Zoonoses in Sweden

2002

NATIONAL VETERINARY INSTITUTE

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

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Table

Graphs

INTRODUCTION

This report was 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 (SBA). The aim of the report is to present zoonotic infections/agents that were found in animals, humans, feedingstuffs and foods in Sweden during 2002.

From animals, the data originate from monitoring or surveillance systems, notifications of clinical observations, findings at laboratories and from meat inspections. Some diseases are notifiable on clinical suspicion, which require laboratory confirmation. In each epidemiological unit (herd or flock), only the index case is reported.

In humans, there are a number of diseases that are notifiable under the Communicable Disease Act. These diseases are reported both by physicians and laboratories. The figures for the total number of cases for each disease are based on the results when these two reporting systems are combined. Before 2000, these two systems were analysed separately. In the present report, the total number of cases and the number of cases reported by physicians are presented. Information about the number of domestic and imported cases is based on reports from physicians. Also, there are other diseases that are reported voluntarily by the laboratories. In this report, the latest adjusted figures from the SMI are used, which explains why slightly different figures may be presented in other reports from the SMI.

In food production, the SLV and the local municipalities have the responsibility for all monitoring and surveillance, although, the SLV supervises all municipalities. The SLV are responsible for the supervision of slaughterhouses, large-scale dairies and cutting- and processing plants, fish plants, establishments that handle eggs and egg products and large-scale establishments that handle food of non-animal origin. On the other hand, the local municipalities are generally responsible for the supervision of for small- and medium-sized establishments, shops and restaurants and water for human consumption. However, the two largest municipalities (Stockholm and Gothenburg) have the responsibility for large-scale meat cutting and processing plants. The local municipalities report the results of microbiological investigations of food and food items to SLV on a yearly basis. A new reporting system was introduced in 2002.

MYCOBACTERIUM BOVIS

M. bovis in animals

Infection with *M. bovis* or *M. tuberculosis* is notifiable in all animal species on the basis of clinical suspicion. The surveillance of food producing animals is based on inspections at slaughter. For diagnosis, bacteriological culture and skin fold tuberculin test for *M. avium* and *M. bovis* are used. A positive case is defined as an animal from which *M. bovis* or *M. tuberculosis* has been isolated. If tuberculosis (TB) would be diagnosed in a food producing animal eradication measures are implemented. The herd is defined as the

epidemiological unit. Sweden is declared officially tuberculosis free (OTF)[1] and fulfils the requirements on control measures in OTF member states [2].

Epidemiological history: In 1958, Sweden declared itself free from bovine TB and has since then also been declared OTF. The last case of bovine TB was diagnosed in 1978. In 1991, TB was diagnosed in a herd of farmed deer after an import of infected deer in 1987. So far, 13 infected herds have been identified, of which all have been depopulated. The last herd was identified in 1997. In 1994, a voluntary control programme for farmed deer was initiated. In wildlife, no TB cases have been reported for more than 50 years.

In 2001, *M. tuberculosis* was isolated from a riding elephant at a zoo. The elephant had lost weight and had been 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. The elephant was euthanised and autopsy showed severe lesions in the lungs and the trachea. The zoo was immediately put under official restrictions and tuberculin testing was initiated in all contact animals and animal keepers. The other elephants and rhinoceroses that were kept in the same building were trunk- or tracheal rinsed and tested bacteriologically. Mycobacterial cultivation was performed and two elephants that tested positive were euthanised in 2002. A giraffe was euthanised after a positive tuberculin skin test. In that animal, autopsy lung lesions were found and *M. tuberculosis* was isolated.

Results from 2002:

Cattle, swine, sheep (Table 1.1.1, 1.1.3)

Fourteen cattle were investigated for the presence of *M. bovis* or *M. tuberculosis* after meat inspection when TB could not be excluded. Of those, seven were suspected following autopsy. All 14 samples were examined by histology and 8 were cultured. Also, 115 pigs were subjected to histological examination after investigation at meat inspection. Of those, 80 were cultured. Lastly, two sheep were investigated. All animals tested negative.

Farmed deer (Table 1.1.2)

In 2002, 564 out of 589 (96%) farmed deer herds were affiliated to the voluntary control programme. Of these, 451 (80%) were declared free from TB; 103 after three whole herd tuberculin tests, 304 after culling of the whole herd and subsequent meat inspection, and 44 were newly established with deer originating from TB free herds. Thus, 113 herds in the control programme were not declared free from TB and 25 were not affiliated to the programme. No animals tested positive against *M. bovis*. Also, eight deer were examined by histology and one was cultured. None tested positive.

Pets, wildlife

Three wildlife animals, two cats and one horse were examined for mycobacteria using histology. All samples were negative.

Zoo animals (Table 1.1.3)

In 2002, the investigation of TB was continued at the Swedish zoo that had one elephant diagnosed with *M. tuberculosis* in 2001. This animal was euthanised. In 2002, all contact animals were investigated: three elephants and three rhinoceroses were cultured, and four giraffes and two buffaloes were subjected to tuberculin testing. Two of the elephants tested

[1] Commission Decision 95/63/EC, replaced by Commission Decision 99/467/EC
[2] Council Directive 64/432/EEC, Annex I, (4) and (5) amended by 98/99

positive and were euthanised. Furthermore, one giraffe tested positive in the tuberculin test and was euthanised. This animal also tested positive in post mortem culture. All other animals tested negative. A part of the zoo is still put under restriction.

M. bovis in humans

Tuberculosis is a notifiable disease under the Communicable Disease Act. Surveillance is mainly based on passive case findings; however, it is recommended that refugees and asylum seekers are screened for TB. The diagnostic methods used are cultivation and isolation of *M. bovis* in clinical specimen or demonstration of the bacteria by nucleic acid amplification test. A case is defined as a person from whom *M. bovis* has been isolated.

Results from 2002 (Table 1.2): Seven cases of *M. bovis* infection were reported, of which four were ≥65 years old and born in Sweden. Most likely they became infected before Sweden was declared free from bovine TB. The two remaining cases were a 64-year old man and a 25-year old woman. Most likely they acquired the infection abroad.

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

BRUCELLA ABORTUS / OVIS / SUIS / MELITENSIS

Brucella in animals

Infection with *Brucella* spp. is notifiable in all animal species on the basis of clinical suspicion. All suspected cases have to be confirmed serologically and bacteriologically. In sheep and goats, surveillance is based on serological surveys according to EU-legislation. Also, on a national initiative, serological surveys are regularly performed in cattle and pigs. The diagnostic tests used in dairy herds are tube agglutination, complement fixation or milk ELISA. Whereas, in beef cattle, swine, sheep and goats the Rose Bengal plate test (RBT) or complement fixation test (CFT) is used. A positive case is defined as an animal from which *Brucella* spp. has been isolated, or an animal giving a significant antibody titre. The herd is as the epidemiological unit. If brucellosis were diagnosed eradication measures would be implemented as vaccination is not allowed. Sweden is declared officially brucellosis free (OBF) [3] in cattle and fulfils the requirements on control measures in OBF member states[4].

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

Results from2002 (Tables 2.1.1–2.1.3)
Bulk milk samples were analysed from 3000 dairy herds (29% of all dairy herds) and investigated by use of an indirect ELISA (Svanova, Biotech, Uppsala) for *B. abortus*. All but seven herds were negative. From these seven herds individual blood samples from all lactating cows (n=184) were analysed by CFT and the RBT. All samples were negative. From pigs, 3000 blood samples were analysed for *B. suis* and all were negative. Furthermore, 9305

[3] Commission Decision 95/74/EC, replaced by Commission Decision 99/432/EEC
[4] Council Directive 64/432/EEC, Annex II (7) and (8), amended by 98/99/EC

samples from sheep at 281 holdings, and 695 samples from goats at 24 holdings were tested for *B. melitensis*. All samples were negative. Also, routine samples were collected from 925 cattle and 1865 pigs and all were negative. Lastly, 104 samples from dogs, 30 from reindeer and 58 from other animals tested negative.

Brucella in humans

Brucellosis is not a notifiable disease under the Communicable Disease Act and the figures in this report are based on voluntary laboratory reports. A case is defined as a person in whom brucellosis has been verified serologically or bacteriologically.

Epidemiological history: During the last 10 years, up to 6 cases have been reported annually. None of these were suspected to be of domestic origin. In 2001, two cases were reported.

Results from 2002 (Table 2.3): In 2002, five cases were reported, of which all had contracted the disease abroad.

Relevance as zoonotic disease: The risk of obtaining brucellosis from domestic sources is negligible, as Sweden is declared free from bovine brucellosis. Also, brucellosis has not been recorded in other animal species in the country.

SALMONELLA

Introduction

Sweden has a long history of controlling *Salmonella* in feedingstuffs, as well as the entire food chain from "farm to fork". This has given the result that virtually all domestic red- and white meat and table eggs are free from *Salmonella*. Surveillance, according to the Swedish *Salmonella* control programme, was initiated in 1995[5] and has shown 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 independent of the reason for sampling. Moreover, in the official control of food, all findings of *Salmonella* are notifiable. All primary isolates are sero- and phage typed, and primary isolates of animal origin are tested for antibiotic resistance.

If *Salmonella* is identified, measures in order to eliminate and trace the source of the infection are always implemented. If cattle or pigs are found infected, restrictions are put on the farm and are not lifted until the infection has been eliminated, as shown by consecutive sampling of faeces. If a poultry is found infected the flock is depopulated. Contaminated feed is treated to eliminate *Salmonella*. Finally, food that is positive for *Salmonella* is destroyed or returned to the country of origin.

Salmonella in feedingstuffs

Current situation: All sampling follow the legislation on feedingstuffs and animal by-products and is supervised by the SJV. In addition to the compulsory testing, a large number of voluntary samples are taken. All *Salmonella* finding are sent to the SVA for confirmation and serotyping.

[5] Commission Decision 95/50/EC

The bacteriological method used is NMKL method No 71 (5th ed., 1999). Serotyping is performed by slide agglutination. Certain serotypes are subtyped by molecular methods. The compulsory samples taken at the feed mills have to be analysed at the SVA. Also, samples taken by official feed inspectors and "hygiene groups", consisting of the county veterinarian and an official feed inspector, are analysed at the SVA. Other samples may be analysed at other laboratories. Most analysing laboratories are accredited according to EN/150/17025.

Measures in case of positive findings: 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.

Heat treatment: All compound feedingstuffs for poultry have to be heat treated to above 75°C. In practice, almost all compound feedingstuffs for ruminants and pigs are heat treated as well. Feed grains aimed for poultry have to originate from a storage plant that has been approved by the SJV. All of the storage facilities must fulfil certain requirements regarding hygiene and biosecurity.

Sampling at feed mills

At the feed mills, samples are taken mainly according to Hazard Analysis Critical Control Point (HACCP) principles, both on the premises and along the production line. The HACCP system was initiated in 1991 and has proved to be effective for detecting and preventing *Salmonella* in feedingstuffs. Feed mills that produce feedingstuffs for poultry are obliged to take a minimum of five samples per week from specified critical control points[6]. Feed mills that produce feedingstuffs for ruminants, pigs or horses, are obliged to take two samples a week[7]. The producer often takes additional voluntary sampling. Official feed inspectors sample at specified points at the feed mills[8], one to five times a year, depending on production volume. Also, a "hygiene group" make yearly inspections at feed mills that produce more than 1000 tons of feedingstuffs annually. Feed mills that produce less are visited less frequently. At these inspections, samples are taken at critical points - especially in connection with coolers, aspirators and elevators.

Sampling of feed materials

Feed materials are classified according to the *Salmonella* risk they may present: (S1) feed materials of animal origin, (S2) high risk feed materials of vegetable origin (e.g. soy bean meal and some products deriving from rape seed), and (S3) low risk feed materials of vegetable origin (e.g. rice).

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

All consignments of feed materials classified as S1, S2 and S3 that is traded into Sweden have to be sampled, either in Sweden or in the country of origin. If the consignment was sampled outside Sweden, it must be proved that the samples were taken and that the results were negative.

[6] from the silo containing compound feedingstuffs, the area around the pellet cooler, the top of the cooler, central aspiration and the elevator for feed material
[7] from the silo and the elevator for feed material
[8] at these visits, dust samples are collected from the top of silos that contain compound feedingstuffs

Sampling of compound feedingstuffs traded into Sweden

All compound feedingstuffs traded into Sweden containing S1, S2 or S3 and that are produced for ruminants, pigs or poultry, are tested for *Salmonella* following the same principles as feed raw materials.

Petfood

Every company producing petfood is inspected and the feed is sampled for *Salmonella* once a year by an official feed inspector. In addition to this, voluntary samples are taken. Every consignment of dog chews from a third country is sampled at the border inspection, even though it must be accompanied by a certificate showing that the petfood has been tested negative for *Salmonella* in compliance with the EU legislation.

Results from 2002 (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 are presented. There is no obligation to report negative results from voluntary samples. Information concerning dog chews comes from the border inspection were dog chews are sampled and rejected if positive for *Salmonella*.

Feed raw material of vegetable origin (Table 3.1.4c)
45 samples of feed raw material were positive for *Salmonella*. The samples were from imported feed materials sampled in Sweden. The isolates came from derived material of soybean, maize and rapeseed. The most common serotypes were *S*. Tenessee (n=14), *S*. Mbandaka (n=7) and *S*. Yoruba (n=6).

Feed mills and compound feedingstuffs (Table 3.1.4d)
In the control of feed mills, 8514 samples were reported and 21 of those were positive. The most common serotypes were *S*. Lexington, *S*. Mbandaka and *S*. Senftenberg (each n=3).

Animal by-products processing plants and feed material of animal origin (Table 3.1.4a, b)
Feed materials of animal origin are sampled in accordance with the EU legislation. In addition to this, many voluntary samples are taken. Out of 2954 analysed samples of feed material, 11 were positive for *Salmonella*. 47 of the 1021 analysed samples from critical control points were also positive. The figure includes follow-up samples and samples taken at specific points because of suspected contamination. The most common serotypes were *S*. Mbandaka (n=23) and *S*. Agona (n=11).

Salmonella in animals

Sampling strategies are outlined in the Swedish *Salmonella* control programme, approved by the EU in 1995 (95/50/EC). The bacteriological investigations are performed according to NMKL No. 71 5th ed. 1999 with a modification of ISO 6579:1993. The most important modification is the exclusion of the selenite broth enrichment step. Serotyping is performed by slide agglutination. Certain serotypes are subtyped by molecular subtyping methods. A case is defined as a single animal from which *Salmonella* of any serotype has been isolated.

Epidemiological unit: In poultry, the flock is the epidemiological unit. Concerning broilers, this is important as 5-8 flocks may be raised annually in each house or compartment and when measures are taken in case of positive findings. The strict hygiene rules that are implemented according to the voluntary Swedish *Salmonella* control programme makes it possible to define the broiler flock as the epidemiological unit. In cattle, pigs and other food-producing animals the herd is the epidemiological unit.

Prophylactic measures: In poultry, there are certain hygienic rules described in the control programme in order to avoid introduction of infection. These rules include: (1) feed production and transport, (2) measures to prevent introduction of infection from the surrounding environment, and, (3) an all in-all out system in all categories of poultry production. In cattle, pigs and other food-producing animals the control of feed ensures that feed to food producing animals virtually is free from *Salmonella*. In poultry, vaccination against salmonellosis is not allowed.

Measures in case of positive findings: Any poultry flock infected with *Salmonella*, irrespective of serotype, will be destroyed. The infected farm is put under restriction, and following destruction of the flock, the premises/contaminated houses are cleaned and disinfected. Also, investigation of the feed supplier is initiated in order to trace the infection. Feedingstuffs on the farm 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 implementation of hygiene measures at the premises.

If *Salmonella* is isolated from cattle, pigs and other food-producing animals, indicating a herd infection, restrictions are put on the farm/herd. Such restrictions may include a ban to transport animals to and from the farm (unless for sanitary slaughter), collection of bacteriological samples, and institution of a sanitation plan, i.e. involving elimination of chronically infected animals, cleaning and disinfections, treatment of manure and sludge and treatment of feedingstuffs. Also, the feed supplier is investigated. Restrictions are lifted when faecal samples from all animals in the epidemiological unit (usually the herd) taken at two consecutive samplings one month apart are negative. If *Salmonella* positive swabs from carcasses are found, hygiene measures are taken at the slaughterhouse. All *Salmonella* contaminated carcasses are deemed unfit for human consumption.

Description of the control programme
Sampling strategies are outlined in detail in the Swedish *Salmonella* control programme, approved by the EU in 1995.

Poultry and eggs: All faecal sampling, as well as all microbiological sampling of breeding flocks, is performed according to Council Directive 92/117/EEC. In addition, more frequent sampling is carried out in the grandparent generations.

Elite-breeding flocks do not occur in Sweden as layers, and broiler breeders are imported as day-old grand parents. In all flocks, faecal sampling are collected five times as well as caecal samples are investigated during rearing period. Also, faecal samples are collected monthly during egg production from breeders as a supplement to the sampling in the hatchery. The parent generation is tested during the rearing period by tissue and faecal sampling. During egg production, samples are taken as 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, 30 additional samples of caecal tissue are collected during the same period. From layers, faecal samples are collected once during rearing period (2 weeks before moving to a laying unit). Furthermore, laying flocks with more than 200 layers from establishments that do not place eggs on the market, as well as all laying flocks from establishments that do place eggs on the market, are sampled three times during production.

Flocks of egg-producing quails are sampled twice a year by faecal sampling. Grand parents, parents and layers are sampled 2-4 weeks prior to slaughter. Also, neck skin samples are taken from poultry at slaughterhouses within the control programme.

Cattle and pigs: At the slaughterhouses, intestinal lymph nodes and swabs taken from parts of the carcass, where the chances of finding *Salmonella* are considered optimal, are collected. All sanitary slaughtered animals are tested for *Salmonella* as well as if there is a clinical suspicion of salmonellosis. In elite breeding- and gilt producing herds, faecal samples are collected annually, and twice annually from sow pools. Apart form the sampling in the control programme, all integrated herds or herds producing weaner pigs that are affiliated to a industry run health control programme are tested once a year by faecal samples. In 2002, a new voluntary *Salmonella* control programmes in cattle and pigs was introduced that will be operational in 2003. It is an official programme supervised by the SBA.

Epidemiological history: The first specific legislation governing the Swedish *Salmonella* control programme was initiated in 1961. In 1995, the parts of the programme that covered cattle, pigs, poultry and eggs, were approved by the EU (95/50/EC) and extended surveillance was initiated. The results showed that Swedish red and white meat and eggs virtually are free from *Salmonella*. Between 1995-2000, four cattle herds were infected with penta resistant S. Typhimurium DT104. One of the herds was depopulated whereas the others were cleaned-up. In 2001, there were eleven infected flocks of poultry and eight cattle herds, but no positive pig herd.

Results from 2002

Poultry: In total, seven cases of *Salmonella* in poultry were notified during 2002(Tables 3.2.1, 3.2.2, Fig 1.1 and 1.2). Of those, three flocks were layers (*S*. Livingstone, *S*. Typhimurium and *S*. Subsp II), one ready to lay pullets *(S.* Rissen), one broiler flock (*S*. St Paul) and two were other meat producing flocks (*S*. Typhimurium (NST) and *S*. Enteritidis).

During the year, there was a period with a number of positive neck skin samples in two slaughterhouses. In one slaughterhouse that slaughtered laying hens *S*. Livingstone was isolated and in the other *S*. Typhimurium was found. The SBA traced the hens slaughtered at those occasions back to their farms of origin for further investigations. However, all sampling at the farms were negative. The slaughterhouses were cleaned and disinfected but there were still positive samples every other day in one of them. Finally the SLV decided to close that slaughterhouse for sanitary actions and since then no positive samples have been found. Results of sampling of neck skins at slaughter are detailed in Table 3.2.4.1 and Fig 1.12.

Pigs: In 2002, one pig herd was infected with *S*. Mbandaka (Table 3.2.4, Fig 1.3). There were only a few *Salmonella* isolates (n=8) from the sampling performed at the slaughterhouses (Table 3.2.4.1, Fig 1.7, 1.8, 1.10 and 1.11). Table 3.2.4.1 also include voluntary sampling at the pig herds. None of theses isolates were re-isolated at the farms.

Cattle: In 2002, 6 cattle herds were infected with *Salmonella* (Table 3.2.4, Fig 1.4). Thus, the favourable situation with low numbers of infected farms remains. The isolated serotypes were *S*. Typhimurium (n=3), *S*. Dublin (n=2) and *S*. Enteritidis (n=1). The following phage types of *S*. Typhimurium were identified: from Farm A) 1, 120 and NST, Farm B) 1 and NST, and Farm C) NST. There were no isolates from the slaughterhouse surveillance (Table 3.2.4.1, Fig 1.6 and 1.9).

Sheep and goats: *Salmonella* was not detected in sheep and goats in 2002.

Other animals: There were 11 isolates from cats, three from dogs, 13 from wild birds, 33 from reptiles and 7 from various other animals (Table 3.2.4, Table I).

Table I. The number of *Salmonella* serotypes isolated in 2002.

Serotype	cats	dogs	reptiles	wild birds	other animals
S. Adelaide			1		
S. Agona		1			1
S. Braenderup			1	1	
S. Cubana			3		1
S. Gwale					1
S. Havana			1		
S. Montevideo			1		
S. Muenchen			1		
S. Newport			3		
S. Poona		1	1		
S. St Paul					1
S. Scleissheim					1
S. Senftenberg				1	
S. Species			9		
S. Subspecies I		1	1		1
S. Subspecies IIIa			1		
S. Subspecies IIIb			4		
S. Subspecies IV			4		
S. Tennessee			1		
S. Typhimurium	11[a]		1	11[b]	
S. Uzaramo					1

[a] Phage type: U 277 n=2, NST n=1and DT 40 n=8
[b] Phage type: DT 40 n=3, DT 41 n=2, NST n=3, DT 195 n=1

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. Susceptibility to antimicrobials was tested with an accredited microdilution method (VetMIC^{TM}) 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).

Results from 2002 (Table 3.2.5.1–3.2.5.3, 3.2.6, 3.2.7.1)
A total of 38 isolates from domesticated animals were investigated. Of these, 21 were *S*. Typhimurium, four *S*. Dublin, three *S*. Enteritidis and the remainder, 10 isolates, were other serovars. Of the *S*. Typhimurium isolates, 11 were from cats and the remainder from food-producing animals.

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).

More information on antibiotic resistance in Salmonella, Campylobacter and other bacteria of animal origin can be found in the report SVARM 2002 (Swedish Veterinary Resistance Monitoring) that is available at www.sva.se.

Salmonella in food

Sampling strategies at cutting plants are outlined in the Swedish *Salmonella* control programme approved by the EU. The frequency of sampling (daily, weekly, monthly or twice annually) depends on the capacity of the establishment. Samples consist of crushed meat and trimmings. All food items may also be sampled for *Salmonella* by municipal official inspections. Bacteriological investigations are done according to NMKL No. 71 5th ed. 1999. 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 in case of positive findings:
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 disinfections 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 from 2002 (Table 3.3.1–3.3.3.)
Sampling at cutting plants
In total, 5624 samples (4478 from beef and pork, and 1146 from poultry) were collected from cutting plants supervised by SLV (Fig 1.13 and 1.14). All samples were negative. In addition to this, 2064 samples were collected at cutting plants supervised by local municipalities. Of those, all were negative. Furthermore, 4412 neck skin samples were collected from poultry at the slaughterhouses, all which were negative (Fig 1.12).

Official control performed by municipalities
230 local municipalities reported 12028 samples being analysed for *Salmonella*. Of those, 103 (0.9 %) were positive. This should be compared with 0.46 % positive samples in 2001. The explanation for the increase is most likely that the municipalities are more and more focusing their control on products like meat, meat products and meat preparations. In total, 2547 samples of meat, meat products and meat preparations were analysed, 65 (2.6 %) were positive. Especially worrying is that out of 421 samples of poultry products 44 (10.4 %) were positive. The results from the Swedish *Salmonella* control programme have consistently shown that the prevalence of *Salmonella* in Swedish animal products is very low so the only reasonable explanation for these results is that the positive products are of foreign origin. This explanation is supported by the results from special projects that investigated *Salmonella* in consignments originating from EU that were performed in 1997, 2000 and 2002. The results from these projects show that consignments from EU are *Salmonella*-positive at a frequency that is unacceptable with regards to the Swedish *Salmonella* guarantees. More encouraging is that the municipalities reported only 3 (0.1 %) positive samples from 3913 analysed samples of ready-to-eat products.

Consignments of meat preparations from EU

In a project performed in 2002, consignments of meat-preparations from EU-countries were analysed for the presence of *Salmonella*. Of 58 sampled consignments 13 (22 %) were positive. Eight different serotypes were isolated from the positive samples and *S.* Enteritidis was isolated from six of the consignments.

Salmonella in fruit and vegetables
A joint project between SLV and the local municipalities was performed in 2002 to investigate *Salmonella* in fruit and vegetables. 2393 samples were analysed of which 10 (0,4 %) were positive. Eight of the ten positive products were imported from the same south-east Asian country indicating that special control of products originating from certain countries may be well motivated.

Spot-checks of consignments originating from EU
A total number of 33 consignments were found contaminated with *Salmonella* when spot checks were performed on fresh meat originating from various EU-countries. Two of the 33 consignments were contaminated with two serotypes. *Salmonella* Typhimurium was isolated from 15 of the 33 consignments, including one *S.* Typhimurium DT 104 (Table 3.3.3). The dispatching EU country is responsible for the *Salmonella* testing according to the Swedish *Salmonella* Guarantees.

The food borne outbreaks are described under "*Salmonella* in humans".

Salmonella in humans

Salmonellosis is a notifiable disease under the Communicable Disease Act. Surveillance is mainly based on passive case findings. In addition, samplings of contact persons occur in connection with *Salmonella* cases/outbreaks. In this report, both total number of cases and cases based on reports by physicians are used. Information about country of origin is available only in the reports by the physicians. Investigations to trace the infection back are always performed. A case is defined as a person from whom *Salmonella*, of any serotype, has been isolated, including subclinical infection. Furthermore, a case is considered to be of domestic origin if the person has been infected in Sweden, thereby domestic cases will also include secondary cases to people infected abroad, as well as people infected by food items of non-domestic origin. A case is considered to be of foreign origin if the person has been abroad during the incubation period for *Salmonella*.

Epidemiological history: The total number of cases between 1992 and 2002 ranged from 3562 to 5159 (Fig 1.5), and there has been a decreasing trend since 1999. During the same 10-year period, the number of domestic cases varied from 452 to 903, with an annual incidence of 5-10/100 000. Around 85% of all cases were infected abroad. In 2001 there were 3894 cases.

Results from 2002 (Table 3.4.1, 3.4.2.)
During 2002, the total number of cases decreased for the third year in a row to 3892. 3769 were clinical reports by the physicians and of those were 2935 (78%) infected abroad and 819 (22%) were domestic (annual incidence 9.2/100 000). The number of domestic cases was considerably higher than the previous year and was partly due to a large-scale outbreak on a ferry, where the cases were reported as infected in Sweden. Twelve cases with unknown country of infection were reported. *Salmonella* Enteritidis was the most common domestic serotype reported (n=134) followed by *S.* Typhimurium (n=129) and *S.* St Paul (n=106).

Eight food borne outbreaks were reported in 2002 (Table 12):

- *S*. Oranienburg: 12 persons got infected after having consumed German chocolate. This was part of an international outbreak with cases in several countries.
- *S*. St Paul: 5 persons got ill at a home for elderly people. The source of infection was not found.
- *S*. St Paul: 87 people, mainly in the Stockholm-Uppsala area, got ill during three months. A case-control study pointed out alfalfa sprouts as the source of infection, but *Salmonella* were never isolated from the food.
- In April 353 passengers contracted *Salmonella* at a ferry running between Ystad and Poland. 193 persons were infected with *S*. Hadar, 103 persons with *S*. Enteritidis phage type 21 and 57 persons were double infected. *S*. Hadar was found in chicken of Polish origin, but *S*. Enteritidis could not be isolated from any food. This was one of the most extensive Salmonella outbreaks in Sweden during the last years.
- *S*. Kottbus: 11 persons got ill after having eaten in a personnel canteen.
- *S*. Blockley: 5 persons contracted *Salmonella* at a hospital during the summer.
- *S*. Bovismorbificans: 8 persons became ill after having eaten at the same coffee shop. The source of infection could not be established.
- *S*. Typhimurium NT: 9 persons in the same neighbourhood contracted salmonellosis at Christmas time. It was shown that they had all eaten at the same restaurant. Contaminated salad was a suspected source of infection, but this could never been proved.

TRICHINELLA SPIRALIS / NATIVA / BRITOVI

Trichinella in animals

Trichinosis is compulsory notifiable and all slaughtered pigs (including wild boars), horses and bears are investigated for the presence of *Trichinella*. The magnetic stirred method for pooled samples is mainly used as a diagnostic method. From horses, 5g of diaphragm muscle or, in some cases, musculus masseter is analysed. A case is defined as an animal in which *Trichinella* spp. is found and the epidemiological unit is the individual animal. If an animal is found infected with *Trichinella*, the carcass will be destroyed.

Epidemiological history: The main domestic reservoir of *Trichinella* spp. is the red fox (Vulpes vulpes) and it is estimated that around 10% of the Swedish fox population is infected, including all three species of *Trichinella*. In domestic pigs, trichinosis has not been reported since 1995. However, sporadic cases (<3 per year) have been reported in free living or farmed wild boars between 1997-1999. In 2001, 8/298 (3%) foxes and 1/20 (5%) lynxs were positive.

Results from 2002 (Table 4.1): No cases were notified in domestic pigs, wild boars or horses. In foxes, 4 of 340 (1%) animals were positive for *Trichinella*, and one of 104 (1%) tested lynxs. All tested bears (n=36), wolves (n=5) and other wild life (n=3) were negative.

Trichinella in humans

Trichinosis is a notifiable disease under the Communicable Disease Act. A case is defined as a person from whom trichinosis has been verified by laboratory investigations. Also, cases with typical clinical symptoms can be reported.

Epidemiological history: There have been no cases of human trichinosis the last ten years.

Results from 2002: No trichinosis was reported.

Relevance as zoonotic disease: The risk of obtaining domestic trichinosis is negligible.

RABIES

Rabies in animals

Rabies is notifiable on clinical suspicion and there is no active surveillance. However, the public is advised to send bats that are found dead for rabies investigation to the SVA, and hunters to notify findings of animals that behave in a way that rabies might be suspected. For diagnosis, fluorescent antibody test (FAT) performed on smears from hippocampus or medulla oblongata, and mouse inoculation test as a complementary test are used. Vaccination is only allowed in dogs and cats that are brought out of Sweden. If rabies were diagnosed, measures to eradicate the disease would be taken.

Epidemiological history: Rabies has not occurred in Sweden since 1886. Dogs and cats from EU and EFTA countries can be brought into Sweden after rabies vaccination and antibody titre control, whereas dogs and cats from other countries have to be kept in quarantine for 4 months. In 1987-89 and 1999, surveys were performed where sick (n=75) or dead bats (n=200) were investigated for rabies, all were negative.

Results from 2002 (Table 5.1): There was no rabies case in Sweden in 2001. 54 bats, 5 dogs, 1 cat, 1 cattle and 1 monkey were tested with negative result.

Rabies in humans

Rabies is a notifiable disease under the Communicable Disease Act.

Epidemiological history: One person in 1975 and 2000, respectively, contracted rabies after having had contact with dogs in Southern Asia.

Results from 2002: No human case of rabies was reported.

Relevance as zoonotic disease: As Sweden is free from rabies in animals since 1886 and import of animals is strictly regulated, the risk of contracting rabies in Sweden is negligible.

CAMPYLOBACTER JEJUNI / COLI

Campylobacter in animals

In animals, *Campylobacter* infection is not notifiable. However, results are available from the *Campylobacter* programme, in which every broiler flock is examined for *Campylobacter* at the slaughterhouse. For diagnosis, cloacal- and neck skin samples are analysed for the presence of the bacteria by NMKL no 119 2ed 1990. Isolates are identified as *C. jejuni* or *Campylobacter* spp. by hippurate hydrolysis. At herd level, a case is defined as a slaughtered group that has tested positive for thermophilic *Campylobacter* in a cloacal sample. The epidemiological unit is the slaughtered group. If a flock is found positive, hygiene measures should be introduced in order to clean-up the barns, where the broilers have been kept, from the infection. There are a few slaughter companies that pay extra for *Campylobacter* free broilers, as a mean to encourage efforts to reduce the infection.

Epidemiological history: From 1991 to June 2001, an industry led *Campylobacter* programme reduced the prevalence of positive broiler flocks to less than 10%. In July 2001 a new, more sampling extensive, *Campylobacter* programme was initiated that showed that the flock prevalence were higher than during previous years (Fig 2.1). It is likely that this was due to increased sampling, less pooling of samples (four pooled cloacal samples and one pooled neck skin sample per flock compared with one pooled cloacal sample prior to 1 July 2001) and daily laboratory analyses. Due to the change in 2001, it is not appropriate to compare the results between the two programmes.

The prevalence varies widely between farms and some seem to be totally free. About one fourth of the farms were free from *Campylobacter* during the first year of the new programme, and the majority of those have been free for several years. A seasonal variation with higher prevalences of *Campylobacter* infection in broiler flocks during late summer and early autumn has been observed.

Results from 2002 (Table 6.1.1)
Of 3842 flocks tested, 760 were positive (20%). It was also found that in 162 of the investigated flocks (21%), one or two out of four cloacal samples were positive, and in 598 flocks (79%) three or four samples were positive. Thus, in one fifth of the flocks the within flock prevalence is considerable lower than 100%.

Antibiotic resistance in Campylobacter from animals

Antimicrobial susceptibility of *Campylobacter* from broiler chickens is monitored within the Swedish Veterinary Antimicrobial Resistance Monitoring programme, SVARM. In 2002, 100 isolates from different flocks were selected randomly from *Campylobacter* control programme year 2002 and tested for antimicrobial susceptibility. It is assumed that the material is representative of *Campylobacter* in broiler chickens in Sweden. Isolates were identified as *C. jejuni* or as hippurate-negative thermophilic *Campylobacter*. Susceptibility to antimicrobials was tested with a microdilution method (VetMIC^{TM}) and break-points are set using microbiological criteria (also called epidemiological break-points) (Table 6.1.4).

Results from 2002 (Table 6.1.2–6.1.4)
The majority of isolates were identified as *C. jejuni* (84%) and only 16% were classified as hippurate-negative thermophilic *Campylobacter* spp. Overall, antimicrobial resistance among *C. jejuni* were low. No isolate was resistant to more than one antimicrobial tested. Resistance to ampicillin (10%) was the most prevalent trait. One isolate was resistant to tetracycline. In year 2002, no isolate was resistant to nalidixic acid.

More information on antibiotic resistance in *Salmonella, Campylobacter* and other bacteria of animal origin can be found in the report SVARM 2002 (Swedish Veterinary Resistance Monitoring) that is available at www.sva.se.

Campylobacter in food

There is no official surveillance for campylobacter in food, but the SLV, municipalities and other research institutions regularly initiate various *Campylobacter* projects. For detecting *Campylobacter* the NMKL 119:1990 2nd ed. is used. Measures in case of positive finding are only taken if human campylobacteriosis has been diagnosed. In those cases, the SLV decides what action to take from case to case.

Results from 2002 (Table 6.2): The local municipalities report very few *Campylobacter* analyses during 2002. Only 168 samples have been reported, of those, only one sample of ready-to-eat food was positive.

Campylobacter in humans

Campylobacteriosis is notifiable under the Communicable Disease Act. Surveillance is based on passive case findings. A positive case is defined as a person from whom *Campylobacter* has been isolated.

Epidemiological history: Infection with *Campylobacter* became notifiable in 1989. From 1990 to 2001, the number of cases reported by physicians increased from 4006 to 7778 (Fig 2.2). Of those, approximately 30-45% are domestic cases. The increase in number of cases is a part of a European trend. Reasons for the peak in the number of domestic cases during the summer months are unknown, but it may be speculated that increased outdoor activities play a role. It may also be suggested that increased travelling abroad leads to increased number of cases acquired abroad.

Results from 2002 (Tables 6.3): During 2002, a total of 7137 cases of campylobacteriosis were reported, which is a decrease compared with the previous year. That breaks the increasing trend of the last five years. Physicians reported 6607 cases and of those, were 2477 (37%) infected in Sweden (annual incidence 27.7/ 100 000). This is also a decrease compared with the previous year. There were 21 cases with unknown country of infection. During 2002 there was one water borne outbreak from which *Campylobacter*, along with several other pathogens (calici-, rota-, adeno- and astroviruses), were isolated from human faecal samples (Table 12). More than 70 persons fell ill. The reason for the outbreak was heavy rains, which made sewage overflow that contaminated the drinking water.

Relevance as zoonotic disease: *Campylobacter* is the most common bacteria causing infectious diarrhoea in Sweden and 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 in order to decrease the number of human cases.

LISTERIA MONOCYTOGENES

Listeria in animals

Listeriosis is notifiable in all animal species. However, there is no active surveillance system and detection of cases is based on clinical observations. The diagnostic methods used include histopathology, immunohistochemistry and bacteriology. A case may be defined with (1) positive histopathology combined with clinical signs, (2) positive bacteriology and histopathology or, (3) positive immunohistochemictry and histopathology. The animal is the epidemiological unit. In a verified case of listeriosis, the SBA decides from case to case to investigate the herd and clarify the source of infection.

Epidemiological history: The situation has been stable over the years with around 10-20 cases annually. However, the number of cases increased from 1999 and onward (33-46 per year). An explanation for this may be the increased number of cattle and sheep that are autopsied due to the TSE surveillance, thereby increasing the chance of finding listeriosis. In 2001, 26 of 33 cases were from sheep.

Results from 2002: In 2002, 51 cases were recorded. Of those were 12 from cattle, 32 from sheep, 3 from goats, 2 from horses and 2 from deer.

Listeria in food

There is no official surveillance of *L. monocytogenes* in food and surveillance is done through various projects initiated by the SLV, municipalities and other research institutions. For diagnosis, an in-house (SLV) method is used for the quantitative analysis and NMKL 136 for the qualitative analysis. If *Listeria* is found in food that will not be further heat-treated and the number of bacteria exceeds the cut-off point (if in 1/5 samples, ≥100 colonies/g, or in 2/5 samples, ≥10 colonies/g are found) the food will be classified as non-fit for human consumption.

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

Results from 2002 (Table 7.1): The local municipalities report only 133 analyses altogether for 2002, of those were 12 (9 %) positive. Fish and fish products were found positive in six (12 %) out of 50 analysed samples and meat and meat products in four (18,2 %) out of 22 samples.

Listeria in humans

Invasive *Listeria* infection is notifiable under the Communicable Disease Act. A case is defined as a person from whom *L. monocytogenes* has been isolated from a normally sterile site. Mother and child/foetus is regarded as one case.

Epidemiological history: Around 25-35 cases were previously reported on a yearly basis, most of them from vulnerable groups (immuno-suppressed persons, pregnant women and elderly). In 2000, 53 cases were reported followed by 67 cases in 2001. The reason for this increase is unknown.

Results from 2002 (Table 7.2): A total of 39 cases were reported in 2002. Of those, 36% were younger than 65-years of age. The incidence was 0.4/100 000 inhabitants. One of the cases was a pregnant woman. 37 cases were of domestic origin, whereas one case was imported and one of unknown origin.

Relevance as zoonotic disease: Food borne 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

There is no monitoring for those *Yersinia* spp. considered as zoonotic agents and the disease is not notifiable in mammals.

Yersinia in food

There is no official surveillance system for *Yersinia* spp. in food. From time to time, municipalities, the SLV and other research institutions initiate projects concerning the baseline prevalence. For diagnosis, bacteriological examination according to NMKL 117, 3rd ed, 1996 is used. In addition to this, a PCR, NMKL 163:1998, may also be used. When products that will not be further heat treatment are positive for pathogenic serotypes of *Y. enterocolitica*, they will be classified as non-fit for human consumption and destroyed.

Results from 2002: No investigations of *Y. enterocolitica* were reported in 2002.

Yersinia in humans

Yersiniosis is a notifiable disease under the Communicable Disease Act. 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 were reported, compared to 556 in 2001 (579 cases in total). This decrease may be due to improved hygienic technique during slaughter of swine and/or less sampling for *Yersinia* spp. in patients.

Results from 2002 (Table 8.3): During 2002, a total of 610 cases were reported. The physician reported 561 cases and of those were 418 (75 %) of domestic origin (annual incidence 4.6/ 100 000). 52 persons (9%) contracted the disease abroad. There has been a change in the distribution of cases throughout the country with an increase in the northern parts.

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

ECHINOCOCCUS GRANULOSUS / MULTILOCULARIS

Echinococcus in animals

Echinococcosis is a notifiable disease in all animals. In food producing animals surveillance is based on slaughter inspections. In foxes, the diagnostic method is the Copro Elisa-test and sedimentation. If an animal is found infected with *Echinococcus* spp., the offal will be destroyed. In order to prevent the introduction of *E. multilocularis*, dogs that are brought in from countries other than Finland and Norway must be treated with praziquantel.

Epidemiological history:
Echinococcus multilocularis has never been reported in Sweden, but sporadic cases of *E. granulosus* infection have occurred in imported horses that most probably were infected abroad. In reindeer, *E. granulosus* infection was prevalent in northern Sweden during the 1970's when around 2% of the reindeer were found infected at slaughter. Based on these findings, the routines at meat inspection of reindeer were revised and organs not approved for consumption were destroyed. During 1986-96 there was no case diagnosed in reindeer, followed by 3 cases in 1996-97. In 2001, a survey was conducted to investigate the prevalence in the Swedish fox population; there were no positive findings in 300 sampled foxes.

Results from 2002 (Table 9.1): As previous year, a survey was conducted in order to investigate the presence of *E. multilocularis* in the Swedish fox population. All 394 tested foxes were negative.

Echinococcus in humans

Echinococcosis is not a notifiable disease and the figures in this report are based on voluntary reports by laboratories. A case is defined as a person from whom echinococcosis has been verified by positive histopathology or serology.

Epidemiological history: Notification of echinococcosis was initiated in 1994 and up to 2001 there have been between 3 and 11 cases annually, all were infected abroad.

Results from 2002 (Table 9.2): During 2002, 14 cases were reported and all were acquired abroad.

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

TOXOPLASMA GONDII

Toxoplasma in animals

Toxoplasmosis is not notifiable in animals and there is no official surveillance. The diagnostic method used is isolation of the agent in mice or cell culture, immunohistochemistry or serology. A case is defined as an animal being test positive. The animal is the epidemiological unit.

Epidemiological history: Results from a study in 1987 show that around 40 % of the sampled cats, 23% of the dogs, 20% of the sheep and 1% of the horses were seropositive against *T. gondii*. In 1999, a study showed that 3.3% of sampled fattening pigs (n=695) and 17.3% of adult pigs (n=110) were seropositive. Another study performed between 1991-99 showed that 84 (38 %) of 221 red foxes were *T. gondii* seropositive. In 2001, 21 out of 84 tested animals were seropositive, of which the majority were cats (n=13).

Results from 2002 (Table 10.1): Twenty of 39 (51%) tested cats were positive for *T. gondii*, 8 of 37 (22%) sheep and 3 of 18 (17%) horses. The remaining 30 samples from dogs (n=14), goats (n=10), and wildlife (n=6) were negative.

Toxoplasma in humans

Toxoplasmosis is a notifiable disease under the Communicable Disease Act. A case is defined as a person from which toxoplasmosis has been verified by laboratory examination (through isolation, PCR-technique or serology).

Epidemiological history: During the last 11 years between 4 and 18 cases have been reported annually. Eighteen cases were reported in 2001.

Results from 2002 (Table 10.2): In 2002, ten cases were reported. Of these, 3 were known to be of domestic origin. Country of origin was unknown for the remaining cases.

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 and cause serious injury with sometimes fatal outcome. There is little information about the most significant sources of infection; the main source are considered to be undercooked or raw meat.

VEROCYTOTOXIC E. COLI O157

VTEC O157 in animals

About 2000 faecal samples are annually collected from cattle at the slaughterhouses for bacteriological investigation of VTEC O157. In addition to this, animals are also sampled if livestock contacts are reported in connection to a human case of. *E. coli* O157 infection. In these cases, VTEC O157 is notifiable in animals. A case is defined as an animal from which VTEC O157 is isolated and the herd is the epidemiological unit.
Detection of VTEC O157 is made by culture in the following way: after pre-enrichment in buffered peptone water and immuno-magnetic separation (IMS; Dynal), materials are cultured on sorbitol MacConkey agar plates containing 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.

Epidemiological history: In 1996, VTEC O157 was isolated in Swedish cattle for the first time and human *E. coli* O157 infection was traced back to presence of VTEC O157 in a cattle herd. Restrictions were laid on the herd and surveillance was initiated. The same year, VTEC O157 in cattle became notifiable. However, since 1999, VTEC O157 findings are only notifiable when associated with human EHEC infection (Table II).

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 have been conducted since 1997 and have shown that between 0.3% and 1.7 % of collected faecal samples were positive for VTEC O157 (Fig 4.1). The highest prevalence is usually recorded in young animals. The lower prevalence figures observed between 1998 and 2000 might reflect the smaller sample size analysed (1g vs 10g). In 2001, 1.3% (26/1998) cattle were positive for VTEC O157.

Table II. Number of cattle herds with suspected connection with human EHEC case and the number of herds with confirmed VTEC O157 in the herd(s) from 1996-2002.

Year	No. of suspected herds	No. of confirmed herds
1996	1	1
1997	8	4
1998	9	3
1999	6	3
2000	5+1[a]	1[a]
2001	4	4
2002	5	4[b]

[a] one goat herd
[b] one herd was infected with VTEC O 26

Results from 2002 (Table 11.1): Of 2032 faecal samples collected from cattle at the slaughterhouses, 29 were positive (1.4%). The number of samples collected at each

slaughterhouse was proportional to the number of slaughtered cattle. Seven out of 91 (7.7%) samples from barley-beef calves (7-9 months at slaughter) were positive, 17 of 1343 (1.3%) young bulls (12-18 months at slaughter) and 5 of 540 (0.9%) adults. These findings are similar to the results presented previous years. Furthermore, 550 swabs were collected at the slaughterhouse by the meat industry. All samples were negative.

Three VTEC O 157 positive cattle herds were found in investigations to trace the source of infection after EHEC disease in human. These strains were identical to the ones that had been isolated from humans, suggesting that the cattle were the source of infection. Also, the same strain of VTEC O 26 was isolated from both a cattle farm and from a human case of EHEC.

There was a foodborn EHEC outbreak in the southern part of Sweden, caused by fermented cold-smoked sausages that were contaminated with VTEC O 157. In the following investigation to trace back the infection, the meat was found to originate from 15 at least farms in the south. All 15 farms were sampled and VTEC O 157 was isolated from five of them, however these strains were different from the one found in the human EHEC cases.

Measures in case of positive findings associated with clinical EHEC infection in man: There are established guidelines and recommendations of how to handle VTEC O 157 in cattle when associations have been made with human EHEC. These recommendations may for example include that animals should be tested negative for VTEC O157 prior to transport and slaughter and that hygiene recommendations should be instituted at the farm. Faecal samples are collected repeatedly in the epidemiological unit (usually the herd) from a representative numbers of animals of different age. All samples have to be negative at two consecutive sampling with at least one month apart before the herd is declared free from infection. Concerning measures taken for contaminated carcasses, see ”E. coli O157 in food”.

VTEC O157 in food

There is no surveillance system for VTEC O157 in food. However, on a voluntary basis, bacteriological examination for VTEC O157 is performed on slaughtered cattle and sheep originating from infected herds as well as the slaughter companies carry out routine sampling of carcasses. Isolation of *E. coli* O157 is performed as described in NMKL 164. PCR is used to identify genes for VT-production and eaeA genes. If VTEC O157 is found in food actions are taken to ensure 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 of Swedish origin. However, one positive sample was found in imported meat in 1996.

Results from 2002: No information is available about the occurrence of VTEC in food, due to insufficient reporting.

EHEC in humans

EHEC caused by *E. coli* O157 is a notifiable disease under the Communicable Disease Act, this includes both clinical and subclinical cases. However, the Haemorrhagic Uremic

Syndrome (HUS) is not notifiable. Serotypes other than O157 are reportable on a voluntary basis. A case is defined as a person from whom *E. coli* O157 has been isolated.

Epidemiological history: In late 1995 and early 1996, there was an *E. coli* O157 outbreak with about 120 confirmed cases. This increased the awareness of *E. coli* O157 and since then, most people with haemorrhagic diarrhoea will be investigated for the presence of this pathogen. Between 1998 and 2001, the number of human cases varied between 59 and 97. In 2001, physicians reported 90 cases.

Results from 2002 (Table 11.3.): During 2002, 129 cases were reported. Of those, 124 were clinical reports by the physicians and 110 laboratory reports. 108 (87%) of the cases reported by physicians were of domestic origin (annual incidence 1.2/100 000). This is a pronounced increase in comparison to the last four years, which can be explained by the two outbreaks that occurred during 2002. A majority of the cases were reported from the county of Skåne (n=49), V Götaland (n=36) and Halland (n=24). Only 16 (13%) persons were infected abroad.

There were 19 cases of HUS reported, of which 12 were reported in children ≤14 years of age. Of those, two were infection abroad. One reason for the unusual high number of HUS is because of one outbreak with nine recorded HUS cases. VTEC O 157 caused all HUS cases.

Two outbreaks were reported in 2002 (Table 12):

- In August, 11 persons, including four children, contracted the infection after having been sea-bathing at the Swedish west coast. The beach and seawater were suspected sources of infection, but bacteria could not be isolated from environmental samples.
- In October, 28 persons in the northeastern part of the county of Skåne got ill. Of those, nine developed HUS. The source of infection was a cold smoked sausage from a local producer. In this outbreak, VTEC O 14 was also isolated.

Relevance as zoonotic disease: VTEC O157 is a serious zoonotic infection and it cannot be excluded that large outbreaks may occur in the future. Compared with other food borne infections, infection with VTEC O157 can be serious, especially in young children developing HUS. There is a lack of knowledge concerning the possibilities to determine if an efficient control strategy of VTEC O157 can be implemented in the primary production. For prophylactic reasons, it has been recommended that young children (<5 years of age) should avoid visit cattle farms and hygiene recommendations have been issued for other visitors. There is also a lack of epidemiological knowledge in animals about serotypes other than O157, although it is known that they cause a significant part of the EHEC cases in humans. More research is needed to estimate the true occurrence of these serotypes in animals, food and humans as well as their zoonotic impact.

Tables for
Reporting on Trends and Sources of Zoonotic Agents

in
animals, feedingstuffs, food and man in the EU
2002

Sweden

National Veterinary Institute

Table 1.1.1. Bovine tuberculosis, 2002

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
Status of herds 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	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

	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.	0	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):	14*	0

*culture (n=8)
n.a. not available

Table 1.1.2. Tuberculosis in farmed deer, 2002

Sweden

MANDATORY **FARMED DEER**

Number of herds under official control:	564*	Number of animals under official control:	18700**

	"OTF" herds	"OTF" herds with status suspended	Herds infected with tuberculosis
Status of herds at year end (a):	451	0	0
New cases notified during the year (b):	0	0	0
	Units tested	Units suspected	Units positive
Routine tuberculin test (c) - data concerning herds:	12	0	0
Routine tuberculin test (c) - data concerning animals:	1130	0	0
	Animals slaughtered	Animals suspected	Animals positive
Routine post-mortem examination (d):	2797	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	
Bacteriological examination (m):	8***	0	

* total number of herds 589
** all animals, 14100 fallow deer and 4600 red deer
***culture (n= 1)

Table 1.1.3. Tuberculosis in animals, 2002

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*M. bovis*	*M. tuberculosis*
Sheep	SVA,SJV	a	animal	2	0		
Pigs	SVA,SJV	a	animal	115*	0		
Horse	SVA,SJV	a, b	animal	1	0		
Cat	SVA,SJV	b	animal	2	0		
Wild life	SVA,SJV	a	animal	3	0		
Zoo animals							
Elephant	SVA,SJV	b	animal	3	1		1
Giraffe	SVA,SJV	b	animal	4	1		1
Others	SVA,SJV	b	animal	5	0		

a) meat inspection of all slaghtered animals
b) authopsy
*culture n=80

Table 1.2. Bovine tuberculosis in man, 2002

	Cases	**Inc.**	**Autochtone cases**	**Inc.**
Tuberculosis *	7	0.08	5	0.06
M. bovis				
M. tuberculosis				

* In two cases, origin of infection was unknown.

	Tuberculosis due to *M. bovis*					
Age group	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year						
1 to 4 years						
5 to 14 years						
15 to 24 years						
25 to 44 years	1		1			
45 to 64 years	2	1	1			
65 years and older	4		4			
Age unknown						
All age groups	7	1	6			

Table 2.1.1. Bovine brucellosis, 2002

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
Status of herds at year end (a):	all herds	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		
	Units tested	Units suspected	Units positive
Routine testing (d1) - data concerning herds:	3000*	0	7
Routine testing (d2) - number of animals tested:	0	0	0
Routine testing (d3) - number of animals tested individually:	184	184**	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):***	925	0	0
Other routine investigations: tests at AI stations (g):	0	0	0
	All animals	Positives	Contacts
Animals destroyed (h):	0	0	0
Animals slaughtered (i):	0	0	

VOLUNTARY **CATTLE** 0

	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):	1	0	

* bulk tank milk
** all lactating cows from the 7 ELISA positive herds
*** including breeding animals, export, import and routine testing

Table 2.1.2. Ovine and caprine brucellosis, 2002

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
Status of herds 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:	305*	0	0
Routine testing (d) - data concerning animals:	10000**	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):	0	0	0
Animals slaughtered (h):	0	0	0

VOLUNTARY **SHEEP AND GOATS**

	Animals tested	Animals suspected	Animals positive
Other investigations: imports (i): ***	27	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	

* 281 sheep and 24 goats
** 9305 sheep, 695 goats
*** including import, export and routine testing

Table 2.1.3. Brucellosis in animals, 2002

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*B. melitensis*	*B. abortus*	*B. suis*
Pigs	SVA	a	animal	4865	0			
Others								
dog	SVA	b	animal	104	0			
reindeer	SVA	b	animal	30	0			
other	SVA	b	animal	58	0			

a) including 1865 routine samples and 3000 survey samples

b) routine samples

Table 2.3. Brucellosis in man, 2002

	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Brucellosis	5				5	
B. abortus						
B. melitensis						
B. suis						
occupational cases						

	Brucellosis		
Age group	**All**	**M**	**F**
< 1 year			
1 to 4 years			
5 to 14 years	1	1	
15 to 24 years			
25 to 44 years			
45 to 64 years	4	3	1
65 years and older			
Age unknown			
All age groups	5	4	1

Table 3.1.1. Salmonella sp. In feed material of animal origin

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,e	sample		234	6			See table 3.1.4.a		
Bone meal	SJV	b,c,d	sample		155	2					
Greaves	SJV	b,c,d	sample		803	2					
Poultry offal meal	SJV	e			n.a.	0					
Feather meal	SJV	e			n.a.	0					
Blood meal	SJV	d*			n.a.	0					
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		332	1			See table 3.1.4.a**		
Fish oil	SJV	c,d			n.a.	0					
Fish silage	SJV	e			n.a.	0					
Other fish products	SJV	-			-	-					
Others											
Protein meal***	SJV	b,c,d	sample		1390	0					
Meat silage	SJV	b,d	sample		40	0					
Environmental samples	SJV	a,c	sample		1021	47			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

**2 different serotypes found in 1 sample

*** Greavemeal added with protein residues

n.a. not available

Table 3.1.2 Salmonella sp. In feed material of vegetable origin, 2002

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.	1	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.	20	See table 3.1.4.c		
Palm kernel derived	SJV	a,c,e			n.a.	0			
Soya (bean) derived	SJV	a,c,e	sample		n.a.	22	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									
Samples from wheat storage plants	SJV	a	sample		192	0			
Samples rape seed processing plant	SJV	a,c	sample		905	5	See table 3.1.4.e		
Rape seed derived samples from domestic processing plant	SJV	a,c	sample		1088	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.

**2 samples included 2 serotypes

n.a.not available

Table 3.1.3. Salmonella sp. In compound feedingstuffs, 2002

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium		
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, dog chew)	SJV	a,b,d,e	sample		151	4	1	1	See table 3.1.4.f	
Other										
Control in feed mills (HACCP)	SJV	a,c,g	sample		8514	21		2	See table 3.1.4.d	
Compound feedingstuffs for livestock animals	SJV	c	sample		57	0				

a) Compulsory sampling (national requirements)

b) Compulsory sampling (EU requirements)

c) Voluntary sampling

d) Production

e) Import

f) Included in the control presented under "Other"

g) Include follow-up samples of positive findings.

n.a. not available

Table 3.1.4. *Salmonella* serotypes isolated in the feed control 2(

Sweden

Sorted according to serotype.

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

After heat treatment	
Serotype	No. of isolates
S. Agona	1
S. Bredeny	1
S. Give	6
S. Montevideo	3
S. Senftenberg	1
Total	12

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

Serotype	No. of isolates
S. Agona	11
S. Bredeney	5
S. Give	1
S. Lille	1
S. Livingstone	2
S. Mbandaka	23
S. Senftenberg	4
Total	47

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

Serotype	No. of isolates
S. Agona	3
S. Anatum	1
S. Fluntern	1
S. Ikayi	1
S. Infantis	1
S. Livingstone	1
S. Mbandaka	7
S. Oranienburg	1
S. Oukam	2
S. Putten	3
S. Senftenberg	1
S. Schleissheim	1
S. Schwartzengrund	1
S. Tenessee	14
S. Typhimurium DT 104	1
S. Yoruba	6
Total	45

d. Salmonella serotypes detected in samples from feed mills

Serotype	No. of isolates
S Anatum	2
S. Cubana	2
S. Duesseldorf	1
S. Havana	1
S. Kingston	1
S. Lexington	3
S. Livingston	1
S. Mbandaka	3
S. Senftenberg	3
S. Tennessee	1
S. Typhimurium DT99	1
S. Typhimurium NST	1
S. Urbana	1
Total	21

e. Salmonella serotypes detected in environme samples from processing plants producing fee material of vegetable origin

Serotype	No. of isolates
S. Cubana	2
S. Mbandaka	3
Total	5

f. Salmonella serotypes detected in dog snack

After heat treatment	
Serotype	No. of isolates
S. Enteritidis	1
S. Typhimurium	1
Unknown	2
Total	4

Table 3.2.1. Salmonella sp. in poultry breeding flocks (Gallus gallus), 2002

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						
Day-old chicks	SJV	b	17	0		
Rearing flocks	SJV	b	17	0		
Productive period	SJV	b	17	0		
Parents, unspecified						
Meat production line						
Breeding flocks						
Elite	SJV	a				
Grandparents	SJV	b	8	0		
Parents						
Day-old chicks	SJV	b	82	0		
Rearing flocks	SJV	b	82	0		
Productive period	SJV	b	82	0		
Parents, unspecified						
Production line, not specified						
Breeding flocks (kalkoner)						
Elite	SJV	a				
Grandparents	SJV	a				
Parents						
Day-old chicks	SJV	b	5	0		
Rearing flocks	SJV	b	5	0		
Productive period	SJV	b	5	0		
Parents, unspecified						

a) None in Sweden.

b) In the health control

Table 3.2.2. Salmonella sp. in other commercial poultry, 2002

Sweden

Animal species	Source of information	Remarks	Flocks tested	Flocks positive	*S.* Enteritidis	*S.* Typhimurium	*S.* Rissen	*S.* Livingstone	*S.* St Paul	*S.* subsp II
Fowl (Gallus gallus)										
Layers										
Day-old chicks										
Rearing period	SJV		339	1			1			
Productive flocks	SJV		841	3		1		1		1
Layers, unspecified										
Broilers										
Day-old chicks										
Rearing period										
Broilers, unspecified	a		3683	1					1	
Fowl (Gallus gallus), unspecified										
Day-old chicks										
Rearing period										
Productive flocks										
Fowl, unspecified										
Ducks										
Breeders										
Productive flocks										
Ducks, unspecified	SJV		47	0						
Geese										
Breeders										
Productive flocks	SJV		35	1	1					
Geese, unspecified										
Turkeys										
Breeders										
Productive flocks	a		293	0						
Turkeys, unspecified										

a) Swedish Poultry Meat Association

Table 3.2.3. Salmonella sp. in non-commercial poultry and birds, 2002

Sweden

Animal species	Source of information	Remarks	Flocks tested	Flocks positive	*S*. Enteritidis	*S*. Typhimurium
Pigeons						
Guinea fowl						
Quails						
Pheasants						
Partridges						
Ostriches						
Ducks			n.a.	2	1	1

n.a. not available

Table 3.2.4. Salmonella sp in animals (non poultry), 2002

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*S*. Enteritidis	*S*. Typhimurium	*S*. Dublin	*S*. Mbandaka	*S. Other**
Cattle	SJV		herd	n.a.	6	1	3	2		
Sheep										
Goats										
Pigs										
Breeding herds										
Fattening pigs										
Pigs, unspecified	SJV		herd	n.a.	1				1	
Solipeds										
Other										
Dogs	SVA		animal	n.a	3					3
Cats	SVA		animal	n.a	11		11			
Reptiles	SVA		animal	n.a	33					33
Monkies	SVA		animal	n.a	2					2
Wild birds	SVA		animal	n.a	13		11			2
Other	SVA		animal	n.a	5					5

* see text

n.a. not available

Table 3.2.4.1. Salmonella in cattle and pigs, results of surveillance at slaughterhouses, 2002

Sweden

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	2889		0		
	minor sl.h.	ln.	animal	258		0		
	major sl.h.	swabs	animal	2845		0		
	minor sl.h.	swabs	animal	276		0		
Adult pigs	major sl.h.	ln.	animal	3114 (3)	S. Typhimurium	1	1	0
					S. Typhimurium	2	NST	1
	minor sl.h.	ln.	animal	145		0		
	major sl.h.	swabs	animal	3108(1)	Salmonella subsp.	2**		
	minor sl.h.	swabs	animal	141		0		
Fattening	major sl.h.	ln.	animal	2916(3)	S. Typhimurium	2	40	0
					S. Typhimurium	1	NST	0
	minor sl.h.	ln.	animal	227		0		
	major sl.h.	swabs	animal	2908		0		
	minor sl.h.	swabs	animal	263		0		
Fowls	major sl.h.	neck skin samples	animal	4412(3)	S. Typhimurium	1	NST	
					S. Livingstone	10***		
					S. Saintpaul	1		
	minor sl.h.	neck skin samples	animal	54		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

** Two positive samples from the same slaghterhouse reisolated from one pooled sample.

***10 positive samples from the same slaughterhouse

Table 3.2.5.1. Antimicrobial susceptibility testing of Salmonella, 2002

Sweden	***Salmonella* spp.**									
Sweden	Cattle		Pigs		Poultry Gallus gallus		Turkeys		Other (specify)[2]	
Isolates out of a monitoring programme (Yes / no)	Yes		Yes		Yes				Yes	
Number of isolates available in the laboratory	9		6		7				14	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	9	0,00	6	0,00	7	0,00			14	0,00
Chloramphenicol	9	0,00	6	0,00	7	0,00			14	0,00
Florfenicol	9	0,00	6	0,00	7	0,00			14	0,00
ß-Lactam										
Ampicillin	9	0,00	6	0,00	7	0,00			14	0,00
Cephalosporins										
ceftiofur	9	0,00	6	0,00	7	0,00			14	0,00
Fluoroquinolones										
Ciprofloxacin [1]	NT		NT		NT		NT		NT	
Enrofloxacin	9	0,00	6	0,00	7	0,00			14	0,00
Quinolones										
Nalidixic acid	9	0,00	6	0,00	7	0,00			14	7,00
Sulfonamides										
Trimethoprim / Sulfonamide[1]	NT		NT		NT				NT	
Trimethoprim	9	0,00	6	0,00	7	0,00			14	0,00
Sulfonamide	9	0,00	6	0,00	7	0,00			14	7,00
Aminoglycosides										
Streptomycin	9	0,00	6	0,00	7	0,00			14	0,00
Gentamicin	9	0,00	6	0,00	7	0,00			14	0,00
Neomycin	9	0,00	6	0,00	7	0,00			14	0,00
Kanamycin [1]	NT		NT		NT		NT		NT	
Number of multiresistant isolates										
fully sensitive	9	100,00	6	100,00	7	100,00			12	83,00
resistant to 1 antimicrobial	0		0		0				2	17,00
resistant to 2 antimicrobials	0		0		0				0	
resistant to 3 antimicrobials	0		0		0				0	
resistant to 4 antimicrobials	0		0		0				0	
resistant to >4 antimicrobials	0		0		0				0	

[1] NT = not tested

[2] 3 dogs and 12 cats

Table 3.2.5.2. Antimicrobial susceptibility testing of S. Enteritidis, 2002

Sweden	***S*.Enteritidis**									
	Cattle		Pigs		Poultry Gallus gallus		Turkeys		Other (specify)[2]	
Isolates out of a monitoring programme (Yes / no)	YES		YES		YES				YES	
Number of isolates available in the laboratory	4		5		1				11	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	4	0,0	5	0,0	1	0,0			11	0,0
Chloramphenicol	4	0,0	5	0,0	1	0,0			11	0,0
Florfenicol	4	0,0	5	0,0	1	0,0			11	0,0
ß-Lactam										
Ampicillin	4	0,0	5	0,0	1	0,0			11	0,0
Cephalosporins										
ceftiofur	4	0,0	5	0,0	1,00	0,0			11	0,0
Fluoroquinolones										
Ciprofloxacin [2]	NT		NT		NT				NT	
Enrofloxacin [2]	4	0,0	5	0,0	1	0,0			11	0,0
Quinolones										
Nalidixic acid	4	0,0	5	0,0	1	0,0			11	10,0
Sulfonamides										
Trimethoprim / Sulfonamide	NT		NT		NT				NT	
Trimethoprim [3]	4	0,0	5	0,0	1	0,0			11	0,0
Sulfonamide	4	0,0	5	0,0	1	0,0			11	0,0
Aminoglycosides										
Streptomycin	4	0,0	5	0,0	1	0,0			11	0,0
Gentamicin	4	0,0	5	0,0	1	0,0			11	0,0
Neomycin [2]	4	0,0	5	0,0	1	0,0			11	0,0
Kanamycin [2]	NT		NT		NT				NT	
Number of multiresistant isolates										
fully sensitive	4	100,0	5	100,0	1	100,0			11	90,0
resistant to 1 antimicrobial	0		0		0				1	10,0
resistant to 2 antimicrobials	0		0		0				0	
resistant to 3 antimicrobials	0		0		0				0	
resistant to 4 antimicrobials	0		0		0				0	
resistant to >4 antimicrobials	0		0		0				0	
Number of multiresistant DT104										
with penta resistance										
resistant to other antimicrobials										

[1] NT=not tested

[2] 11 isolates from cats

Table 3.2.5.3. Antimicrobial susceptibility testing of S.Typhimurium, 2002

Sweden	***S*.Typhimurium**									
	Cattle		Pigs		Poultry Gallus gallus		Turkeys		Other (specify)[2]	
Isolates out of a monitoring programme (Yes / no)	YES		YES		YES				YES	
Number of isolates available in the laboratory	4		5		1				11	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	4	0,0	5	0,0	1	0,0			11	0,0
Chloramphenicol	4	0,0	5	0,0	1	0,0			11	0,0
Florfenicol	4	0,0	5	0,0	1	0,0			11	0,0
ß-Lactam										
Ampicillin	4	0,0	5	0,0	1	0,0			11	0,0
Cephalosporins										
ceftiofur	4	0,0	5	0,0	1,00	0,0			11	0,0
Fluoroquinolones										
Ciprofloxacin [2]	NT		NT		NT				NT	
Enrofloxacin [2]	4	0,0	5	0,0	1	0,0			11	0,0
Quinolones										
Nalidixic acid	4	0,0	5	0,0	1	0,0			11	10,0
Sulfonamides										
Trimethoprim / Sulfonamide	NT		NT		NT				NT	
Trimethoprim [3]	4	0,0	5	0,0	1	0,0			11	0,0
Sulfonamide	4	0,0	5	0,0	1	0,0			11	0,0
Aminoglycosides										
Streptomycin	4	0,0	5	0,0	1	0,0			11	0,0
Gentamicin	4	0,0	5	0,0	1	0,0			11	0,0
Neomycin [2]	4	0,0	5	0,0	1	0,0			11	0,0
Kanamycin [2]	NT		NT		NT				NT	
Number of multiresistant isolates										
fully sensitive	4	100,0	5	100,0	1	100,0			11	90,0
resistant to 1 antimicrobial	0		0		0				1	10,0
resistant to 2 antimicrobials	0		0		0				0	
resistant to 3 antimicrobials	0		0		0				0	
resistant to 4 antimicrobials	0		0		0				0	
resistant to >4 antimicrobials	0		0		0				0	
Number of multiresistant DT104										
with penta resistance										
resistant to other antimicrobials										

[1] NT=not tested

[2] 11 isolates from cats

[2] Alternatives, only one needs be tested

[3] Not necessary to be tested

Table 3.2.6. Breakpoints used for antibiotic resistance testing of Salmonella, 2002

Sweden

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	**Standard for breakpoint (NCCLS,...)**	**Breakpoint µg/ml**		**Disk content**	**Zone diameter (mm)**		
		Susceptible <=	**Resistant >**	**µg**	**Susceptible >=**	**Intermediate**	**Resistant <=**
Tetracycline	epidem.[1]	4	8				
Chloramphenicol	epidem.[1]	8	16				
Florfenicol	epidem.[1]	8	16				
ß-Lactam							
Ampicillin	epidem.[1]	4	8				
Cephalosporins							
ceftiufur	epidem.[1]	1	2				
Fluoroquinolones							
Ciprofloxacin [2]	NT						
Enrofloxacin	epidem.[1]	0,125	0,25				
Quinolones							
Nalidixic acid	epidem.[1]	8	16				
Sulfonamides							
Sulfonamide/TMP[2]	NT						
Trimethoprim	epidem.[1]	4	8				
Sulfonamide	epidem.[1]	128	256				
Aminoglycosides							
Streptomycin	epidem.[1]	16	32				
Gentamicin	epidem.[1]	4	8				
Neomycin	epidem.[1]	4	8				
Kanamycin [2]	NT						

[1] breakpoints set according to epidemiological (mocrobiological) critera, i.e. based on distribution

[2] NT=not tested

[2] Alternatives, only one needs be tested

[3] Not necessary to be tested

Table 3.2.7.1. Antimicrobial susceptibility testing of Salmonella- quantitative data, 2002

Sweden	*Salmonella enterica (= Salmonella* spp*)*
Sweden	Cattle, pig, poultry, dog and cat

Isolates out of a monitoring programme (Yes / no)	YES	Agar diffusion	
		Agar dilution	
Number of isolates available in the laboratory	36	Broth dilution	X

Number of isolates with MIC[1]:

Antimicrobials:	N	<=0,0039	0,007	0,015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256
Tetracycline	36								1		23	12						
Chloramphenicol	36										8	25	3					
Florfenicol	36										3	27	6					
ß-Lactam																		
Ampicillin	36									28	8							
Cephalosporin																		
ceftiofur	36							1	5	28	2							
Fluoroquinolones																		
Ciprofloxacin	NT[2]																	
Enrofloxacin	36					8	28											
Quinolones																		
Nalidixic acid	36											33	2			1		
Sulfonamides																		
Trimethoprim / Sulfonamide	NT[2]																	
Trimethoprim [3]	36							9	25	2								
Sulfonamide	36															28	7	
Aminoglycosides																		
Streptomycin	36												4	18	13	1		
Gentamicin	36								1	25	8	2						
Neomycin	36										23	12	1					
Kanamycin	NT[2]																	

Number of multiresistant isolates																		
fully sensitive	34																	
resistant to 1 antimicrobial	2																	
resistant to 2 antimicrobials	0																	
resistant to 3 antimicrobials	0																	
resistant to 4 antimicrobials	0																	
resistant to >4 antimicrobials	0																	

[1] range not tested shown in grey; isolates with MICs equl to or lower than the lowest tested given as the lowest tested concentration

[2] NT=not tested

[2] Alternatives, only one needs be tested

[3] Not necessary to be tested

Table 3.2.7.1. Antimicrobial susceptibility testing of Salmonella- quantitative data, 2002

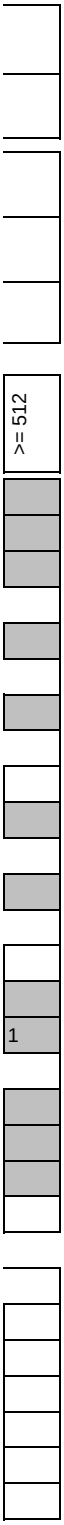


Table 3.3.1. Salmonella sp. in meat and meat products, 2002

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	
Raw meat									
Beef and veal									
at slaughterhouse	SLV	b							
at processing plant									
at retail level	SLV	a	sample	25	1 125	11*			
Pork									
at slaughterhouse	SLV	b							
at processing plant									
at retail level									
Beef and pork at cutting plants	SLV	d	sample	25	4478	0			
Poultry									
at slaughterhouse	SLV	b							
at cutting plant	SLV	d	sample	25	1146	0			
at retail level	SLV	a	sample	25	321	41*			
Other meat									
at slaughterhouse									
at cutting plant	SLV	e	sample	25	2 064	0			
at retail level	SLV	a,c	sample	25	19	0			
Minced meat									
Meat products									
Beef and veal - meat products									
at slaughterhouse									
at processing plant									
at retail level	SLV	a	sample	25	962	10*			
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	25	100	3*			
Other animals - meat products									
at slaughterhouse									
at processing plant									
at retail level	SLV	a,c	sample	25	20	0			

a) Official control by 230 local municipalities
b) Swab sampling, see Table 3.2.4.1
c) Wild animals
d) 1-5 samples pooled to 25 mg
e) Beef, pork and poultry from cutting plants supervised by local municipalities.
* Information about isolated serotypes is not available

Table 3.3.2. Salmonella sp. in other food, 2002

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	7	0		
Ready to eat milk products	SLV	a	sample	25	338	0		
Eggs and egg products								
Table eggs and egg products	SLV	a	sample	25	39	0		
Egg preperations	SLV							
Egg products	SLV							
Fish and fish products								
Fish and fish products	SLV	a	sample	25	347	0		
Seafood and seafood products	SLV	a	sample	25	296	1*		
Other food								
Soups, sauces, fat…	SLV	a	sample	25	419	0		
Fruits and vegetables	SLV	a,b	sample	25	2 139	26*		
Species and herbs	SLV	a	sample	25	98	3*		
Ready to eat fooda	SLV	a	sample	25	3 913	3*		
Icecream and deserts	SLV	a	sample	25	1332	0		
Other	SLV	a	sample	25	553	6*		

a) Official control by 230 local municipalities

b) A majority of samples included in a joint projekt between SLV and local municipalties

* Information about isolated serotypes is not available

Table 3.3.3. Salmonella in 33 consignments from EU countries, 2002
Sweden

Country	**Type of consignment**	**Salmonella serotypes**
Belgium	Beef	*S*. Rissen
Denmark	Pork tenderloin	*S*. Derby (5) *S*. Idikan *S*. Livingstone *S.* Lockleaze *S*. Typhimurium (4) *S*. Typhimurium DT 193 *S*. Typhimurium NST unknown
Denmark	Turkey breasts	*S*. St Paul
France (via Denmark)	Chicken fillet	*S*. Agona
France (via Denmark)	Pork	*S*. Typhimurium
France	Beef (kebab meat)	unknown
France	Turkey fillets	*S.* Hadar
Germany	Pork	*S*. Typhimurium (5) *S*. Typhimurium DT 104 *S*. Typhimurium, S. St Paul
Germany	Beef	*S*. Typhimurium
Germany	Turkey breasts	*S*. Kottbus
Germany	Chicken meat	unknown
Germany (via Netherlands)	Chicken legs	*S*. Indiana, *S*. Virchow
Ireland	Beef	*S*. Dublin

Table 3.4.1. Salmonellosis in man, 2002

Sweden	Cases *	Inc.	Autochtone cases **	Inc.	Imported cases **	Inc.	Unknown status **
Salmonellosis	3892	43.5	819	9.2	2935	32.8	15
S. Enteritidis	1598	17.9	134	1.5	1415	15.8	
S.Typhimurium	317	3.58	129	1.4	175	2.0	
other serotypes	1977		556		1345		

* Based on reports by physicians and laboratories

** Based on reports by physicians

	Salmonellosis*			*S*. Enteritidis			*S*. Typhimurium		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	7	2	5	1	0	1	1	1	0
1 to 4 years	65	34	31	7	1	6	20	10	10
5 to 14 years	66	30	36	8	4	4	20	10	10
15 to 24 years	105	40	65	19	5	14	10	5	5
25 to 44 years	309	146	163	51	24	27	26	11	15
45 to 64 years	176	85	91	39	22	17	29	11	18
65 years and older	91	39	52	9	5	4	23	12	11
Age unknown	0	0	0	0	0	0	0	0	0
All age groups	819	376	443	134	61	73	129	60	69

* Domestic cases

Table 3.4.2. Salmonellosis in man, seasonal distribution, 2002

	*Salmonella sp.**	*S*. Enteritidis *	*S*. Typhimurium *
Month	Cases	Cases	Cases
January	46	5	5
February	34	2	10
March	87	4	14
April	272	45	2
May	58	14	8
June	48	6	7
July	51	9	9
August	74	14	25
September	57	17	22
October	43	8	12
November	23	4	4
December	26	6	11
not known	0	0	0
Total	819	134	129

* Domestic cases

Table 4.1. Trichinella in animals, 2002

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive
Pigs	SVA	a		3 285 001	0
Solipeds	SVA	a		4 737	0
Wild boars	SVA	a		3242	0
Foxes	SVA			340	4
Other Wildlife					
Lynx's	SVA			104	1
Bears	SVA			36	0
Wolves	SVA			5	0
Other Wildlife	SVA			3	0

a) All slaughtered animals

5.1. Rabies in animals, 2002

Animal species	Source of information	Remarks	Animals tested	Animals positive
Cattle	SVA		1	0
Sheep				
Goats				
Pigs				
Solipeds				
Wildlife, all				
Bats	SVA		54	0
Foxes				
Other wildlife				
Dogs	SVA		5	0
Cats	SVA		1	0
Other pets				
Others	SVA	a	1	0

a) monkey

Table 6.1.1. Thermophilic Campylobacter sp. in animals, 2002

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	SVA, a	b	flock	3842	760				
Broilers - slaughterhouse									
Other poultry									
Dogs									
Cats									
Wildlife									
Others									

a) Swedish Poultry Meat Association

b) All positive findings are *C. Jejuni* or C. Spp.

Table 6.1.2. Antimicrobial susceptibility testing of Campylobacter, 2002

Sweden	***Campylobacter species***			
Sweden	Cattle	Pigs	Poultry	Humans
Isolates out of a monitoring programme (Yes / no)			YES	
Number of isolates available in the laboratory			84,00	

Antimicrobials:	N	% R	N	% R	N	% R	N	% R
Tetracycline					84,00	1,20		
ß-Lactam								
Ampicillin					84,00	9,60		
Fluoroquinolones								
Ciprofloxacin								
Enrofloxacin					84,00	0,00		
Quinolones								
Nalidixic acid					84,00	0,00		
Aminoglycosides								
Gentamicin					84,00	0,00		
Macrolides								
Erythromycin					84,00	0,00		

Number of multiresistant isolates								
fully sensitive					75	89,0		
resistant to 1 antimicrobial					9	11,0		
resistant to 2 antimicrobials								
resistant to 3 antimicrobials								
resistant to 4 antimicrobials								
resistant to >4 antimicrobials								

Table 6.1.3. Antimicrobial susceptibility testing of Campylobacter - quantitative data, 2002

Sweden	*Campylobacter species*
Sweden	Broiler chicken

Isolates out of a monitoring programme (Yes / no)	YES	Agar diffusion	
		Agar dilution	
Number of isolates available in the laboratory	84	Broth dilution	X

Number of isolates with MIC[1]:

Antimicrobials:	N	<=0,0039	0,007	0,015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256
Tetracycline	84							81	2							1		
ß-Lactam																		
Ampicillin	84								6	3	18	37	9	3	4	4		
Fluoroquinolones																		
Enrofloxacin	84					23	52	7	2									
Ciprofloxacin																		
Quinolones																		
Nalidixic acid	84									12	43	26	3					
Aminoglycosides																		
Gentamicin	84							25	44	15								
Macrolides																		
Erythromycin	84							5	22	40	15	2						

Number of multiresistant isolates																		
fully sensitive	75																	
resistant to 1 antimicrobial	9																	
resistant to 2 antimicrobials																		
resistant to 3 antimicrobials																		
resistant to 4 antimicrobials																		
resistant to >4 antimicrobials																		

[1] range not tested shown in grey; isolates with MICs equl to or lower than the lowest tested given as the lowest tested concentration

Table 6.1.3. Antimicrobial susceptibility testing of Campylobacter - quantitative data, 2002

>= 512

Table 6.1.4. Breakpoints used for antibiotic resistance testing of Campylobacter, 2002

Sweden

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	**Standard for breakpoint (NCCLS,...)**	**Breakpoint µg/ml**		**Disk content**	**Zone diameter (mm)**		
		Susceptible <=	**Resistant >**	**µg**	**Susceptible >=**	**Intermediate**	**Resistant <=**
Tetracycline	epidem.[1]	4	8				
ß-Lactam							
Ampicillin	epidem.[1]	8	16				
Fluoroquinolones							
Enrofloxacin	epidem.[1]	0,5	1				
Ciprofloxacin							
Quinolones							
Nalidixic acid	epidem.[1]	8	16				
Aminoglycosides							
Gentamicin	epidem.[1]	4	8				
Macrolides							
Erythromycin	epidem.[1]	8	16				

[1] breakpoints set according to epidemiological (mocrobiological) critera, i.e. based on distribution

Table 6.2. Thermophilic Campylobacter sp. in food, 2002

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		13	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		14	0				
Other - Raw meat										
at slaughterhouse										
at processing plant										
at retail level										
Meat products										
Beef and veal - meat products										
at slaughterhouse										
at processing plant										
at retail level	SLV	a	sample		3	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		14	0				
Other - meat products										
at slaughterhouse										
at processing plant										
at retail level										
Other food										
Ready to eat foods	SLV	a	sample		99	1				
Ready to eat milk products	SLV	a	sample		15	0				
Fish products										
Others	SLV	a	sample		10	0				

a) Official control by 230 local municipalities

Table 6.3. Campylobacteriosis in man, 2002

Sweden	Cases *	Inc.	Autochtone cases **	Inc.	Imported cases **	Inc.	Unknown status **
Campylobacteriosis	7137	73.9	2476	27.7	4017	44.9	114
C. jejuni							
C. coli							
C. upsaliensis							

* Based on reports by physicians and laboratories.

** Based on reportes by physicians.

	Campylobacter sp. *			*C. jejuni*			*C. coli*		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	9	8	1						
1 to 4 years	207	127	80						
5 to 14 years	168	97	71						
15 to 24 years	289	157	132						
25 to 44 years	891	479	412						
45 to 64 years	616	348	268						
65 years and older**	296	161	134						
Age unknown	0								
All age groups	2476	1377	1098	0	0	0	0	0	0

* Domestic cases

** 1 person of unknown sex

Month	Campylobacter Cases	*C.jejuni* Cases	*C.coli* Cases	*C.upsaliensis* Cases
January	96			
February	91			
March	55			
April	81			
May	144			
June	280			
July	552			
August	473			
September	276			
October	228			
November	134			
December	66			
not known				
Total	2476	0	0	0

Table 7.1. Listeria monocytogenes in food, 2002

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	SLV	a	sample			22	4
Pork							
Poultry							
Other							
Other ready to eat food products							
Milk products	SLV	a	sample			34	0
Milk, raw							
Fish and fish products	SLV	a	sample			50	6
Seafood	SLV	a	sample			11	1
Others							
Ready to eat foods	SLV	a	sample			16	1

a) Official control by 230 local municipalities

Table 7.2. Listeriosis in man, 2002

	Cases	Inc.
Listeriosis	39	0.4
Congenital cases	1	
Deaths	12	

	Listeriosis			*L. monocytogenes*		
Age group	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	1		1			
1 to 4 years						
5 to 14 years	1		1			
15 to 24 years						
25 to 44 years	1		1			
45 to 64 years	11	5	6			
65 years and older	25	12	13			
Age unknown						
All age groups	39	17	22	0	0	0

Table 8.3. Yersiniosis in man, 2002

Sweden	Cases *	Inc.	Autochtone cases **	Inc.	Imported cases **	Inc.	Unknown status **
Yersiniosis							
Y. enterocolitica	610	6.3	418	4.8	52	0.58	91
Y. enterocolitica O:3							
Y. enterocolitica O:9							

* Based on reports by physicians and laboratories.

** Based on reports by physicians.

	Yersiniosis		
Age group	**All**	**M**	**F**
< 1 year	4		4
1 to 4 years	129	60	69
5 to 14 years	44	28	16
15 to 24 years	38	27	11
25 to 44 years*	102	58	43
45 to 64 years	60	31	29
65 years and older	41	16	25
Age unknown			
All age groups	418	220	197

* one person of unknown sex

	Yersiniosis
Month	Cases
January	43
February	23
March	17
April	17
May	25
June	27
July	53
August	55
September	51
October	54
November	23
December	30
not known	
Total	418

Table 9.1. Echinococcus sp. in animals, 2002

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*Echinococcus* detected	*E. multilocularis*	*E. granulosus*
Cattle							
Sheep							
Goats							
Pigs							
Solipeds							
Dogs	SVA		animal	1	0		
Cats							
Foxes	SVA		animal	394	0		
Wildlife, other							

9.2. Echinicoccosis in man, 2002

	Cases	**Inc.**	**Autochtone cases**	**Inc.**	**Imported cases**	**Inc.**
Echinococcosis	14	0.16				
Cystic echinococcosis						
Alveolar echinococcosis						

	Echinococcus		
Age group	**All**	**M**	**F**
< 1 year			
1 to 4 years			
5 to 14 years			
15 to 24 years*	1		
25 to 44 years	4	3	1
45 to 64 years	6	5	1
65 years and older	3	2	1
Age unknown			
All age groups	14	10	3

* one person of unknown sex

Table 10.1. Toxoplasma gondii in animals, 2002

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*T.gondii*
Cattle					
Sheep	SVA	a	animal	37	8
Goats	SVA	a	animal	10	0
Pigs					
Solipeds	SVA	a	animal	18	3
Dogs	SVA	a	animal	14	0
Cats	SVA	a	animal	39	20
Others					
Foxes	SVA	a	animal	1	0
Badgers	SVA	a	animal	1	0
Bears	SVA	a	animal	4	0

a) Toxoplasma screening

10.2. Toxoplasmosis in man, 2002

	Cases	Inc.
Toxoplasmosis	10	0.11
Congenital cases	1	

	Toxoplasmosis		
Age group	**All**	**M**	**F**
< 1 year	1	1	
1 to 4 years			
5 to 14 years	1	1	
15 to 24 years	1		1
25 to 44 years	5	2	3
45 to 64 years	1		1
65 years and older	1	1	
Age unknown			
All age groups	10	5	5

Table 11.1. Verocytotoxic Escherichia coli (VTEC) in animals, 2002

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* O 26
Cattle								
Cattle at slaughter	SVA	faeces	animal	2032	29	29		
Cattle at slaughter	a	swab	animal	550	0			
Cattle*	SVA, SJV	faeces	herd	5	4	3		1
Cattle**	SVA, SJV	faeces	herd	15	5	5		
Sheep	SVA	faeces	animal	2	0			
Goats	SVA	faeces	animal	3	0			
Pigs	SVA	faeces	animal	2	0			
Cats	SVA	faeces	animal	1	0			

a) Swedish meats

* Investigation due to human cases of EHEC

** Investigation due to a foodborn outbreak. These findings were not associated to human cases of EHEC.

11.3. Verocytotoxic Escherichia coli (VTEC) infection in man, 2002

	Cases *	**Inc.**	**Autochtone cases ****	**Inc.**	**Imported cases ****	**Inc.**
HUS						
- clinical cases	19	0.21	17	0.19	2	0.02
- lab. confirmed cases	14	0.16	13	0.15	1	0.01
- caused by O157 (VT+)	14	0.16	13	0.15	1	0.01
- caused by other VTEC						
***E.coli* infect. (except HUS)**						
- clincial cases	78	0.87	66	0.74	11	0.12
- laboratory confirmed	96	1.07	82	0.92	9	0.10
- caused by O157 (VT+)	96	1.07	82	0.92	9	0.10
- caused by other VTEC						

	HUS*			*E.coli* infections O157**		
Age group	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	1	1	0	1	1	0
1 to 4 years	6	2	4	30	17	13
5 to 14 years	3	1	2	25	15	10
15 to 24 years	1	1	0	6	2	4
25 to 44 years	4	0	4	30	10	20
45 to 64 years	1	0	1	7	1	6
65 years and older	1	0	1	9	5	4
Age unknown	0	0	0	0	0	0
All age groups	17	5	12	108	51	57

* Based on reports by physicians and laboratories

**Based on reports by physicians. Domestic cases.

Table 12. Foodborne outbreaks in humans, 2002

COUNTRY Causative agent	General outbreak	Family outbreak	Total number of persons			Source			Type of evidence	Location of exposure	Contributing factors
			ill	died	in hospital		Sus-pected	Con-firmed			
1	2	3	4	5	6	7			8	9	10
EHEC	1		11	n.r.		water/beach	yes		epidemiological	sea bath	
EHEC	1		28	n.r.		cols smoked sausage		yes	bacteriological	several	
S. Oranienburg	1		12	n.r.		choclate		yes		international	
S. Saintpaul	1		5	n.r.		unknown			epidemiolgical	home for elderly people	
S. Saintpaul	1		87	n.r.		bean sprouts	yes		case-control study	several	
S. Hadar, S. Enteritidis	1		353	n.r.		chicken and other source		yes	bacteriological	ferry	
S. Kottbus	1		11	n.r.		unknown	yes		epidemiological	personnel canteen	
S. Blockley	1		7	n.r.		unknown	yes		epidemiological	hospital and other places	
S. Bovismorbificans	1		8	n.r.		unknown	yes		epidemiological	coffee shop	
S. Typhimurium NT	1		9	n.r.		salad	yes		epidemiological	restaurant	
Campylobacter	9		26	n.r.		different food items				several different outbreaks	
Campylobacter	1		74	n.r.		water		yes	bacteriological		

Table 13.1. Animal population and number of slaughtered animals in Sweden 2002

Animal species	Number of animals (in thousands)		Number of herds		Slaughtered		Sanitary slaughtered[2]
Cattle > 1 year	695	5	27 810		471 594	2	1 504
Calves < 1 year	514	5	25 159	8	33 974	2	7
Dairy cattle	403	5	11 270	8	n.a.		n.a.
Total No. of cattle [1)]	1 612	5	29 038	8	505 568	2	1 511
Sows, gilts	208	8	2 726	8	n.a.		n.a.
Boars	3	8	1 878	8	n.a.		n.a.
Fattening pigs	1 096	8	3 260	8	n.a.		n.a.
Piglets	574	8	2 506	8	n.a.		n.a.
Total No. of pigs	1 882	8	3 998	8	3 285 001	2	1
Sheep[3)]	426		7 495	8	200 547	2	0
Goats, not kids	n.a.		n.a.		n.a.		n.a.
Farmed deer	18 700	4	595	4	2 797	2	0
Horses	285	9	-		4 737	2	647
Reindeer	227	7	-		58 999	7	0
Wild boar (farmed and wild)	-		-		818	2	0
Moose	-		-		1 399	2	0
Poultry layers [6)]	7 408	1	5 768	1			
Turkeys	n.a.		n.a.		706 891	2	-
Ducks	n.a.		n.a.		59 645	2	-
Geese	n.a.		n.a.		27 272	2	-
Ratites	n.a.		n.a.		1 041	2	-
Broilers	-		-		77 382 874	2	-
Laying hens	-		-		3 380 940	2	-
Breeders	-		-		690 589	2	-

1) Source: No animals /herds in 2001: Yearbook of Agriculture Statistics 2002

2) Source: National Food Administration

3) Including 229 000 lambs

4) Source : Svenska Djurhälsovården (4 600 kron 14 100 dov)

5) Statistics Sweden, Number of cattle in December 2002

6) Including 1 721 342 chicken of layer breeed

7) SBA

8) Livestock on the 13th of June 2002, SBA

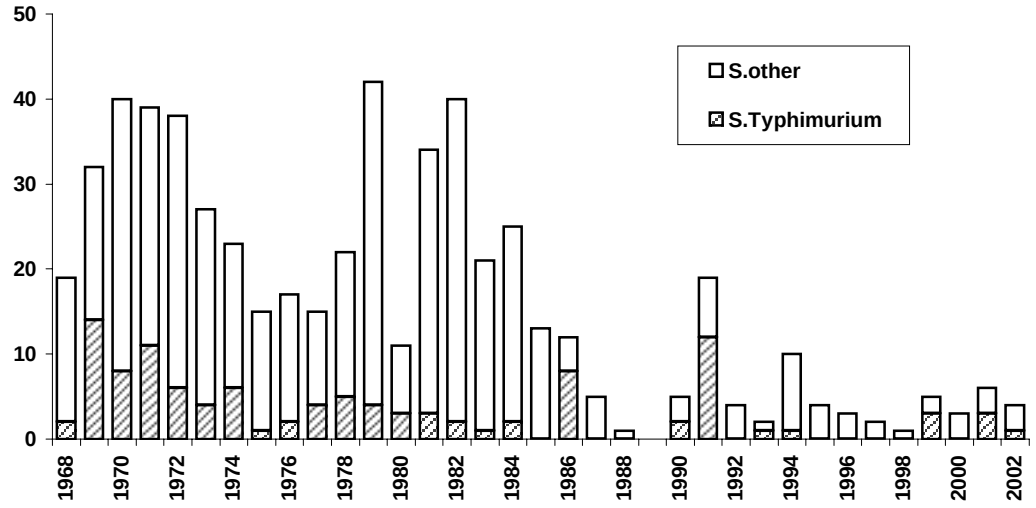
9) Estimated

Table 13.2. Human population (in thousands) by age and sex in Sweden 2002

Age group	Female	Men	Total
< 1 year	47	49	96
1 to 4 years	178	188	366
5 to 14 years	560	590	1 150
15 to 24 years	513	537	1 050
25 to 44 years	1191	1241	2 432
45 to 64 years	1147	1167	2 314
65 years and older	878	656	1 534
All age groups	4 514	4 428	8 941

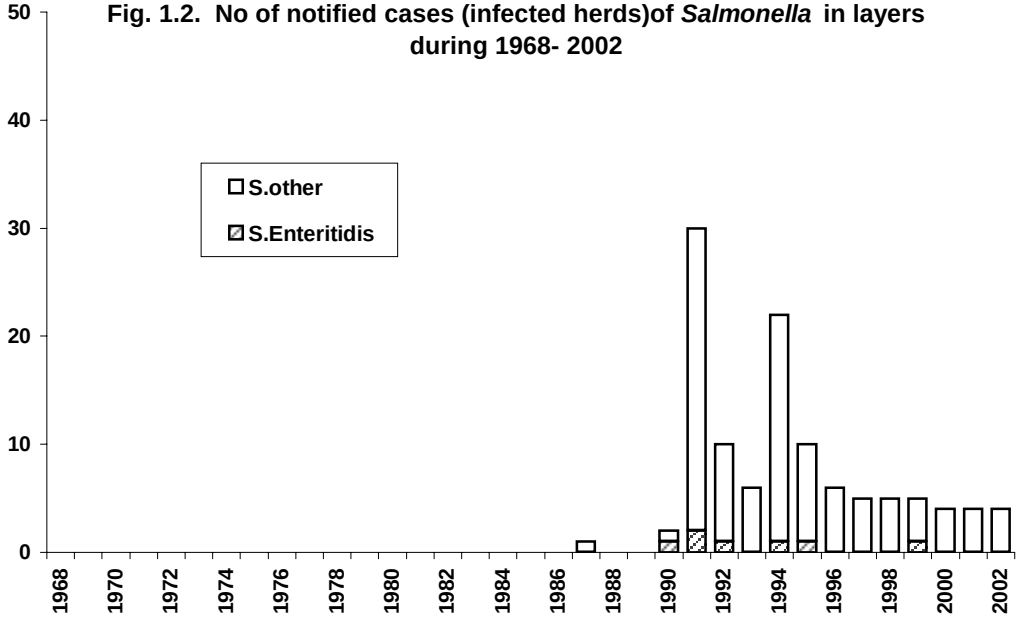
Source: Offical Statistics of Sweden, Statistics Sweden, December 2002

Fig. 1.1 No of notified cases (infected herds)of *Salmonella* in broilers during 1968-2002



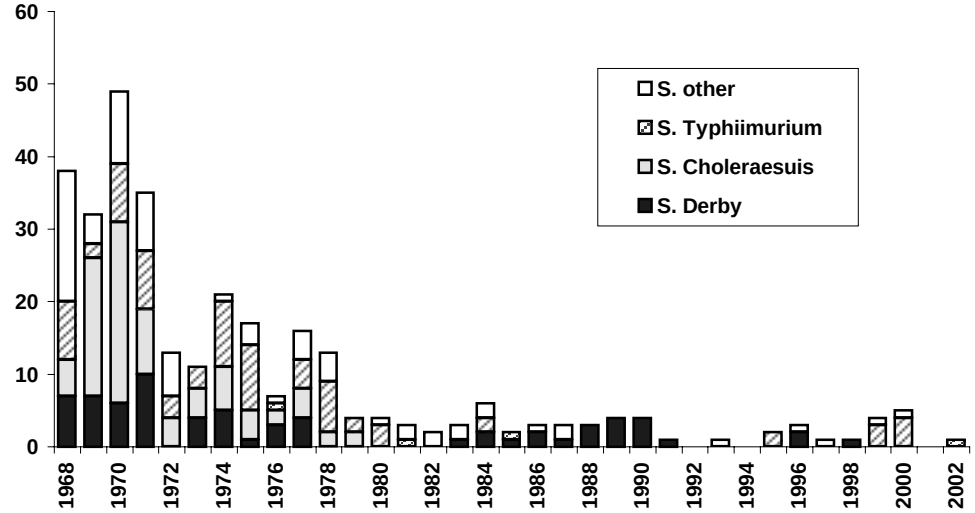
1970: Initiation of voluntary programme. 1984: Initiation of compulsory sampling. Source: SJV
1991: S. Typhimurium spread from a hatchery. 1991: One broiler parent flock infected.

Fig. 1.2. No of notified cases (infected herds)of *Salmonella* in layers during 1968- 2002



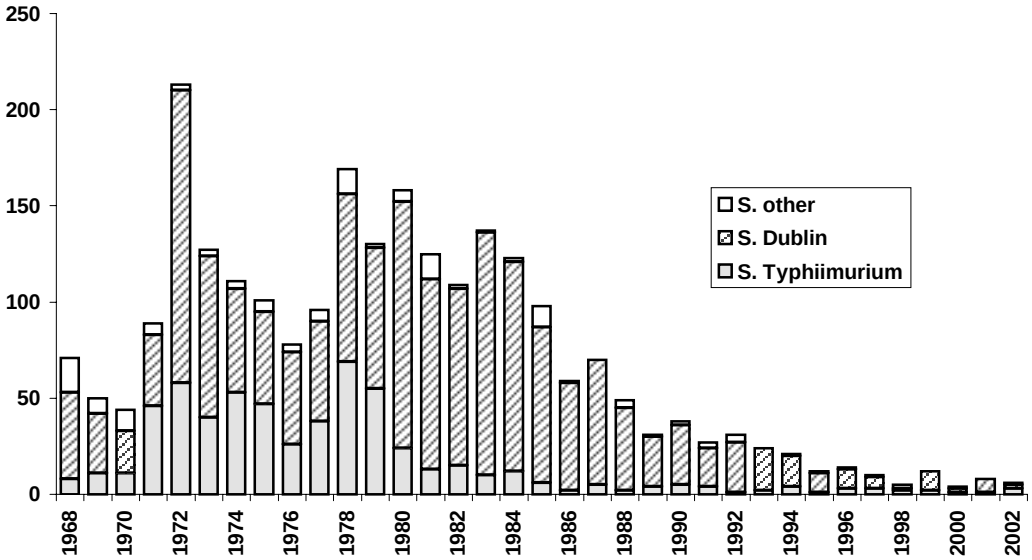
1991: start of the industry led sampling programme in layers Source: SJV

Fig 1.3. Number of notified cases (infected herds) of *Salmonella* in pigs during 1968-2002



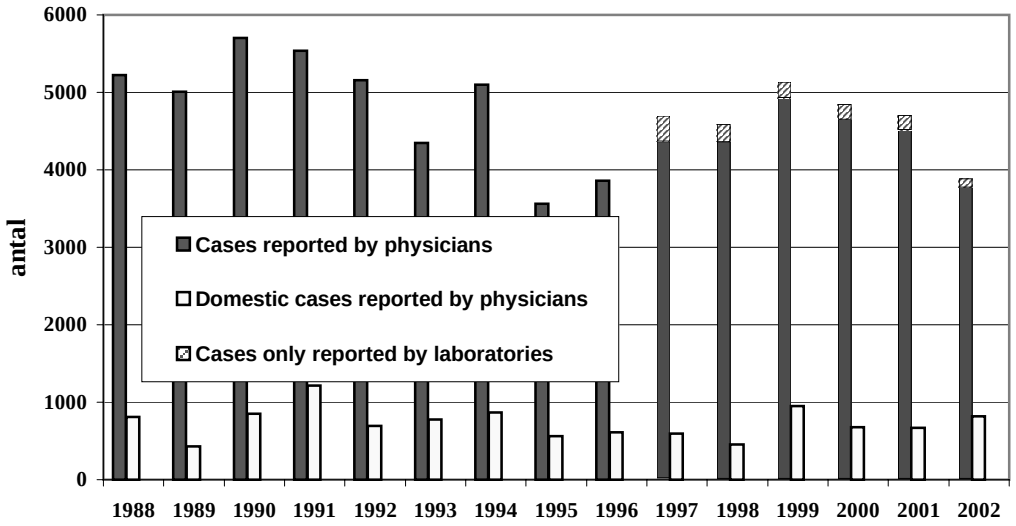
Source: SJV

Fig. 1.4. No of notified cases (infected herds) of *Salmonella* in cattle during 1968-2002



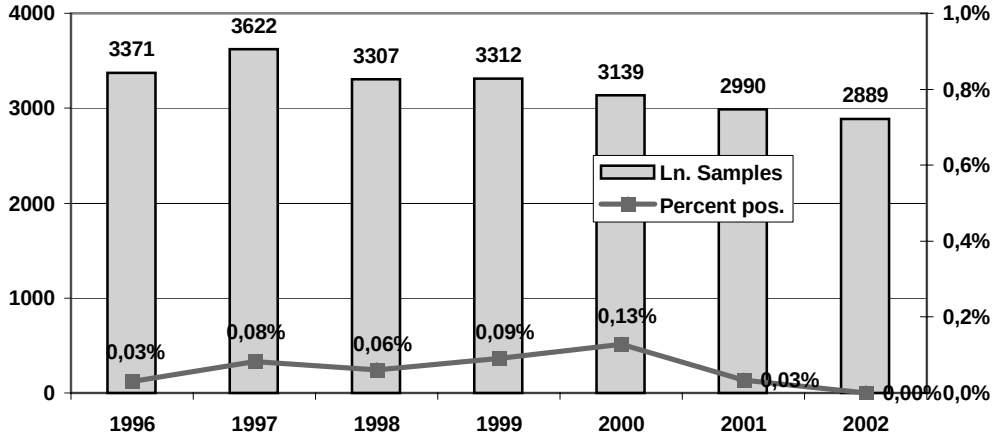
Source: SJV

Figure 1.5. Number of cases of Salmonella in humans reported by physicians 1988 -2002



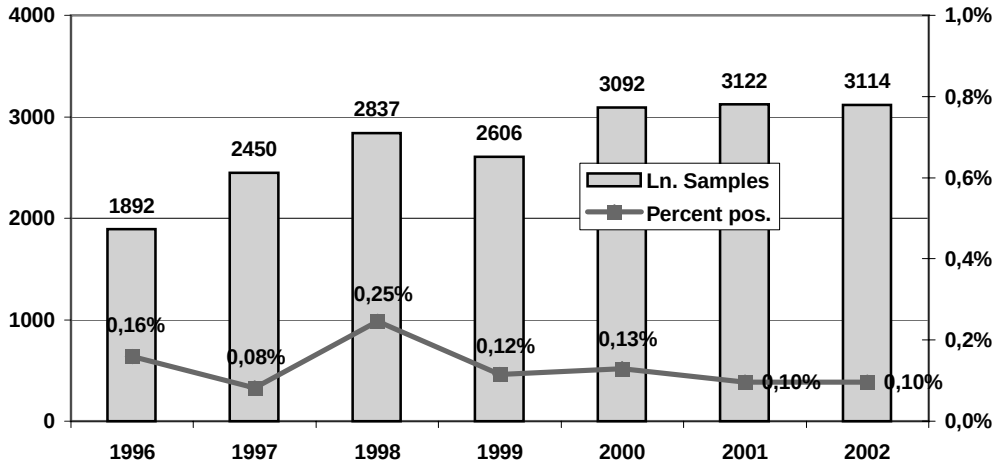
Source: SMI

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



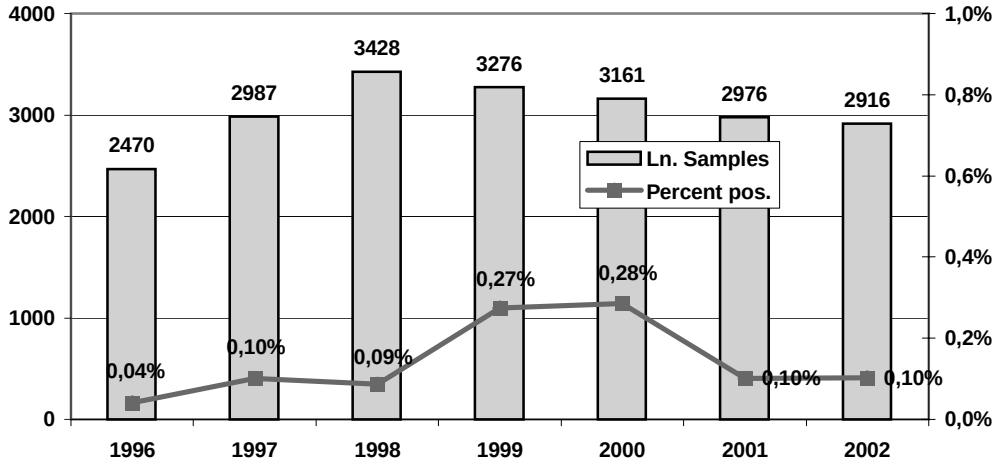
Source: SLV

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



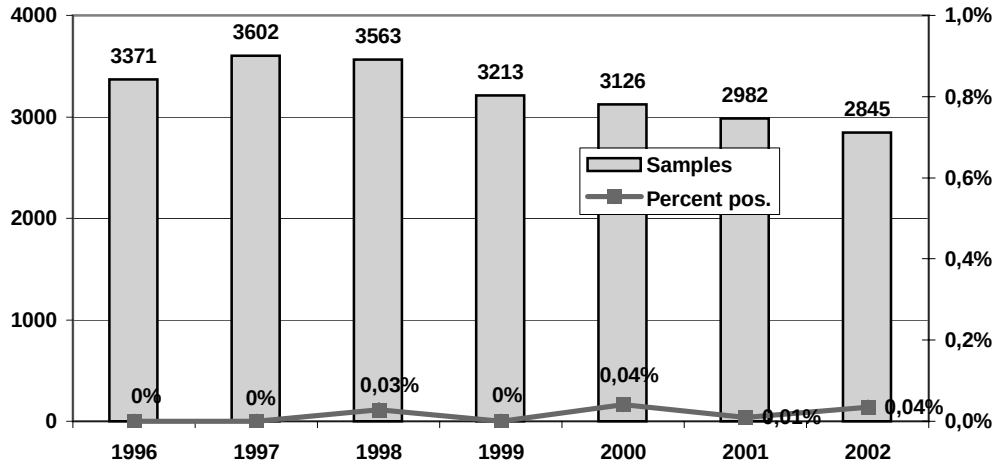
Source: SLV

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



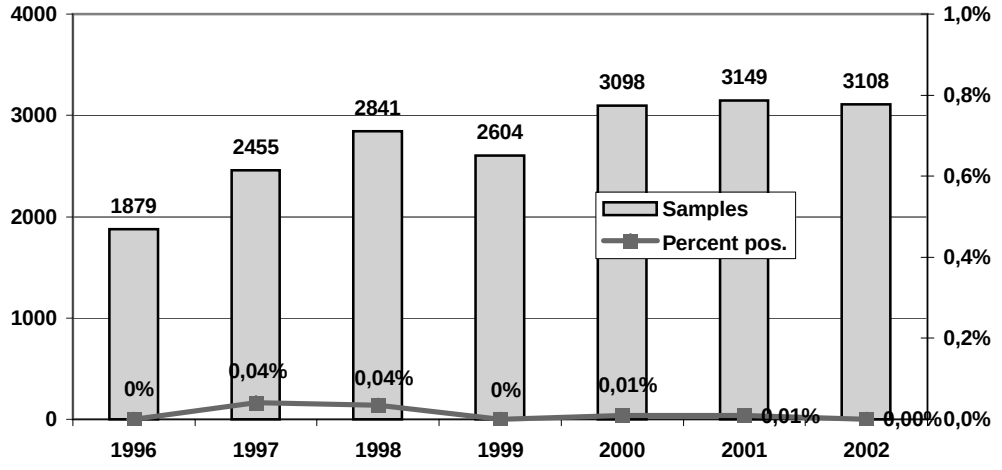
Source: SLV

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



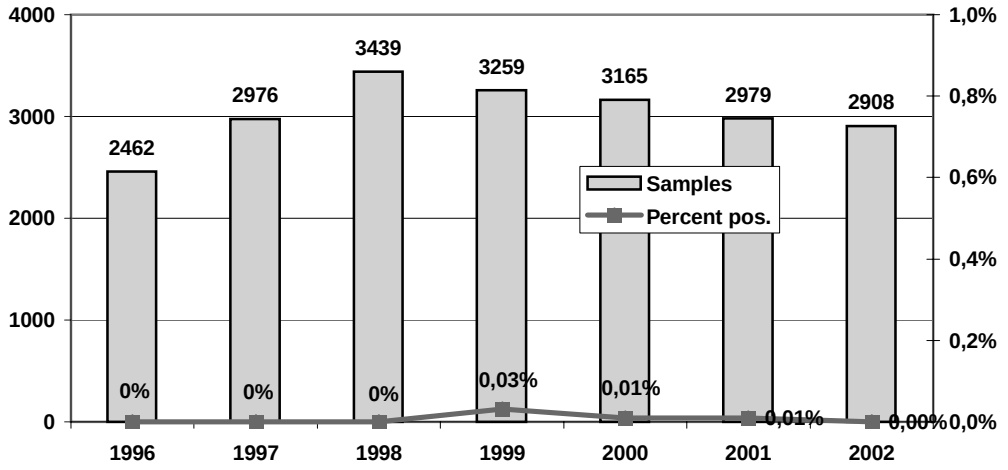
Source: SLV

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



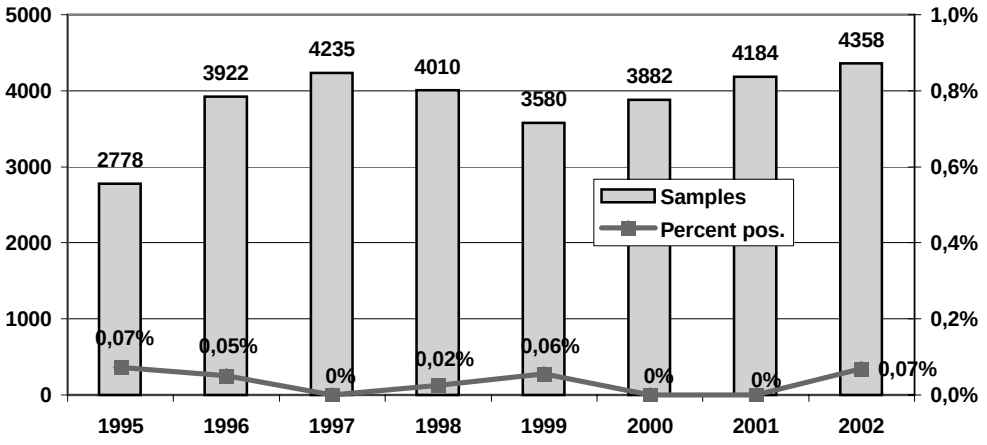
Source: SLV

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



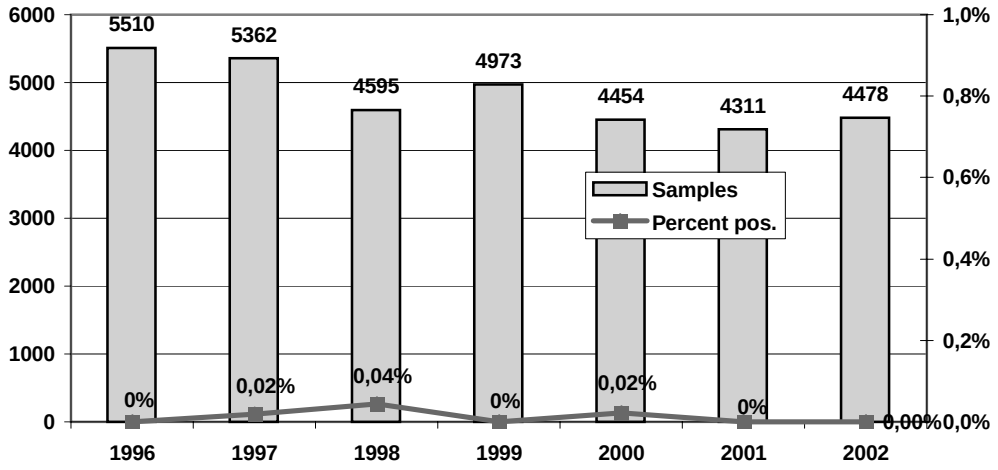
Source: SLV

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



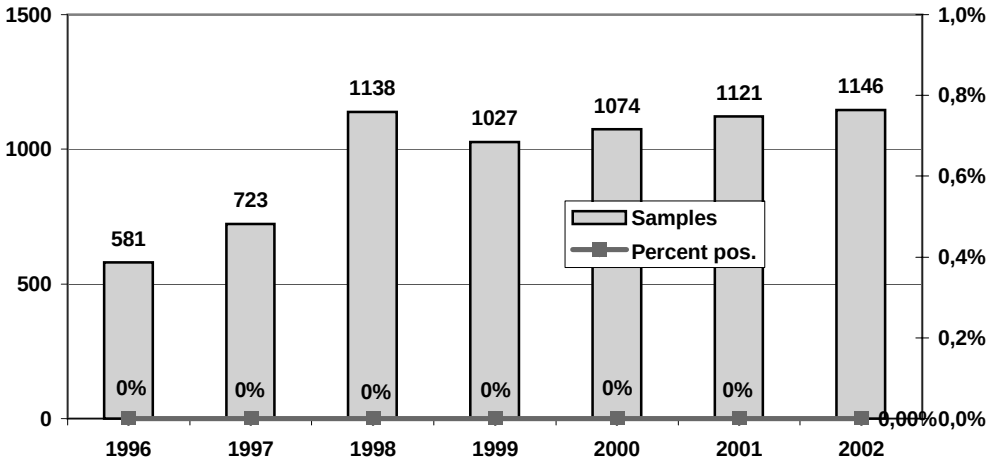
Source: SLV

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



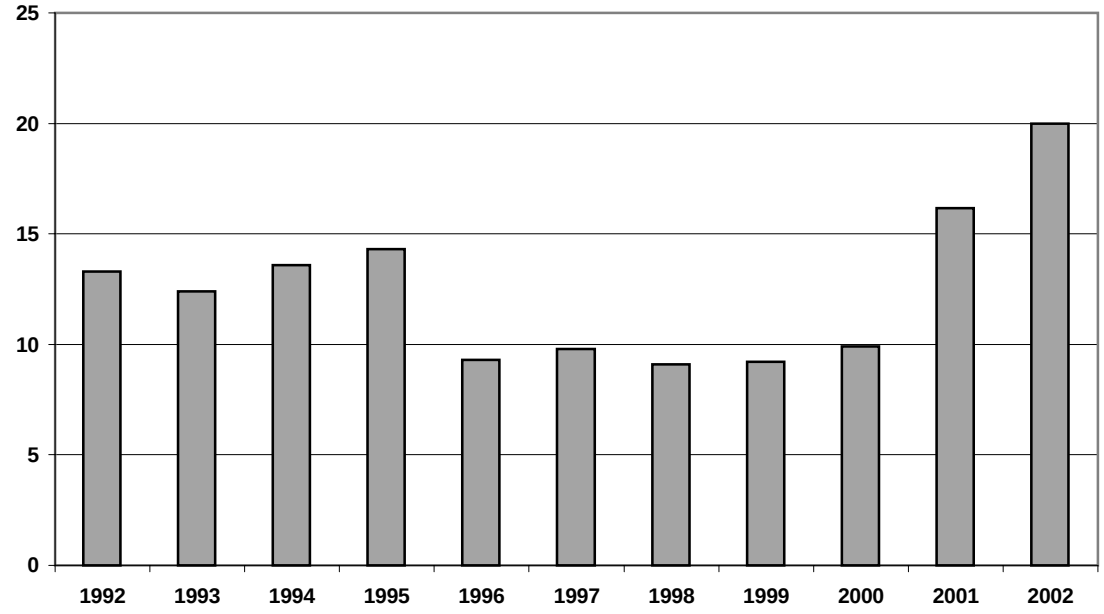
Source: SLV

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



Source: SLV

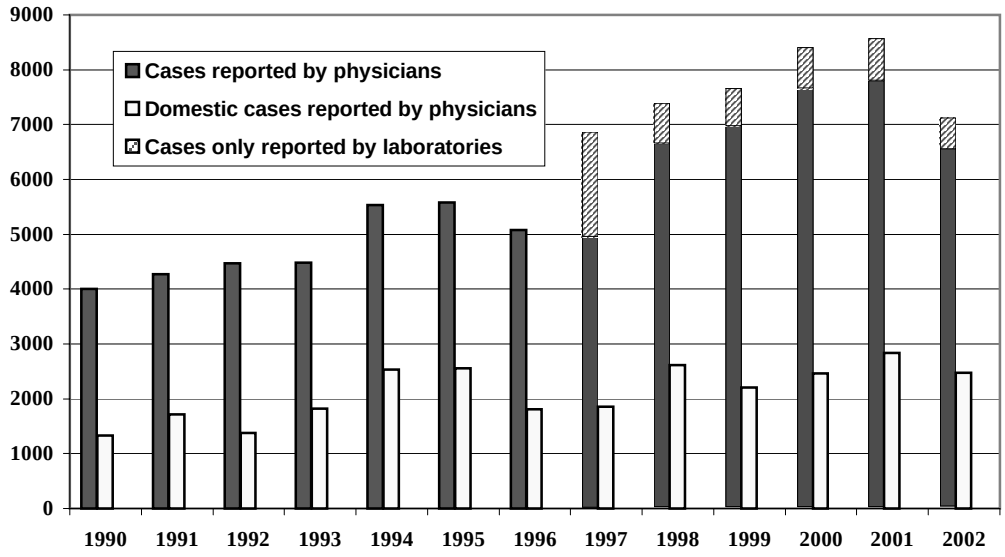
Fig. 2.1. Percent campylobacter positive broiler flocks at slaughter 1992-2002



In July 2001, a new campylobacter programme was implemented.

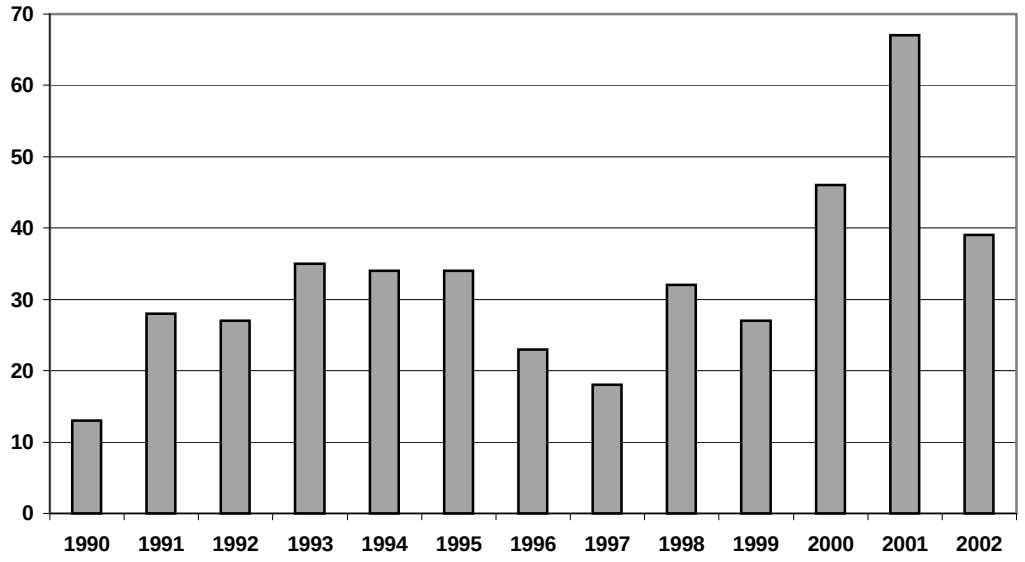
Source: Swedish Poultry Meat Association

Fig. 2. 2. Number of notified cases of Campylobacter in humans, reported by physicians, In Sweden 1990-2002



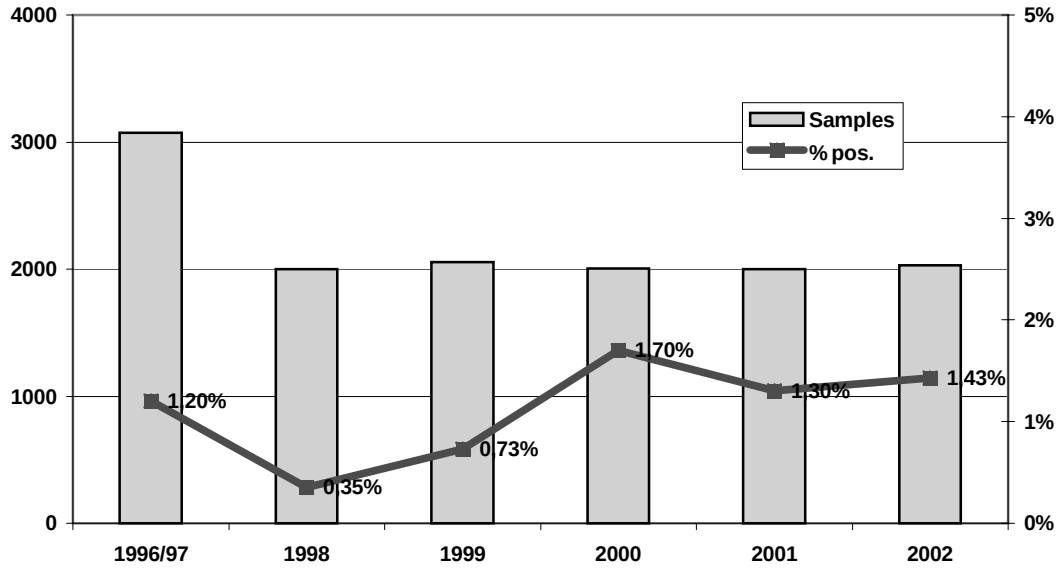
Source: SMI

Fig 3. Number of cases of Listeria in humans notified by physicians, in Sweden, 1997-2002



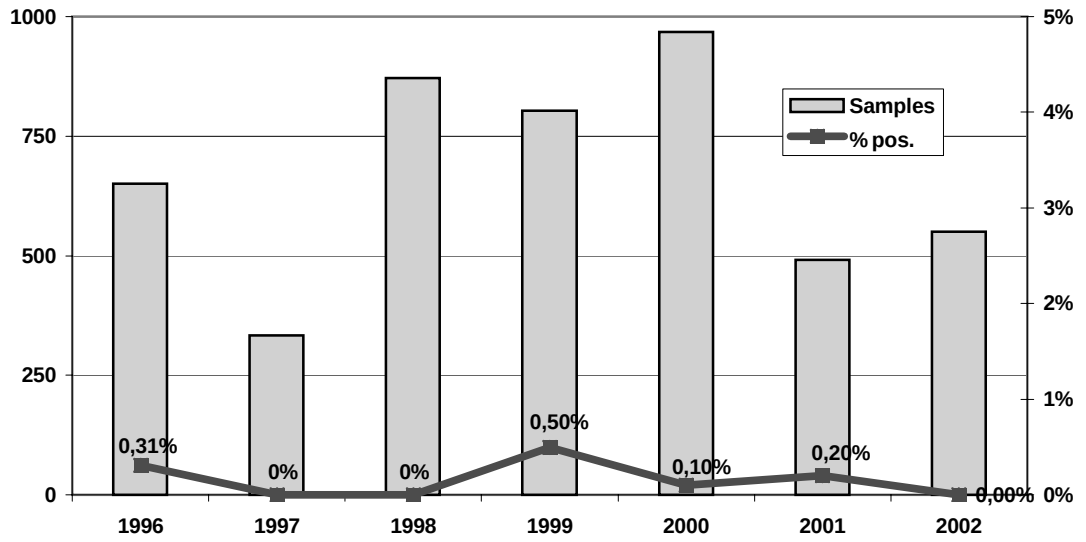
Source: SMI

Fig.4.1. Number of fecal samples collected at routine monotoring of cattle at slaughter and percent VTEC O157 positive, 1996-2002



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

Fig.4.2. Number of swabs examined from cattle carcasses at slaughter and percent VTEC O157 positive, 1996-2002



Source: Swedish Meats

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