobacter found in products that will be consumed without further heat-treatment is considered as unfit for consumption.

Notification system in place

None.

Results of the investigation

In 2007, local health authorities reported 14 samples of fresh poultry meat and poultry meat products taken at retail.
However, no results were reported (For results from sampling of poultry meat at slaughter, see "Campylobacter in animals".)

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

Poultry products are still considered to be an important source of human infection.

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

Campylobacter in poultry is relevant both to findings in poultry meat and products thereof as well as to human cases.

Additional information

19 local authorities have reported altogether 266 Campylobacter samples taken in official control during 2006. Of these 157 were samples of ready-to -eat food (not specified) 14 vegetables, 23 poultry meat and products, 58 red meat and products thereof, 5 eggs and eggsproducts. The remaining samples are not specified. One sample of ready -to -eat -foods were found unfit for human consumption due to Campylobacter load.

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. lari	C. upsaliensis	C. jejuni	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus)										
fresh										
- at retail	local health auth.	single	not known	14	1					1

Table Campylobacter in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. jejuni	C. coli	C. upsaliensis	C. lari	Thermophilic Campylobacter spp., unspecified

Footnote

26 local health authorities report altogether 64 samples of Camp. spp.
Of these 24 were ready-to-eat food (1 pos.);1 nuts (0);1 past. milk (0);2 red meat (0); 14 poultry and poultry prod (1);3 crusteceans and molluscs (0); 14 fruit and veg. (0) and the rest not specified.
In a baseline study (sept 2006-sept 2007) 753 cattle carcasses were swabbed after evsceration but before chilling. Of these 0.2% were positive for Camp.spp.

2.2.4. Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

In the Campylobacter programme, all flocks of broilers are examined for Campylobacter at the slaughterhouse. The program includes all members of Swedish Poultry Meat Association (SPMA, Svensk Fagel) and some of the non-members and is financed by the Swedish Board of Agriculture (SJV) and the SPMA.
SINGLE STUDIES:
1) A study was conducted to investigate the variation of Campylobacter load within a flock. Samples were collected at slaughter.

Frequency of the sampling

At slaughter

Other: Every slaughter group is sampled

Type of specimen taken

At slaughter

Other: caecum samples

Methods of sampling (description of sampling techniques)

At slaughter

FROM EACH SLAUGHTER GROUP:
Ten caeca are taken from ten birds per slaughter group and pooled to form one composite sample.
SINGLE STUDIES
1) Twentysevenflocks were sampled at during the slaughter process 20 intact caeca from 20 broilers in each flock were sampled and placed individually in a plastic jar without transport media Each was used for qualitative and quantitative analysis.

Case definition

Rearing period

At farm level, a case is defined as a flock that tested positive for thermophilic Campylobacter in a sock sample. The epidemiological unit is the flock.

Before slaughter at farm

See "Rearing priod"

At slaughter

At farm level, a case is defined as a slaughtered group that tested positive for thermophilic Campylobacter in a ceacum sample. The epidemiological unit is the slaughtered group.

Diagnostic/ analytical methods used

Rearing period

Bacteriological method: NMKL 119:1990

Before slaughter at farm

Bacteriological method: NMKL 119:1990

At slaughter

Bacteriological method: ISO 10272:1

Vaccination policy

Other preventive measures than vaccination in place

Preventive measures at primary production are hygiene barriers, cleaning and disinfection after slaughter of each flock and leaving the stable empty for a defined period before introducing a new flock. Specific advices to each producer is also given by the SPMA. The majority of the slaughter companies pay extra for Campylobacter free broilers, as a bonus to encourage efforts to reduce the introduction of Campylobacter into the broiler flocks.

Control program/ mechanisms

The control program/ strategies in place

In the current monitoring programme of Campylobacter in broilers all flocks are sampled at slaughter. The programme is voluntary and financed by the SPMA and the SJV.
The SPMA covers the entire production chain, from feed manufacturers, breeding companies, hatcheries, broiler producers, abattoirs and processing plants. Members of the SPMA produce approximately 99% of all broilers slaughtered in Sweden. The members are obliged to only use approved feed and to participate in stipulated animal health programs, such as Salmonella, welfare and classification program.

Measures in case of the positive findings or single cases

If a flock is found positive, stricter hygiene measures should be implemented in order to clean-up the stable where the broilers have been kept from colonization.

Notification system in place

In poultry, Campylobacter infection is not notifiable. However, results from the Campylobacter programme are available from the SPMA.

Results of the investigation

From the producers affiliated to the SPMA 309 (12%) out of 2514 slaughter groups were positive for Campylobacter 2007. From 89 slaughter groups not affiliated to the control programme 20 (22%) were positive.
SINGLE STUDIES:
1) Out of the total 540 sampled ceacum samples Campylobacter spp. were found in the quantitative analysis in 241 caeca and by qualitative analysis in 254 ceacum samples. In three out of 540 analyses ceaca Campylobacter spp. could be found only in the quantitative analysis. In 16 out of the 540 ceaca Campylobacter spp could be found in the qualitative analysis but could not be quantified. Out of 27 sampled flocks, Campylobacter were found in all twenty samples by quantification in 7 flocks and qualitative samples in 12 flocks and in at least one ceaca in 15 flocks. The highest number of Campylobacter spp. found in one ceaca was 8.6 log10 cfu/ g ceacum content.

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

From 2001-2005, the number of Campylobacter positive slaughter groups decreased (including cloacal and neck skin samples). Results from 2007 were similar to those obtained in 2006. The decreasing trend could be due to increased awareness of the farmer about the importance of hygienic barriers.

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

Consumption of poultry meat is regarded an important source of domestically acquired Campylobacter infection in humans, even if there are other sources of importance.

Additional information

Between 1991 and June 2001, a Campylobacter monitoring programme was run by the industry SPMA. During that period the prevalence varied between 9 and 16%. Between 1 July 2001 and 21 December 2005 a new and more sampling intensive Campylobacter programme was run. The program was voluntary, financed by the SPMA and SJV, with additional funding from the European Commission and run by the SPMA, SJV, SLV, SVA and SMI.
Studies within the programme have shown that about one third of the producers seldom delivered campylobacterpositive slaughter batches. A seasonal variation with higher prevalence of Campylobacter infection in broiler flocks during late summer and early autumn has been observed.
In 2002 it was shown that in one fifth of the flocks the within flock prevalence was considerable lower than 100%.
In 2003, a study showed that the majority of positive flocks were infected during the last week before slaughter.
In 2004, it was shown that there was no difference in findings of Campylobacter outside the stables between different producers that often or seldomly deliver Campylobacter positive slaughter groups.
In 2005, two qualitative studies were conducted to compare different samples at farm level and at slaughter. Furthermore, a quantitative study was carried out on neck skin and whole carcass rinse samples

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for thermophilic Campylobacter spp.	C. jejuni	C. coli	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Gallus gallus (fowl)									
broilers									
- at slaughterhouse	SVA, SVPMA	slaughter batch	2603	329	313				16

(1) : Approximately 95% of the isolates are C.jejuni

Footnote

Flocks associated to the Swedish Poulty Meat Association (Svensk Fagel): 309/ 2514 (12%) positive slaughter groups.
Flocks not associated to the SMPA: 20/ 89 (22%) positive slaughter groups.

2.2.5. Antimicrobial resistance in Campylobacter isolates

2.3. LISTERIOSIS

2.3.1. General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/ or infection in the country

Listeriosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).
Between 35 and 67 cases are recorded annually, the majority of these are immuno-suppressed cases, pregnant women or elderly.
In animals, an increased number of cases was observed in the late 1990s which might be due to increased usage of big bale silage and/ or increased number of autopsies (as part of the TSE surveillance). Since then the number of reported cases vary around 35 per year.

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

After a peak in the number of reported human cases in 2001 the annual number has decreased and the situation has been stable until last year. In 2007 there was an increase in the number of reported cases, 56 cases were notified and the majority were infected in Sweden. 63 % of the infected were men, which differs from 2006 when the number of female cases dominated. Among the infected, cases in the age group above 70 years were the most common.
The number of infected pregnant women increased in 2007. During the year there were 5 compared to 1 in 2006 and 2 at the most in other years. Of the 5 women 2 were believed to have been infected abroad. In 2 of the cases the infection lead to miscarriage.
In animals the situation seems to be stable.

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

Food borne transmission is thought to be more important than transmission from animals.
No outbreaks were reported in 2007 and the source of transmission therefore remains unknown for most of the cases.

2.3.2. Listeriosis in humans

A. Listeriosis in humans

Reporting system in place for the human cases

Surveillance is based on passive case finding.

Case definition

A case is defined as a person from whom L. monocytogenes has been isolated from a normally sterile site. Mother and child/ foetus is regarded as one case.

Diagnostic/ analytical methods used

Cultivation from blood and cerebral spinal fluid.

Notification system in place

Invasive Listeria infection is notifiable under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

Around 25-35 cases were previously reported on a yearly basis, most of them from vulnerable groups (immuno-suppressed persons, pregnant women and elderly). The number of cases increased during 2000 (n=53) and peaked in 2001 (n=67). Since then the number of cases have declined until 2007 when the number has gone up to 56.

Results of the investigation

After a peak in the number of reported human cases in 2001 the annual number has decreased and the situation has been stable until last year. In 2007 there was an increase in the number of reported cases, 56 cases were notified and the majority were infected in Sweden. 63 % of the infected were men, which differs from 2006 when the number of female cases dominated. Among the infected, cases in the age group above 70 years were the most common.
The number of infected pregnant women increased in 2007. During the year there were 5 compared to 1 in 2006 and 2 at the most in other years. Of the 5 women 2 were believed to have been infected abroad. In 2 of the cases the infection lead to miscarriage.

Relevance as zoonotic disease

Food borne transmission is believed to be more important than transmission from animals. Listeriosis has practically only been relevant in immuno-suppressed people, pregnant women and elderly.

2.3.3. Listeria in foodstuffs

A. Listeria spp. in food

Monitoring system

Sampling strategy

Sampling is performed by local authorities on a random basis. No official control progam exists. Sampling usually takes place at retail level but can also be at production units.<br/ >Sampling performed by industry is not reported to the authorities unless specifically asked for.

Frequency of the sampling

At the production plant

Other: According to in-house control at each production plant.

At retail

Other: According to the local authorities own decisions.

Definition of positive finding

At the production plant

A sample positive for L. monocytogenes

At retail

A sample positive for L. monocytogenes

Diagnostic/ analytical methods used

At the production plant

Bacteriological method: NMKL 136 : 2004 is probably what is mostly used. For quantitative analysis an in-house (SLV) method is used.

At retail

Other: For diagnosis, an in-house (SLV) method is used for the quantitative analysis and NMKL 136 for qualitative analysis.

Preventive measures in place

Most production plants are focusing on preventing environmental contamination of the plant.<br/ >

Control program/ mechanisms

The control program/ strategies in place

There is no official surveillance of L. monocytogenes in food and surveillance is done through

various projects initiated by the National food administration (SLV), municipalities and other research institutions.

Measures in case of the positive findings

If Listeria is found in food that will not be further heat-treated the food is regarded as unfit for human consumption if 3 out of 5 samples or more are found positive or 1 or more contains ≥100 L. monocytogenes/ gram. At retail level, where usually only one sample is taken the food will be regarded as unfit for human consumption if ≥100 L. monocytogenes / gram is found. Food for young children and sensitive populations are regarded as unfit for consumption if L. monocytogenes is found, regardless of concentration.

Results of the investigation

For results reported in 2007 see the prevalence tables for food

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

The situation is stable. Vacuumpacked smoked or marinated fish continues to be the major problem.

Additional information

During 2001, the National Food Administration (SLV) and the local municipalities performed a project with the aim to investigate the prevalence of L. monocytogenes in different ready-to-eat-foods. Out of 3600 samples, 63 (1.7%) were positive. It was shown that fish products had the highest percentage (6.2%) of positive samples.

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/ g	L. monocytogenes > 100 cfu/ g

Footnote

Local health authorities report 3 samples of cheese (not specified)and 2 of other milkproducts (not specified).
No positive samples reported

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/ g	L. monocytogenes > 100 cfu/ g
Meat from broilers (Gallus gallus)										
meat products										
cooked, ready-to-eat										
- at retail	local health authorities	single	10g	29	0	unknown		unknown		
Fish										
smoked										
- at retail	local health authorities	single	10g	57	14	unknown		unknown		
Other processed food products and prepared dishes										
- at retail - Monitoring	local health authorities	single	10g	494	8	unknown		unknown		

Footnote

In a baseline study (sept 2006-sept 2007) 753 cattle carcasses were swabbed after evisceration before chilling. Of these 1% were positive for Listeria monocytogenes.

2.3.4. Listeria in animals

A. Listeria spp. in animal - all animals

Monitoring system

Sampling strategy

There is no active surveillance system and detection of cases is based on clinical observations.

Frequency of the sampling

When there is a suspected case.

Case definition

A case may be defined with (1) positive histopathology combined with clinical signs, (2) positive bacteriology and histopathology or, (3) positive immunohistochemistry and histopathology. The animal is the epidemiological unit.

Diagnostic/ analytical methods used

The diagnostic methods used include histopathology, immunohistochemistry and bacteriology.

Measures in case of the positive findings or single cases

In a verified case of listeriosis, the SJV decides from case to case to investigate the herd and clarify the source of infection.

Notification system in place

Listeriosis is notifiable in all animal species.

Results of the investigation

In 2007, 28 sheep, 4 cattle and 1 fallow deer tested positive for Listeria. The number of tested animals is unknown.

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

Before 1999, there were between 10 and 20 reported listeria infections in animals per year. However, the number of cases increased from 1999 and onward (33-51 per year). An explanation for this may be the increased use of big bale silage.

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

As Listeria spp are present in the environment and also to a small degree in food-producing animals, a risk of contracting domestic listeriosis does exist. However, cases of listeriosis in animals and listeriosis in humans are often not epidemiologically linked.

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria spp.	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals)	SJV	animal		4	4	
Sheep	SJV	animal		28	28	
Deer						
(Fallow deer)	SJV	animal		1	1	

Footnote

The total number of analyses is not known.

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

In 1996, VTEC O157 was isolated in Swedish cattle for the first time and human E. coli O157 infection was traced back to a cattle herd. The same year, VTEC O157 in cattle became notifiable. However, since 1999, VTEC O157 findings in cattle are only notifiable when associated with human EHEC.
Between 1997 and 2002 annual prevalence studies of VTEC among cattle at slaughter were conducted. Results showed that the prevalence was around 1%. In the prevalence study 2005/ 2006 the prevalence was 3.4%. These figures can not be compared as the laboratory methodology had been slightly modified.
Up til 2003, the number of human VTEC O157 infections varied from 80-90, apart from 2002 when 129 cases were reported. This was due to an outbreak of VTEC O157 infection (including 28 cases) in southern Sweden (county of Skane), caused by contaminated locally produced fermented cold-smoked sausages.
In 2004, the Communicable Diseases Act was changed to include all serotypes of VTEC instead of only VTEC O157. This change has caused a great increase in reported cases to a total number of 198.
In 2005 there was an extraordinary peak in the number of EHEC cases (385 ill people in total). The peak was partly due to a large outbreak including 135 cases, caused by contaminated salad.
Of the total cases of human VTEC about 60 % are domestic.

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

VTEC infection is a serious zoonotic infection and cattle, or products there of, are important sources of infection. The majority of human cases are reported from the western part of Sweden and in this region it seems to be a specific cluster of VTEC O157, perhaps more pathogenic than others. Furthermore, most of the VTEC positive farms are located in the same area. Domestically produced food has been the source of infection in two larger outbreaks (see above). It cannot be excluded that outbreaks caused by domestic produced foods may occur in the future.
In 2005 there was an overall increase of human cases with EHEC. One explanation to this is the change in the legislation in 2004, to include all the serotypes. There was also a large outbreak involving 135 cases.
In 2006 and 2007 the number of cases were lower again, as no large outbreaks were reported.

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

In case of human infection, trace back investigation is performed. If the infection is traced back to a farm with animals, special recommendations are given, for example about improved hygiene. The majority of human cases of sporadic EHEC O157 infection are reported from the area with the highest herd prevalence of VTEC O157, that is the western part of Sweden.

Recent actions taken to control the zoonoses

In 2006, a commission to perform a risk profile of VTEC in humans, food and animals was given to a number of national authorities by the Ministry of Agriculture.

2.4.2. E. Coli Infections in humans

A. Verotoxigenic Escherichia coli infections in humans

Reporting system in place for the human cases

Surveillance is based on passive case findings.

Case definition

A case is defined as a person from whom EHEC (of any serotype) has been isolated.

Diagnostic/ analytical methods used

Cultivation and nucleic acid amplification. PFGE.

Notification system in place

Since 1st of July 2004 all serotypes of EHEC is notifiable under the Communicable Disease Act (both from the laboratory and the physician). Before that types other than O157 were reported on a voluntary basis. Both clinical and subclinical cases are included. However, the Haemorrhagic Uremic Syndrome (HUS) is not notifiable.

History of the disease and/ or infection in the country

In late 1995 and early 1996, there was an outbreak of EHEC O157 (VTEC O157) including approximately 120 cases. The outbreak increased the awareness of EHEC O157 and after this event most people with haemorrhagic diarrhoea are investigated for EHEC O157.
Between 1998 and 2001, the number of human cases varied between 78 and 95.
In 2002, physicians and laboratories reported 129 cases. This sudden increase in number of cases was caused by two outbreaks caused by water (n=11) and contaminated cold-smoked sausage (n=28), respectively. In 2003 the number of cases was lower again (n=72).
During 2004 the Communicable Disease Act was changed to include all serotypes of EHEC (VTEC) instead of just EHEC O157. This change in the legislation, caused a great increase in reported cases to a total number of 198.
In 2005 there was an extraordinary peak in the number of EHEC cases (385 ill people in total). The peak was partly due to a large outbreak including 135 cases, which was caused by contaminated lettuce.
In 2006 and 2007 there were mostly sporadic cases and no outbreaks and the number of cases are therefore lower.

Results of the investigation

In 2007 263 EHEC cases were reported, of which 59 % had acquired their infection in Sweden. The number of cases was about the same as previous year but the proportion of domestic cases was lower.
Like previous years, most domestic cases were reported from the south-western parts of the country. Children in the agegroup 0-9 years were most representated with 37 % of those cases and 59 % were women.
A majority of the domestic cases were reported during the summer months but many were also reported during autumn and early winter.

The serotype O157:H7 was dominating among the domestic cases. About half of those shared the same PFGE pattern.
For infections contracted abroad, countries of infection were dominated by Turkey and Tunisia with about 34 % of the cases infected outside Sweden.
During 2007 mainly sporadic and family outbreak related cases were reported.

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

Please see "Results of the investigation" for trends.
During 2007 there were manly sporadic cases and no major outbreaks and the source of infection therefore remains unknown in most cases.
For the few cases where the sources were known or suspected, they were mainly food related such as unpasteurised milk from farms that later were found to be contaminated or for example minced meat that was not properly cooked. Secondary cases within the same family were common.

Relevance as zoonotic disease

EHEC (VTEC) O157 is a serious zoonotic infection and it cannot be excluded that large outbreaks may occur in the future. Compared with other food borne infections, infection with EHEC O157 can be serious, especially in young children developing HUS. There is a lack of knowledge concerning the possibilities to determine if an efficient control strategy of VTEC O157 can be implemented in the primary production. For prophylactic reasons hygiene recommendations have been issued for visitors to farms with cattle. There is also a lack of epidemiological knowledge about serotypes other than O157 in animals, although it is known that these serotypes cause a significant part of the EHEC (VTEC) infections in humans. More research is needed to estimate the true occurrence of these serotypes in animals, food and humans as well as their zoonotic impact.

2.4.3. Escherichia coli, pathogenic in foodstuffs

2.4.4. Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy

TRACE BACK OF HUMAN INFECTION:
If a County Medical Officer in a Swedish county suspects that a human VTEC infection has been acquired after a contact with a farm, the County Veterinary Officer will be informed, and state a request to the Swedish Board of Agriculture for sampling animals on the relevant farm. Sampling is targeted mainly against young stock, as they are more prone to shed the bacteria, and performed by a veterinarian.
If a cattle herd has been linked to a human EHEC case and VTEC strains with indistinguishable subtyping pattern (PFGE) as the human isolate has been isolated from cattle, it is recommended that animals from this farm are sampled during slaughter. From those animals, carcass swabs are collected and the carcasses are arrested awaiting the answer of this investigation.
PREVALENCE STUDIES:
Prevalence studies will be conducted in approximately every 3rd year. The last study was conducted 2005/ 06. In these surveys, around 2000 faecal samples are collected randomly throughout the year from cattle at the slaughterhouses for bacteriological investigation of VTEC O157. Samples are collected by veterinarians.

Frequency of the sampling

Animals at farm

Other: Trace back of human VTEC infection.

Animals at slaughter (herd based approach)

Other: study (animal based): sampling distributed evenly throughout the year

Type of specimen taken

Animals at farm

Other: Faeces and/ or milkfilter.

Animals at slaughter (herd based approach)

Other: study (animal based): faeces, ear samples; trace back: carcass swabs

Methods of sampling (description of sampling techniques)

Animals at farm

TRACE BACK OF HUMAN INFECTION: Up to 100 individual faecal samples per

farm are collected. Mainly young animals are sampled. Most samples are analysed as pooled samples with up to five individual samples pooled to one consisting of 25 g.
For individual faecal samples, approximately 30 g of faeces is collected.

Animals at slaughter (herd based approach)

TRACE BACK OF HUMAN INFECTION: A total of 30x20-25 cm or a total of approximately 700cm2 area of the carcass is swabbed.
SINGLE STUDY (ANIMAL BASED APPROACH):
After slaughter 30 g of faeces were collected from the rectum with disposable plastic gloves and placed in plastic cups. Also, the outer 1/ 3 of the ear was removed after slaughter. Samples collected in the study were analysed individually.

Case definition

Animals at farm

A case is defined as an animal from which the investigated VTEC serotype is isolated. The herd is the epidemiological unit.

Animals at slaughter (herd based approach)

A positive herd is defined as a herd from which an animal tested positive for the VTEC serotype investigated for.
SINGLE STUDY:
A case was defined as an animal from which VTEC O157 was isolated.

Diagnostic/ analytical methods used

Animals at farm

Other: NMKL No 164:2005 2nd ed

Animals at slaughter (herd based approach)

Other: NMKL No 164:2005 2nd ed

Vaccination policy

Vaccination is not used.

Other preventive measures than vaccination in place

The guidelines established in 1997 were revised in 2004. They give recommendations of how to minimize spread of VTEC to other animals, neighbouring farms and to people (especially children). In 2004, binding directives were introduced by the SJV to prevent disease associated with animals in public settings. According to the directives, each setting should establish a written hygiene programme, inclusive of visitors instructions. A qualitative risk assessment was made as a guideline for the establishment of these compulsory preventive measures in which testing for VTEC of ruminants used for exhibition is recommended.

Control program/ mechanisms

Recent actions taken to control the zoonoses

In 2006, a risk profile for VTEC was made by the National Food Administration (SLV), Board of Agriculture (SJV), National Veterinary Institute (SVA), Institute of Infectious Disease Control (SMI), Board of Health and Welfare (SoS) and the Swedish Environmental Protection Agency (NV).
A baseline study was performed sept 2006- sept 2007. 753 cattle carcasses were swabbed before chilling after evisceration. 2 % of the samples were positive for VTEC (VT1 and/ or VT2 and eae or saa).
The results are much in line with earlier prevalence studies in sweden.

Suggestions to the Community for the actions to be taken

It could be discussed if it would be beneficial to harmonise monitoring of VTEC prevalence in cattle within the EU.

Measures in case of the positive findings or single cases

The guidelines include recommendations of how to handle VTEC in cattle when associations have been made with human VTEC infection. For example that animals should be tested negative for VTEC prior to transport and slaughter, and that hygiene recommendations should be instituted at the farm. Faecal samples are collected repeatedly in the epidemiological unit (usually the herd) from a representative numbers of animals of different age.

Notification system in place

VTEC O157 is notifiable in animals if there is an epidemiological link to human VTEC infection.

Results of the investigation

Eight cattle farms were sampled for VTEC in trace back of human infection. Six of these farms were sampled for VTEC O157, one for VTEC 08 and one farm for VTEC 103. From 4 of these farms, VTEC O157 that was indistinguishable with the human isolates was detected.

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

VTEC infection is regarded as a serious zoonotic infection and cattle, or products thereof, are important sources of human infection. A large proportion of human VTEC O157 cases are reported from the western part of Sweden (county of Halland). It has also been shown that a large proportion of VTEC O157 positive farms are in the same area. It seems to be a special cluster of VTEC O157 in this region, perhaps more pathogenic than others.
It cannot be excluded that outbreaks caused by domestic produced foods will occur in the future.

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 source of human infection. Another important source is consumption of contaminated foods, for example unpasteurised milk. Two outbreaks caused by domestic food have been recorded: 1) 28 cases were reported in 2002. The source of infection was locally produced sausage. 2) In 2005 an outbreak including 135 cases was reported. The cource of infection was locally produced salad that had been irrigated by contaminated water from a nearby

canal. Both outbreaks were reported from areas where VTEC O157 is prevalent in cattle farms.

Additional information

In 1996, VTEC O157 was isolated in Swedish cattle for the first time and human E. coli O157 infection was traced back to presence of VTEC O157 in a cattle herd. Restrictions were laid on the herd and surveillance was initiated. The same year, VTEC O157 in cattle became notifiable. However, since 1999, VTEC O157 findings are only notifiable when associated with human VTEC infection.
From 1996-2007, one to ten farms have been investigated annually as suspected sources of human infection. Of those, 1-4 farms per year have been confirmed as sources of infection (in total 38 herds). VTEC O157 have been detected on all farms but four (VTEC O8, O26, O121 and O103). One of the herd was a goat herd and two had sheep.
In 1998 a survey was conducted at slaughterhouse level in other animals but cattle. The results showed that 0.8 % (4/ 474) lambs and 0.9 % (1/ 109) sheep and 0.08% (2/ 2446) pigs were positive for VTEC O157.
Between 1996 and 2003, the industry (Swedish Meats) analysed 334-968 carcass swabs at the slaughterhouses. Sporadic positive samples were found during four years.
Another study has showed that 9% of the dairy herds in Sweden were positive for VTEC O157, of these, 23% were situated in the Western part of Sweden (the county of Halland).
Between 1997 and 2002, prevalence studies for VTEC O157 in cattle have been conduceted at slaughterhouse level. The results showed an overall individual prevelance of 0.3-1.7%. The highest prevalence (5.3%) was recorded in calves 7-9 months of age, followed by young stock 12-18 months of age (1.6%) and adult cattle (0.7%). As results did not change much throughout between the years additional prevalence studies will be performed approx every 3rd year. The last study was conducted 2005/ 06.

Table VT E. coli in animals

	Source of information	Sampling unit	Sample weight	Units tested	Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC) - VTEC O157	Verotoxigenic E. coli (VTEC) - VTEC non-O157	Verotoxigenic E. coli (VTEC) - VTEC, unspecified
Cattle (bovine animals)	SVA	herd		8	4	4		

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:
Sweden was declared free from bovine tuberculosis in 1958. Until 1978, sporadic cases occurred in cattle. Compulsory tuberculin testing of all cattle was abolished in 1970 and the national bovine TB control in cattle was based on meat inspection. When Sweden joined the European Community in 1995 the status of OTF (officially tuberculosis free) was obtained. No cases have been repored in wildlife for more than 55 years.
M. bovis was diagnosed in farmed deer in 1991. Trace back investigation revealed that the infection was introduced by imported deer in 1987. In 1994, a voluntary control programme was introduced that became mandatory in 2003. In total, 13 herds have tested positive and all have been depopulated.
In humans, less than 10 cases of M. bovis are notified annually in Sweden. Most of these are found in elderly people, infected in their youth before bovine TB was eradicated in Sweden, or in immigrants from areas where bovine TB is still common.
M. tuberculosis: Between 2001 and 2005, M. tuberculosis was diagnosed in elephants and giraffes at a zoo in eastern part of Sweden, and in one elephant at a zoo in the western part. The animals were euthanised and a thorough investigation was performed (See "M. Tuberculosis in Zoo animals"). No human infection has been associated to this outbreak.

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)

As Sweden is OTF, the risk of contracting domestic TB from livestock and other animals is negligible.
The risk for animal keepers to contract infection with M. tuberculosis from zoo animals is small, but cannot be ruled out as elephants, and other relevant animals at zoos, might carry subclinical infection.

2.5.2. Tuberculosis, Mycobacterial Diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Surveillance is mainly based on passive case findings; however, it is recommended that refugees and asylum seekers are screened for TB.

Case definition

A case is defined as a person from whom M. bovis has been isolated

Diagnostic/ analytical methods used

The diagnostic methods used are cultivation and isolation of M. bovis in clinical specimen in addition to possible direct detection of nucleic acid. Further verification is however needed by means of different molecular genetic techniques.

Notification system in place

Tuberculosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

Results of the investigation

Four cases of M. bovis infection were reported, of which 2 were older than 65 years old and born in Sweden. Most likely they became infected before Sweden was declared free from bovine TB. The remaining 2 persons were younger, immigrants and had probably acquired their infection abroad.

Relevance as zoonotic disease

Most cases of M. bovis infection in the Swedish population are acquired abroad. Apart from this, cases also occur among elderly people who got infected before M. bovis was eradicated from the Swedish cattle population. As Sweden is OTF, the risk of contracting domestic TB from animals is negligible. Also, the risk of contracting bovine TB from people in Sweden is considered extremely low as there are few cases of human TB caused by M. bovis in Sweden and person-to-person spread is rare.

2.5.3. Mycobacterium in animals

A. Mycobacterium bovis in bovine animals

Status as officially free of bovine tuberculosis during the reporting year

The entire country free

Sweden was declared free from bovine tuberculosis in 1958. When Sweden joined the EU in 1995, the status of Officially Tuberculosis Free (OTF) was obtained (former Decision 95/ 63/ EC, Commission Decision 03/ 046/ EG, as last amended by 04/ 230/ EG. Sweden fulfils the requirements for control measures in OTF member states (Council Directive 64/ 432/ EEC, Annex A, as last amended by 00/ 20/ EC).

Monitoring system

Sampling strategy

Monitoring is performed by meat inspections at slaughter of food producing animals. The inspection is performed by the SLV. If TB is suspected, samples are collected and analysed at the SVA. Furthermore, tuberculin tests are performed at artifical insemination stations and at export/ import of animals as required according to EU-legislation (Council Directive 64/ 432/ EEC). Sampling is also performed in case of clinical suspicion.

Frequency of the sampling

All cattle are inspected at slaughter and samples are taken in case suspected pathological changes are detected. Samples are also collected at necropsy in case of clinical suspicion or positive tuberculin test.

Type of specimen taken

Organs/ tissues: Samples from organs/ tissues with suspected lesions and adjacent lymph nodes. Both fresh and formalin fixed samples.

Methods of sampling (description of sampling techniques)

If TB is suspected after a positive tuberculine test, several lymph nodes are collected for histopathology, acid fast staining of direct smears and mycobacterial culture. Any organ with gross lesions is also sampled. Lymph nodes always collected for culture include retropharyngeal, submandibular, parotideal, medistinal, tracheobronchial, mesenterial, iliacal and inguinal lymph nodes. Lymphnodes are pooled for culture, wheras organs with pathological changes are cultured separately.

Case definition

A positive case is defined as an animal from which M. bovis. M. tuberculosis, or any other mycobacteria in the M. tuberculosis-complex has been isolated.

Diagnostic/ analytical methods used

Samples from autopsy/ meat inspection are investigated by histology and direct smears. If TB cannot be ruled out by these methods, culture is performed. For culture, lymph nodes are pooled (including at least two lymph nodes from each region) whereas organs with pathological lesions are cultured separately. Culture is performed
according to the method SVA 4120 and SVA 4122. Cultures are read once/ week for eight weeks and microscopy of suspected colonies is performed. If acid-fast rods are seen, a molecular probe for the M. tuberculosis complex is applied to colony material. If deemed necessary, re-culture is carried out at four weeks. In case mycobacteria in the M. tuberculosis-complex is isolated the strain is further subtyped.

Vaccination policy

Vaccination is not allowed.

Control program/ mechanisms

The control program/ strategies in place

Sweden is OTF and fulfils the requirements on control measures in OTF member states (see "The entire country free").

Suggestions to the Community for the actions to be taken

Apply rules for TB control on all domestic animal species and not just cattle.

Measures in case of the positive findings or single cases

If tuberculosis would be diagnosed in a food producing animal eradication measures are implemented, including depopulation of the whole herd, in accordance with the Swedish Act of Epizootics.

Notification system in place

Infection with M. bovis, M. tuberculosis, or other mycobacteria in the M. tuberculosis-compelx, is compulsory notifiable in all animal species on the basis of suspicion (for ex clinical- or post mortem suspicion).

Results of the investigation

In total, 5 cattle were investigated for M. bovis in 2007. The reason for investigation was that TB could not be ruled out at slaughter inspection.
Culture was performed in one animal.

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

As Sweden is OTF, the risk of contracting domestic TB from animals is negligible.

Additional information

Animals other than cattle:
Apart from the tested cattle mentioned above, other animals were also tested for bovine TB in 2007. For example, 34 pigs were investigated, following suspicion at meat inspection. After histological

invstigation and direct smears 24 were cultured. All were negative. Other animal species tested are shown in Table Tuberculosis in other animals.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

In 1994, a voluntary official control programme was implemented. In June 2003, the control programme became compulsory. In the programme, tuberculin tests or whole herd slaughter are performed in all herds to obtain free status and any herd found positive for TB is depopulated. Furthermore, all deer are inspected at slaughter. All animals >1 year that are found dead or euthanized are subjected to autopsy.
Sampling is also performed in case of clinical suspicion.

Frequency of the sampling

Sampling is performed after any suspicion of TB, for example if TB is suspected after meat inspection of slaughtered animals, if there is a clinical suspicion, or if there is a positive tuberculin test.
SAMPLING IN THE CONROL PROGRAMME
In brief, a herd obtains Bovine TBfree status (Astatus) after three consecutive whole herd tuberculin tests of all deer older than one year, with negative results. Only herds with Astatus may sell live deer and to maintain the A status all female deer have to be tested after three years without reactors. Bovine TB free status can also be obtained by slaughter of the whole herd and repopulation with deer from TB free herds (A status).

Type of specimen taken

Organs/ tissues: Samples from organs/ tissues with suspected lesions and adjacent lymph nodes. Both fresh and formalin fixed samples.

Methods of sampling (description of sampling techniques)

If TB is suspected after a positive tuberculin test, several lymph nodes are collected for histopathology, acid fast staining of direct smears and mycobacterial culture. Any organ with gross lesions is also sampled. Lymph nodes always collected for culture include retropharyngeal, submandibular, parotideal, medistinal, tracheobronchial, mesenterial, iliacal and inguinal lymph nodes. Lymph nodes are pooled for culture, wheras organs with pathological changes are cultured separately.

Case definition

A positive case is defined as an animal from which M. bovis,
M. tuberculosis, or other mycobacteria in the M. tuberculosis complex, have been isolated.

Diagnostic/ analytical methods used

Samples from necropsy/ meat inspection are investigated by histology and direct smears. The

results from these tests determine if culture is performed. Culture is performed according to the method SVA 4120 and SVA 4122. Cultures are read once/ week for eight weeks and microscopy of suspected colonies is performed. If acidfast rods are seen, a molecular probe for the M. tuberculosis complex is used on colony materials. If deemed necessary, reculture is carried out at four weeks. In case mycobacteria in the M. tuberculosiscomplex is isolated the strain is further subtyped.

Vaccination policy

Vaccination is not allowed.

Control program/ mechanisms

The control program/ strategies in place

A voluntary official TB control programme in farmed deer, administered by the industry (the Swedish Animal Health Service; www.svdhv.org) partially financed by the authorities, was implemented in July 1994. In June 2003, when 96% of all herds were affiliated to the programme, the control programme was made compulsory, including all herds in the country. At present, the programme is near finalisation.

Recent actions taken to control the zoonoses

The control programme has changed so that herds having tested negative four times do not need to continue testing. However, it is required to identify all animals >1 year of age with ear tags and inspect all slaughtered, euthanised or dead deer for TB.

Measures in case of the positive findings or single cases

If tuberculosis would be diagnosed in farmed deer eradication measures are implemented, including depopulation of the whole herd, in accordance with the Swedish Act of Epizootics.

Notification system in place

Infection with M. bovis, M. tuberculosis, or other mycobacteria in the M. tuberculosiscomplex, is notifiable in all animal species on the basis of suspicion (for ex clinicalor post mortem suspicion).

Results of the investigation

All 635 deer herds in Sweden were affiliated in 2006. Since the beginning of the programme, 570 (90%) herds have been declared free from TB; 108 after three whole herd tuberculin tests, 372 after culling of the whole herd and subsequent meat inspection, and 90 herds were established with deer originating from TB free herds. Thus, 65 herds in the control programme are not yet declared free from TB. Compared with the previous year, 33 additional herds were declared free during 2006.
In the control programme, tuberculin tests were performed on 259 animals from 9 herds. One herd was tested twice.
16 deer were investigated by histology and direct smears after suspicion at meat inspection. All samples were negative.

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

As the control programme has run sucessfully throughout the years, and there were only a few farms

not affiliated, the SJV made one of the final steps by making the programme mandatory. Thus, Sweden is about to finalise the programme.

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

It can be considered that the risk of contracting human TB from a farmed deer is negligble.

Additional information

The voluntary control programme became compulsory in 2003. Since the program's inception it has become evident that, on certain large extensive deer farms, it is difficult to muster all animals in the herd and virtually impossible to establish that no deer are present outside the mustering pen. An alternative control was needed in these herds. Followingly, the national legislation was amended so that owners of farms larger than 100 hectares and where there are no imported deer in the herd or any epidemiological links to imports, may apply to SBA for the alternative control for BTB, based on slaughter and meat inspection. In these herds, at least 20% of the herd (equally distributed over sex and age classes) shall be slaughtered annually for at least 15 years and the carcasses submitted for meat inspection. Furthermore, all other deer that are killed or die due to other reasons shall be meat inspected/ autopsied.

C. M. tuberculosis in animal - Zoo animals

Monitoring system

Sampling strategy

Sampling is performed in case of clinical suspicion, or if suspected lesions are detected at autopsy.

Type of specimen taken

Organs/ tissues: Samples from organs/ tissues with suspected lesions and adjacent lymph nodes. Both fresh and formalin fixed samples. Also tracheal and trunk samples may be taken.

Methods of sampling (description of sampling techniques)

If TB is suspected after a positive tuberculine test, several lymph nodes are collected for histopathology, acid fast staining of direct smears and mycobacterial culture. Any organ with gross lesions is also sampled. Lymph nodes always collected for culture include retropharyngeal, submandibular, parotideal, medistinal, tracheobronchial, mesenterial, iliacal and inguinal lymph nodes. Lymph nodes are pooled for culture, wheras organs with pathological changes are cultured separately.
In some cases of low suspicion, where killing of the animal is not immediately necessary, tracheal or trunk (for elephants) samples are taken.

Case definition

A positive case is defined as an animal from which M. bovis, M. tuberculosis, or other mycobacteria in the TBcomplex has been isolated.

Diagnostic/ analytical methods used

Samples collected at necropsy are investigated by histology and direct smears. The result from these test determines if culture is done. Apart from this, samples from animals that were positive in the tuberculin test are always cultured. Culture is performed according to the method SVA 4120. Cultures are read once/ week for eight weeks and microscopy of suspected colonies is performed. If deemed necessary, reculture is carried out at four weeks. If growth of acidfast rods is seen, a molecular probe for the M. tuberculosis complex is used on colony material. In case mycobacteria in the M. tuberculosis complex are isolated the strain is further subtyped.

Vaccination policy

Vaccination is not allowed.

Other preventive measures than vaccination in place

Presently, trunkor trachael lavage for detection of mycobacteria in the M. tuberculosis complex in elephants and other relevant zoo animals, are performed at the two largest Zoos in Sweden, where TB has been diagnosed on a few occasions since 2001. Tuberculin testing is also performed on some ungulates.

Control program/ mechanisms

The control program/ strategies in place

There is no specific control programme for Zoo animals.

Suggestions to the Community for the actions to be taken

To make all findings of mycobacteria in the M. tuberculosis complex compulsory notifiable.

Measures in case of the positive findings or single cases

If tuberculosis would be diagnosed in a Zoo animal eradication measures are implemented, in accordance with the Swedish Act of Epizootics.

Notification system in place

Findings of M. bovis, M. tuberculosis, or other mycobacteria in the TBcomplex is notifiable in all animal species on the basis of clinical suspicion.

Results of the investigation

No case of Tb was detected in zoo animals in 2007.

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

Zoo animals, especially elephants, have been shown to present a risk for transmitting tuberculosis and this merits further attention.

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

The Zoo animals that were positive for M. tuberculosis in previous years have most likely carried the infection subclinically for long periods. It cannot be ruled out that there is a risk for animal care takers to contract TB from these animals. The risk for Zoo visitors to become infected is regarded as very small due to the low level of contact with the animals.

Additional information

In 2001, M. tuberculosis was isolated from a diseased riding elephant at a zoo in the eastern part of Sweden. The zoo was immediately put under official restrictions and tuberculin testing and/ or bacteriological sampling was initiated in all contact animals and animal keepers. In total 5 elephants, including the index case, and one giraffe were euthanised due to positive culture. In 2003, the restrictions were lifted after cleaning and disinfection of all buildings and other housing of the infected animals. No human infection has been identified associated to these animal cases.
In Dec 2004, a female elephant at a Zoo in the western part of Sweden was positive for M. Tuberculosis. An epidemiological link was found between the two Zoos, and subtyping of the bacterial isolates confirmed this link.
In 2005, one giraffe from a Zoo at the eastern part of Sweden was culture positive for M. Tuberculosis.

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium spp.	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified	M. avium complex
Sheep (1)	SVA, SJV	animal	1	0				
Pigs	SVA, SJV	animal	34	19				19
Cattle (bovine animals) (2)	SVA, SJV	animal	5	0				
Solipeds, domestic	SVA, SJV	animal	2	0				
Dogs	SVA, SJV	animal	4	0				
Alpacas								
zoo animals	SVA, SJV	animal	1	0				
Marine mammals								
zoo animals (3)	SVA, SJV	animal	4	0				
Giraffes	SVA, SJV	animal	1	0				
Deer								
- at farm (4)	SVA, SJV	animal	16	0				
Monkeys								
- at zoo (5)	SVA, SJV	animal	1	0				

(1) : culture n=24
(2) : culture n=1
(3) : dolphins, grey seals
(4) : culture n=8
(5) : chimpanzee

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/ 432/ EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests (*)	Number of animals tested			
SVERIGE	25054	1590409	25054	100	0	0				1	
Total	25054	1590409	25054	100	0	0		0	0	1	0

Footnote

Note that the number of herds and animals are from 2006

(*) Legend:

In column "Interval between routine tuberculin tests" use the following numeric codes: (0) no routine tests; (1) tests once a year; (2) tests each two years; (3) tests each three years concerning 24 month-old animals; (4) tests each 4 years; (5) others (please give details).

Table Tuberculosis in farmed deer

Region	Total number of existing farmed deer		Free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests (*)	Number of animals tested			
SVERIGE	632	18416	526	83.228	0	0				2	0
Total	632	18416	526	83.228	0	0		0	0	2	0

Footnote

* 526 herds are free, the remaining 106 are not classified as infected. If a herd would be infected, all animals are euthanised. * Tuberculin testing: There is a stepwise procedure for a herd to be declared free. For detailed information, see text "Mycobacterium bovis in farmed deer".

(*) Legend:

In column "Interval between routine tuberculin tests" use the following numeric codes: (0) no routine tests; (1) tests once a year; (2) tests each two years; (3) tests each three years concerning 24 month-old animals; (4) tests each 4 years; (5) others (please give details).

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 bovine brucellosis in Sweden was reported in 1957. Brucellosis has not been diagnosed in other animal species. Sweden was declared officially brucellosis free (OBF) in cattle 1995 and in goats and sheep (OBmF) 1994, and fulfils the requirements on control measures in OBF and OBmF member states.
The few yearly cases in humans are all suspected to have been acquired abroad.

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

The national situation remains stable. This is shown in the yearly serological surveillance in cattle, pigs, sheep and goats. Since the start of the surveillance (mid 1990s), no positive sample has been detected.
Each year there are usually a few clinical suspicions of brucella infection in animals, for example abortions or genital infections, all of which have been negative in serological/ bacteriological analyses.
The sitution in humans remains stable.

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

The risk of obtaining brucellosis from domestic sources is negligible, as Sweden is declared OBF and ObmF.

2.6.2. Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

Surveillance is based on passive case finding.

Case definition

A case is defined as a person in whom brucellosis has been verified serologically or bacteriologically.

Diagnostic/ analytical methods used

Cultivation from blood and bonemarrow.

Notification system in place

Since 1st of July 2004 brucellosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

From the 1st of July 2004 brucellosis is a notifiable disease and before that the figures were based on voluntary laboratory reports.
During the last 10 years, up to eleven cases have been reported annually. None of these were suspected to be of domestic origin.

Results of the investigation

Eight cases were reported in 2007, all infected abroad.

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

The few yearly cases in humans are all suspected to have been acquired abroad.

Relevance as zoonotic disease

The risk of obtaining brucellosis from domestic sources is negligible, as Sweden is declared free from bovine, caprine and ovine brucellosis. Furthermore, brucellosis has not been recorded in animal species in Sweden.

Table Brucella in humans - Species/ serotype distribution

Brucella	Cases 0	Cases Inc. 0	Autochthon cases 0	Autochthon Inc. 0	Imported cases 8	Imported Inc. 0.09
B. abortus						
B. melitensis						
B. suis						
Brucella spp., unspecified					8	0.09
Occupational cases						

2.6.3. Brucella in foodstuffs

2.6.4. Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

Sweden is declared officially brucellosis free (OBF) in cattle since 1994, Decision 2003/ 467/ EC last amended by Decicion 2005/ 764/ EC (originally in Act of Accession of Austria, Finland and Sweden and in former Decisions 94/ 972/ EC and 94/ 74/ EC). Current surveillance standards for bovine brucellosis are given in the EU legislation, Directive 64/ 432/ EEC.

Monitoring system

Sampling strategy

All clinically suspected cases have to be confirmed serologically and bacteriologically. Cattle are investigated serologically at breeding stations and before import or export. On a national initiative, serological surveys are regularly performed in cattle, in bulk milk and/ or individal serum samples. The industry (Swedish Dairy Association) collect serum and bulk milk samples in their various control programmes. Of those samples, 1000 serum and 2000 bulk milk samples, respectivly, are systematically collected for serological screening of Brucella abortus.

Frequency of the sampling

The serological screening is performed anually. Individual animals are sampled at breeding stations and at import/ export. Herds are also sampled when there is a suspicion of brucellosis.

Type of specimen taken

Other: serum and/ or milk

Methods of sampling (description of sampling techniques)

Milk samples and sera are collected from dairy herds. The milk samples are pooled (5-50 individuals) before analysis. From beef herds, sera is only collected from cattle >2 years old. At least 0.5 ml sera is analysed.

Case definition

A positive case is defined as an animal from which Brucella spp. has been isolated, or an animal giving a significant antibody titre.

Diagnostic/ analytical methods used

The diagnostic test used is an indirect ELISA. For confirmation the complement fixation test.

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

If brucellosis was diagnosed eradication and control measures would be implemented in accordance with the Swedish Act of Epizootics.

Notification system in place

Infection with Brucella spp. is notifiable in all animal species on the basis of clinical suspicion.

Results of the investigation

In the screening programme, serum samples from 1 000 cattle and bulk milk samples from 2000 dairy herds were analysed by use of an indirect ELISA. All samples were negative.
Additionally, 351 breeding animals, or animals for export, were tested and all were negative.
In two abortions of calves brucellosis could not be ruled out and culture were performed. However, none was positive.
1 herd was investigated due to seropositive animals detected at export. Brucellosis was ruld out in this herd.

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

The last case of bovine brucellosis was reported in 1957. Brucellosis has not been diagnosed in other animal species.

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

As Sweden has been free from bovine brucellosis for many decades, the risk of contracting domestic brucella infection from cattle is considered negligible.

Additional information

Brucella abortus has been regularly tested for in cattle since 1988. From 1997 and forward, about 3 000 samples (bulk milk and/ or serum samples) have been tested yearly. Out of all these samples, none have been confirmed positive.
Several other animal species were tested before, mainly breeding or at import/ export (see table "Brucellosis in other animals").

B. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Sweden is declared officially brucellosis free and in goats and sheep (OBmF) since 1994 (Decision 94/ 972/ EC). The current surveillance standards are given in EU legislation, Directive 91/ 68/ EEC.

Monitoring system

Sampling strategy

In sheep and goats, surveillance is based on serological surveys according to EU-legislation. The samples from the sheep are collected within the voluntary control programme for Maedi-Visna. The number of samples each year represent approximately 5% of the sheep population.
In addition to this, all clinically suspected cases have to be examined serologically and bacteriologically. Samples are also collected at import/ export.

Frequency of the sampling

Annual testing of a sample of sheep. Herds are also sampled when there is a suspicion of brucellosis. Test are performed at import/ export.

Type of specimen taken

Blood

Case definition

A positive case is defined as an animal from which Brucella spp. has been isolated, or an animal giving a significant antibody titre. The herd is the epidemiological unit

Diagnostic/ analytical methods used

A buffered antigen test (Rose Bengal) was used and confirmation was done by a complement fixation test.

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

If brucellosis was diagnosed eradication measures would be implemented in accordance with the Swedish Act of Epizootics.

Notification system in place

Infection with Brucella spp. is notifiable in all animal species on the basis of clinical suspicion.

Results of the investigation

In total, 7027 individual serum samples from sheep were analysed and all were negative.
12 animals for import/ export tested negative.

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

Brucellosis has never been diagnosed in other animals than bovines (last case in 1957).

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

As Sweden has been free from ovine brucellosis for many decades, the risk of contracting domestic brucella infection from sheep is considered negligible.

Additional information

Brucella melitensis has been screened for in 5% (approximately 10.000 animals/ year) of the sheep population, and in a number of goats, yearly since 1995. Out of all these samples, none have been confirmed positive.

C. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Sweden is declared officially brucellosis free in goats and sheep (OBmF) since 1994 (94/ 972/ EC). Current surveillance standards are given in EU legislation, Directive 91/ 68/ EEC.

Monitoring system

Sampling strategy

In sheep and goats, surveillance is based on serological surveys according to EU-legislation. The samples from goats were collected within the CAE programme. Furthermore, all clinically suspected cases have to be examined serologically and bacteriologically.

Frequency of the sampling

Annual testing of a sample for screening. Herds are also sampled when there is a suspicion of brucellosis.

Type of specimen taken

Blood

Case definition

A positive case is defined as an animal from which Brucella spp. has been isolated, or an animal giving a significant antibody titre.

Diagnostic/ analytical methods used

The buffered antigen test (Rose Bengal) was used and for confirmation a complement fixation test.

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

If brucellosis was diagnosed eradication measures would be implemented in accordance with the

Swedish Act of Epizootics.

Notification system in place

Infection with Brucella spp. is notifiable in all animal species on the basis of clinical suspicion.

Results of the investigation

In total, 312 individual sera from goats were analysed for antibodies against B. melitensis. All were negative.
Additional 12 goats tested negative at breeding or at export/ import.

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

Brucellosis has never been diagnosed in other animals than bovines (last case in 1957).

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

As Sweden has been free from caprine brucellosis for many decades, the risk of contracting domestic brucella infection from goats is considered negligible.

Additional information

Brucella melitensis has been screened for in 5% (approximately 10.000 animals/ year) of the sheep population, and in a number of goats, yearly since 1995. Out of all these samples, none have been confirmed positive. The herd is considered the epidemiological unit.

D. Brucella spp. in animal - Pigs

Monitoring system

Sampling strategy

The declaration of freedom from brucellosis in Swedish pigs is based on annual testing of a random sample of the pig population. The samples are collected within the yearly screening of Aujeszky´s disease.

Frequency of the sampling

Annual testing in the serological screening. Animals are also tested at breeding stations and at import/ export. Herds are sampled if there is a suspicion of brucellosis.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

The samples size is at least 0.5 ml sera.

Case definition

A positive case is defined as an animal from which Brucella spp. has been isolated, or an animal giving a significant antibody titre. The herd is the epidemiological unit.

Diagnostic/ analytical methods used

The Rose Bengal plate test (RBT) or complement fixation test is used.

Vaccination policy

Vaccination is not permitted.

Measures in case of the positive findings or single cases

If brucellosis was diagnosed eradication measures would be implemented in accordance with the Swedish Act of Epizootics.

Notification system in place

Infection with Brucella spp. is notifiable in all animal species on the basis of clinical suspicion.

Results of the investigation

In total, 3000 individual serum samples from pigs were analysed for antibodies against Brucella suis. All samples were negative. Additional 333 sera from wild boars were screened and all were negative. Apart from this, 1451 breeding animals or animals aimed for export/ import tested negative.

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

Brucellosis has never been diagnosed in other animals than bovines (last case in 1957).
Since 1995, Brucella has been screened for in approximately 3000 samples from pigs every year. Out of all these samples, none have been confirmed positive.

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

As Sweden has been free from porcine brucellosis for many decades, the risk of contracting domestic brucella infection from pigs is considered negligible.

Additional information

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. melitensis	B. abortus	B. suis	Brucella spp., unspecified
Pigs (1)	SVA	animal	1451	0				
(- at farm - animal sample - blood - Surveillance - official controls (other than control and eradication programmes) - official sampling - objective sampling)	SVA	animal	3000	0				
Wild boars (2)	SVA	animal	333	0				
Dogs								
pet animals (3)	SVA	animal	99	0				
Camels (4)	SVA	animal	17	0				
Cattle (bovine animals) (5)	SVA	animal	366	0				
Goats (6)	SVA	animal	12	0				
Sheep (7)	SVA	animal	27	0				
Deer (8)	SVA	animal	44	0				
Reindeers (9)	SVA	animal	178	0				
Moose (10)	SVA	animal	9	0				
Antelopes (11)	SVA	animal	1	0				
Other ruminants (12)	SVA	animal	4	0				

(1) : breeding animals and animals for export
(2) : screening
(3) : breeding, export/ import and clinical suspicions
(4) : clinical suspicions and export
(5) : breeding animals, export and clinical suspicions
(6) : export
(7) : breeding animals and animals for export/ import
(8) : export/ import (mainly fallow deer)
(9) : export
(10) : export
(11) : export
(12) : export

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk samples			Information about abortions			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds tested	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
																		Serologically	BST		
SVERIGE	25054	1590409	25054	100	0	0	0	1000	0	2000	0	0	0	0	0	0	0	0	0	0	0
Total	25054	1590409	25054	100	0	0	0	1000	0	2000	0	0	0	0	0	0	0	0	0	0	0

Footnote

Note that number of animals and number of herds are from 2006.
Breeding animals and animals tested at import/ export are not present here as they were not sampled as "investigation of suspecte cases".

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

Region	Total number of existing ovine / caprine		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
SVERIGE	9152	505466	9152	100	0	0	0	7000	0	0	0	0	0	0
Total	9152	505466	9152	100	0	0	0	7000	0	0	0	0	0	0

Footnote

Note that number of animals and number of herds are from 2006 and include only sheep.
Breeding animals and animals tested at import/ export are not present here as they were not sampld as "investigation of suspected cases".

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

Yersinia infection is not notifiable in animals, therefore there is little epidemiological data on the occurrence of the disease in animals.
In the beginning of the 1990s there were about 1000 annual human cases. Since then, there has been a decrease in the number of cases, which might be attributed to improved hygiene at slaughter and/ or decreased sampling in patients. During the last five years, around 550-800 cases per year have been reported.

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

Approximately 70% of human yersinia infections are of domestic origin. Of these, children below the age of six years predominate.
In 2005, for the first time in many years, less cases were reported than during the year before. In 2006 the trend was still pointing downwards and in 2007 the number of cases was stable.
The majority of the cases were as usual in the age group under ten years and a small majority was men.
In general, it is expected that meat from pigs are a common source of infection in humans.

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

As pigs are common asymptomatic carriers of Yersinia it can be expected that meat from pigs is one of the sources of human infection.

Recent actions taken to control the zoonoses

2.7.2. Yersiniosis in humans

A. Yersinosis in humans

Reporting system in place for the human cases

Surveillance is based on passive case findings.

Case definition

A case is defined as a person from whom pathogenic Yersinia spp. has been isolated.

Diagnostic/ analytical methods used

Cultivation, serotyping and serology (antibody detection).

Notification system in place

Yersiniosis is a notifiable disease under the Communicable Disease Act since 1996 (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

Prior to 1996, yersiniosis was only reported from laboratories. In the beginning of the 1990's, more than 1000 cases were reported. Until the turn of the century there was a steady decrease that probably was due to improved hygienic technique during slaughter of swine and/ or less sampling for Yersinia spp. in patients. However, from 2002 there was an increase in the number of cases. In 2005 the trend was pointing downwards again and this decrease continued in 2006 and the number was stable in 2007.

Results of the investigation

During 2006 the trend of yersiniosis cases was pointing downwards for the second year in a row and the number of cases was stable during 2007. In domestically acquired cases there was as light increase of 7 %. During the months July-August more cases were reported than during the other months of the year.
The majority of the cases were as usual in the age group under ten years and a small majority was men.

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

According to the reports from the physicians, 30 % of the cases suspected food or water being the source of infection.

Relevance as zoonotic disease

A significant part (approximately 70 %) of the human infections are of domestic origin. Yersinosis has its greatest potential as a zoonosis in young children. Reasons for this need to be further investigated. To be able to lower the number of cases, more detailed epidemiological knowledge is needed.

Table Yersinia in humans - Seasonal distribution

Month	Y. enterocolitica	Yersinia spp.
	Cases	Cases
January		43
February		40
March		21
April		33
May		49
June		50
July		65
August		71
September		53
October		51
November		55
December		36
not known		
Total :	0	567

2.7.3. Yersinia in foodstuffs

A. Yersinia spp. in food

Monitoring system

Sampling strategy

There is no official surveillance system for Yersinia spp. in food. From time to time, municipalities, the SLV and other research institutions initiate projects concerning the baseline prevalence.

Diagnostic/ analytical methods used

For diagnosis, bacteriological examination according to NMKL 117, 3rd ed, 1996 is used. In addition to this, a PCR, NMKL 163:1998, may also be used.

Measures in case of the positive findings or single cases

When products that will not be further heat treatment are positive for pathogenic serotypes of Y. enterocolitica, they will be classified as non-fit for human consumption and destroyed.

Results of the investigation

In 2007 the local authorities reported altogether 122 samples of various foods analysed for Yersinia in various categories of foods. No positive samples were reported.
Sept2006-Sept 2007 a study of cattle carcasses was performed . 753 carcasses were swabbed and analysed.Of these 5% were positive for Y.enterocolitica when using realtime-PCR but no positive samples could be found by culture.

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

Fresh pig meat as well as pig meat products are considered to be the main source of Yersinia infection in humans.

Additional information

In 2004 the SLV performed a survey to investigate the presence of Yersinia in food. Out of 933 samples collected from fresh pig meat at retail 97 (10%) were positve, and 31 (6%) out of 522 samples from pig meat products at retail, were positive for Y. enterocolitica when analysed with PCR. Only one of the samples was positive after conventional culturing.

2.7.4. Yersinia in animals

A. Yersinia enterocolitica in pigs

Control program/ mechanisms

The control program/ strategies in place

There is no surveillance of Yersinia spp. in animals.

Notification system in place

Findings of Yersinia are not notifiable in animals.

2.8. TRICHINELLOSIS

2.8.1. General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/ or infection in the country

In domestic pigs, trichinosis has not been reported since 1994. Sporadic cases have been reported in free living or farmed wild boars and other wild life.
The last outbreak with human cases occurred in 1969.
Since the beginning of the 1990´s three sporadic cases have been reported, in 1997, in 2004 and in 2007. The two last cases had consumed cold smoked pork abroad or imported cold smoked pork sausage.
The Directive 2075/ 2005 was not implemented in Sweden during 2006.

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

Trichinosis in farmed animals is, and has been, extremely rare for many years. The prevalence of Trichinella spp in wildlife that might be eaten (wild boars) is low to very low, while it is higher in carnivorous wildlife such as foxes, lynxes, wolves and bears.

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

The risk of obtaining domestic trichinosis is negligible as all slaughtered pigs and horses are subject to meat inspection. However, for meat originating from wildlife, that might be infected with Trichinella, risk mitigation measures other than meat inspection, such as freezing, are necessary.

2.8.2. Trichinellosis in humans

A. Trichinellosis in humans

Reporting system in place for the human cases

Surveillance is based on passive case finding.

Notification system in place

Trichinellosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

Description of the positive cases detected during the reporting year

One imported case was reported during 2007. A Spanish student brought a wild boar sausage from his homecountry. He consumed part of the sausage at New Years Eve and later he and seven other students consumed the sausage without cooking. The student who brought the sausage became ill by the end of January.Two of the others had symptoms but they had normal blood results. The first student had antibodies against Trichinella in blood but the other students were serologically negative.The sausage was analyzed and contained around 1,5 larvae per gram of the sausage, all alive, of Trichinella britovi.

Table Trichinella in humans - Species/ serotype distribution

Trichinella	Cases 0	Cases Inc. 0	Autochthon cases 0	Autochthon Inc. 0	Imported cases 1	Imported Inc. 0.01
T. britovi					1	0.01
Trichinella spp.						

Table Trichinella in humans - Age distribution

Age Distribution	Trichinella spp.		
	All	M	F
<1 year			
1 to 4 years			
5 to 14 years			
15 to 24 years	1	1	
25 to 44 years			
45 to 64 years			
65 years and older			
Age unknown			
Total :	1	1	0

2.8.3. Trichinella in animals

A. Trichinella in pigs

Number of officially recognised Trichinella-free holdings

Sweden has not implemented a system of trichinella free holdings.

Monitoring system

Sampling strategy

General

Sweden has not implemented a system of trichinella free holdings, or regions with negligble Trichinella risk.
All domestic pigs are controlled for Trichinella at slaughter according to Directive.

Frequency of the sampling

General

Every slaughtered pig is sampled.

Type of specimen taken

General

Diaphragm muscle.

Methods of sampling (description of sampling techniques)

General

Methods used are in accordance to Commission Regulation 2075/ 2005.

Case definition

General

A case is defined as an animal in which Trichinella spp. is found. The epidemiological unit is the individual animal.

Diagnostic/ analytical methods used

General

Artificial digestion method of collective samples.

Measures in case of the positive findings or single cases

If an animal is found infected with Trichinella, the carcass will be destroyed. The competent authority will also investigate the source and possible spread of infection.

Notification system in place

Trichinosis is compulsory notifiable in animals.

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

All slaughtered pigs were negative for Trichinella spp.

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

Trichinosis in Swedish farmed pigs is extremely rare. The last case was found in 1994 and the situation remains favourable. Trichinella is sporadically found in wild and farmed wild boars.

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

The risk of obtaining domestic trichinosis from farmed pigs is negligble.

Additional information

In 2007, 1 wolf, 2 wild boars and 7 lynxes were positive for Trichinella.

B. Trichinella in horses

Monitoring system

Sampling strategy

All horses are controlled for Trichinella at slaughter according to Regulation 2075/ 2005/ EU (new regulation).

Frequency of the sampling

Every slaughtered horse (soliped) is sampled.

Type of specimen taken

Samples for musculus masseter or the tongue is analysed.

Methods of sampling (description of sampling techniques)

Methods used are in accordance to EU Directive.

Case definition

A case is defined as a horse (soliped) in which Trichinella spp. is found and the epidemiological unit is the individual horse.

Diagnostic/ analytical methods used

Artificial digestion method of collective samples.

Results of the investigation including the origin of the positive animals

All slaughtered horses were negative for Trichinella spp.

Measures in case of the positive findings or single cases

If an animal is found with Trichinella, the carcass will be destroyed.

Notification system in place

Trichinosis is compulsory notifiable.

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

Trichinosis in horses sent for slaughter has never been reported in Sweden.

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

The risk of obtaining trichinosis from horses slaughtered in Sweden is negligble.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella spp.	T. spiralis	Trichinella spp., unspecified	T. britovi	T. nativa
Pigs	SJV	animal	3015991	0				
Solipeds, domestic								
horses	SJV	animal	2987	0				
Wild boars								
wild (1)	SVA	animal	17545	2	2			
Foxes								
wild	SVA	animal	215	0				
artic fox	SVA	animal	2	0				
Bears	SVA	animal	158	0				
Lynx	SVA	animal	126	7	2		2	3
Wolves								
wild	SVA	animal	18	1	1			
Badgers	SVA	animal	5	0				
Birds								
wild								
(White-tailed eagle)	SVA	animal	5	0				
(Golden eagle)	SVA	animal	5	0				
(Common Buzzard)	SVA	animal	1	0				
(Peregrine falcon)	SVA	animal	1	0				
(Ural owl)	SVA	animal	1	0				
Wild animals								
(Wolverine)	SVA	animal	7	0				
(Otter)	SVA	animal	12	0				
Zoo animals, all								
(Lion)	SVA	animal	2	0				
(Tiger)	SVA	animal	1	0				
Raccoon dogs	SVA	animal	4	0				

(1) : The figures for wild swine include both wild and farmed.

Footnote

The total number of analyses for all except for pigs and horses is the number of analyses performed at the SVA.

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

The last diagnosed cases of E. granulosus in animals was in 1997 (one reindeer) and 2000 (one moose). E. multilocularis has never been diagnosed in the country.
Voluntary notification of echinococcosis in humans was initiated in 1994 and since then 3-24 cases have been reported annually, all assumed to have been infected abroad.

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

Sporadic cases of E. granulosus infection have occurred in imported horses that most probably were infected abroad, presumably in England and Ireland. In reindeer, E. granulosus infection was prevalent in northern Sweden during the 1970s when around 2% of the reindeer were found infected at slaughter. Based on these findings, the routines at meat inspection of reindeer were revised and organs not approved for consumption were destroyed. During 1986-96 there was no case diagnosed in reindeer, followed by 3 cases in 1996-97. From elks, there have been two positive findings of E. granulosus, one in the early 1980s in the southern part of Sweden and one in 2000 in the central part of the country.
Since 2001 there has been an annual investigation of 300-400 foxes in order to detect E. multilocularis and E. granulosus. None of the investigated animals have tested positive in 2001-2007.
As E. multilocularis spreads within Europe, a high awareness and risk mitigating measures are important. In 2006, a risk assessment of introducing E. multilocularis into Sweden from EU and the effect of antihelmintics was performed (see text "E. multilocularis").

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

E. multilocularis has never been diagnosed in Sweden. However, the risk assessment showed that there is a medium to high risk of introducing the parasite into Sweden from dogs and cats entering the country from EU. If introduced, it is likely that the parasite will establish itself within Sweden in wildlife reservoirs with serious consequences unless a strategy of antihelmintic is implemented and complied with.

Recent actions taken to control the zoonoses

Since 1994 all dogs that are brought in from countries other than Finland and Norway must be treated with praziquantel as a preventive measure.

Suggestions to the Community for the actions to be taken

Continuous treatment of dogs and cats prior to entering countries free from E. multilocularis from countries with the infection.

2.9.2. Echinococcosis in humans

A. Echinococcus spp. in humans

Reporting system in place for the human cases

Surveillance is based on passive case finding.

Case definition

A case is defined as a person in whom echinococcosis has been diagnosed.

Diagnostic/ analytical methods used

Histopathology or serology.

Notification system in place

Since 1st of July 2004 echinococcosis is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

Notification of echinococcosis (based on voluntary reports by laboratories) was initiated in 1994 and since then 3-24 cases have been reported annually, all are assumed to have been infected abroad.

Results of the investigation

In 2007, 24 cases infected with Echinococcus spp. were reported, which may look like a huge increase from the seven cases notified the year before. However, only seven persons were diagnosed for the first time in 2007 and the rest were reported retrospectively from 1997 to 2006.
Out of all cases, 16 were women and eight men in the age 20 to 80 years. They originated from and were assumed to have been infected in endemic areas, mainly Iraq and Turkey.

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

Echinococcosis is not spread in the country, but sometimes persons, originating from places where the disease exists, are found being infected.

Relevance as zoonotic disease

Currently none of the Echinococcus species represents any threat to humans in Sweden. However, due to the spread of the tapeworm (E. multilocularis) in other European countries, including findings of the parasite in Denmark, the situation might change and an increased awareness is necessary. However, it can not be excluded that echinococcosis can be introduced through the increased illegal movement of dogs into Sweden, that has been seen during the last years.

2.9.3. Echinococcus in animals

A. E. granulosus in animal

Monitoring system

Sampling strategy

All food producing animals are macroscopically examined at slaughter. If there is a suspicion of echinococcosis, samples are investigated microscopically.
Samples from foxes are collected as part of annual investigations of around 300 foxes. Single necropsied, mainly wild wolves, may also be examined.

Type of specimen taken

Other: Gut tissue from foxes and cyst material from intermediate hosts.

Methods of sampling (description of sampling techniques)

Gut contents of necropsified foxes is sieved and examined under microscope for Echinococci. In case of suspicion, cyst materials are collected from food producing animals at slaughter.

Case definition

A case is defined as an animal in which the parasite has been found.

Diagnostic/ analytical methods used

Other: In food producing animals surveillance is based on slaughter inspections. From foxes the contents of the intestine of 100 foxes are examined by parasitological technique. PCR may also be used.

Control program/ mechanisms

The control program/ strategies in place

In order to prevent the introduction of E. multilocularis, dogs that are brought in from countries other than Finland and Norway must be treated with praziquantel. This treatment also prevents additional introduction of E. granulosus.

Measures in case of the positive findings or single cases

If an animal is found infected with Echinococcus spp. the offal and carcass will be destroyed.

Notification system in place

Echinococcosis is a notifiable disease in all animals.

Results of the investigation

All slaughtered animal were investigated macroscopically, and microscopically if deemed necessary. All were negative. A wolf that was subjected to necroscopy tested negative.

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

See Echinococcus general evaluation

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

The risk of obtaining domestic echinococcosis is small.

B. E. multilocularis in animal

Monitoring system

Sampling strategy

All food producing animals are macroscopically examined at slaughter. If there is a suspicion of echinococcosis, samples are investigated microscopically.
Samples from foxes are collected as part of annual investigations of around 200-400 foxes.
In addition, E. multilocularis will be look for when, mainly, wild wolves are examined post mortem.

Type of specimen taken

Other:

Methods of sampling (description of sampling techniques)

Samples of faeces and parts of the gut are collected from foxes at necropsy. In case of suspicion, cyst materials are collected from food producing animals at slaughter.

Case definition

A case is defined as an animal in which the parasite has been found.

Diagnostic/ analytical methods used

Other: In food producing animals surveillance is based on slaughter inspections, whereas the Copro-Elisa-test and sedimentation (WHO Manual 2001) is used in foxes.

Control program/ mechanisms

The control program/ strategies in place

In order to prevent the introduction of E. multilocularis, dogs that are brought in from countries other than Finland and Norway must be treated with praziquantel.

Suggestions to the Community for the actions to be taken

Keeping the policy of treating dogs and cats entering the country with antihelmintics.

Measures in case of the positive findings or single cases

If an animal is found infected with Echinococcus spp. the offal will be destroyed. If E. multilocularis

is found in Swedish animals, there would be a need of increased public awareness on this matter and an education campaign on the risk of exposure from wildlife would be started.

Notification system in place

Echinococcosis is a notifiable disease in all animals.

Results of the investigation

One wolf subjected to necroscopy tested negative. The results for the foxes are pending.
All slaughtered animal were investigated macroscopically, and microscopically if deemed necessary. All were negative.

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

E. multilocularis has never been reported in Sweden. Since 2001 there has been an annual investigation of 300-400 foxes in order to detect E. multilocularis and E. granulosus. All have been negative.
Results from the assessment conducted 2006 shows that: 1)there is high risk for serious consequences if E. multilocularis is introduced into Sweden, 2) the number of infected dogs and cats introduced could be between 10-40 per year. However, the risk can be reduced to low or very low if a high compliance (>99%) to a policy of that all dogs or cats that could have been exposed to infected intermediate hosts are treated with antihelmintics before entering Sweden.

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

The risk of obtaining domestic echinococcosis is small.

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus spp.	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Wolves	SVA	animal	245	0			

Footnote

The results for foxes are pending.

2.10. TOXOPLASMOSIS

2.10.1. General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/ or infection in the country

Toxoplasmosis is not notifiable in animals. However, serological studies in the 1990s showed that a large proportion of Swedish cats, dogs, foxes, sheep and a smaller number of pigs were seropositive. Since the first of July 2004 toxoplasmosis in humans is not a notifiable disease under the Communicable Disease Act. During the last 10 years before that between 4 and 18 human cases were reported annually, mainly in immuno-suppressed persons and in pregnant women.

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

There is little information about the most common sources of infection, however undercooked or raw meat is considered important.

2.10.2. Toxoplasmosis in humans

A. Toxoplasmosis in humans

Reporting system in place for the human cases

Since the first of July 2004, toxoplasmosis is no longer a notifiable disease under the Communicable Disease Act.

Case definition

A case is defined as a person in whom toxoplasmosis has been verified.

Diagnostic/ analytical methods used

Antibody detection in serum and cerebro-spinal fluid by direct agglutination, IFL and immunosorbent agglutination assay.
Nucleic acid amplification test.

Notification system in place

Since the first of July 2004 toxoplasmosis is not a notifiable disease under the Communicable Disease Act.

History of the disease and/ or infection in the country

During the last 10 years between 4 and 18 cases have been reported annually. In 2003, 17 cases were reported. Of these, 8 were known to be of domestic origin. In 2004, 5 cases were reported. From the first of July in 2004 there is no mandatory reporting of toxoplasmosis.

Results of the investigation

Relevance as zoonotic disease

Clinical toxoplasmosis is most important in immuno-suppressed persons and in pregnant women. The infection can be transmitted from the mother to the foetus and cause serious and fatal injury. There is little information about the most common sources of infection, however undercooked or raw meat is considered important.
As a preventive measure for pregnant women it is recommended that they refrain from cleaning up faeces from cats.

2.10.3. Toxoplasma in animals

A. T. gondii in animal

Monitoring system

Sampling strategy

There is no official surveillance for Toxoplasma spp in animals. Sampling, mainly of sheep, goats, cats or dogs, is performed in case of clinical suspicion of toxoplasmosis.

Notification system in place

Toxoplasmosis is not notifiable in animals.

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

Results for toxoplasma investigations were previously reported when a majority of the samples were analysed at the SVA. Nowadays, it is not known how large proportion of samples are being analysed at other laboratories and, therefore, results for toxoplasmosis have been omitted.

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

A risk of contracting domestic Toxoplasma spp infection does exist. However, the relevance of clinical toxoplasmosis is most important in immunosuppressed persons and in pregnant women.

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii
Sheep (1)	SVA	animal		11	11
Dogs (2)	SVA	animal		1	1
Cats (3)	SVA	animal		15	15

(1) : The number of total units tested not available.
(2) : The number of total units tested not available.
(3) : The number of total units tested not available.

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

The Swedish animal population has been free from rabies since 1886.
Two humans, one in 1974 and one in 2000, contracted rabies after having had contact with dogs in India and Thailand, respectively. Apart from that, there have been no human cases reported in modern times.

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

The national situation is stable. However, there are concerns about the risk of introducing rabies through the increased number of dogs that are brought into the country illegally.

Recent actions taken to control the zoonoses

The special provisions that Sweden has in the current legislation of movement of dogs and cats is under evaluation. For information about conducted risk assessment, see "Rabies in dogs".

2.11.2. Rabies in humans

A. Rabies in humans

Reporting system in place for the human cases

Surveillance is based on passive case finding.

Case definition

A case is a person with positive rabies diagnostic.

Diagnostic/ analytical methods used

Serology, antigen detection and isolation of the virus.

Notification system in place

Rabies is a notifiable disease under the Communicable Disease Act (both from the laboratory and from the physician).

History of the disease and/ or infection in the country

Two persons, one in 1974 and one in 2000, contracted rabies after having had contact with dogs in India and Thailand, respectively. Apart from that, there have been no human cases reported in modern times.

Results of the investigation

No human case of rabies was reported.

Relevance as zoonotic disease

As Sweden is free from rabies in animals since 1886 and import of animals is strictly regulated, the risk of contracting rabies in Sweden is negligible. However, it can not be excluded that rabies can be introduced through the increased illegal movement of dogs into Sweden, that has been seen during the last years.

2.11.3. Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

The surveillance of rabies in Sweden is passive.

Frequency of the sampling

Sampling is performed when there is a suspicion of rabies.

Type of specimen taken

Organs/ tissues: imprints from brain tissue

Methods of sampling (description of sampling techniques)

Specimens from brain tissue are analysed as soon as possible after collection.

Case definition

A case is defined as an animal from which rabies virus has been detected.

Diagnostic/ analytical methods used

Other: fluorescent antibody test (FAT) performed on smears from hippocampus or medulla oblongata, and mouse inoculation test as a complementary test

Vaccination policy

Vaccination of animals is allowed but usually only traveling dogs and cats are vaccinated. Dogs and cats that are brought into the country has to be tested for levels of protective antibodies following vaccination.

Control program/ mechanisms

The control program/ strategies in place

Recent actions taken to control the zoonoses

Since the number of dogs that are brought into the country, both legally and illegally, has increased an assessment of the risks involved is needed. A risk assessment regarding the risk of introducing rabies with illegally imported dogs was performed 2005. The risk was assessed as low and dependent on the origin of the dogs and number of dogs imported. A risk assessment regarding legally imported dogs and cats from the rest of EU was completed during summer 2006. The risk was assessed as very low.

Suggestions to the Community for the actions to be taken

One suggestion is to have import restrictions on dogs from areas where rabies virus strains are adapted to dogs.

Measures in case of the positive findings or single cases

If rabies were diagnosed, measures to eradicate the disease would be taken in accordance with the Swedish Act of Epizootics.

Notification system in place

Rabies is notifiable on clinical suspicion

Results of the investigation

No dogs were investigated.

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

Rabies has not occurred in Sweden since 1886. Dogs and cats from EU, EFTA countries and certain third countries (EU998/ 2003)can be brought into Sweden after rabies vaccination and antibody titre control, whereas dogs and cats from other countries have to be kept in quarantine for four months. Presently there is a great concern about increased number of illegally imported dogs into Sweden.

Additional information

Other animal species that were tested in 2007 were: 26 bats, 3 cats and 1 cattle, respectively. All were negative.
Veterinarians and the public are advised to send bats that are found dead to the SVA for rabies investigation, and hunters are encouraged to notify SVA about wildlife that behave in a way that rabies might be suspected.
In 1987-89 and 1999, surveys were performed where sick (n=75) or dead bats (n=200) were investigated for rabies, all were negative. Between 1998 and 2006, 348 bats were investigated and all were negative.

Table Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	Unspecified Lyssavirus	European Bat Lyssavirus - unspecified	Classical rabies virus (genotype 1)
Cattle (bovine animals)	SVA	animal	1	0			
Cats	SVA	animal	3	0			
Bats							
wild	SVA	animal	26	0			

2.12. Q-FEVER

2.12.1. General evaluation of the national situation

2.12.2. Coxiella (Q-fever) in animals

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1. ENTEROCOCCUS, NON-PATHOGENIC

3.1.1. General evaluation of the national situation

3.1.2. Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of Enterococcus spp., unspecified in animal

Sampling strategy used in monitoring

Frequency of the sampling

Antimicrobial resistance in enterococci from healthy animal is regularly monitored in the Swedish Veterinary Antimicrobial Resistance Monitoring programme (SVARM).
In 2007, isolates from broilers were tested.

Type of specimen taken

Intestinal content (caecum) from broilers were sampled. Each animal is from a unique flock but not nessecary from a unique production site.

Methods of sampling (description of sampling techniques)

In all 339 samples were collected from seven abattoirs. The abattoirs accounted for 99.4% of the total volume of broilers slaughtered in Sweden in 2007. The number of samples collected at each abattoir was proportional to the slaughter volume of the abattoir.

Procedures for the selection of isolates for antimicrobial testing

All isolates (28 E. faecalis and 197 E. faecium) obtained from culture of the 339 samples were tested for antimicrobial susceptibility.

Methods used for collecting data

Results of antimicrobial susceptibility testing and information on origin of isolates were stored in a database at SVA. For compiling statistics, relevant data were extracted from the database.

Laboratory methodology used for identification of the microbial isolates

Isolation and antimicrobial susceptibility testing was performed at the National Veterinary institute
For samples from broilers, 0.5 g colon content was diluted in 4.5 mL saline. From the dilution, 0.1 mL was spread onto Slanetz-Bartley (SlaBa) agar. The plates were incubated for 48 h at 37°C. One colony, randomly chosen, was sub-cultured on bile-esculin agar and blood agar (37°C, 24 h). Colonies with a morphology consistent with enterococci, and with a positive reaction on bile-esculin agar were tested for antimicrobial susceptibility and identified to species level according to Devriese et al. (1993) by use of the following biochemical tests: mannitol, sorbitol, arabinose, saccharose, ribose, raffinose and methyl-a-D-glucopyranoside.
Antimicrobial susceptibility was tested using dilution methods in cation adjusted Mueller-Hinton broth (CAMBH). The tests were performed following the standards for microdilution of the National Committee of Clinical Laboratory Standards (NCCLS, 2002) using VetMIC panels produced at the Dept. of Antibiotics, SVA. As quality control, Enterococcus faecalis ATCC 29212 was included.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

For antimicrobials tested and range of tested concentrations see Table ”Breakpoints used for antimicrobial susceptibility testing of Enterococcus spp.in Animals”.

Results of the investigation

Antimicrobial resistance in enterococci from broilers occurred but the prevalence of resistance was low in an international perspective and without obviuos unwanted trends. No isolate was resistant to linezolid or vancomycin.

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

The situation is favourable regarding antimicrobial resistance in commensal enterococci from broilers. Also the situation among isolates from slaughter pigs and cattle previously studied in SVARM is favourable.

Table Antimicrobial susceptibility testing in E. faecium

n = Number of resistant isolates	E. faecium	
	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring	
Isolates out of a monitoring programme	yes	
Number of isolates available in the laboratory	197	
Antimicrobials:	**N**	**n**
Aminoglycosides		
Gentamicin	197	0
Kanamycin	197	0
Streptomycin	197	2
Amphenicols		
Chloramphenicol	197	0
Fully sensitive	197	17
Glycopeptides (Cyclic peptides, Polypeptides)		
Bacitracin	197	45
Vancomycin	197	0
Ionophores		
Narasin	197	175
Macrolides		
Erythromycin	197	22
Oxazolidines		
Linezolid	197	0
Penicillins		
Ampicillin	197	2
Resistant to 1 antimicrobial	197	93
Resistant to 2 antimicrobials	197	71
Resistant to 3 antimicrobials	197	14
Resistant to 4 antimicrobials	197	2
Resistant to >4 antimicrobials	197	0
Streptogramins		
Virginiamycin	197	8
Tetracyclines		
Tetracyclin	197	31

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

	E. faecium
	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	197

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	32	197	0							5	70	103	18	1								2	256
Kanamycin	1024	197	0											2	57	97	34	6	1			16	2048
Streptomycin	128	197	2										2	93	96	4		1			1	8	1024
Amphenicols																							
Chloramphenicol	32	197	0							4	128	61	3	1								0.5	64
Glycopeptides (Cyclic peptides, Polypeptides)																							
Bacitracin	32	197	45						56	13	8	27	38	10	38	3	4					1	128
Vancomycin	4	197	0						193	3	1											1	128
Ionophores																							
Narasin	2	197	175					17	3	2	106	69										0.12	16
Macrolides																							
Erythromycin	4	197	22					53	97	22	3	3	4	3	1	11						0.5	64
Oxazolidines																							
Linezolid	4	197	0						10	159	28											0.5	16
Penicillins																							
Ampicillin	4	197	2				29	31	59	54	22	2										0.25	32
Streptogramins																							
Virginiamycin	4	197	8					39	86	50	14	6	2									0.5	64
Tetracyclines	2	197	31					162	3	1	3	2	1	7	15	3						0.5	64

Table Antimicrobial susceptibility testing in E. faecalis

n = Number of resistant isolates	E. faecalis	
	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring	
Isolates out of a monitoring programme		yes
Number of isolates available in the laboratory		28
Antimicrobials:	**N**	**n**
Aminoglycosides		
Gentamicin	28	0
Kanamycin	28	1
Streptomycin	28	0
Amphenicols		
Chloramphenicol	28	0
Fully sensitive	28	7
Glycopeptides (Cyclic peptides, Polypeptides)		
Bacitracin	28	3
Vancomycin	28	0
Ionophores		
Narasin	28	10
Macrolides		
Erythromycin	28	8
Oxazolidines		
Linezolid	28	0
Penicillins		
Ampicillin	28	0
Resistant to 1 antimicrobial	28	10
Resistant to 2 antimicrobials	28	6
Resistant to 3 antimicrobials	28	4
Resistant to 4 antimicrobials	28	1
Resistant to >4 antimicrobials	28	0
Streptogramins		
Virginiamycin	28	0
Tetracyclines		
Tetracyclin	28	16

Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring - quantitative data [Dilution method]

	E. faecalis
	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	28

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	32	28	0								1	6	21									2	256
Kanamycin	1024	28	1											9	17	1					1	16	2048
Streptomycin	512	28	0										1	1	14	12						8	1024
Amphenicols																							
Chloramphenicol	32	28	0								7	21										0.5	64
Glycopeptides (Cyclic peptides, Polypeptides)																							
Bacitracin	32	28	3								4	15	5	1		1	2					1	128
Vancomycin	4	28	0						7	19	2											1	128
Ionophores																							
Narasin	2	28	10				10	8			7	3										0.12	16
Macrolides																							
Erythromycin	4	28	8					7	8	4	1		5			3						0.5	64
Oxazolidines																							
Linezolid	4	28	0					1	1	24	2											0.5	16
Penicillins																							
Ampicillin	4	28	0					5	23													0.25	32
Streptogramins																							
Virginiamycin	32	28	0							1		6	18	3								0.5	64
Tetracyclines	2	28	16					7	5				1	5	10							0.5	64

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

Test Method Used

Broth dilution

Standards used for testing

NCCLS

Enterococcus, non-pathogenic	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Tetracyclines	EUCAST	2		2	0.5	64				
Amphenicols										
Chloramphenicol	EUCAST	32		32	0.5	64				
Aminoglycosides										
Streptomycin (1)	EUCAST	512		512	8	1024				
Gentamicin	EUCAST	32		32	2	256				
Kanamycin		1024		1024	16	2048				
Macrolides										
Erythromycin	EUCAST	4		4	0.5	64				
Glycopeptides (Cyclic peptides, Polypeptides)										
Bacitracin	EUCAST	32		32	1	128				
Vancomycin	EUCAST	4		4	1	128				
Oxazolidines										
Linezolid	EUCAST	4		4	0.5	16				
Penicillins										
Ampicillin	EUCAST	4		4	0.25	32				
Streptogramins										
Virginiamycin (2)	EUCAST	32		32	0.5	64				
Ionophores										
Narasin	EUCAST	2		2	0.12	16				

(1) : Cut-off 512 mg/ L is for E. faecalis, for E. faecium cut-off is 128 mg/ L.
(2) : Cut-off 32 mg/ L is for E. Faecalis, for E. faecium cut-off is 4 mg/ L.

Footnote

These cut of values apply for E. faecalis. For E. faecium they differ for some antimicrobials. See foot-notes.

3.2. ESCHERICHIA COLI, NON-PATHOGENIC

3.2.1. General evaluation of the national situation

3.2.2. Antimicrobial resistance in Escherichia coli, non-pathogenic isolates

A. Antimicrobial resistance of E. coli in animal - Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring

Sampling strategy used in monitoring

Frequency of the sampling

Antimicrobial resistance i E. coli from healty farm animals is regularly monitored in the Swedish Veterinary Antimicrobial Resistance Monitoring Programme (SVARM). In 2007 isolates from broilers where tested.

Type of specimen taken

Isolates are from intestinal content (caecum) collected from healty broilers at slaughter.

Methods of sampling (description of sampling techniques)

In total 339 samples were cultured. Each sample is from a unique flock but not necessarily from a unique production site. Samples cultured were collected at seven abattoirs that in 2007 accounted for 99.4% of the total volume of broilers slaughtered. The number of samples from each abattoir is roughly proportional to the annual slaughter volume of the abattoir.

Procedures for the selection of isolates for antimicrobial testing

All isolates (296) obtained were tested.

Laboratory methodology used for identification of the microbial isolates

Approximately 0.5 g of colon content was diluted in 4.5 mL saline. After thorough mixing, 0.1 mL of this suspension was spread on MacConkey agar. After incubation overnight at 37 C, one lactose positive colony with morphology typical for E. coli was sub-cultured on horse-blood agar (5% v/ v), after which the isolate was tested for production of tryptophanase (indole) and beta-glucuronidase (p-nitrophenyl-beta-D- glucopyranosiduronic acid, PGUA). Only lactose-positive isolates with typical morphology and positive reactions in both tests were selected for susceptibility tests.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The Dept. of Antibiotics at The National Veterinary Institute performed antimicrobial susceptibility tests, with accredited methodology, using dilution methods in cation adjusted Mueller-Hinton broth (CAMBH). Tests were performed following the standards for microdilution of the Clinical and Laboratory Standards Institute (CLSI, 2006). The microdilution panels used, VetMIC, are produced at the Dept. of Antibiotics, SVA.

Breakpoints used in testing

For antimicrobials tested and cut-off values used for interpretation see relevant Table.

Results of the investigation

See relevant Table.

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

There are no apparent trends in resistance among E. coli from broilers. Overall prevalence of resistance is low. The three isolates resistant to third generation cephalosporins this year were negative for ESBL production when tested by the phenotypic method recommended by CLSI.

Table Antimicrobial susceptibility testing of E. coli in animals

n = Number of resistant isolates	E. coli							
	Cattle (bovine animals)		**Pigs**		**Gallus gallus (fowl)**		**Turkeys**	
Isolates out of a monitoring programme					yes			
Number of isolates available in the laboratory					296			
Antimicrobials:	**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Aminoglycosides								
Gentamicin					296	1		
Kanamycin					296	5		
Streptomycin					296	11		
Amphenicols								
Chloramphenicol					296	1		
Florfenicol					296	0		
Cephalosporins								
Cefotaxim					296	3		
Ceftiofur					296	3		
Fluoroquinolones								
Ciprofloxacin					296	21		
Fully sensitive					296	251		
Penicillins								
Ampicillin					296	14		
Quinolones								
Nalidixic acid					296	20		
Resistant to 1 antimicrobial					296	29		
Resistant to 2 antimicrobials					296	4		
Resistant to 3 antimicrobials					296	4		
Resistant to 4 antimicrobials					296	3		
Resistant to >4 antimicrobials					296	5		
Sulfonamides								
Sulfonamide					296	18		
Tetracyclines								
Tetracyclin					296	10		
Trimethoprim					296	2		

Footnote

The three isolates resistant to cefotaxime and ceftiofur were negatvie fro ESBL production when tested by the phenotypic method recommended by CLSI.

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

	E. coli
	Gallus gallus (fowl) - broilers - at slaughterhouse - animal sample - faeces - Monitoring
Isolates out of a monitoring programme	yes
Number of isolates available in the laboratory	296

Antimicrobials:	Number of resistant isolates (n) and number of isolates with the concentration (u/ ml) or zone (mm) of inhibition equal to																						
	Break point	**N**	**n**	**<=0.03**	**0.06**	**0.12**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**	**lowest**	**highest**
Aminoglycosides																							
Gentamicin	2	296	1					37	219	39				1								0.5	64
Kanamycin	8	296	5							37	214	40		5								2	16
Streptomycin	16	296	11								63	208	14	2	1	5	3					2	256
Amphenicols																							
Chloramphenicol	16	296	1						1	19	223	52					1					1	128
Florfenicol	16	296	0								132	156	8									4	32
Cephalosporins																							
Cefotaxim	0.25				154	111	28				3											0.06	2
Ceftiofur	1					6	74	186	27			3										0.12	16
Fluoroquinolones																							
Ciprofloxacin	0.06			120	155	3	10	8														0.008	1
Penicillins																							
Ampicillin	8	286	14					1	47	169	54	1			14								
Quinolones																							
Nalidixic acid	16	296	20						6	120	146	4			5	9	6					1	128
Sulfonamides																							
Sulfonamide	256	296	18										205	62	10	1					18	16	2048
Tetracyclines																							
Tetracyclin	8	296	10					3	172	110		1			3	7						0.5	64
Trimethoprim	2	296	2				92	136	58	8					2							0.25	32

Footnote The three isolates resistant to cefotaxime and ceftiofur were negatvie for ESBL production when tested by the phenotypic method recommended by CLSI.

Table Breakpoints used for antimicrobial susceptibility testing in Animals

Test Method Used

Broth dilution

Standards used for testing

NCCLS

Escherichia coli, non-pathogenic	Standard for breakpoint	Breakpoint concentration (microg/ ml)			Range tested concentration (microg/ ml)		Disk content	Breakpoint Zone diameter (mm)		
		Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Amphenicols										
Chloramphenicol	EUCAST	16		16	1	128				
Florfenicol	EUCAST	16		16	4	32				
Tetracyclines										
Tetracyclin	EUCAST	8		8	0.5	64				
Fluoroquinolones										
Ciprofloxacin		0.06		0.06	0.008	1				
Enrofloxacin										
Quinolones										
Nalidixic acid	EUCAST	16		16	1	128				
Trimethoprim	EUCAST	2		2	0.25	32				
Sulfonamides										
Sulfonamide		256		256	16	2048				
Aminoglycosides										
Streptomycin	EUCAST	16		16	2	256				
Gentamicin	EUCAST	2		2	0.5	64				
Neomycin										
Kanamycin	EUCAST	8		8	2	16				
Trimethoprim + sulfonamides										
Cephalosporins										
Cefotaxim	EUCAST	0.25		0.25	0.06	2				
3rd generation cephalosporins										
Penicillins										
Ampicillin	EUCAST	8		8	0.25	32				

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1. HISTAMINE

4.1.1. General evaluation of the national situation

4.1.2. Histamine in foodstuffs

4.2. ENTEROBACTER SAKAZAKII

4.2.1. General evaluation of the national situation

4.2.2. Enterobacter sakazakii in foodstuffs

4.3. STAPHYLOCOCCAL ENTEROTOXINS

4.3.1. General evaluation of the national situation

4.3.2. Staphylococcal enterotoxins in foodstuffs

5. FOODBORNE OUTBREAKS

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

The municipal environmental/ public health authorities are responsible for detecting and preventing diseases related to food and water. Ill persons and the overall epidemiological investigation are the responsibilities of the regional infectious disease authority and the general practitioner. The municipal environmental/ public health authorities are required to report the results of outbreak investigations to the Swedish National Food Administration (SLV)over the Internet. Based on the reports received, SLV and the Swedish Institute for Infectious Disease Control (SMI), prepare a yearly report which is also sent to the WHO Surveillance program for control of foodborne infections and intoxications in Europe.

Description of the types of outbreaks covered by the reporting:

The reporting covers both sporadic cases and outbreaks (i.e. two or more cases with similar symptoms associated with a food or a meal in common). In general, no distinction between family or general outbreaks is made. We do not classify the outbreaks in "verified" or "possible". Instead we classify the agent as verified, suspected or unknown; and the food as verified, probable, possible or unknown. In the list of agents we also have nitrite, copper and tin. The date of the reporting of the food-borne outbreak to the municipal environmental/ public health authorities is the main date of the report and determines the reporting year of the report, i.e. not the onset of symptoms.

Foodborne Outbreaks: summarized data

	Total number of outbreaks	Number of possible outbreaks	Number of verified outbreaks
Bacillus	0	0	0
Campylobacter	2	1	1
Clostridium	1	1	0
Escherichia coli, pathogenic	3	1	2
Foodborne viruses	19	14	5
Listeria	0	0	0
Other agents	5	4	1
Parasites	0	0	0
Salmonella	15	12	3
Staphylococcus	1	1	0
Unknown	77	77	0
Yersinia	0	0	0

Verified Foodborne Outbreaks: detailed data

Campylobacter spp., unspecified

	Value
Code	ID08/0083
Subagent Choice	
Outbreak type	General
Human cases	22
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Broiler meat (Gallus gallus) and products thereof
More Foodstuff	marinated chicken drum
Type of evidence	Analytical epidemiological evidence, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Cross-contamination
Outbreaks	1
Comment	RR=3.88; CI 1.01-14.9

Enterotoxigenic E. coli (ETEC)

	Value
Code	ID08/0081
Subagent Choice	
Outbreak type	General
Human cases	40
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Mixed or buffet meals
More Foodstuff	sandwich layer-cake
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Unknown
Outbreaks	1
Comment	

VTEC O76

	Value
Code	ID08/0114
Subagent Choice	
Outbreak type	Unknown
Human cases	5
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Cheese
More Foodstuff	
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Imported from outside EU
Contributory factors	Unknown
Outbreaks	1
Comment	cheese from Turkey

Calicivirus (including norovirus)

	Value
Code	IDV08/0005
Subagent Choice	
Outbreak type	General
Human cases	35
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Tap water, including well water
More Foodstuff	well-water
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Water source
Origin of foodstuff	Domestic
Contributory factors	Cross-contamination
Outbreaks	1
Comment	Norov. Contamination by nearby overflowing sewage

norovirus (Norwalk-like virus)

	Value
Code	ID08/0048
Subagent Choice	
Outbreak type	General
Human cases	480
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff	tomatoes
Type of evidence	Laboratory detection in human cases, Analytical epidemiological evidence
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Infected food handler
Outbreaks	1
Comment	Norov subgroup 2; Restaurant at a big company

norovirus (Norwalk-like virus)

	Value
Code	ID08/0079
Subagent Choice	
Outbreak type	General
Human cases	30
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Crustaceans, shellfish, molluscs and products thereof
More Foodstuff	oystres
Type of evidence	Laboratory detection in human cases, Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Unknown
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	norov GGI

norovirus (Norwalk-like virus)

	Value
Code	IDV08/0004
Subagent Choice	
Outbreak type	General
Human cases	293
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Tap water, including well water
More Foodstuff	tap water
Type of evidence	Laboratory detection in human cases
Setting	Household
Place of origin of problem	Water distribution system
Origin of foodstuff	Domestic
Contributory factors	Cross-contamination
Outbreaks	1
Comment	Norov. Sub-agents: Rotav, Campylobacter spp. Reparation of the water distribution net.

norovirus (Norwalk-like virus)

	Value
Code	ID08/0086
Subagent Choice	
Outbreak type	General
Human cases	35
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Unknown
More Foodstuff	
Type of evidence	Laboratory detection in human cases
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Catering services, restaurant
Origin of foodstuff	Unknown
Contributory factors	Infected food handler
Outbreaks	1
Comment	norov GGI

Histamine

	Value
Code	ID08/0108
Subagent Choice	
Outbreak type	General
Human cases	10
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Fish and fish products
More Foodstuff	tuna
Type of evidence	Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Imported from outside EU
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	also outbreak at other nearby occasion due to tuna from same supplier; >500 mg/kg

Other serotypes

	Value
Code	ID08/0006
Subagent Choice	
Outbreak type	General
Human cases	12
Hospitalized	5
Deaths	unknown
Foodstuff implicated	Eggs and egg products
More Foodstuff	mayonnaise
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	S. enteridis; Egg from Poland

Other serotypes

	Value
Code	ID08/0101
Subagent Choice	
Outbreak type	General
Human cases	179
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff	baby spinach
Type of evidence	Analytical epidemiological evidence, Laboratory detection in human cases
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Intra community trade
Contributory factors	Unprocessed contaminated ingredient
Outbreaks	1
Comment	S.Java; OR 4,9; CI 1,8-13,7. Spinach from Italy

S. Stanley

	Value
Code	ID08/0102
Subagent Choice	
Outbreak type	General
Human cases	51
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Vegetables and juices and other products thereof
More Foodstuff	alfaalfa sprouts
Type of evidence	Laboratory detection in human cases, Analytical epidemiological evidence
Setting	Household
Place of origin of problem	Processing plant
Origin of foodstuff	Domestic
Contributory factors	Inadequate heat treatment
Outbreaks	1
Comment	PFGE; OR 28,6; CI 3,8-216,4. Eurosurveillance 2007/071018. S. Mbandaka found in another batch of alfaalfa seed; seed imported, sprouted in Sweden