Report to the Commission

Trends and sources of zoonotic infections recorded in Sweden during 2001

2002-06-25

National Veterinary Institute

Swedish Board of Agriculture
National Food Administration
Swedish Institute for Infectious Disease Control

Tables

Graphs

1	No of notified cases of *Salmonella*	Broiler	1968-2001
1.2		Layers	1968-2001
1.3		Pigs	1968-2001
1.4		Cattle	1968-2001
1.5		Humans	1980-2001
1.6	*Salmonella* surveillance at slaughter houses (lymph node samples)	Cattle	1996-2001
1.7		Adult pigs	1996-2001
1.8		Fattening pigs	1996-2001
1.9	*Salmonella* surveillance at slaughter houses (swab samples)	Cattle	1996-2001
1.10		Adult pigs	1996-2001
1.11		Fattening pigs	1996-2001
1.12	*Salmonella* surveillance at slaughter houses (neck skin samples)	Poultry	1995-2001
1.13	*Salmonella* surveillance at cutting plants (supervised by SLV)	Beef, pork	1996-2001
1.14		Poultry	1996-2001
2	No of *Campylobacter* positive flocks per year	Broiler	1992-2001
2.2	No. of cases of *Campylobacter* in humans, notified by physicians	Humans	1991-2001
3	No. of cases of *Listeria* in humans, notified by physicians	Humans	1997-2001
4	Number and percent VTEC O157 positive faecal samples	Cattle	1996-2001
4.2	Number and percent VTEC O157 positive swab samples	Cattle	1996-2001

INTRODUCTION

This report has been produced by the Swedish Zoonosis Center at the National Veterinary Institute (SVA) in co-operation with the Swedish Institute for Infectious Disease Control (SMI), the National Food Administration (SLV) and the Swedish Board of Agriculture (SJV).

The report includes zoonotic infections/agents occurring in animals, humans, feedstuffs and food.

The total number of animals, herds and number of slaughtered animals in Sweden, according to species, are outlined in table 12.1 and the human population is specified in table 12.2.

DEFINITIONS-

Animal data

Monitoring: Continuous system (active or passive) of collecting data.
Active monitoring: The system is based on targeted examinations
Passive monitoring: Only notification requirement

Notification: Passive system to collect data

Compulsory monitoring programme: The monitoring is based on a legal provision

Voluntary monitoring programme: The monitoring is done on a voluntary basis

Surveillance: Specific extension of monitoring with a view to taking appropriate control measures

Survey: An investigation in which information is systematically collected for a limited time period

Screening: A particular type of diagnostic survey. The presumptive identification of unrecognised disease or infection by the application of tests or examinations which can be applied rapidly.

Human data

Outbreak: An incident in which 2 or more persons experience a similar illness after ingestion of the same type of food, or after consumption of water from the same source, and where epidemiological evidence implicates the food or water as the source of illness

Household outbreak (family outbreak): An outbreak affecting 2 or more persons in the same private household

General outbreak: An outbreak affecting members of more than one private household or residents of an institution

Single case (sporadic case): A case of an illness (irrespective of the nature of the source)

Imported case: A case where the incubation period, clinical and epidemiological data suggest that infection was acquired in another country, and where there is no epidemiological evidence suggesting indigenous infection

Domestic case: A case where the incubation period, clinical and epidemiological data suggest indigenous infection

SURVEILLANCE AND NOTIFICATION

Animals

In addition to specific surveillance systems described in the report, surveillance is also achieved by notification of clinical observations, laboratory findings and findings at meat inspection. In Sweden, certain diseases are notifiable already on the basis of a clinical suspicion. In such cases, an investigation to confirm the diagnosis must always be made.
Only the index case in each herd or flock (epidemiological unit) is reported.

Humans

There are two reporting systems for communicable diseases in Sweden:
i) Diseases that are notifiable under the Communicable Disease Act. These

diseases are reported by the physicians and by the laboratories.
ii) Diseases that are reported on a voluntary basis by the laboratories.

Before 2000, these two reporting systems were analysed separately. In the present report, in the written context, both the total number of reported cases and the number of cases reported by physicians are included. In the figures calculations on place of infection and age distribution are, as in previous years, performed on cases where reports by physicians are available (unless other sources are mentioned).

Food
The responsibility for the surveillance of the food-producing industry is divided between the SLV and the local municipalities. The SLV has the responsibility for all slaughterhouses and the large scale cutting and processing plants. The SLV is also responsible for all large scale dairies, fish plants, establishments handling eggs and egg products, all large scale establishments handling food of non-animal origin. The municipalities are in general responsible for small and medium sized establishments, shops and restaurants and for all water for human consumption. The two largest municipalities (Stockholm and Gothenburg) have a delegated responsibility even for large scale cutting and processing plants.
The local municipalities are supervised by the SLV.
There is currently no reporting system in place, where the SLV automatically obtains results from the microbiological investigations of food and food items performed in the local municipalities. However, findings of *Salmonella* in food of animal origin as well as positive *Salmonella* findings in official control are notifiable.

MYCOBACTERIUM BOVIS

M. bovis in animals

Disease agent

Mycobacterium bovis

Surveillance/notification systems

Infection with *M. bovis* or *M. tuberculosis* is notifiable in all animal species on the basis of a clinical suspicion. For food producing animals, inspection at slaughter is the main surveillance system in place. Sweden was declared officially free from bovine tuberculosis in cattle herds according to Commission Decision 95/63/EC, replaced by Commission Decision 1999/467/EC.
Sweden fulfils the requirements laid down in Council Directive 64/432/EEC, Annex I, (4) and (5) amended by 98/99 /EC on control measures in officially tuberculosis free member states.

Methods used

Bacteriological culture and comparative skin fold tuberculin test (*M. avium* and *M. bovis* tuberculin).

Case definition used and epidemiological unit

A case is defined as a single animal from which *M. bovis* or *M. tuberculosis* has been isolated. The herd is the epidemiological unit.

Measures taken in case of isolation of M. bovis or M. tuberculosis

If tuberculosis were to be diagnosed in food producing animals, measures to eradicate the disease would be taken.

Epidemiological history

Sweden declared itself free from bovine tuberculosis in 1958 and is also declared officially free from tuberculosis in bovine herds according to EU-legislation. The last case of tuberculosis in cattle was

diagnosed in 1978. No cases have been reported in wildlife for more than 50 years. Tuberculosis was diagnosed in a herd of farmed deer in 1991. The source of infection was a consignment of fallow deer imported in 1987. No spread of the infection to any other animal species has been found. A total of 13 infected deer herds have been identified (the last one in 1997) and all have been depopulated. A voluntary control programme was introduced in 1994, relevant parts were outlined in the 1995 report. Movement restrictions apply for all deer herds that have not obtained tuberculosis free status.

Results of the investigations in 2001

Cattle (Table 1.1.1.)
At meat inspection, four cattle with suspicious lesions were investigated for the presence of *Mycobacteria*. Based on findings at the histological investigations and direct smears tuberculosis could be ruled out in three cases. Bacterial investigation for *Mycobacteria* was performed in one case. All samples were negative.
At a routine tuberculin test (comparative intradermal test) of eight bulls kept isolated before entering a breeding herd, two animals tested positive (one of them inconclusive according to EEC 64/432). Both animals were euthanised. The autopsy showed no tuberculosis lesions and the bacteriological examination was negative.

Farmed deer (Table 1.1.2.)
In December 2001, 556 (96%) out of the 578 farmed deer herds were affiliated to the control programme.
A total of 432 herds (75%) had obtained tuberculosis-free status. Of these, 105 were declared free following at least three whole herd tuberculin tests and 287 following slaughter and meat inspection of the whole herd. Furthermore, 40 new herds were declared free as they were newly established with deer originating from tuberculosis free herds. Another 124 herds were affiliated to the control program but had not obtained tuberculosis-free status. Of these herds, 43 were tuberculin testing the deer and 27 were depopulating their herd.
No infected herds were found in 2001.
In all, 20 deer were examined due to suspicion of mycobacterial infection. Bacteriological examination for the presence of *M. bovis* or *M. tuberculosis* was performed in six cases. None was positive.

Swine, sheep and goats (Table 1.1.3.)
A total of 36 pigs sampled at meat inspection were examined for *Mycobacteria* and culture was performed in 27 cases. None were positive for the tuberculosis –complex. Only one sheep was investigated and found to be negative. No goats were investigated.

Pets, wildlife and zoo animals (Table 1.1.3.)
Mycobacterium tuberculosis was detected in an elephant at a Swedish zoo in October 2001. The elephant, which was used as a riding animal, had lost weight during the summer and was eventually taken out of work. This elephant was caught wild in Burma in 1971 and had been kept in a German circus and a Danish zoo before coming to the Swedish zoo in 1990. Bacteriological examination was performed and *M. tuberculosis* was isolated. The elephant was euthanised in late October and the autopsy showed severe lesions in the lungs and the trachea. The zoo was immediately put under official restrictions and tuberculin testing was initiated in contact animals and animal keepers. The other elephants and rhinoceroses were trunk- or tracheal rinsed and sampled. Cultivation for *Mycobacterium* was performed and another elephant that tested positive for *Mycobacteria* was euthanised in early 2002.
The final results from the disease investigation in the zoo are not complete at

the time of this report.

Apart from the animals at the zoo, samples from 3 horses, 6 dogs, 7 wildlife animals and 2 other animals were investigated for *Mycobacteria*. All samples were negative.

M. bovis in humans

Surveillance/ notification systems

Tuberculosis is a notifiable disease under the Communicable Diseases Act. Figures in this report are based on reports by physicians and on laboratory reports. The surveillance is mainly based on passive case findings. Screening by health control of foreign refugees and asylum seekers is recommended but not uniformly performed.

Laboratory criteria for diagnosis

Isolation of *M. bovis* from a clinical specimen or demonstration of *M. bovis* from a clinical specimen by nucleic acid amplification test.

Case definition

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

Results of the investigations in 2001

(Table 1.2.)

Only preliminary figures for 2001 are available. Five cases of *M. bovis* have been reported. Three of the cases were born in Sweden, all were elderly men between 80 and 82 years old. The other two cases were women, one 24 years and the other 64 years old. Both of them were probably infected abroad.

Relevance as zoonotic disease

Almost all cases of *M. bovis* in humans in Sweden are infected abroad. Cases also occur in elderly people infected before *M. bovis* was eradicated from the Swedish cattle population. As Sweden is officially free from bovine tuberculosis, the risk of people contracting tuberculosis from Swedish animals is considered negligible. As very few cases of human tuberculosis due to *M. bovis* occur in Sweden and person to person spread of *M. bovis* is rare, the risk of contracting bovine tuberculosis from people in Sweden is judged to be negligible.

BRUCELLA ABORTUS / OVIS / SUIS / MELITENSIS

Brucella in animals

Disease agent

Brucella abortus, Brucella ovis, Brucella suis, Brucella melitensis

Surveillance/ notification systems

Infection with *Brucella* spp. is notifiable in all animals on the basis of clinical suspicion, such as abortions. Serological surveys in sheep and goats are performed according to EU-legislation. Also, serological surveys are regularly performed in cattle and pigs. Sweden was declared officially free from brucellosis in cattle herds according to Commission Decision 95/74/EC, replaced by Commisission Decision 1999/466/EC. Sweden fulfils the requirements laid down in Council Directive 64/432/EEC, Annex II (7) and (8), amended by 98/99/EC on control measures in officially brucellosis free member states.

Methods used

In dairy herds one of several methods can be used: tube agglutination, complement fixation or a milk ELISA. For beef cattle, swine, sheep and goats, complement fixation test or the Rose Bengal plate test is used. If a clinical case is suspected, serological and bacteriological methods are used.

Case definition used and

epidemiological unit

A case is defined as a single animal from which *Brucella spp*. has been isolated or an animal showing significant antibody titres to *Brucella spp*. The herd is the epidemiological unit.

Vaccination policy

Vaccination is not allowed

Measures taken in case of brucella diagnosis.

If brucellosis were to be diagnosed, measures to eradicate the disease would be taken.

Epidemiological history

The last case of bovine brucellosis was reported in 1957. Brucellosis in other species has never been found.

Results of the investigations in 2001

(Tables 2.1.1, 2.1.2 and 2.1.3)

One bulk milk sample from each of 3000 dairy herds (24% of all dairy herds) were analysed serologically with an indirect ELISA (Svanova, Biotech, Uppsala) for *B. abortus*. All samples were negative.
Blood samples were collected from 3000 pigs and analysed serologically with a tube agglutination test for *B. suis*. All samples were negative.
In total, 9900 sera from sheep and 175 from goats were tested serologically for *B. melitensis* using the Rose Bengal test. The samples from sheep originated from 5% of all sheep herds (about 400 herds). All samples were negative.
Furthermore, 2129 pigs, including wild boars, were tested serologically for *Brucella suis* and 1018 cattle for *Brucella abortus*.
Blood samples from 68 dogs, 20 reindeers and 44 other animals were analysed. All samples were negative.

Investigations have been performed in 4 cattle herds, of which 2 showed clinical signs of abortions. Also, one boar was investigated due to clinical suspicion of *Brucella* infection. All samples were negative.

Brucella in humans

Surveillance/ notification systems

Brucellosis is not a notifiable disease under the Communicable Disease Act. Figures in this report are based on voluntary laboratory reports.

Case definition

A case is defined as a person in whom brucellosis has been verified by laboratory investigations (bacteriology or serology).

Epidemiological history

During the last 10 years, up to 6 cases has been reported each year. None of these cases were suspected to be of domestic origin.

Results of the investigations in 2001

(Table 2.3.)

During 2001 only two cases were reported, both persons had contracted the disease abroad.

Relevance as zoonotic disease

The risk of obtaining brucellosis from domestic sources is negligible.

SALMONELLA

Sweden has achieved an efficient control of *Salmonella*, despite the industrialisation of animal production. Due to the control, both red and white meat and table eggs produced in Sweden are virtually free from *Salmonella*. Surveillance, according to the Swedish salmonella control programme initiated in 1995 (Commission Decision 95/50/EC), indicates that the overall prevalence is below 0.1%.

Any finding of *Salmonella*, irrespective of serotype, in animals, humans, feed and

food of animal origin is notifiable[1]. In addition, findings of *Salmonella* in official sampling of food of any origin is notifiable. All primary isolates of *Salmonella* are characterized by sero- and phage typing and isolates of animal origin are also tested for antibiotic resistance.

Action, including an investigation to clarify the source of infection, is always taken at any finding of *Salmonella*. Restrictions on animal movements are put on the farm. Restrictions are only lifted when the infection has been eliminated. Feed contaminated with *Salmonella* is destroyed or treated to eliminate the contamination. Food contaminated with *Salmonella* is destroyed or returned to the country of origin[2].

Salmonella in feedingstuffs

Surveillance/ notification systems

The salmonella control of feed has a long tradition in Sweden. At the feed mills samples are taken mainly according to HACCP principles (HACCP = Hazard Analysis Critical Control Point). This system was initiated in 1991 and has proved to be effective for the prevention of salmonella.
The feed control is supervised by the SJV and the samples are taken in accordance with the Swedish legislation on feedingstuffs and the legislation on animal by-products. In addition to the compulsory testing, a large number of voluntary samples are taken.
It is compulsory to notify findings of *Salmonella spp*. Any positive finding shall be reported immediately to the SVA and sent to their laboratory for confirmation and serotyping.

[1] See ”surveillance systems” under ”feedstuffs”, ”animals”, ”food” and ”humans”.
[2] See ”measures taken in case of salmonella isolation” under ”feedstuffs”, ”animals”, ”food” and ”humans”.

Environmental sampling (HACCP sampling) at feed mills
Samples taken at feed mills mainly consist of samples taken at critical points on the premises and along the production line in accordance with HACCP principles.

Sampling at the feed mills
A feed mill that produces feedingstuffs for poultry is obliged to take at least five samples a week from the following critical points: silo containing compound feedingstuffs, the area around the pellet cooler, the top of the cooler, central aspiration and elevator for feed material. For feed mills that only produce feedingstuffs for ruminants, pigs or horses, two samples a week are sufficient (from the silo and the elevator mentioned above). The producer usually also takes additional voluntary samples.

Sampling made at official inspections
Official feed inspectors visit the feed mills one to five times a year. (The frequency depends on the size of the feed mill.) During these visits a dustsample is taken from the top of a silo that contains compound feedingstuffs (especially feedingstuffs intended for poultry).
A “hygiene group” consisting of the county veterinarian and an official feed inspector once a year visits feed mills that have a production above 1000 tons a year. During these visits samples are taken at critical points - especially in connection with coolers, aspirators and elevators.

Sampling of feed materials and sampling in the production of feed materials
A classification of feed material has been made according to the *Salmonella* risk they may present. Feed materials of animal origin are classified as S1. Feed materials of vegetable origin considered as high risk (e.g. soy bean meal and some products deriving from rapeseed) are classified as S2 and vegetable low risk feed materials

(e.g. rice) are classified as S3.

Domestic production
Every batch of feed material of animal origin produced has to be sampled. If there is a continuous production, the number of samples to be taken is decided by the SJV. The production of feed materials classified has to follow a hygiene programme, containing routines for *Salmonella* sampling, approved by the SJV.

Feed materials traded into Sweden
Feed materials classified as S1, S2 or S3 have to be tested for *Salmonella*. A large amount of samples are taken from the consignment in accordance with a statistical model. The consignment can also be sampled in the country of origin. If so, it must be proved that the samples have been taken and that the results have been negative.

Sampling of compound feedingstuffs traded into Sweden
Any kind of feedingstuffs containing S1, S2 or S3 destined for the feeding of ruminants, pigs or poultry has to be tested for *Salmonella* in accordance with the same testing principles as for feed raw materials (see above).

Petfood
Every supplier of petfood is inspected once a year by an official feed inspector, and a random sample for salmonella is taken. In addition to the sampling at official inspections, voluntary samples are taken. Every consignment of dog chews coming from a third country is sampled at the border inspection even though it must be accompanied by a certificate showing that the petfood has been tested negative for salmonella in compliance with the EU legislation.
During 2001 the survey that was initiated in 2000, to check the prevalence of salmonella in dog chews deriving from the EU, continued.

Methods 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 subtyping methods. Laboratories must be accredited (according to EN 17025) for the method.

Analysing laboratories
The compulsory samples taken at the feed mills have to be analysed at the SVA. Other samples may be analysed at other accredited laboratories. The samples taken by the official feed inspectors and the "hygiene group" are analysed at the SVA.

Measures taken in case of salmonella isolation

No feed materials containing, or suspected of containing, *Salmonella* may be used in the production of feedingstuffs.
Positive *Salmonella* findings always give rise to further testing and decontamination in accordance with the legislation.

Heat treatment

All compound feedingstuffs for poultry have to be heat treated to at least 75° C. In practice almost all compound feedingstuffs for ruminants and pigs are heat treated as well.
Feed grain cannot be sold to a poultry farm as feed for poultry unless it has been heat treated or comes from a storage plant that has been approved by the SJV. In order to be approved the storage plant must fulfil certain requirements i.e. sampling at critical control points once a year.

Results of the investigations in 2001
(Tables 3.1.1 – 3.1.4)

In the tables only the compulsory samples and those of the voluntary samples that have been reported to the SJV have been registered. (There is no obligation to report

negative results from voluntary samples.) Information concerning dog chews also comes from the border inspection were dog chews are sampled and rejected if positive for salmonella.

Feed raw material of vegetable origin
52 samples were positive for *Salmonella.* All those samples were from imported feed materials. The isolates came from derived material of soy bean, maize, rape seed and palm kernel. The most common serotypes were *S.*Mbandaka, *S.*Senftenberg and *S.*Tenessee (table 3.1.4 c).

Feed mills and compound feedingstuffs
In the environmental control of feed mills 7974 samples have been reported. Most of these are compulsory samples. 26 positive samples were found. The most common serotypes were *S.* Mbandaka and *S.* Yoruba (Table 3.1.4d)

Animal by-products processing plants and feed material of animal origin
Feed material of animal origin is sampled in accordance with the EU legislation. In addition many voluntary samples are taken. Out of 3635 analysed samples of feed material, two were positive for *Salmonella*. 51 of the 1449 analysed samples taken at critical control points were positive for *Salmonella*. The figure includes follow up samples and samples taken at specific points because of suspected contamination. The most common serotypes were *S.* Mbandaka and *S.* Agona. (Table 3.1.4b)

Salmonella in animals

Surveillance/notification systems

Poultry and eggs
Any finding of *Salmonella*, irrespective of serotype, is notifiable. Sampling strategies are outlined in the Swedish salmonella control programme approved by the EU.
All faecal samples are collected according to Council Directive 92/117/EEC. Microbiological sampling of breeding flocks is carried out according to Council Directive 92/117/EEC. In addition, more frequent testing is carried out in the grand parent generation. Elite breeding flocks does not occur in Sweden as layer and broiler breeders are imported as day-old grandparents. During the rearing period, sampling is done on 5 separate occasions. Caecal samples are taken as a supplement to the faecal sampling. During egg production faecal samples are taken from the breeders every month as a supplement to the sampling in the hatchery.
The parent generation is tested during the rearing period by tissue sampling as well as faecal sampling. During egg production, samples are taken as has been described for grand parents.
Ratite breeders are tested every third month by faecal samples.
All meat producing flocks of broilers, turkeys, ducks, ratites and geese are investigated by faecal sampling 1-2 weeks before slaughter. In broilers additional sampling is carried out as 30 samples of caecal tissue are collected 1-2 weeks prior to slaughter.
Pullets (laying hens during rearing period) are tested (faecal samples) once during the rearing period, 2 weeks before moving to a laying unit. Sampling of laying flocks with more than 200 layers from establishments not placing eggs on the market and of all laying flocks from establishments placing their eggs on the market is carried out as faecal samples three times during production. Since April 1998, flocks of egg-producing quail are sampled twice a year by faecal sampling. Grand parents , parents and layers are sampled 2-4 weeks prior to slaughter.
Within to the control programme, neck skin samples are taken from poultry at slaughterhouses.

Cattle and pigs
Any finding of *Salmonella*, irrespective of serotype, is notifiable. Sampling strategies

are outlined in the Swedish salmonella control programme approved by the EU. Sampling of slaughtered animals is carried out in all abattoirs. Samples consist of intestinal lymph nodes and swabs taken from parts of the carcass where the chances of finding *Salmonella* are considered optimal. All sanitary slaughtered animals are tested for *Salmonella*.
Faecal samples are collected annually in elite breeding herds, gilt-producing herds and twice annually in so-called sow pools. In addition to the *Salmonella* control programme, all weaner pig producing/integrated herds affiliated to a health control programme run by the industry, are tested by faecal samples collected annually. Samples for culture of *Salmonella* are also taken at any clinical suspicion of *Salmonella* as well as at autopsies.

Sheep, goats and other food producing animals
Any finding of *Salmonella*, irrespective of serotype, is notifiable.

Method used

Bacteriological investigations are done according to NMKL No. 71 5th ed. 1999. A modification of ISO 6579:1993 is used, the most essential modification being the exclusion of the selenite broth enrichment step. Serotyping is performed by slide agglutination. Certain serotypes are subtyped by molecular subtyping methods.

Case definition and definition of epidemiological unit

A case is defined as a single animal from which *Salmonella* of any serotype has been isolated.

Poultry
The flock is the epidemiological unit. This is especially important as regards broilers, where 5-8 flocks may be raised annually in each house or compartment, and each flock is tested. The flock is also the unit, as regards measures taken. The strict hygiene rules that are implemented according to the Swedish prophylactic *Salmonella* control programme makes it possible to define the flock as the epidemiological unit.

Cattle and pigs and other food producing animals
The herd is usually the epidemiological unit.

Vaccination policy

Poultry
Vaccination of poultry against salmonellosis is not allowed.

Prophylactic measures

Poultry
The Swedish *Salmonella* control programme includes the following hygienic rules in order to avoid introduction of infection:
- Rules for feed production and transport (HACCP process control, heat treatment, hygiene control).
- Hygiene rules to protect the poultry from *Salmonella* infection from the surroundings (restrictions for visitor, rodent control, hygiene barriers etc.).
- All in - all out systems in all categories of poultry production.

Cattle, pigs and other food producing animals
An efficient control of *Salmonella* (see ” *Salmonella* in animal feedstuffs”) ensures that feed to food producing animals is virtually free from *Salmonella*.

Measures taken in case of salmonella isolation

Poultry
Any poultry flock infected with *Salmonella*, irrespective of serotype isolated, will be destroyed. Farms where *Salmonella* is found are put under restrictions, and after destruction of the flock, the premises/contaminated poultry houses are cleaned and disinfected. An investigation of the feed suppliers involved

is also initiated. Feedstuffs are destroyed or decontaminated.
Isolation of *Salmonella* in neck skins collected at slaughter is considered to be a contamination at slaughter and will lead to hygiene measures being taken at the slaughterhouse.

Cattle, pigs and other food producing animals
If *Salmonella* is isolated from an animal, indicating an infection in the herd of origin, action is always taken. This involves restrictions put on the herd. Animals are not allowed to enter or leave the herd, unless for sanitary slaughter. Samples are taken in the herd, for bacteriological investigation, and a sanitation plan is instituted, involving the elimination of chronically infected animals, cleaning and disinfection, manure and sludge treatment, disinfection or treatment of feedstuffs etc. An investigation of the feed supplier involved is also initiated. Restrictions are lifted when faecal samples from all animals in the epidemiological unit (usually the herd), taken at two consecutive sampling occasions one month apart, are negative. If swab samples from the carcasses of slaughtered animals are positive for *Salmonella*, hygiene measures are taken at the slaughterhouse.
Carcasses found to be contaminated with *Salmonella* are deemed unfit for human consumption.

Epidemiological history

The Swedish salmonella control programme was initiated in 1961. In 1995, certain parts of the programme, covering cattle, pigs poultry and eggs, were approved by the EU (95/50/EC) and an extended surveillance programme was initiated. Results of the surveillance show that Swedish red and white meat and eggs are virtually free from *Salmonella*.
S. Typhimurium DT104 was first isolated in a cattle herd in 1995. From 1995 to December 2000 a total of four cattle herds have been found infected with this type of *Salmonella*. In all four cases the strains were penta resistant. One herd has been depopulated and the remaining herds have been cleared from *Salmonella* by normal routine measures taken by authorities. No pig herd or poultry flock has been found infected with *S.* Typhimurium DT104.

Results of investigations 2001
(Tables 3.2.1, 3.2.2)

Poultry
The number of flocks investigated is outlined in tables 3.2.1 and 3.2.2. In all, 11 cases of *Salmonella* were notified during 2001 of which 5 were layers and 3 were broilers (figures 1 and 1.2) and 3 were other meat producing flocks (geese and turkey).
In layers, *S.* Livingstone was isolated in 3 flocks and *S.* Pullorum in 2 hobbyflocks with laying hens. One of the later herds had had problems with hatching and high mortality among young chickens. At the bacteriological investigation at autopsy *S.* pullorum was isolated. During the disease investigation one contact herd also infected with *S.*pullorum was found. Poultry from the first herd had been sold to the contact herd. Two other contact herds were investigated but they were not infected. All poultry in the two infected herds have been destroyed. The source of the infection has not been found. Previosly, *S.* Pullorum has not been isolated in Sweden since 1962.
Outbreaks in 3 broiler flocks were due to infection with *S.* Soerenga, *S.* Rissen and *S.* Thyphimurium (DT 41) respectively. In turkey, *Salmonella* Typhimurium (DT 12) was isolated in 1 flock and S. San Diego in another. In geese, *Salmonella* Typhimurium (DT 1) was isolated in one flock.
S. Enteritidis or *S.* Typhimurium DT104 has not been isolated in poultry in 2001.
Results of sampling of neck skins at slaughter are detailed in table 3.3.1 and figure 1.12.

Cattle and pigs

A summary of all animals/herds sampled for *Salmonella* according to the EU-approved Swedish salmonella control programme is outlined in table 3.2.4.1. Voluntary sampling in pig herds is also included. Sero- and phage types of all notified isolates are outlined in table 3.2.4 and 3.2.4.1.

Pigs

As can be seen in tables 3.2.4.1 and 3.2.4, figures 1.7, 1.8, 1.10 and 1.11., the *Salmonella* situation in pig continues to be very favourable. In 2001 no pig herd was found infected with *Salmonella* (table 3.2.4 and 3.2.4.1).

Cattle

Results of the surveillance programme at slaughter houses (table 3.2.4.1, figures 1.6 and 1.9) and results of other surveillance (table 3.2.4.) show that the *Salmonella* situation continues to be very favourable in cattle.
In 2001 a total of 8 cattle herds were considered infected with *Salmonella* (table 3.2.4, 3.2.4.1 and figure 1.3.), compared to 4 and 12 herds in 2000 and 1999 respectively.
In 2001, *S.* Dublin was isolated in 7 herds and *S.* Typhimurium DT 120 in one herd. In four cases the infection was detected at autopsy, in one case at a trace back investigation, in one case at normal slaughter (lymph node) and in one case through an abortion investigation. In the last case the infection was detected through the investigation performed due to a human case of salmonellosis (*S.* Typhimurium DT 120) in the dairy farmers family.

Sheep, goats

No cases of *Salmonella* were found in sheep or goats in 2001.

Horses

A total of three cases of *Salmonella* were notified during 2001 (table 3.2.4.) *S.* Typhimurium DT 120 was isolated in 2 cases and *S.* Livingstone in one case. *S.* Typhimurium DT120 was isolated from a horse in a large animal clinic. The horse was brought to the clinic with symptoms of intoxication and was later euthanised. The clinic and the horse farm were put under official restrictions and *Salmonella* Typhimurium DT120 was isolated from both places.
*S.*Livingstone was detected at autopsy of a horse that died of colic.

Other animal species

During 2001 a total of eleven *Salmonella* infected cats were reported. Of those nine cats were infected with *S.* Typhimurium DT 40, one with *S.*Typhimurium DT120 and one with *S.*Livingstone.

Salmonella was isolated in two dogs, in one case *S.* Bovismorbificans and in the other *S.* Enteritidis DT1.

Seventeen isolates from reptiles were also reported, sero- and phage types are detailed below;

* *S.* Iruma	
**S.* Muenchen	(3)
**S.* subspecies I = 4,12:b:-	
**S.* subspecies II 56:6:-	
**S.* subspecies II = 58:1z13,z28:z6	
**S.* subspecies III O48;r,z, *S.* subspecies III, O50;r,z, *S.* subspecies II, O40;z4,z24	
**S.* subspecies IIIa = 53:z10:z35	
**S.* subspecies IIIb = 16:z10:e,n,x,Z15	
**S.* subspecies IIIb = 47:-:-	(2)
**S.* IIIb = 58:1,v:z35	
**S.* subspecies IIIb 57:c:-	
**S.* subspecies IV = 50:g,Z51;-	
**S.* subspecies IV = 11:z4z23:-	
**S.* subspecies IV = 40:z4z24:-	

Wildlife

S. Typhimurium was isolated from 4 wild birds. *S.* Typhimurium DT40 were isolated in three cases and *S.* Typhimurium DT93 in one case.

Antibiotic resistance in *Salmonella* from animals

In Sweden active surveillance of antimicrobial susceptibility among *Salmonella* of animal origin has been performed regularly since 1978. The surveillance includes isolates from all notified cases of *Salmonella* from warm-blooded animals. Any finding of *Salmonella* in animals is notifiable and the isolate has to be sent to the national reference laboratory for confirmation and antibiotic resistance testing. If several animals in the same epidemiological unit are infected, only the first isolate is sent for confirmation.

Susceptibility is tested with a microdilution method (VetMIC™) following the recommendations of National Committee of Clinical Laboratory Standards (NCCLS) (Table 3.2.6) and break-points are set using microbiological criteria (also called epidemiological break-points).

A total of 45 isolates from domesticated animals were investigated. Of these, 24 were *S.* Typhimurium, seven *S.* Dublin, one *S.* Enteritidis and the remainder, 7 isolates, were other serovars. Of the *S.* Typhimurium isolates, only one was from cattle and as much as 50% was from pets and horses.

Results are given in Tables 3.2.5.1, 3.2.5.2, 3.2.5.3 and 3.2.5.4. Overall, only two isolates (4%) were classified as resistant to any of the antimicrobials tested. These were two isolates of *S.* Typhimurium, one DT 104 and one DT 120, isolated from cats and with similar antibiograms. Both isolates were resistant to ampicillin, chloramphenicol/florfenicol, streptomycin, sulphamethoxazole and tetracycline).

In addition to the material presented in the tables, isolates from wild birds were also tested. A total of 7 isolates, all of which were *S.* Typhimurium, were investigated. One of these, a DT 40, was resistant to nalidixic acid and the remainder were sensitive to all tested antimicrobials.

More information on antibiotic resistance in *Salmonella* and other bacteria of animal origin, including *Campylobacter* spp, can be found in the report SVARM 2001 (Swedish Veterinary Resistance Monitoring) that is available at http://www.sva.se/.

Salmonella in food

Surveillance/notification systems

Any finding of *Salmonella* in food of animal origin, irrespective of subspecies, is notifiable. Moreover, in the official control, findings of *Salmonella* in all kinds of food are notifiable.
Sampling strategies at cutting plants are outlined in the Swedish salmonella control programme approved by the EU. The frequency of sampling is correlated to the capacity of the establishment. Depending on the production capacity, sampling is performed daily, weekly, monthly or twice annually. Samples consist of crushed meat and trimmings. All food items may also be sampled for Salmonella by municipal official inspections.

Methods used

Bacteriological investigations are done according to NMKL No. 71 5th ed. 1999. Sometimes, if results are questioned, or in cases of export or import analysis, a modified ISO 6579:1993 is used, in which the selenite broth enrichment is excluded. Serotyping is performed by slide agglutination.

Measures taken in case of Salmonella isolation

Any food contaminated with *Salmonella sp.* is deemed unfit for human consumption and destroyed.
If any *Salmonella* is isolated in food of animal origin, the origin of contamination

is traced back to the contaminated carcass, as well as slaughterhouse or holding whenever possible. Effective cleaning and disinfection of the premises and equipment is immediately carried out in the plant. Increased sampling is also performed to verify that the *Salmonella* contamination is eliminated. If any *Salmonella* is found in foods of vegetable or other origin the same procedure is used and the remainder of the consignment is destroyed if found. *Salmonella* contaminated consignments (at spot checks) that originate from EU countries are traced back, if possible, and destroyed or returned to the sender in accordance with article 7.2 of Directive 89/662/EEC. Consignments from third countries are not allowed to enter Sweden if *Salmonella* of any subspecies is found at border inspection points. Fresh meat, meat preparations and minced meat from non-EU countries are always checked for *Salmonella*.

Results of the investigations in 2001

(Table 3.3.1-3.3.3.)

Sampling at cutting plants

In total, 5432 samples (4311 from beef and pork, and 1121 from poultry) were collected from cutting plants supervised by SLV (figures 1.13 and 1.14). All of these samples tested negative for the occurrence of *Salmonella*.

In addition, 1819 samples were collected at cutting plants supervised by local municipalities. In one sample *S*. Dublin was isolated.

At slaughterhouses, 4243 neck skin samples were collected from poultry, mainly broilers, but also from layers and other poultry. All samples were negative (figure 1.12).

Official control performed by municipalities

During 2001, 109 out of the 289 local municipalities have reported results from their official control. In all, these municipalities analysed 11 621 samples and 54 (0,46 %) were positive for *Salmonella* (Table 3.3.1. and 3.3.2.). The high frequency of positive samples compared with the results from last year can partly be explained by double reporting and the fact that reporting municipalities can differ between years. Nevertheless, the increase of positive samples is alarming and it is important to learn if this is indicating a new trend or if it is an accidental occurrence.

Spot-checks of consignments originating from EU

A total number of 28 consignments were reported to be contaminated with *Salmonella* when spot checks were performed on fresh meat originating from various EU-countries (25 consignments) and meat sold to Sweden from various EU-countries but originating in third countries (3 consignments), (Table 3.3.3). That dispatching EU-country is then responsible for the *Salmonella* testing according to the Swedish *Salmonella* Guarantees. Four of the 28 consignments were contaminated with more than one kind of *Salmonella* and seven of them were contaminated with *S.* Typhimurium. Of those seven, one was a *S.* Typhimurium DT 104. Four of the consignments were contaminated with *S.* Enteritidis and three of those were phagtype 4.

Meats arriving directly from third countries are always controlled at the Border Inspection Points (BIP), and any consignment with a positive finding will be rejected and not allowed to enter Sweden. In such BIP checks 7 different consignments were found to be *Salmonella* contaminated during the year 2001, meat as well as food of sesame seed/paste origin. One consignment of Helva (from sesame seed) was found positive for *S.* Typhimurium DT 104. There has been two outbreaks of foodborne disease caused by sesame seed products during the year. One of them was caused by *S.* Typhimurium DT 104. (See “Results of investigations” under Salmonella in humans)

Salmonella in humans

Surveillance/ notification systems

Salmonella infection is a notifiable disease under the Communicable Diseases Act. The surveillance is mainly based on passive case findings. In addition, sampling of contact persons occur in connection with *Salmonella* cases/outbreaks. People in certain "risk professions" may be voluntary sampled after visits abroad. Figures in this report are based on reports by physicians[3].

Case definition

A case is defined as a person from whom *Salmonella* of any serotype has been isolated. Thereby subclinically infected persons are also included in the number of cases. An investigation is performed on all cases of salmonellosis. A case is considered to be of domestic origin if the person is 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 *Salmonella*.

Epidemiological history

The total number of reported cases[4] during the last ten years (1992-2001) has ranged between 3562 and 5159 (figure 1.5.). Approximately 85% of the cases were infected abroad.
The number of domestic cases has ranged between 452 and 903 during these ten years (the annual incidence is between 5 and10/100 000).

[3] See introduction
[4] Reports by physicians

Results of the investigation in 2001 (Table 3.4.1. 3.4.2.)

During 2001, a total of 4711 cases were reported, 4508 were clinical reports by the physicians and 4681 laboratory reports. Of the 4508 cases reported by physicians approximately 85 % were infected abroad and 668 (~15%) were domestic cases (annual incidence 7.5/100 000). Ten cases with unknown country of infection were also reported. The number of reported domestic infections was approximately the same as the year before.
S. Typhimurium was the most common domestic serotype reported (277 cases) followed by *S.* Enteritidis (137 cases) and *S.* Agona (13 cases).
During 2001 seven food borne outbreaks have been reported:

- *S.* Livingstone from frozen fish gratin. At least 16 persons became ill in Sweden after consumption of fish gratin (fish and mashed potatoes). The same producer also produced other types of gratins (fish, macaroni and egg sauce) in Norway, where 44 persons contracted the disease.
- *S.* Typhimurium PT 9 and 30 from tahini (sesame seed product). At least 61 people were infected with *Salmonella* after consumption of tahini, 55 persons contracted *S.* Typhimurium DT 9 and six persons DT 40. *S.* Typhimurium of both phage types were also isolated from the product.
- S. Typhimurium DT 104, multiresistant. Twenty persons contracted Salmonella after eating Helva (an imported dessert or sweet containing sesame seeds and syrup). S. Typhimurium DT 104 was also found in the product. This was an international outbreak with at least four countries involved.
- S. Typhimurium DT 12, 33 persons got infected after a meal at a restaurant.
- S. Bovismorbificans was responsible for an outbreak involving at least eight persons living in the same area. The source of the infection is unknown.
- S. Muenchen, at least sex persons fell ill

after eating at the same restaurant.

- S. Orientalis was the reason for five persons getting ill, they were living in the same area. The source of infections was not found.

Relevance as zoonotic disease

Since many years approximately only 10-15% of all notified cases have been domestically acquired. Sources of domestic human infections vary.
As Swedish red and white meat and eggs are virtually free from *Salmonella*, the risk of contracting salmonellosis in Sweden is small compared to many other countries. The low annual incidence of domestic cases supports this statement.

TRICHINELLA SPIRALIS/NATIVA/BRITOVI

Trichinella in animals

Disease agent

Trichinella spiralis, Trichinella nativa and *Trichinella britovi*

Surveillance/notification systems

Trichinosis is compulsory notifiable. All slaughtered pigs (including wild boars), horses and bears are investigated for the presence of *Trichinella* (see table 4.1.).

Methods used

The magnetic stirred method for pooled samples is mainly used.
From horses, 5g of diaphragm muscle or, in some few cases, *Musculus masseter* is analysed by the magnetic stirred method.

Case definition used and epidemiological unit

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

Measures taken if trichinosis is diagnosed

The carcass of an infected animal will be destroyed.

Epidemiological history

The main reservoir for *Trichinella* spp. in Sweden is the red fox (*Vulpes vulpes*). Approximately 10% of the fox population is estimated to be infected. All three species of *Trichinella*, i.e. *spiralis, nativa* and *britovi*, have been found in red foxes in Sweden.
In domestic pigs, no *Trichinella* cases have been reported after 1995. However, sporadic cases (<3 per year) were reported in wild boars (free living or farmed) between 1997-1999. No cases were reported in 2000.

Results of the investigations in 2001 *(Table 4.1)*

During 2001, no cases were notified in domestic pigs or wild boars. Among 298 investigated foxes and 20 lynx, *Trichinella* was detected in 8 foxes and in 1 lynx.

Trichinella in humans

Surveillance/ notification systems

Trichinosis is a notifiable disease under the Communicable Diseases Act.

Case definition

A case is defined as a person in whom trichinosis has been verified by laboratory investigations (histopathology or serology). Cases with typical clinical symptoms could also be reported.

Epidemiological history

During the last ten years no cases of trichinosis in humans have been reported.

Results of the investigations in 2001 *(Table 4.2)*

No case of trichinosis was reported during 2001.

Relevance as zoonotic disease

The risk of obtaining trichinosis from domestic sources is negligible.

RABIES

Rabies in animals

Surveillance/notification systems

Rabies is notifiable already on clinical suspicion in Sweden. Apart from this, there is no official surveillance system for rabies in animals, except the ordinary clinical surveillance performed by veterinarians. In addition, hunters are advised to notify the authorities of any animals they find which behave in such a way that rabies might be suspected.

Laboratory test for diagnosis

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 not allowed in Sweden except for dogs and cats that are brought out of the country.

Measures taken in case of rabies diagnosis

Should rabies occur, relevant measures to eradicate the disease would be taken.

Epidemiological history

No case of rabies has occurred since 1886 and Sweden is recognised as free from rabies. Dogs and cats originating from EU and EFTA countries can enter the country after rabies vaccination and antibody titre control. Other dogs and cats entering the country have to be kept in quarantine for 4 months.
In 1987-89 and 1999 surveys were performed where sick or dead bats (n=200 and 75 respectively) were investigated for rabies, all were negative.

Rabies in animals

Results of the investigations in 2001 *(Table 5.1)*

No cases of rabies occurred in animals in Sweden in 2001.
40 bats, 7 dogs, 2 cats, 1 fox and 1 raccoon were tested with negative result.

Rabies in humans

Epidemiological history

Rabies is a notifiable disease under the Communicable Diseases Act. During 2000 a young woman contracted rabies after a visit to Thailand where she had taken care of a wounded puppy, which later died. Before that no case of rabies had occurred since 1975 when a person contracted rabies after taking care of a puppy in India.

Results of the investigations in 2001

No case of rabies in human was reported.

Relevance as zoonotic disease

As Sweden has been free from rabies in animals since 1886 and has strict import regulations, there is no domestic rabies threat to humans.

CAMPYLOBACTER (thermophilic)

Campylobacter in animals

Disease agent

Campylobacter jejuni and *Campylobacter coli.*

Surveillance/notification systems

Infection with *Campylobacter* is not compulsory notifiable in animals. A system of monitoring exists only for broilers. It is an industry-led programme in

which every flock sent for slaughter is examined for *Campylobacter* at the slaughterhouse. In July 1, 2001, a new, official *Campylobacter* programme replaced the former industry-led programme, introducing a more sampling intensive regime

Methods used

Cloacal samples and neck skin samples are analysed for the presence of *Campylobacter* spp. by NMKL no 119 2ed 1990. Isolates are identified as *C. jejuni* / *C. coli* and no further characterisation such as serotyping or other subtyping methods are performed routinely.

Case definition used and epidemiological unit

A case at herd level is defined as any cloacal sample from a slaughtered group, being positive for thermophilic *campylobacter*. The epidemiological unit is the slaughtered group. At animal level a case is defined as an animal from which thermophilic *Campylobacter* spp. has been isolated.

Measures taken in case of Campylobacter isolation

If a flock is found positive for *Campylobacter*, the owner of the flock should introduce hygienic measures in order to clear the barns, where the broilers are kept, from the infection. If *Campylobacter* is not found at the control at slaughter, the farmer gets more paid from some slaughter companies.

Epidemiological history

From 1991 to June 2001, an industry led *Campylobacter* programme reduced the prevalence of *Campylobacter* positive flocks to less than 10%. In July 2001 a new, more sampling intensive, *Campylobacter* programme was initiated and an increased *Campylobacter* prevalence among flocks was detected (fig 2.). Reasons for this increase have not yet been analysed, but may partly be due to increased sampling.

The prevalence varies between farms and some farms seem to be totally free. About one third of farms are free from *Campylobacter* all year round and the majority of those have been free for several years. A seasonal variation of *Campylobacter* infection in broiler flocks has been observed where higher prevalences have been found in late summer and early autumn.

Results of the investigations in 2001 *(Table 6.1)*

As the sampling strategy changed from July 1 it is not possible to compare the figures from the first six months of the year with the figures from the last six months. During the first six months of 2001 2080 flocks were sampled, of those tested 193 positive (9.3%) for *Campylobacter*. During the last six months 2140 flocks were tested and 489 of those were positive (22.9%).

Another finding with the new programme was that not all tested samples from the flocks were positive, indicating that the within flock prevalence might be considerably lower than 100 % in a number of flocks.

Campylobacter in food

Surveillance systems

There is no official surveillance system for *Campylobacter* in food. From time to time, municipalities, the SLV and other research institutions initiate various *Campylobacter* projects.

Methods used

The NMKL 119:1990 2:nd ed. is used.

Measures taken in case of campylobacter isolation

No measures are taken in case of positive findings. Should an outbreak occur, the National Food Administration decides what action to take from case to case.

Results of the investigations in 2001 *(Table 6.2)*

Sampling performed within the official control has been added up for 109 out of the 289 local municipalities. A total of 234 samples were collected (Table 6.2.). Fifteen of the samples were positive, all in poultry meat or products of poultry meat.

Campylobacter in humans

Surveillance/ notification systems

Campylobacter infection is notifiable under the Communicable Diseases Act. The surveillance is mainly based on passive case findings. Figures in this report are based on reports by physicians.

Case definition

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

Epidemiological history

Infection with *Campylobacter* became notifiable in 1989. In the last ten years, the total number of reported *Campylobacter* infections[5] has varied between 4475–7845 and the domestic cases 1383–2832 (figure 2.2). The reason for the year-to-year variation in domestic cases is unknown.

Results of the investigations in 2001 *(Tables 6.3.)*

The total number of cases of campylobacteriosis increased during 2001. A total of 8577 cases were reported, 7845 cases were reported by the physicians and 8392 by the laboratories. This is the largest figure ever reported.
Out of the cases reported by physicians approximately 62 % were infected abroad. In all, 2832 domestic cases (annual incidence 31.8/100 000) were reported along with 129 cases with unknown country of infection. The number of reported domestic infections has increased with nearly 400 cases from the year before. No outbreaks can explain the increase of domestic cases.

Relevance as zoonotic disease

Campylobacter is the most common bacteria causing infectious diarrhoea in Sweden today. A significant part of the reported cases (30-45 %) is of domestic origin. The population etiological fractions are unknown and more epidemiological knowledge is needed about the disease in order to decrease the number of human cases.

LISTERIA MONOCYTOGENES

Listeria in animals

Disease agent

Listeria monocytogenes

Surveillance/ notification systems

There is no specific surveillance system for listeriosis in animals and surveillance is based on clinical observations. Listeriosis is notifiable in all animals.

Methods used

Histopathology, immunohistochemical methods and bacteriology.

Case definition used and epidemiological unit

A case may be defined in three different ways: 1) a histopathological diagnosis in combination with clinical signs of listeriosis, 2) a positive bacteriological

[5] Reports by physicians

result combined with a positive histopathological diagnosis, 3) a positive immunohistochemical result in combination with histological lesions. The animal is the epidemiological unit.

Measures taken if L. monocytogenes is isolated

In a verified case of listeriosis, the SJV decides on a case-by-case basis, to investigate the herd and try to clarify the source of infection. When appropriate, the veterinary investigation is carried out in co-operation with local public health authorities.

Epidemiological history

The situation has been stable over the years with approximately 10-20 cases annually. However, in 1999 and 2000 there was an increase in the number of reported cases (46 and 34, respectively). It is possible that as a consequence of a larger number of cattle and sheep that are autopsied due to TSE surveillance, a larger number of *Listeria* cases will also be identified.

Results of the investigations in 2001

During 2001, 33 cases were notified and of those were 26 sheep, 5 cattle, 1 horse and 1 duck.

Listeria in food

Surveillance/notification systems

There is no officially co-ordinated surveillance system for *Listeria monocytogenes* in food. Surveillance is achieved by various projects initiated by municipalities, the SLV and other research institutions.

Methods used

An in-house (SLV) method is used for the quantitative analysis and NMKL no 136 for the qualitative analysis.

Measures taken if L. monocytogenes is isolated

Listeria monocytogenes found in food supposed not to be further heat-treated: If the number of bacteria exceeds the cut-off point (if in one sample out of five, more than 100 colonies/g or in two or more out of five samples 10 or more colonies/g are found) the food will be classified as not fit for human consumption and subsequently destroyed.

Results of the investigations in 2001

During the year 2001 the SLV and the local municipalities performed a joint project with the purpose of studying the baseline prevalence of *Listeria monocytogenes* in different kinds of ready-to-eat-foods. A total of 3600 samples have been analysed and out of those were 63 (1.7%) positive. A comparison between different kinds of products showed that fish products had the highest percentage (6.2%) of positive samples. These products also had the highest number of bacteria. This should be compared with 0.7% positive samples for meat products and cheese. The municipalities have also performed sampling of fresh products (see Table 7.1). These results show that 5 (9.3%) out of 54 samples of fresh fish were positive.

<u>Possible outbreak of gastrointestinal Listeriosis</u>

An outbreak of febrile gastroenteritis was detected amongst consumers of on-site manufactured dairy products from a summer farm in Sweden. Forty-eight cases were identified. Their symptoms were short lived and included diarrhoea, fever, abdominal cramps and vomiting. A cohort study with 33 eaters of dairy product gave an attack rate of 52% and an association between the total amount of fresh cheese eaten and development of illness (P=0.07). Bacteriological analysis of the cheese samples revealed a heavy contamination with *L. monocytogenes* (range 3.0 x 10^3-6.3 x10^7 cfu per gram). Molecular profiles

for *L. monocytogenes* isolated from cheese and stool samples were identical. Results of both microbiological and epidemiological analyses point at *L. monocytogenes* as the most likely cause of this outbreak, which maybe more frequent than previously thought.

Listeria in humans

Surveillance/ notification systems

Invasive infections of listeriosis is a notifiable disease under the Communicable Diseases Act.

Case definition

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

Epidemiological history

Approximately 25-35 cases[6] have been reported annually.
Normally, no single cases are observed outside the vulnerable groups (immuno-suppressed persons, pregnant women and elderly). Single cases not known to belong to any risk group may occur.

Results of the investigation in 2001 *(Table 7.2.)*

The increase in the number of reported *Listeria* cases continued during 2001. A total of 67 cases were reported, compared with 53 reported cases during year 2000. Of the reported cases 34% are younger than 65 years of age. 44 (66%) of the total number of cases were of domestic origin and in 2 of the cases the country of infection were not known. The domestic incidence was 0.8/100 000 inhabitants. Only one of the cases had an underlying disease. Five of the cases were pregnant women.

Relevance as zoonotic disease

Foodborne transmission is believed to be more important than transmission from animals. Listeriosis has practically only been relevant as a zoonotic disease in immuno-suppressed people, pregnant women and elderly.

YERSINIA ENTEROCOLITICA

Yersinia in animals

No specific monitoring system exists for those *Yersinia* species considered as zoonotic agents. Yersiniosis is not notifiable in mammals.

Yersinia in food

Surveillance systems

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

Methods used

Bacteriological examination according to NMKL 117, 3rd ed, 1996 is performed. In addition a PCR, NMKL 163:1998, may also be used.

Measures taken if Yersinia enterocolitica is isolated

When products that will not be exposed to further heat treatment are positive for pathogenic serotypes of *Yersinia enterocolitica*, they will be classified as not fit for human consumption and subsequently be destroyed.

[6] Reports by physicians

Results of the investigations in 2001

No investigations of *Yersinia enterocolitica* were reported in 2001.

Yersinia in humans

Surveillance/ notification systems

Yersiniosis is a notifiable disease under the Communicable Diseases Act. The figures of yersiniosis in this report are mainly based on reports by physicians[7].

Case definition

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

Epidemiological history

Prior to 1996, yersiniosis was only reported from laboratories. In the beginning of the 1990's, more than 1000 cases of yersiniosis where reported compared to 556 in 2001[8]. This decrease could be due to improved hygienic technique during slaughter of swine and/or less sampling for Y*ersinia* spp. in patients.

Results of the investigations in 2001 *(Table 8.3.)*

During 2001, a total of 579 cases were reported, 519 reports from the physicians and 556 laboratory reports.
Of the 519 cases reported from the physicians 389 (75 %) cases were of domestic origin and 27 had an unknown country of infection. The domestic incidence was 4.4/100 000 inhabitants.

Relevance as zoonotic disease

A significant part (approximately 70 %) of the human infections are of domestic origin. To be able to decrease the number of cases, more knowledge is needed concerning the epidemiology of the disease.

[7] See introduction
[8] Reports by laboratories

ECHINOCOCCUS GRANULOSUS/ MULTILOCULARIS

Echinococcus in animals

Disease agent

Echinococcus granulosus and *Echinococcus multilocularis*

Surveillance/notification systems

Echinococcosis is notifiable in Sweden. The only surveillance system in place is inspection at slaughter. However, in 2001 a survey was carried out in order to investigate the prevalence in the Swedish fox population.

Methods used

The Copro Elisa-test and sedimentation is used to detect *Echinococcus* in foxes.

Measures taken if echinococcosis is diagnosed

Offals from animals found infected with *Echinococcus* spp. will be destroyed.

Epidemiological history

Echinococcus multilocularis
This parasite has never been reported in Sweden.

Echinococcus granulosus
Sporadic cases occur in horses. Investigations have shown that they have been imported and probably were infected abroad.
In reindeer, *E. granulosus* was shown to be prevalent during the 1970s in Northern Sweden. At slaughter, approximately 2% were infected. Based on these findings the routines at meat inspection of reindeer were revised and organs not approved for consumption had to be destroyed. During 1986-1996 no case of *E. granulosus* was diagnosed in reindeer. In 1996-1997, 3

cases were found and since then there have been no cases.
To prevent *E. multilocularis* to be introduced into the country, dogs that are brought in from other countries must be treated with praziquantel.

Results of the investigations in 2001 *(Table 9.1.)*

During 2001, no cases were detected during inspection at slaughter.
A survey was done in the Swedish fox population in order to investigate if the parasite is occurring within the country, 300 foxes were tested and all were found negative.

Echinococcus in humans

Surveillance/ notification systems

Echinococcosis is not a notifiable disease under the Communicable Disease Act. Figures in this report are based on voluntary reports by laboratories.

Case definition used and epidemiological unit

A case is defined as a person where echinococcosis has been verified by laboratory investigations (histopathology or serology).

Epidemiological history

Notification of echinococcosis was initiated in 1994. Between 3 and 11 cases have been reported annually, all infected abroad.

Results of the investigations in 2001 *(Table 9.2)*

Eight cases were reported during 2001. All were infected abroad but it is not known in which countries they contracted the infection.

Relevance as zoonotic disease

Currently none of the *Echinococcus* species represents any threat to humans in Sweden. However, due to the spread of the tape worm (*E. multilocularis*) in other European countries, including findings of the parasite in Denmark the situation might change and an increased awareness is necessary.

TOXOPLASMA GONDII

Toxoplasma in animals

Disease agent

Toxoplasma gondii

Surveillance/notification systems

No specific surveillance system exists for toxoplasmosis in animals. Toxoplasmosis is not notifiable in animals.

Methods used

Isolation of the agent in mice or cell culture, immunohistochemistry or serology.

Case definition used and. epidemiological unit

A case is defined as an animal that is positive in any of the above mentioned tests. The animal is the epidemiological unit.

Epidemiological history

Results of investigations performed during 1987 indicate that approximately 40 % of the cats, 23% of the dogs, 20% of the sheep and 1% of the horses in Sweden have antibodies against *Toxoplasma gondii*. Investigations performed in sheep showed that the prevalence increased with increasing age.
A serological study performed in 1999 on 807 slaughtered pigs showed that 3.3% of fattening pigs (n=695) and 17.3% of adult pigs (n=110) were seropositive.
An investigation performed between 1991 and 1999 showed that 84 (38 %) of 221 red

foxes had antibodies against *Toxoplasma gondii*.

Results of the investigations in 2001 *(Table 10.1)*

During 2001, 84 animals were tested and of those were 13 cats, 7 sheep and 1 pig positive for *Toxoplasma gondii.*

Toxoplasma in humans

Surveillance/ notification systems

Toxoplasmosis is a notifiable disease under the Communicable Diseases Act. The figures of toxoplasmosis in this report are based on reports by physicians.

Case definition

A case is defined as a person where toxoplasmosis has been verified by laboratory examination (through isolation, PCR-technique or serology).

Epidemiological history

The true incidence of toxoplasmosis is unknown. Concerning the number of reported cases, the situation is stable, in the last 10 years between 4 to 18 cases have been reported annually[9].

Results of the investigations in 2001 *(Table 10.2)*

During 2001, a total of 18 cases were reported. Of these, 1/3 of the cases were known to be of domestic origin, 1/3 were known to have been infected abroad and in 1/3 of the cases the country of infection were not known.

Relevance as zoonotic disease

Clinical toxoplasmosis is most important in immuno-suppressed persons and in pregnant women. During pregnancy the infection can be transmitted to the foetus causing death or serious injury. However, more knowledge is needed concerning the most significant sources of infection in Sweden. The main source seems to be undercooked or raw meat.

[9] Reports by physicians

VEROCYTOTOXIC *E. COLI* O157

VTEC O157 in animals

Disease agent

Verotoxin-producing *Escherichia coli* serotype O157

Surveillance / notification system

Since 1997, approximately 2000 faecal samples from cattle are collected annually at slaughter-houses and analysed for VTEC O157. If livestock contacts are reported in a human case of. *E. coli* O157 infection, the animals are investigated by bacteriological sampling. Any case of VTEC O157 with connection to a human case of enterohaemorrhagic disease is notifiable.

Methods used

VTEC O157
Isolation of VTEC O157 strains are made after pre-enrichment in buffered peptone water followed by immuno-magnetic separation (IMS; Dynal), and culture on sorbitol MacConkey with cefixime and tellurit (CT-SMAC). Suspected colonies are confirmed by latex agglutination and biochemistry. A PCR method is used to identify genes for VT production and eaeA genes. In addition, certain isolates have been subtyped by use of PFGE.

VTEC non O157
Enrichment is done in buffered peptone water in 37º C for 6 hours. Plating out from enrichment broth to McConkey agar. Incubation overnight in 37º C. From McConkey agarplate colony material is harvested for PCR analysis, analysis for VT1 and VT2. If a sample is positive for VT genes, individual colonies from the McConkey agarplate are picked and

analysed individually for verotoxin production.

Case definition used and epidemiological unit

A case is defined as an animal from which VTEC O157 is isolated. The herd is the epidemiological unit. Case definition for notification see "surveillance/notification system"

Epidemiological history

In 1996, VTEC O157 was for the first time isolated in cattle in Sweden. Also, human infection with *E. coli* O157 was for the first time traced back to presence of VTEC O157 in a cattle herd. Restrictions were laid on the herd and surveillance was initiated. In October 1996, findings of VTEC O157 in cattle became notifiable. This changed in summer 1999 and since then only findings of VTEC O157 having a connection with a human case of EHEC is notifiable.
Previous slaughterhouse surveys have shown that 0.8 % (4/474) lambs and 0.9 % (1/109) sheep and 0.08% (2/2446) pigs were positive for VTEC O157. Routine slaughterhouse surveys among cattle since 1997 have shown that between 0.3% and 1.7 % of collected faecal samples were positive for VTEC O157 (figure 4). The lower prevalence figures observed during 1998 –2000 might reflect the smaller sample size analysed (1g vs 10g).

The number of cattle herds with suspected connection with human EHEC case and the number of herds where VTEC O157 have been identified in the herd(s) are detailed below:

Year	Number of cattle herds with suspected connection with human EHEC case	Herds where VTEC O157 was isolated
1996	1	1
1997	8	4
1998	9	3
1999	6	3
2000	5+1*	0+1*
2001	4	4

* Including one goat herd

Two of the herds were still considered infected with VTEC O157 at the end of 2001.

Results of the investigations in 2001 (Table 11.1)

In the annual slaughterhouse surveillance, 1998 faecal samples were taken from cattle. Sampling was proportional to the number of cattle slaughtered at each slaughterhouse. Of these samples, 26 (1.3%) were positive for VTEC O157. As seen in previous years the prevalence is higher in young animals compared to adult animals. In barley-beef calves (7-9 months at slaughter) 4 of 76 (5.3%) were positive, in young bulls (12-18 months at slaughter) 19 out of 1327 (1.4%) and in adult cattle 3 of 527 (0.6%) were positive.

During 2001, VTEC O157 was isolated from cattle at 4 herds which were suspected to be connected with human cases of EHEC. In total six humans cases that were suspected of having contracted the disease from these four farms were investigated. In two cases children had been given unpasteurized milk from cows at two separate farms. On both these farms *E. coli* O157 was isolated both from the children and from the cows. From one of the herds, VTEC O157 was isolated from a filter at the entrance of the milk tank. This is the first time in Sweden that VTEC O157 have been isolated from milking equipment.

Three human EHEC cases (two children and one person of unknown age), where the humans had visited a sheep farm, a goat farm and a children zoo, were investigated. However, VTEC O157 was not isolated from animals at any of the farms.

Measures taken in infected herds with connection to clinical cases of EHEC in human

There are established guidelines for the handling of infected herds with connection to cases of human disease. In short, the guidelines are as follows:
Movement of live animals from the herd of origin requires that each animal, prior to movement has tested negative for VTEC O157. In the herd, samples are taken four times a year for bacteriological examination and hygiene recommendations and other measures are instituted. Animals sent to slaughter are examined for VTEC O157.
Concerning measures taken for contaminated carcasses, see "*E. coli* O157 in food".
The herd is considered to be free from the infection when faecal samples from all animals in the epidemiological unit (usually the herd) taken on two consecutive sampling with one month interval are negative.

VTEC O157 in food

Surveillance systems

There is no routine surveillance system for VTEC O157 in food in Sweden. On a voluntary basis, bacteriological examination for VTEC O157 is performed on slaughtered cattle and sheep originating from infected herds. Also, the slaughter companies carry out routine sampling at slaughterhouses on a voluntary basis.

Methods used

Isolation of *E. coli* O157 strains is made according to NMKL 164. A PCR method is used to identify genes for VT-production and *eae*A genes.

Measures in case of positive findings

If VTEC O157 is found in food, SLV will take necessary action, on a case to case basis, to ensu re that contaminated food will not reach the consumer.
When there is a clear epidemiological connection to human cases of EHEC caused by an infection with VTEC O157, it is recommended that the animals from that holding should be slaughtered last in the day. All carcasses should be swabbed for VTEC O157 and the carcasses retained pending results. In case of positive findings the carcasses will be destined for heat-treated products. The abattoirs should be thoroughly cleaned and disinfected after such slaughter.

Epidemiological history

Until 1999 VTEC O157 had not been identified in food in Sweden. One positive sample was found in imported meat in 1996.

Results of investigations in 2001

No information is available about the occurrence of VTEC in food, due to insufficient reporting.

EHEC in humans

Surveillance/ notification systems

Since the first of January 1996, enterohaemorragic *E. coli* O157 is a notifiable disease under the Communicable Diseases Act. Any case where *E. coli* O157 has been isolated, including subclinically infected people, is reported. HUS (haemorrhagic uremic syndrome) is not notifiable in Sweden. Other serotypes of verotocytotoxic E. coli than O157 is reportable on a voluntary basis. Figures of *E. coli* O157 in this report are based on reports by phycisians.

Case definition used

A case is defined as a person from whom *E. coli* O157 has been isolated.

Epidemiological history

During the autumn of 1995, and the first weeks of 1996, an *E. coli* O157 outbreak occurred in Sweden with about 120

confirmed cases. This increased the awareness of *E. coli* O157 and today most people with haemorrhagic diarrhoea will be investigated for the presence of this pathogen. The number of human cases varied between 59-97 during 1998-2000.

Results of the investigations in 2001

(Table 11.3.)

During 2001, a total of 95 cases were reported. Of them 90 cases were reports from the physicians.
63 (70 %) of the cases reported by physicians were of domestic origin and 27 (30 %) were infected abroad. The domestic incidence was 0.7/100 000 inhabitants. This is approximately the same amount of cases as reported in 2000. No outbreaks were reported during 2001.

Six cases of HUS due to *E. coli* O157 and three cases of HUS due to non O157 were reported. The true number of cases of HUS is unknown, as there is no mandatory reporting system for HUS in Sweden.

Relevance as zoonotic disease

VTEC O157 is a serious zoonotic infection. It cannot be excluded that large outbreaks may occur in the future. Compared with other food borne infections, infection with VTEC O157 could be very serious, especially in young children developing HUS. Much research still has to be performed before it will be possible to determine whether an efficient strategy for controlling VTEC O157 in the primary production can be implemented. As a prophylactic measure, it has been recommended that groups of young children (< 5 years of age) should not visit cattle farms and hygiene recommendations have been issued for other visitors.
As most research has focused on serotype O157 less is known about other serotypes. Although it is known that other serotypes causes a significant part of the EHEC cases in Sweden very little is known concerning the true occurrence of these serotypes in animals, food and humans and their zoonotic impact.

Tables for
Reporting on Trends and Sources of Zoonotic Agents

in
animals, feedingstuffs, food and man in the EU
2001

Sweden

National Veterinary Institute

Definitions are given in the Manual for Reporting

Sweden

Content

Table

Graphs

Table 1.1.1. Bovine tuberculosis, 2001

Sweden **Region:**

MANDATORY **CATTLE**

Number of herds under official control:	All herds	Number of animals under official control:	All animals

	OTF bovine herds	OTF bovine herds with status suspended	Bovine herds infected with tuberculosis
Notification at year end (a):	All herds	0	0
New cases notified during the year (b):		0	0
	Units tested	Units suspected	Units positive
Routine tuberculin test (c) - data concerning herds:	All herds OTF	0	0
Routine tuberculin test (c) - data concerning animals:	All herds OTF	0	0
	Animals slaughtered	Animals suspected	Animals positive
Routine post-mortem examination (d):	All slaughtered animals	4	0
		Herds suspected	Herds confirmed
Follow up of suspected cases in post-mortem examination (e):		0	0
Follow-up investigation of suspected cases: trace, contacts (f):		0	0
	Animals tested	Animals suspected	Animals positive
Other routine investigations: exports (g):	n.a.	0	0
Other routine investigations: tests at AI stations (h):	n.a.	2	0
	All animals	Positives	Contacts
Animals destroyed (i):	0	0	0
Animals slaughtered (j):	0	0	0

VOLUNTARY **CATTLE**

	Animals tested	Animals suspected	Animals positive
Other investigations: imports (k):	All imported animals	0	0
	Herds tested	Herds suspected	Herds positive
Other investigations: farms at risk (l):	n.a.	0	0
	Samples tested	*M. bovis* isolated	
Bacteriological examination (m):	4*	0	

* Direct smears (n=4), culture (n=1)

Table 1.1.2. Tuberculosis in farmed deer, 2001

Sweden

MANDATORY **FARMED DEER**

Number of herds under official control:	all herds *	Number of animals under official control:	all animals **

	"OTF" herds	"OTF" herds with status suspended	Herds infected with tuberculosis
Notification at year end (a):	432	0	0
New cases notified during the year (b):			0
	Units tested	Units suspected	Units positive
Routine tuberculin test (c) - data concerning herds:	21	0	0
Routine tuberculin test (c) - data concerning animals:	1350	2	0
	Animals slaughtered	Animals suspected	Animals positive
Routine post-mortem examination (d):	3942	0	0
		Herds suspected	Herds confirmed
Follow up of suspected cases in post-mortem examination (e):		0	0
Follow-up investigation of suspected cases: trace, contacts (f):		0	0
	Herds tested	Herds suspected	Herds positive
Other routine investigations: exports (g):	0	0	0
Other routine investigations: tests at AI stations (h):	0	0	0
	All animals	Positives	Contacts
Animals destroyed (i):	0	0	0
Animals slaughtered (j):	0	0	0

VOLUNTARY **FARMED DEER**

	Animals tested	Animals suspected	Animals positive
Other investigations: imports (k):	0	0	0
	Herds tested	Herds suspected	Herds positive
Other investigations: farms at risk (l):	0	0	0
	Samples tested	*M. bovis* isolated	
	20 ***	0	

* 578 herds

**13023 fallow deer and 4487 red deer

***direct smear (n=20), culture (n=6)

Table 1.1.3. Tuberculosis in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*M. bovis*	*M. tuberculosis*
Sheep	SVA, SJV	A)	animal	1	0		
Pigs	SVA, SJV	A)	animal	36	0		
Horse	SVA, SJV	A, B)	animal	3	0		
Dog	SVA, SJV	A)	animal	6	0		
wild-life	SVA, SJV	A)	animal	7	0		
Zoo animals							
elephant	SVA, SJV	A)	animal	5	2		2
rhinoceros	SVA, SJV	A)	animal	3	0		
other	SVA, SJV	A)	animal	2	0		

A) meat inspection of all slaughtered animals

B) autopsy

Table 1.2. Bovine tuberculosis in man, 2001

Sweden	**Cases**	**Inc.**	**Autochtone cases**	**Inc.**	**Imported cases**	**Inc.**
Tuberculosis						
M. bovis	5	1.0	3	0.6	2	0.4
M. tuberculosis						
Reactivation of previous cases						

	Tuberculosis due to *M. bovis*		
Age group	**All**	**M**	**F**
< 1 year			
1 to 4 years			
5 to 14 years			
15 to 24 years			1
25 to 44 years			
45 to 64 years			1
65 years and older		3	
Age unknown			
All age groups	0	3	2

Table 2.1.1. Bovine brucellosis, 2001

Sweden **Region:**

MANDATORY **CATTLE**

Number of herds under official control:	All herds	Number of animals under official control:	All animals
	OBF bovine herds	OBF bovine herds with status suspended	Bovine herds infected with brucellosis
Animals tested Notification at year end (a):	All herds	0	0
New cases notified during the year (b):		0	0
	Animals tested	Animals suspected	Animals positive
Notification of clinical cases, including abortions (c):	2	2	0
	Units tested	Units suspected	Units positive
Routine testing (d) - data concerning herds:	3000*	0	0
Routine testing (d) - data concerning animals:	0	0	0
		Herds suspected	Herds confirmed
Follow-up investigation of suspected cases: trace, contacts (e):		0	0
	Animals tested	Animals suspected	Animals positive
Other routine investigations: exports (f):	1018**	0	0
Other routine investigations: tests at AI stations (g):	All animals at AI stations tested	0	0
	All animals	Positives	Contacts
Animals destroyed (h):	0	0	0
Animals slaughtered (i):	0	0	0

VOLUNTARY **CATTLE**

	Animals tested	Animals suspected	Animals positive
Other investigations: imports (j):	0	0	0
	Herds tested	Herds suspected	Herds positive
Other investigations: farms at risk (k):	0	0	0
	Samples tested	Brucella isolated	
Bacteriological examination (l):	0	0	

* bulk tank milk

**including breeding animals, export, import and other routine investigations

Table 2.1.2. Ovine and caprine brucellosis, 2001

Sweden **Region:**

MANDATORY **SHEEP AND GOATS**

Number of holdings under official control:	All holdings	Number of animals under official control:	All animals

	OBF ovine and caprine holdings	OBF ovine and caprine holdings with status suspended	Ovine and caprine holdings infected with brucellosis
Notification at year end (a):	All holdings	0	0
New cases notified during the year (b):	0	0	0
	Animals tested	Animals suspected	Animals positive
Notification of clinical cases, including abortions (c):	0	0	0
	Units tested	Units suspected	Units positive
Routine testing (d) - data concerning holdings:	400*	0	0
Routine testing (d) - data concerning animals:	10075**	0	0
		Holdings suspected	Holdings confirmed
Follow-up investigation of suspected cases: trace, contacts (e):		0	0
	Animals tested	Animals suspected	Animals positive
Other routine investigations: exports (f):	0	0	0
	All animals	Positives	Contacts
Animals destroyed (g):			
Animals slaughtered (h):			

VOLUNTARY **SHEEP AND GOATS**

	Animals tested	Animals suspected	Animals positive
Other investigations: imports (i):	103 ***	0	0
	Holdings tested	Holdings suspected	Holdings positive
Other investigations: holdings at risk (j):	0	0	0
	Samples tested	Brucella isolated	
Bacteriological examination (k):	0	0	

* Estimated number of tested flocks

** 9900 sheep, 175 goats

*** including export, import and other investigations

Table 2.1.3. Brucellosis in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*B. melitensis*	*B. abortus*	*B. suis*
Pigs	SVA	survey	Animal	3000	0			
Pigs	SVA	A)	Animal	2057	0			
Wildboar	SVA	A)	Animal	72	0			
Others								
Dogs	SVA	A)	Animal	68	0			
Reindeer	SVA	A)	Animal	20	0			
Others	SVA	A)	Animal	44	0			

A) Routine sample

Table 2.3. Brucellosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Brucellosis	2				2	
B. abortus	n.a.					
B. melitensis	n.a.					
B. suis	n.a.					
occupational cases	0					

Table 3.1.1. Salmonella sp. in feed material of animal origin, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	*S*. Enteritidis	*S*. Typhimurium			
Milk products	SJV	d*,e			n.a.	0					
Land animal products											
Meat meal	SJV	-			-	-					
Meat and bone meal	SJV	b,c,d	sample		1044	0					
Bone meal	SJV	b,c,d	sample		320	1			See table 3.1.4.a		
Greaves	SJV	b,c,d	sample		446	1			See table 3.1.4.a		
Poultry offal meal	SJV	e			n.a.	0					
Feather meal	SJV	e			n.a.	0					
Blood meal	SJV	-			-	-					
Animal fat	SJV	c			n.a.	0					
Fish, other marine animals, their products and by-products, other fish-products											
Fish meal	SJV	b,c,d	sample		321	0					
Fish oil	SJV	c,d			n.a.	0					
Fish silage	SJV	-			-	-					
Other fish products	SJV	-			-	-					
Others											
Hemoglobin	SJV	b,c,d	sample		-	-					
Hemoglobinpowder	SJV	b,c,d	sample		192	0					
Protein meal**	SJV	b,c,d	sample		1297	0					
Meat silage	SJV	b,d	sample		15	0					
Environmental samples	SJV	a,c	sample		1449	51			See table 3.1.4.b		

a) Compulsory sampling (national requirements)
b) Compulsory sampling (EU requirements)
c) Voluntary sampling
d) Production
e) Import
* Approved food plant
** Greavemeal added with protein residues

Table 3.1.2. Salmonella sp. in feed material of vegetable origin, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	*S*. Enteritidis	*S*. Typhimurium			
Cereal grains, their products and by-products											
Barley (and derived)	SJV	c			n.a.	0					
Wheat (and derived)	SJV	c			n.a.	0					
Maize	SJV	c			n.a.	0					
Maize (derived)	SJV	c,e	sample		n.a.	5			See table 3.1.4.c		
Other	SJV	-			-	-					
Oil seeds, oil fruits, their products and by-products											
Groundnut derived	SJV	-			-	-					
Rape seed derived	SJV	a,c,e*	sample		n.a.	7			See table 3.1.4.c		
Palm kernel derived	SJV	a,c,e	sample		n.a.	3			See table 3.1.4.c		
Soya (bean) derived	SJV	a,c,e	sample		n.a.	37			See table 3.1.4.c		
Cotton seed derived	SJV	-			-	-					
Sunflower seed derived	SJV	c			n.a.	0					
Linseed derived	SJV	c			n.a.	0					
Other oil seeds derived	SJV	-			-	-					
Other materials											
Legume seeds, ...	SJV	c			n.a.	0					
Tubers, roots, ...	SJV	c			n.a.	0					
Other seeds and fruits	SJV	c			n.a.	0					
Forages and roughage	SJV	c			n.a.	0					
Other plants, ...	SJV	-			-	-					
Other sampling											
Environmental samples from wheat storage plant.	SJV	a	sample		158	0					
Environmental samples rape seed processing plant	SJV	a,c	sample		735	0					
Rape seed direved samples from national processing pla	SJV	a,c	sample		957	0					

a) Compulsory sampling (national requirements)
b) Compulsory sampling (EU requirements)
c) Voluntary sampling
d) Production
e) Import
* The samples from the national processing plant are reported seperately below.

Table 3.1.3. Salmonella sp. in compound feedingstuffs, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	*S*. Enteritidis	*S*. Typhimurium	Other serotypes		
Cattle											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Pigs											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Poultry											
Poultry (not specified)											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Poultry - Breeders											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Poultry - Layers											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Poultry - Broiler											
Process control	SJV	a,c,f			f	f					
Final product	SJV	c			n.a.	0					
Pet food											
Dog snacks (pigs ears, chewing bones)	SJV	b,c	sample		n.a.	n.a.			See table 3.1.4.f		
Other											
Environmental control in feed mills	SJV SJV	a,c,g	sample		7974	26			See table 3.1.4.d		
Compound feedingstuffs for livestock animals	SJV	c	sample		242	1			See table 3.1.4.e		

a) Compulsory sampling (national requirements)
b) Compulsory sampling (EU requirements)
c) Voluntary sampling
d) Production
e) Import
f) Included in the environmental control presented under "Other".
g) Contains also followup samples due to positive findings.

Table 3.1.4. *Salmonella* serotypes isolated in the feed control 2001
Sorted according to serotype.

a. Salmonella serotypes detected in feed raw material of animal origin

After heat treatment	
Serotype	No. of isolates
S. Montevideo	1
S. Senftenberg	1
Total	2

b. Salmonella serotypes detected in environmental samples from processing plants producing feed material of animal origin

Serotype	No. of isolates
S. Agona	13
S. Bredeney	6
S. Give	1
S. Mbandaka	23
S. Montevideo	3
S. Senftenberg	5
Total	51

c. Salmonella serotypes detected in feed raw material of vegetable origin

Serotype	No. of isolates
S. Adelaide	1
S. Agona	3
S. Anatum	1
S. Cabanai	1
S. Cubana	3
S. Derby	1
S. Havana	4
S. Infantis	2
S. Lexington	2
S. Livingstone	3
S. Mbandaka	8
S. Menston	1
S. Oukam	1
S. Poona	1
S. Putten	2
S. Senftenberg	6
S. Subspieces	2
S. Tenessee	5
S. Yoruba	4
Not sero typed	1
Total	52

d. Salmonella serotypes detected in environmental samples from feed mills

Serotype	No. of isolates
S. Agona	1
S. Bredeney	1
S. Carrau	1
S. Cubana	2
S. Duesseldorf	1
S. Havana	1
S. Infantis	1
S. Lexington	2
S. Mbandaka	6
S. Meleagridis	2
S. Rissen	1
S. Senftenberg	1
S. Tennessee	1
S. Worthington	1
S. Yoruba	3
Unknown	1
Total	26

e. Salmonella serotypes detected in compound feedingstuff for livestock animals

Serotype	No. of isolates
S. Cerro	1
Total	1

f. Salmonella serotypes detected in dog snacks

After heat treatment	
Serotype	No. of isolates
S. Derby	1
S. Infantis	1
Total	2

Table 3.2.1. Salmonella sp. in poultry breeding flocks (Gallus gallus), 2001

Sweden

	Source of information	Remarks	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium				
Egg production line										
Breeding flocks										
Elite	SJV	A)								
Grandparents	SJV	B)	3	0						
Parents	SJV									
Day-old chicks	SJV	B)	9	0						
Rearing flocks	SJV	B)	9	0						
Productive period	SJV	B)	13	0						
Parents, unspecified										
Meat production line										
Breeding flocks										
Elite	SJV	A)								
Grandparents	SJV	B, C)	15	0						
Parents	SJV									
Day-old chicks	SJV	B), C)	89	0						
Rearing flocks	SJV	B), C)	95	0						
Productive period	SJV	B), C)	107	0						
Parents, unspecified										
Production line, not specified										
Breeding flocks										
Elite										
Grandparents										
Parents										
Day-old chicks										
Rearing flocks										
Productive period										
Parents, unspecified										

A) There are no elite breeding herds in Sweden

B) Number of flocks tested. The number of times each flock is sampled is specified in the Swedish salmonella control programme.

C) Data from 4 out of 6 farms are included.

Table 3.2.2. Salmonella sp. in other commercial poultry, 2001

Sweden

Animal species	Source of information	Remarks	Flocks tested	Flocks positive	*S*. Enteritidis	*S*. Typhimurium				
Fowl (Gallus gallus)										
Layers										
Day-old chicks	SJV		0							
Rearing period	SJV		251	0						
Productive flocks	SJV		866	5			*S*. Livingstone (3), *S*. Pullorum (2) *			
Layers, unspecified										
Broilers										
Day-old chicks										
Rearing period	SPMA		3144	3		1	*S*. Soerena (1), *S*. Rissen (1), *S*. Typhimurium (1)			
Broilers, unspecified										
Fowl (Gallus gallus), unspecified										
Day-old chicks										
Rearing period										
Productive flocks										
Fowl, unspecified										
Ducks										
Breeders										
Productive flocks										
Ducks, unspecified	SJV		n.a							
Geese										
Breeders										
Productive flocks	SJV		n.a	1		1				
Geese, unspecified										
Turkeys										
Breeders	SPMA	A)	6							
Productive flocks	SPMA		4							
Turkeys, unspecified	SPMA		202	2		1	*S*. San Diego (1), *S*. Typhimurium (1)			

SPMA=Swedish Poultry Meat Association

A) 2 flocks day-old chicks, 4 rearing flocks

* S. Pullorum detected in two small hobby flocks

Table 3.2.4. Salmonella sp. in animals (non poultry), 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Dublin	S. Livingstone	S. Bovismorbificans	
Cattle	SJV		herd	*	8		1	7			
Sheep	SJV		animal	*	0						
Goats	SJV		animal	*	0						
Pigs											
Breeding herds	SJV		herd	*	0						
Fattening pigs	SJV		herd	*	0						
Pigs, unspecified	SJV		herd	*	0						
Solipeds			herd	*	3		2		1		
Other											
Cats	SJV		animal	n.a.	11		10		1		
Dogs	SJV		animal	n.a.	2	1				1	
Reptiles	SJV		animal	*	17						

* see text

Table 3.2.4.1. Salmonella in cattle and pigs, results of surveillance at slaughterhouses, 2001.

Number of animals/herds sampled for Salmonella according to the Salmonella control programme.

Animal species	Place of sampling	Type of sample *	Sampling unit	No of samples (no. pos)	Sero and phage type	No. of isolates	Phage type	*Salmonella* reisolated in the herd of origin
Cattle	major sl.h.	ln.	animal	2990 (1)	S. Dublin	1		1
	minor sl.h.	ln.	animal	255 (0)				
	major sl.h.	swabs	animal	2982 (0.3)	S. Typhimurium	0.3 **	40	0
	minor sl.h.	swabs	animal	261 (0)				
Adult pigs	major sl.h.	ln.	animal	3122 (3)	S. Mendoza	1		0
					S. Typhimurium	2	40	2
	minor sl.h.	ln.	animal	189 (2)	S. Typhimurium	2	40, 40+41	2
	major sl.h.	swabs	animal	3149 (0.3)	S. Typhimurium	0.3 **	40	0
	minor sl.h.	swabs	animal	187 (0)				
Fattening pigs	major sl.h.	ln.	animal	2976 (3)	S. Typhimurium	1	120	0
					S. Typhimurium	1	40	1
					S. Typhimurium	1	NT	0
	minor sl.h.	ln.	animal	260 (1)				
	major sl.h.	swabs	animal	2979 (0.3)	S. Typhimurium	0.3 **	40	0
	minor sl.h.	swabs	animal	263 (0)				

* Sampling specified in the Swedish salmonella control programme (Com. Dec 95/50/EC).

major sl.h.= major slaughter houses, minor sl.h.= minor slaughter houses

ln.: sample including at least 5 lymphnodes; f.s.: feacal sample; swab: swab sample of the carcass

** One pooled sample (swabs from cattle and pigs) was positive, Salmonella was never reisolated from the individual samples

Table 3.2.5.1. Antimicrobial susceptibility testing of Salmonella, 2001

Sweden	***Salmonella* spp.**				
	Cattle	Pigs	Poultry*	Other **	Other (specify)
Isolates out of a monitoring programme (Yes / no)	YES	YES	YES	YES	
Number of isolates available in the laboratory	9	9	11	16	

Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	9	0,00	9	0,00	0	0,00	16	13,00		
Chloramphenicol	9	0,00	9	0,00	0	0,00	16	13,00		
Florfenicol	9	0,00	9	0,00	0	0,00	16	13,00		
ß-Lactam										
Ampicillin	9	0,00	9	0,00	0	0,00	16	13,00		
3rd generation cephalosporin										
ceftiofur	9	0,00	9	0,00	0	0,00	16			
Fluoroquinolones										
Ciprofloxacin	ND		ND		ND		ND			
Enrofloxacin	9	0,00	9	0,00	0	0,00	16			
Quinolones										
Nalidixic acid	9	0,00	9	0,00	0	0,00	16			
Sulfonamides										
Trimethoprim / Sulfonamide	ND		ND		ND		ND			
Trimethoprim	9	0,00	9	0,00	0	0,00	16			
Sulfonamide	9	0,00	9	0,00	0	0,00	16	13,00		
Aminoglycosides										
Streptomycin	9	0,00	9	0,00	0	0,00	16	13,00		
Gentamycin	9	0,00	9	0,00	0	0,00	16			
Neomycin	9	0,00	9	0,00	0	0,00	16			
Kanamycin	ND		ND		ND		ND			

Number of multiresistant isolates										
fully sensitive	9	100,00	9	100,00	11	100,00	14	88,00		
resistant to 1 antimicrobial	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 2 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 3 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 4 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to >4 antimicrobials	0	0,00	0	0,00	0	0,00	2	13,00		

* includes all poultry

** includes isolates from 12 cats, 2 dogs and 2 horses

Table 3.2.5.2. Antimicrobial susceptibility testing of S. Enteritidis, 2001

Sweden	***S*.Enteritidis**				
	Cattle	Pigs	Poultry*	Other**	Other (specify)
Isolates out of a monitoring programme (Yes / no)					
Number of isolates available in the laboratory	0	0	0	1	

Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline							1	0,00		
Chloramphenicol							1	0,00		
Florfenicol							1	0,00		
ß-Lactam										
Ampicillin							1	0,00		
3rd generation cephalosporin										
ceftiofur							1	0,00		
Fluoroquinolones										
Ciprofloxacin							ND			
Enrofloxacin							1	0,00		
Quinolones										
Nalidixic acid							1	0,00		
Sulfonamides										
Trimethoprim / Sulfonamide							ND			
Trimethoprim							1	0,00		
Sulfonamide							1	0,00		
Aminoglycosides										
Streptomycin							1	0,00		
Gentamycin							1	0,00		
Neomycin							1	0,00		
Kanamycin							ND			

Number of multiresistant isolates										
fully sensitive							1	100,00		
resistant to 1 antimicrobial							0	0,00		
resistant to 2 antimicrobials							0	0,00		
resistant to 3 antimicrobials							0	0,00		
resistant to 4 antimicrobials							0	0,00		
resistant to >4 antimicrobials							0	0,00		

* includes all poultry

** includes 1 isolate from a dog

Table 3.2.5.3. Antimicrobial susceptibility testing of S.Typhimurium, 2001

Sweden	***S*.Typhimurium**				
	Cattle	Pigs	Poultry*	Other **	Other (specify)
Isolates out of a monitoring programme (Yes / no)					
Number of isolates available in the laboratory	1	8	3	12	

Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	1	0,00	8	0,00	3	0,00	12	17,00		
Chloramphenicol	1	0,00	8	0,00	3	0,00	12	17,00		
Florfenicol	1	0,00	8	0,00	3	0,00	12	17,00		
ß-Lactam										
Ampicillin	1	0,00	8	0,00	3	0,00	12	17,00		
3rd generation cephalosporin										
eg. Cefotaxim	1	0,00	8	0,00	3	0,00	12	0,00		
Fluoroquinolones										
Ciprofloxacin	ND		ND		ND		ND	0,00		
Enrofloxacin	1	0,00	8	0,00	3	0,00	12	0,00		
Quinolones										
Nalidixic acid	1	0,00	8	0,00	3	0,00	12	0,00		
Sulfonamides										
Trimethoprim / Sulfonamide	ND		ND		ND		ND	0,00		
Trimethoprim	1	0,00	8	0,00	3	0,00	12	0,00		
Sulfonamide	1	0,00	8	0,00	3	0,00	12	17,00		
Aminoglycosides										
Streptomycin	1	0,00	8	0,00	3	0,00	12	17,00		
Gentamycin	1	0,00	8	0,00	3	0,00	12	0,00		
Neomycin	1	0,00	8	0,00	3	0,00	12	0,00		
Kanamycin	ND		ND		ND		ND	0,00		

Number of multiresistant isolates										
fully sensitive	1	100,00	8	100,00	3	100,00	10	83,00		
resistant to 1 antimicrobial	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 2 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 3 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 4 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to >4 antimicrobials	0	0,00	0	0,00	0	0,00	2***	17,00		

Number of multiresistant DT104										
with penta resistance	0		0		0		1			
resistant to other antimicrobials										

* includes all poultry; ** includes isolates from 11 cats and 1 horse. *** One DT104 and one DT 120, from cats

Table 3.2.5.4. Antimicrobial susceptibility testing of Salmonella, 2001

Sweden	*other serotypes*				
	Cattle*	Pigs**	Poultry ***	Other****	Other (specify)
Isolates out of a monitoring programme (Yes / no)	YES	YES	YES	YES	
Number of isolates available in the laboratory	8	1	8	3	

Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	8	0,00	1	0,00	8	0,00	3	0,00		
Chloramphenicol	8	0,00	1	0,00	8	0,00	3	0,00		
Florfenicol	8	0,00	1	0,00	8	0,00	3	0,00		
ß-Lactam										
Ampicillin	8	0,00	1	0,00	8	0,00	3	0,00		
3rd generation cephalosporin										
eg. Cefotaxim	8	0,00	1	0,00	8	0,00	3	0,00		
Fluoroquinolones										
Ciprofloxacin	ND		ND		ND		ND			
Enrofloxacin	8	0,00	1	0,00	8	0,00	3	0,00		
Quinolones										
Nalidixic acid	8	0,00	1	0,00	8	0,00	3	0,00		
Sulfonamides										
Trimethoprim / Sulfonamide	ND		ND		ND		ND			
Trimethoprim	8	0,00	1	0,00	8	0,00	3	0,00		
Sulfonamide	8	0,00	1	0,00	8	0,00	3	0,00		
Aminoglycosides										
Streptomycin	8	0,00	1	0,00	8	0,00	3	0,00		
Gentamycin	8	0,00	1	0,00	8	0,00	3	0,00		
Neomycin	8	0,00	1	0,00	8	0,00	3	0,00		
Kanamycin	ND		ND		ND		ND			

Number of multiresistant isolates										
fully sensitive	8	100,00	1	100,00	8	100,00	3	100,00		
resistant to 1 antimicrobial	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 2 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 3 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to 4 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		
resistant to >4 antimicrobials	0	0,00	0	0,00	0	0,00	0	0,00		

* includes 7 Dublin and 1 S. subspecies I

** includes 1 Mendoza

*** includes 4 Livingstone, 1 Riessen, 1 San-Diego and 2 S. species

**** includes 1 Bovismorbificans and 2 Livingstone

Table 3.2.6. Breakpoints used for antibiotic resistance testing of Salmonella, 2001

Sweden

please tick or write ↓

Test method used

Agar diffusion	
Agar dilution	
Broth dilution	X

Standards used for testing

NCCLS	X

Is the testing procedure subject to quality control

(Yes/No):	YES

Breakpoints used		**Breakpoint µg/ml**	
			Resistant >
Tetracycline			>8
Chloramphenicol			>8
Florfenicol			>16
ß-Lactam			
Ampicillin			>2
3rd generation cephalosporin			
ceftiofur			>2
Fluoroquinolones			
Ciprofloxacin			ND
Enrofloxacin			>0.5
Quinolones			
Nalidixic acid			>16
Sulfonamides			
Sulfonamide/TMP			ND
TMP			>8
Sulfonamide			>256
Aminoglycosides			
Streptomycin			>32
Gentamycin			>8
Neomycin			>32
Kanamycin			ND

Table 3.3.1. Salmonella sp. in meat and meat products, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive		*Serotypes*
Raw meat								
Beef and veal								
at slaughterhouse		A)						
at retail level	SLV	B)	sample	25	2 490	13		*
Pork								
at slaughterhouse		A)						
at retail level								
Beef and Pork								
at cutting plant	SLV	D)	sample	25	4 311	0		
Poultry								
at slaughterhouse	SLV	E)	animal	25	4 243	0		
at cutting plant	SLV	D)	sample	25	1121	0		
at retail level	SLV	B)	sample	25	179	2		*
Other meat								
at slaughterhouse								
at cutting plant	SLV	F)	sample	25	1 819	1		S.Dublin
at retail level	SLV	B) C)	sample	25	12	0		
Minced meat								
Meat products								
Beef and veal - meat products								
at slaughterhouse								
at processing plant								
at retail level	SLV	B)	sample	25	1003	1		*
Pork - meat products								
at slaughterhouse								
at processing plant								
at retail level								
Poultry - meat products								
at slaughterhouse								
at processing plant								
at retail level	SLV	B)	sample	25	113	2		*
Other animals - meat products								
at slaughterhouse								
at processing plant								
at retail level	SLV	B) C)	sample	25	11	0		

A) Swab sampling see table 3.2.4.1

B) Official control at 109 local municipalities

C) Meat from wild animals

D) 1 to 5 samples are pooled to 25 gram

E) 1 to 10 samples (neck skins) collected at the same slaughterhouse may be pooled to 25 gram

F) Beef/pork/poultry, cutting plants supervised by local authorities

* Information about isolated serotypes is not available.

Table 3.3.2. Salmonella sp. in other food, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium			
Milk and milk products											
Milk, raw	SLV	A)	sample	25	28	0					
Ready to eat milk products	SLV	A)	sample	25	160	1					
Other milk products	SLV	A)	sample	25	250	1					
Eggs and egg products											
Table eggs											
Egg preperations											
Egg and egg products	SLV	A)	sample	25	54	0					
Fish and fish products											
Fish and fish products	SLV	A)	sample	25	517	1					
Seafood and seafood products	SLV	A)	sample	25	370	1					
Other food											
Soups, sauces, fat ...	SLV	A)	sample	25	467	0					
Fruits and vegatables	SLV	A)	sample	25	926	1					
Ice cream and desserts	SLV	A)	sample	25	662	0					
Ready to eat foods	SLV	A)	sample	25	3473	1					
Species and herbs	SLV	A)	sample	25	64	6					
Other	SLV B)	A)	sample	25	842	24					

A) Official control by 109 local municipalities

B) All units tested are not reported

Information about isolated serotypes is not available.

Table 3.3.3. Salmonella in 28 consignments from EU countries into Sweden, 2001

Country	Type of consignment	Salmonella serotypes
France (via the Netherlands)	Duckbreast	*S*. Hadar
Brazil (via the Netherlands)	Chicken fillet	*S*. Enteritidis
Denmark	Pork tenderloin	*S*. Typhimurium
Thailand via Denmark	Frozen chickenbreast	*S*. Schwarzengrund
Denmark	Frozen beeftrimmings	*S*. Dublin
Denmark	Pork tenderloin	*S*. Derby
Denmark	Pork tenderloin	*S*. subspecies 1
The Netherlands	n.a.	unknown specie
France (via Denmark)	Duckbreast	unknown specie
France	Turkey breast	*S*. Kottbus
Germany	Frozeb beeftrimmings	*S*. Typhimurium DT 104
Spain	Beefmeat for Kebab	*S*. Altona
Denmark	Pork tenderloin	*S*. subspec 1
Germany	Pork meat	*S*. Typhimurium
The Netherlands	Frozen marinated chickenfillet	*S*. Enteritidis DT 4
Thailand (via the Netherlands)	Frozen chickenfillet	*S*. Enteritidis DT 4
Denmark	Pork tenderloin	*S*. Typhimurium
Denmark	Ham	*S*. typhimurium
France (via Denmark)	Duckbreast	*S*. Hadar (2) *S*. Anatum (3) *S*. Saintpaul
France (via Denmark)	Duck breast	unknown specie
France	Quail filled with gooseliver	unknown specie
Italy	Frozen pork tenderloin	*S*. Bovismorbificans
Germany	Frozen pork meat (head) in blocks	*S*. London (2) *S*. Typhimurium (1)
The Netherlands	Frozen chickenfillet	*S*. Enteritidis DT 4
Germany	Beef meat	*S*. Typhimurium
Spain	Fresh frozen porkmeat	*S*. Rissen (2) *S*. Brandenburg
Spain	Fresh frozen porkmeat	*S*. Rissen *S*. Derby
Denmark	Beef trimmings	*S*. Montevideo

Table 3.4.1. Salmonellosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.	Unknown status
Salmonellosis	4508	50.6	668	7.5	3830	43,0	10
S. Enteritidis	2255	25.3	137	1.6	2118	2.4	
S.Typhimurium	535	6	277	3.1	258	2.9	
of these: DT 104							
other serotypes							

	***Salmonella* sp.**		*S*. Enteritidis		*S*. Typhimurium			
Outbreaks	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases
All outbreaks	7	141	0	0	3	106	4	35
General outbreaks	7	141	0	0	3	106	4	35
Family outbreaks	0							

	Salmonellosis			*S*. Enteritidis			*S*. Typhimurium		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	8	4	4	1	1	0	5	2	3
1 to 4 years	91	54	37	19	10	9	44	27	17
5 to 14 years	91	49	42	19	12	7	44	24	20
15 to 24 years	76	36	40	13	6	7	30	17	13
25 to 44 years	164	80	84	35	17	18	76	36	40
45 to 64 years	143	70	73	29	13	16	49	24	25
65 years and older	95	42	53	21	11	10	29	15	14
Age unknown	0	0	0		0	0	0	0	0
All age groups	668	335	333	137	70	67	277	145	132

Table 3.4.2. Salmonellosis in man - seasonal distribution, 2001

Sweden

Month	*Salmonella sp.* Cases	*S*. Enteritidis Cases	*S*. Typhimurium Cases
January	33	11	8
February	29	5	9
March	46	6	25
April	48	4	26
May	62	14	29
June	53	10	29
July	87	19	45
August	112	29	42
September	63	11	26
October	66	17	26
November	43	7	7
December	26	4	5
not known	0	0	0
Total	668	137	277

Table 4.1. Trichinella in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive
Pigs	SVA		animal	*	0
Solipeds	SVA		animal	*	0
Wild boars	SVA		animal	*	0
Foxes	SVA		animal	298	8
Other Wildlife					
Bear	SVA		animal	9	0
Lynx	SVA		animal	20	1
Badger	SVA		animal	1	0

* All slaughtered animals

Table 4.2. Trichinellosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Trichinellosis	0					

	Trichinellosis			
Outbreaks	Outbreaks	Cases	Outbreaks	Cases
All outbreaks				
General outbreaks				
Family outbreaks				

	Trichinellosis								
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year									
1 to 4 years									
5 to 14 years									
15 to 24 years									
25 to 44 years									
45 to 64 years									
65 years and older									
Age unknown									
All age groups	0	0	0	0	0	0	0	0	0

Table 5.1. Rabies in animals, 2001

Sweden

Animal species	Source of information	Remarks	Animals tested	Animals positive
Cattle	SVA		0	
Sheep	SVA		0	
Goats	SVA		0	
Pigs	SVA		0	
Solipeds	SVA		0	
Wildlife, all				
Bats	SVA, SJV		40	0
Foxes	SVA, SJV		1	0
Other wildlife	SVA, SJV		1	0
Dogs	SVA, SJV		7	0
Cats	SVA, SJV		2	0
Other pets	SVA			
Others	SVA			

Table 6.1. Thermophilic Campylobacter sp. in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Thermophilic *Campylobacter* sp.	*C. jejuni*	*C. coli*	*C. lari*	*C. upsaliensis*
Cattle									
Dairy cows									
Others									
Sheep									
Goats									
Pigs									
Solipeds									
Poultry, total									
Broilers - farm level									
Broilers - slaughterhouse	SVA, A)	B)	flock	4220	682				
Other poultry									
Dogs									
Cats									
Wildlife									
Others									

A) Swedish Poultry Meat Association

B) Due to change in sampling strategy, 2080 flocks were tested in the first 6 months and of those we
193 flocks positive, whereas, 489 flocks out of 2140 tested positive during the last 6 months.
See text for more information.

Table 6.2. Thermophilic Campylobacter sp. in food, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Thermophilic *Campylobacter* sp.	*C. jejuni*	*C. coli*	*C. lari*	*C. upsaliensis*
Raw meat										
Beef and veal - Raw meat										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		14	0				
Pork - Raw meat										
at slaughterhouse										
at processing plant										
at retail level										
Poultry - Raw meat										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		79	9				
Other - Raw meat										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		1	0				
Meat products										
Beef and veal - meat products										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		17	0				
Pork - meat products										
at slaughterhouse										
at processing plant										
at retail level										
Poultry - meat products										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		35	6				
Other - meat products										
at slaughterhouse										
at processing plant										
at retail level	SLV	A)	sample		2	0				
Other food										
Milk, raw										
Ready to eat milk products	SLV	A)	sample		2	0				
Fish and seafood	SLV	A)	sample		4	0				
Ready to eat foods	SLV	A)	sample		65	0				
Others	SLV	A)	sample		15	0				

A) Official control by 109 local municipalities

Table 6.3. Campylobacteriosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.	Unknown status
Campylobacteriosis	7845	88.1	2832	31.8	4884	54.8	129
C. jejuni	n.a.		n.a.				n.a.
C. coli	n.a.		n.a.				n.a.
C. upsaliensis	n.a.		n.a.				n.a.

	Campylobacter sp.		*C. jejuni*		*C. coli*		*C. upsaliensis*	
Outbreaks	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases
All outbreaks	0							
General outbreaks								
Family outbreaks								

	Campylobacter sp.			*C. jejuni*			*C. coli*		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	1	1	0						
1 to 4 years	199	105	93						
5 to 14 years	161	89	72						
15 to 24 years	318	187	130						
25 to 44 years	1053	573	479						
45 to 64 years	740	424	316						
65 years and older	356	189	167						
Age unknown	4	2	2						
All age groups	2832	1570	1259	0	0	0	0	0	0

3 persons with unknown sex

Month	Campylobacter Cases	*C.jejuni* Cases	*C.coli* Cases	*C.upsaliensis* Cases
January	111			
February	108			
March	105			
April	91			
May	179			
June	257			
July	641			
August	585			
September	277			
October	233			
November	167			
December	78			
not known				
Total	2832	0	0	0

Table 7.1. Listeria monocytogenes in food, 2001

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Definition used	Units tested	*Listeria monocytogenes*		
Ready to eat meat and meat products									
Beef and veal		A)	sample			447	5		
Pork									
Poultry	SLV	A)	sample			89	0		
Other	SLV	A)	sample			19	0		
Other ready to eat food products									
Milk products									
Milk, raw	SLV	A)	sample			33	0		
Cheese	SLV	A)	sample			581	11		
Ready to eat food	SLV	A)	sample			481	6		
Other raw products									
Fish	SLV	A)	sample			54	5		
Fish products	SLV	A)	sample			356	19		
Seafood	SLV	A)	sample			14	1		
Seafood products	SLV	A)	sample			99	4		
Fruits and vegetables	SLV	A)	sample			82	1		
Others	SLV	A)	sample			81	32		

A) Official control reported by 109 local municipalities

Table 7.2. Listeriosis in man, 2001

Sweden	Cases	Inc.
Listeriosis	67	0.8
Congenital cases	5	
Deaths		

	L. monocytogenes			
Outbreaks	Outbr.	Cases	Outbr.	Cases
All outbreaks	0			
General outbreaks				
Family outbreaks				

	Listeriosis			*L. monocytogenes*		
Age group	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	4	3	1	n.a		
1 to 4 years						
5 to 14 years						
15 to 24 years	1		1			
25 to 44 years	7	2	5			
45 to 64 years	15	11	4			
65 years and older	39	24	15			
Age unknown	1					
All age groups	67	40	26	0	0	0

Table 8.3. Yersiniosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.	Unknown status
Yersiniosis	519	5.8	389	4.4	103	1.2	27
Y. enterocolitica	n.a.						
Y. enterocolitica O:3	n.a.						
Y. enterocolitica O:9	n.a.						

	Yersiniosis		*Y.enterocolitica*					
Outbreaks	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases
All outbreaks	0							
General outbreaks								
Family outbreaks								

	Yersiniosis			*Y. enterocolitica*					
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	2	2	0	n.a.					
1 to 4 years	121	54	67						
5 to 14 years	53	31	22						
15 to 24 years	26	13	13						
25 to 44 years	90	55	35						
45 to 64 years	61	32	29						
65 years and older	36	17	19						
Age unknown									
All age groups	389	204	185	0	0	0	0	0	0

	Yersiniosis	*Y. enterocolitica*
Month	Cases	Cases
January	33	n.a.
February	17	n.a.
March	8	n.a.
April	17	n.a.
May	32	n.a.
June	34	n.a.
July	56	n.a.
August	51	n.a.
September	43	n.a.
October	40	n.a.
November	29	n.a.
December	29	n.a.
not known		n.a.
Total	389	0

Table 9.1. Echinococcus sp. in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*Echinococcus* detected	*E. multilocularis*	*E. granulosus*
Cattle	SJV			A)			
Sheep	SJV			A)			
Goats	SJV			A)			
Pigs	SJV			A)			
Solipeds	SJV			A)			
Dogs	SVA, SJV		animal	0			
Cats	SVA, SJV		animal	0			
Foxes	SVA, SJV		animal	300	0	0	0
Wildlife, other	SVA, SJV		animal	0			

A) inspection at slaughter

Table 9.2. Echinococcosis in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Echinococcosis	8	0.09			8	0.09
Cystic echinococcosis						
Alveolar echinococcosis						

	Echinococcus			*E. granulosus*			*E. multilocularis*		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year				n.a.			n.a.		
1 to 4 years				n.a.			n.a.		
5 to 14 years	2	2		n.a.			n.a.		
15 to 24 years				n.a.			n.a.		
25 to 44 years *	4	1	2	n.a.			n.a.		
45 to 64 years	2	1	1	n.a.			n.a.		
65 years and older				n.a.			n.a.		
Age unknown									
All age groups	8	4	3	0	0	0	0	0	0

* 1 person of unknown sex

Table 10.1. Toxoplasma gondii in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*T.gondii*
Cattle	SVA		animal	1	0
Sheep	SVA		animal	22	7
Goats					
Pigs	SVA		animal	3	1
Solipeds					
Dogs	SVA		animal	19	0
Cats	SVA		animal	37	13
Others	SVA		animal	2	0

Table 10.2. Toxoplasmosis in man, 2001

Sweden	Cases	Inc.
Toxoplasmosis	18	0.2
Congenital cases		

	Toxoplasmosis								
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	1	1	0						
1 to 4 years	1	1	0						
5 to 14 years	2	1	1						
15 to 24 years	0	0	0						
25 to 44 years	12	3	9						
45 to 64 years	1	0	1						
65 years and older	1	0	1						
Age unknown									
All age groups	18	6	12	0	0	0	0	0	0

Table 11.1. Verocytotoxic Escherichia coli (VTEC) in animals, 2001

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	VT *E.coli* detected	VT *E.coli* O 157	VT *E.coli* O 157:H7	VT *E.coli* Other serotypes
Cattle								
Calves	SVA B)	faeces	animal	2	0			
Beef cattle								
Dairy cows								
Cattle at slaughter	SJV,SVA	faeces	animal	1998	26	26		
Cattle at slaughter	A)	swabs	animal	491	1	1		
Sheep	SVA B)	faeces	animal	23	0			
Goats	SVA B)	faeces	animal	4	0			
Pigs	SVA B)	faeces	animal	2	0			
Solipeds								
Poultry								
Dogs								
Cats								
Others								

A) Swedish Meats

B) Investigation due to human EHEC cases.

Table 11.3. Verocytotoxic Escherichia coli (VTEC) infections in man, 2001

Sweden	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
HUS						
- clinical cases						
- lab. confirmed cases						
- caused by O157 (VT+)	6		6			
- caused by other VTEC	3					
***E.coli* infect. (except HUS)**						
- clincial cases						
- laboratory confirmed						
- caused by O157 (VT+)	90	1.0	63	0.7	27	0.3
- caused by other VTEC						

	E. coli O157		*E. coli* O157:H7					
Outbreaks	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases	Outbr.	Cases
All outbreaks	0							
General outbreaks								
Family outbreaks								

	HUS			*E.coli* infections O157			*E.coli* infections non-O157		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	0	0	0	0	0	0	n.a.		
1 to 4 years	4	3	1	30	19	11	n.a.		
5 to 14 years	3	0	3	22	7	15	n.a.		
15 to 24 years	0	0	0	10	3	7	n.a.		
25 to 44 years	1	1	0	17	5	12	n.a.		
45 to 64 years	0	0	0	6	3	3	n.a.		
65 years and older	1	0	1	5	1	4	n.a.		
Age unknown	0	0	0	0	0	0	n.a.		
All age groups	9	4	5	90	38	52	0	0	0

Table I2.1. Animal population and number of slaughtered animals in Sweden 2000

Animal species	Number of animals (in thousands)		Number of herds		Slaughtered		Sanitary slaughtered[2]
Cattle > 1 year					456229	2	1 406
Calves < 1 year	494	5			33218	2	10
Dairy cattle	418	5	12 676	1	n.a.		n.a.
Total No. of cattle [1)]	1 652	5	32 063	1	579 447	2	1 416
Sows, gilts	212	5	3 223	1	n.a.		0
Boars	4	5	-		n.a.		0
Fattening pigs	1 089	5	3 897	1	n.a.		0
Piglets	586	5	-		n.a.		-
Total No. of pigs	1 891	5	4 809	1	3169042	2	0
Sheep[3)]	452	5	8 041	1	193722	2	1
Goats, not kids	n.a.		n.a.		n.a.		0
Farmed deer	17	4	578	4	3942	2	0
Horses	300	5	-		4657	2	563
Reindeer 7)	221	1	-		9540	2	0
Wild boar (farmed and wild)	-		-		518	2	0
Moose	-		-		1364	2	1
Poltry layers [6)]	7324	1	5678	1			
Broilers	5859	8					
Total number of poultry	13 709	8	5 914	8	-		-
Turkeys	n.a.		n.a.		593369	2	-
Ducks	n.a.		n.a.		76 055	2	-
Geese	n.a.		n.a.		27 726	2	-
Ratites	n.a.		n.a.		1 760	2	-
Broilers	-		-		73 355 181	2	-
Laying hens	-		-		3 407 250	2	-
Breeders	-		-		634 157	2	-

1) Source: No animals /herds in 2000: Yearbook of Agriculture Statistics 2001

2) Source: National Food Administration

3) Including 244 000 lambs

4) Source : Swedish Meats

5) Statistics Sweden, Number of livestock, June 2001

6) Including 1654 063 chicken of layer breeed

7) No of reinderrs in winter herds

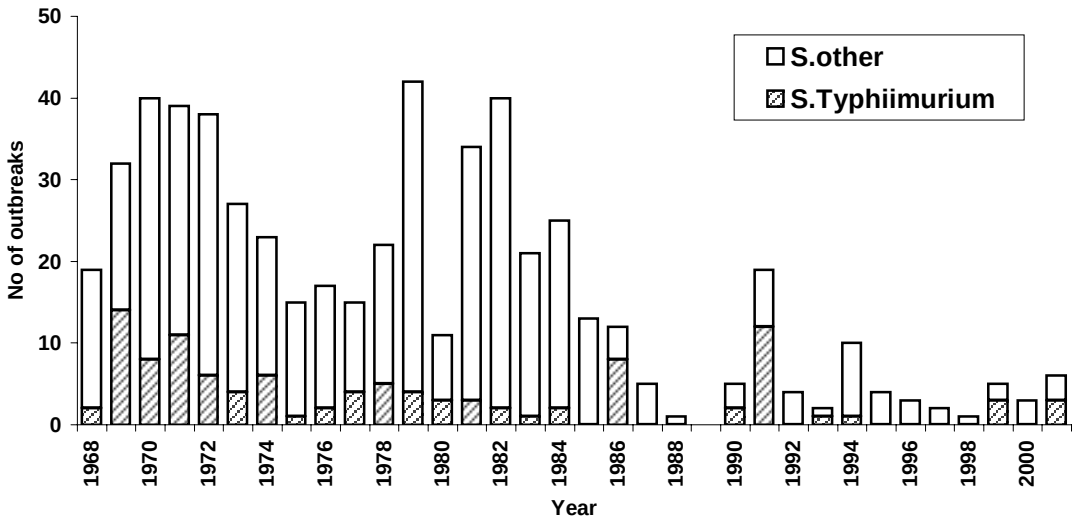
8) Figures from 2000

Table I2.2. Human population (in thousands) by age and sex, in Sweden , 31 December, 2001

Age group	Female	Men	Total
< 1 year	44	47	92
1 to 4 years	177	187	364
5 to 14 years	567	597	1165
15 to 24 years	505	530	1035
25 to 44 years	1193	1242	2434
45 to 64 years	1134	1154	2288
65 years and older	880	652	1532
All age groups	4 500	4 409	8 910

Source: Offical Statistics of Sweden, Statistics Sweden

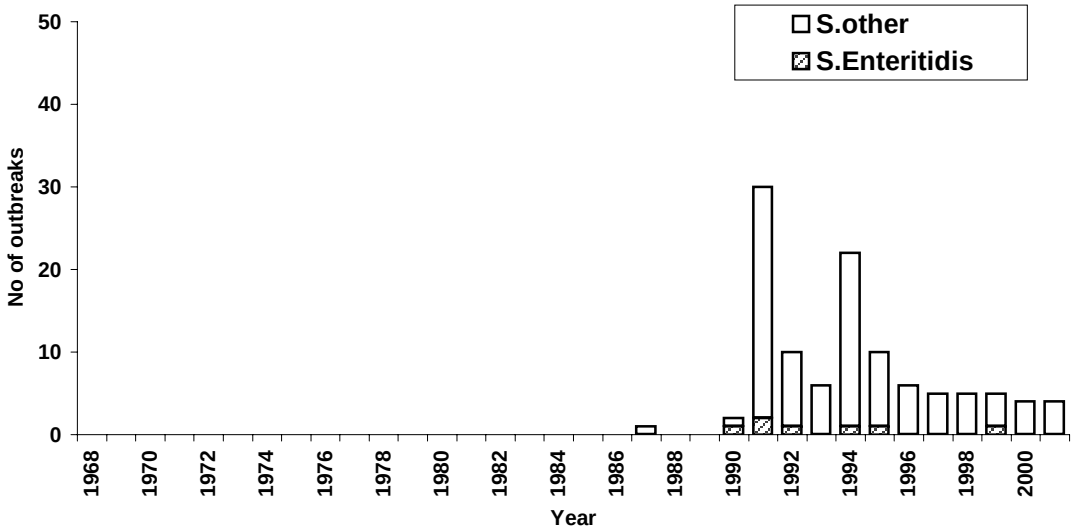
Fig. 1. No of notified cases (infected herds)of *Salmonella* in broilers during 1968-2001



1970: Initiation of voluntary programme. 1984: Initiation of compulsory sampling.
1991: S. Typhimurium spread from a hatchery. 1991: One broiler parent flock infected.

Source: SJV

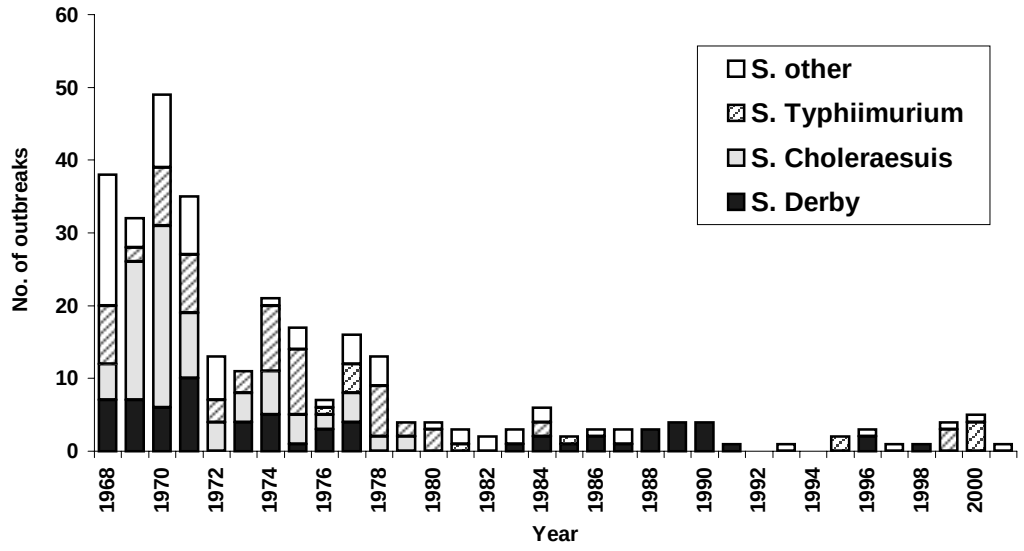
Fig. 1.2. No of notified cases (infected herds) of *Salmonella* in layers during 1968-2001



1991: start of the industry led sampling programme in layers

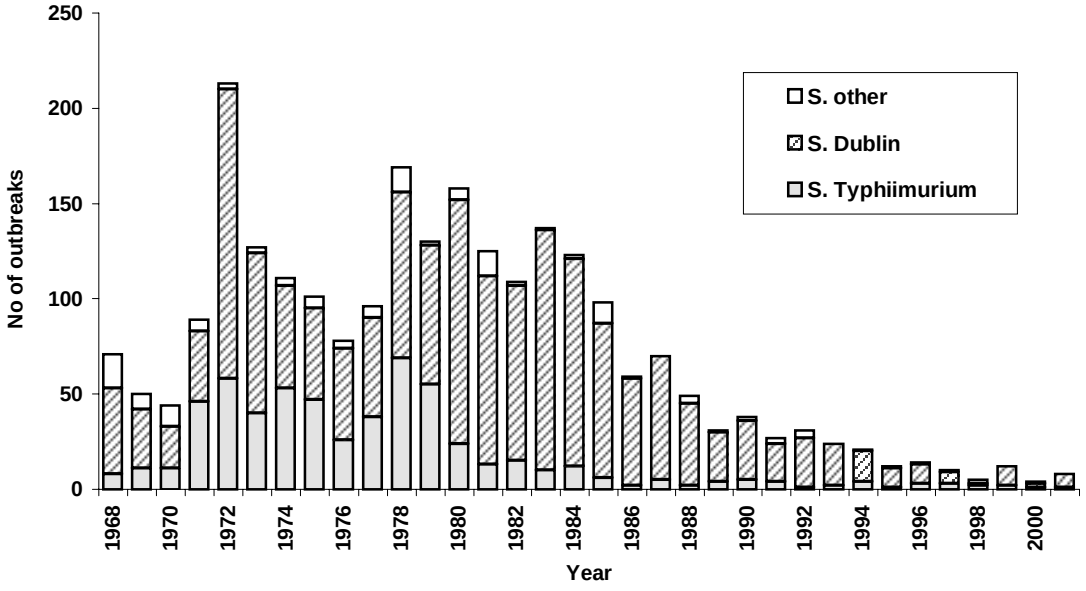
Source: SJV

Fig. 1.3. Number of notified cases (infected herds) of *Salmonella* in pigs during 1968 - 2001



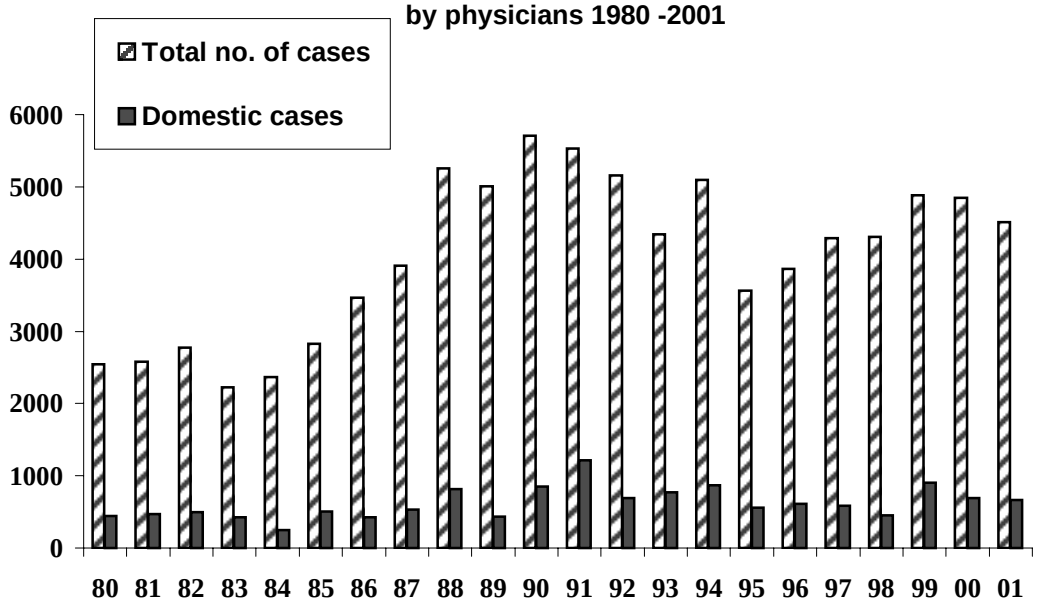
Source: SJV

Fig. 1.4. No of notified cases (infected herds) of *Salmonella* in cattle during 1968 - 2001



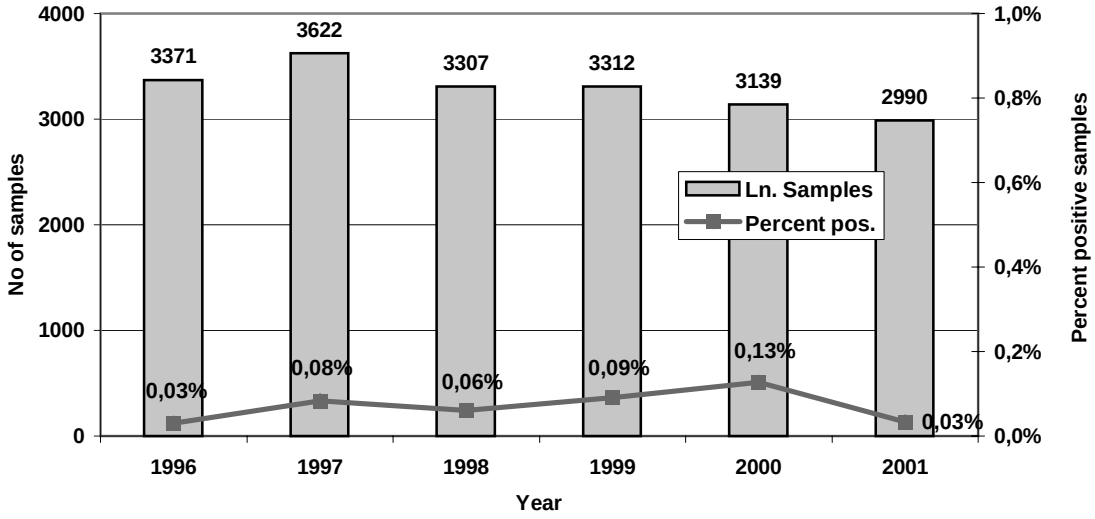
Source: SJV

Figure 1.5. Number of cases of Salmonella in humans reported by physicians 1980 -2001



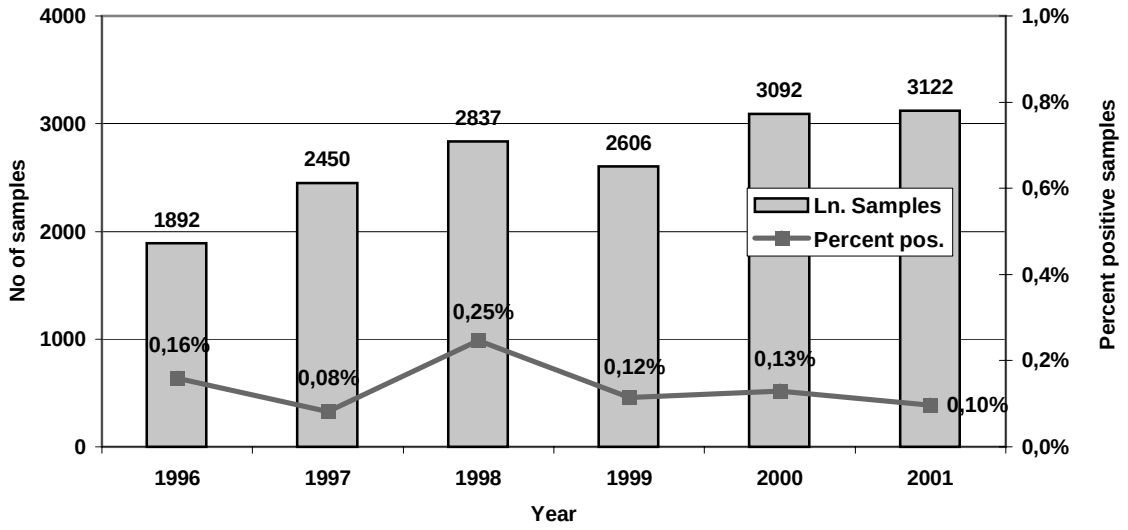
Source: SMI

Fig. 1.6. Salmonella control of cattle, lympf nodes sampled at major slaughter-houses



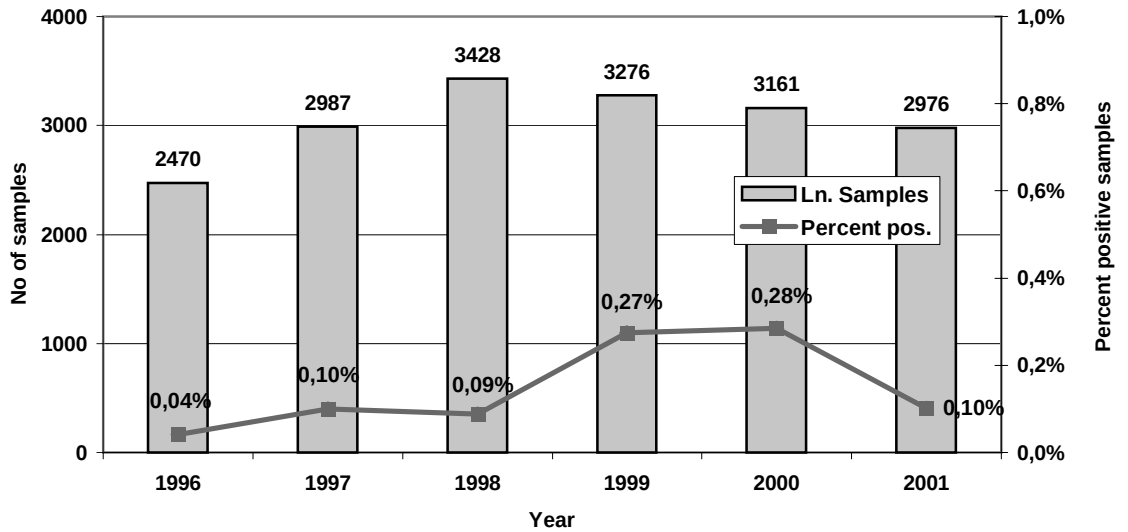
Source: SLV

Fig. 1.7. Salmonella control of adult pigs, lymph nodes sampled at major slaughter-houses



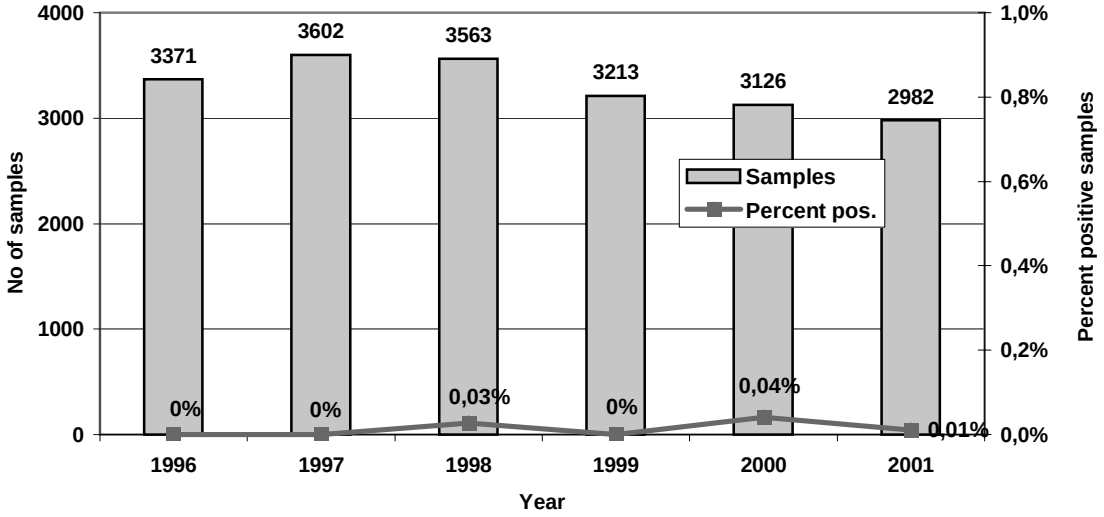
Source: SLV

Fig. 1.8. Salmonella control fattening pigs, lymph nodes sampled at major slaughter-houses



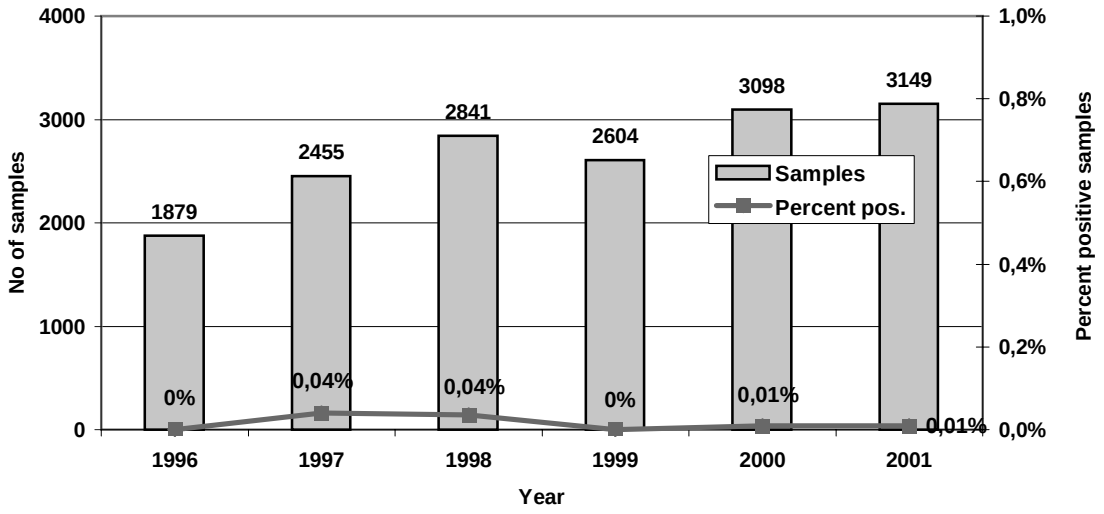
Source: SLV

Fig. 1.9. Salmonella control of cattle, swabs sampled at major slaughter-houses



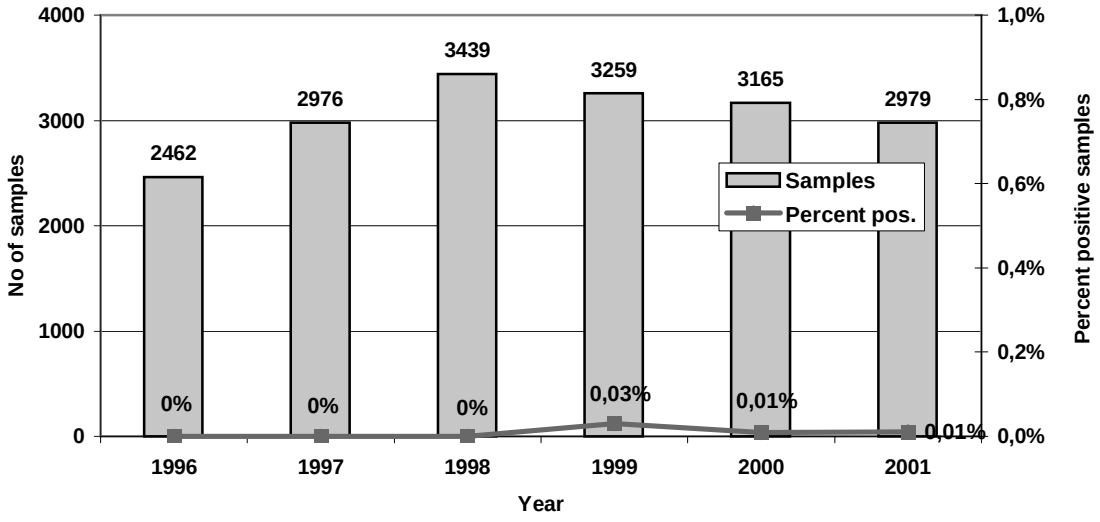
Source: SLV

Fig. 1.10. Salmonella control of adult pigs, swabs sampled at major slaughter-houses



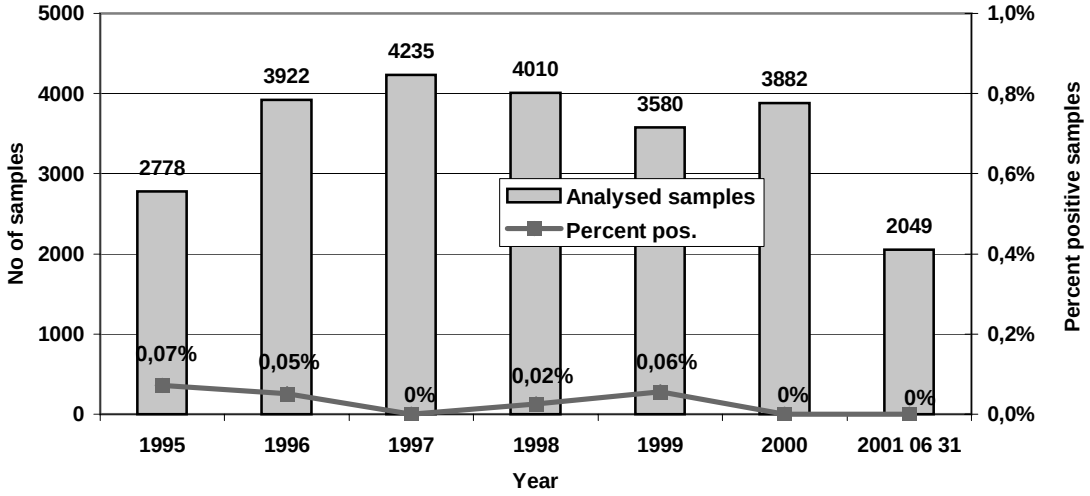
Source: SLV

Fig. 1.11. Salmonella control of fattening pigs, swabs sampled at major slaughter-houses



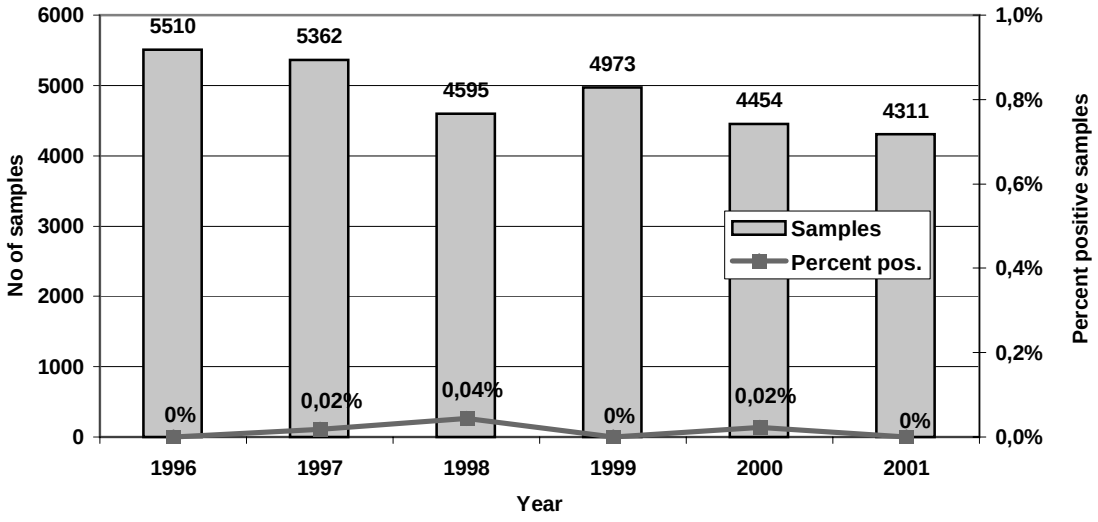
Source: SLV

Fig. 1.12. Salmonella control of poultry at major slaughter-houses



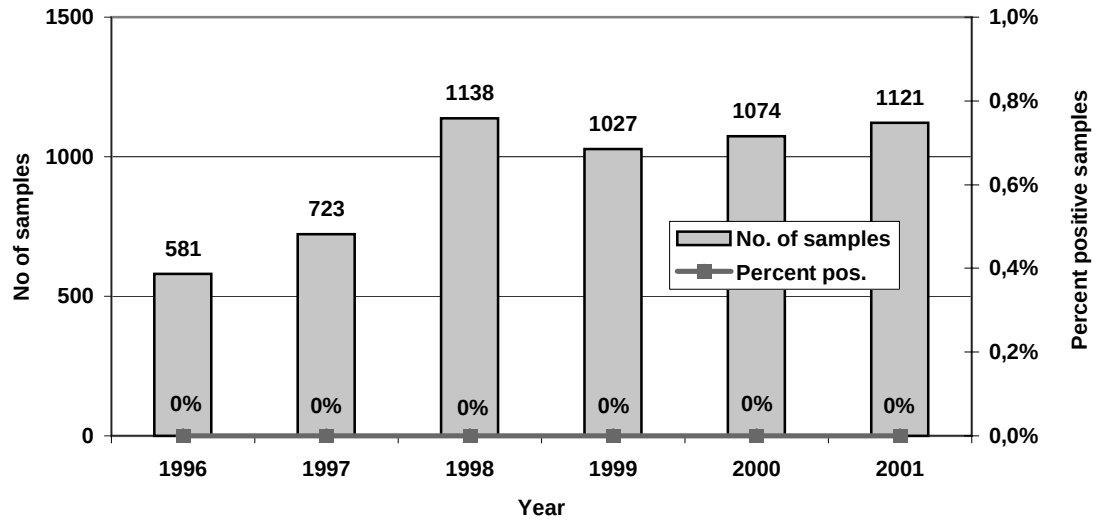
Source: SLV

Fig.1.13. Salmonella crushed meat/scraping (beef, pork) at cutting plants supervised by SLV



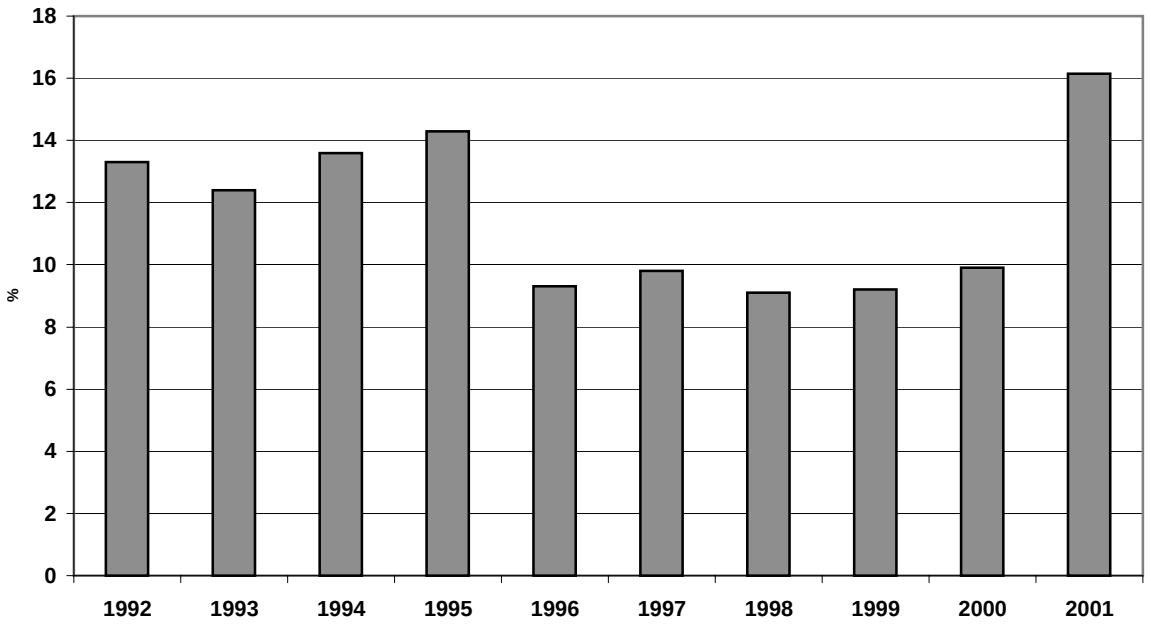
Source: SLV

Fig. 1.14. Salmonella control of crushed meat/meat scrapings (poultry) at cutting plants supervised by SLV



Source: SLV

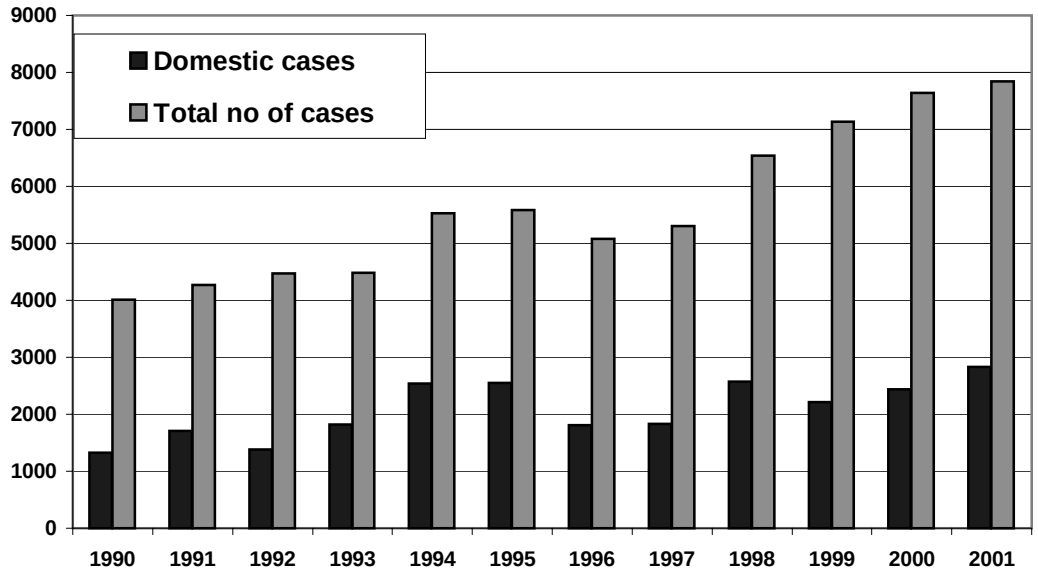
Fig. 2. Percent campylobacter positive broiler flocks at slaughter 1992-2001



In July 2001, a new Campylobacter programme was implemented.

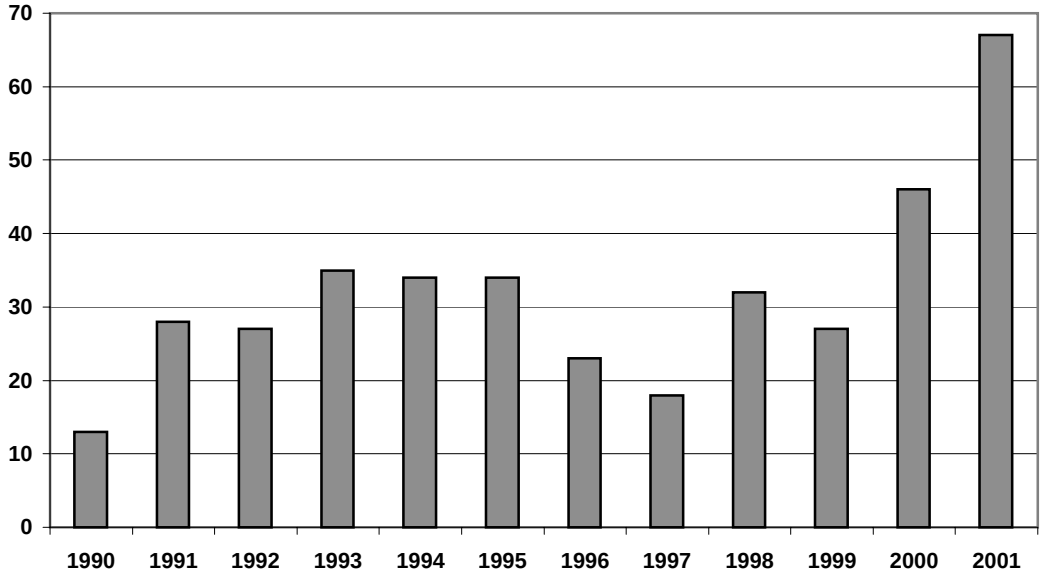
Source: Swedish Poultry Meat Association

Fig. 2. 2. Number of notified cases of Campylobacter in humans, reported by phycisians, In Sweden 1990-2001



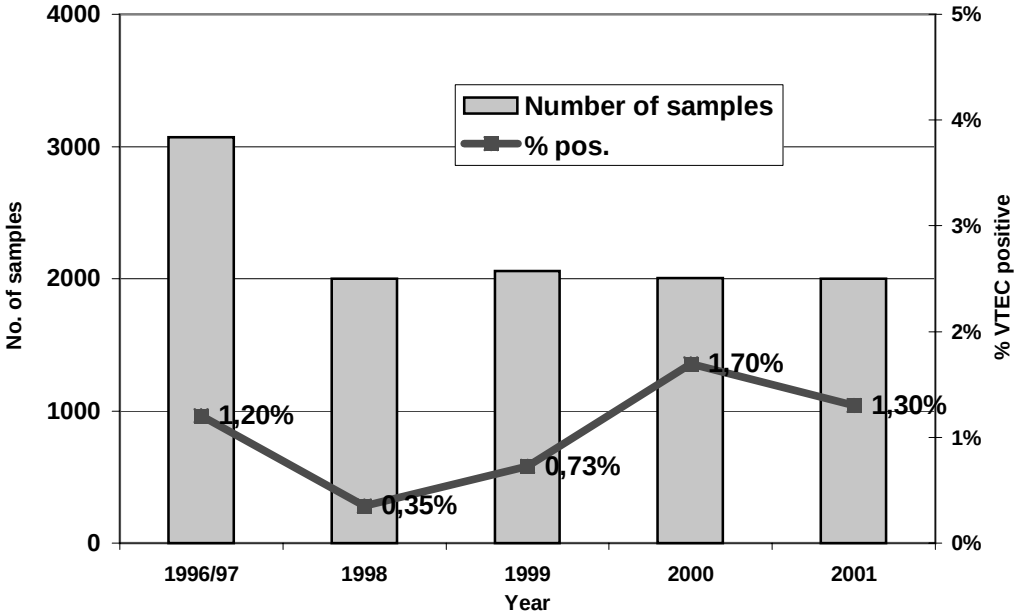
Source: SMI

Fig 3. Number of cases of Listeria in humans notified by physicians, in Sweden, 1997-2001



Source: SMI

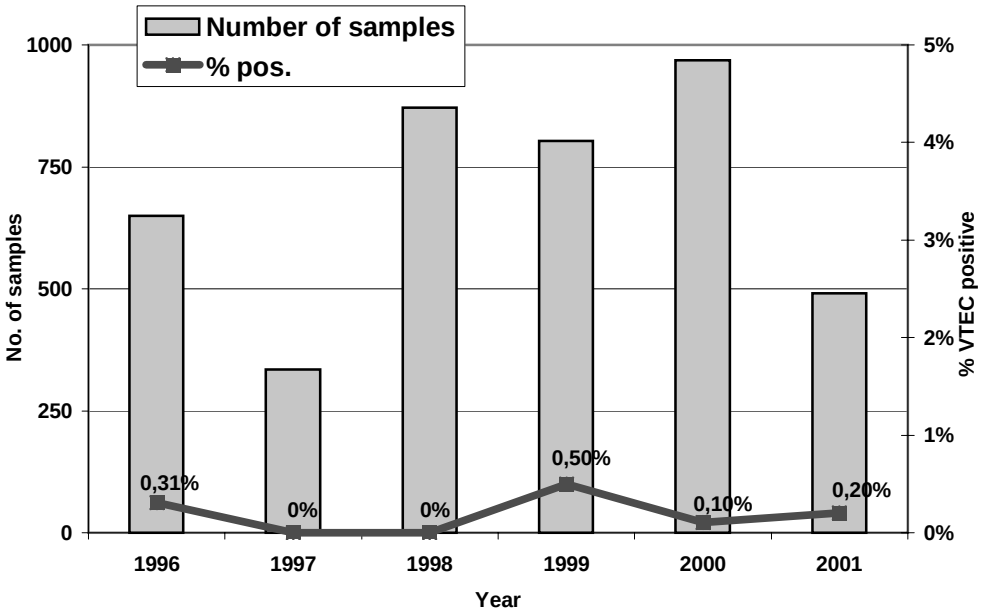
Fig.4. Number and percent VTEC O157 positive fecal samples collected at routine monotoring of cattle at slaughter, 1996-2001



Sample size: 1996 to August 1997: 10 g faeces. September 1998 to mid 1999: 1 g faeces. Second part of 1999 to 2001: 10g faeces.

Source: SJV

Fig.4.2. Number and percent VTEC O157 positive cattle carcasses examined at slaughter, 1996-2001



Source: Swedish Meats