Zoonoses in Sweden
2003

Report to the Commission

Trends and sources of zoonotic infections recorded in Sweden during 2003

NATIONAL VETERINARY INSTITUTE

This report was produced by the Swedish Zoonosis center at the National Veterinary Institutete
in co-operation with the
Swedish Board of Agriculture (SBA)
National Food Administration (SLV)
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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 2003.

From animals, the data originate from monitoring or surveillance systems, from notifications of clinical observations, from findings at laboratories and meat inspections. The data is collected from the authorities mentioned above as well as from the industries. Some of the included zoonotic 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 the respective disease are based on the results when these two reporting systems are merged. Before 2000, these two reporting 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. 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.

In the table section, the tables that are not relevant and where there is no information available have been deleted. Data about animal population and the number of slaughtered animals are shown in Table 14.1. Demographic data are shown in Table 14.2.

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, histological examination 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] since 1995 (former Decision 95/63/EC) and fulfils the requirements on control measures in OTF member states [2].

Epidemiological history:
Sweden was declared free from bovine TB in 1958 and obtained the status OTF in 1995 when Sweden joined the European Community. 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, all of which have been depopulated. In 1994, a voluntary control programme for farmed deer was initiated. The last herd was identified in 1997. TB control in farmed deer was made compulsory by law in 2003. 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 and/or bacteriological sampling was initiated in all contact animals and animal keepers. Another elephant was found positive in trunk washes in late 2001 and was put down in early 2002. In the beginning of 2002, all contact animals were trunk- or tracheal rinsed: three elephants and three rhinoceroses were cultured, and four giraffes and two buffaloes were subjected to tuberculin testing. Positive cultures were found from one of the elephants and one giraffe tested positive in the tuberculin test, both animals were euthanised. In the giraffe, autopsy lung lesions were found and *M. tuberculosis* was isolated. All other animals tested negative. In 2003, the restrictions were lifted after cleaning and disinfection of all buildings and other housing of the infected animals.

Results from 2003:
<u>Cattle, swine, sheep</u> (Table 1.1.1, 1.1.3)
Three samples from cattle were investigated by culture, as meet inspection and examination by histology could not rule out TB infection. All samples were negative. Furthermore, two heifers from two herds tested positive in tuberculin tests before export. The two reagents were euthanised. Also, one cattle herd was investigated due to clinical suspicion of TB and in that herd one positive reagent was euthanised. Apart from this, 521 cattle were tuberculin tested and all were negative. The majority of these animals were tested at breeding stations, but also animals aimed for export or import.

78 pigs were subjected to histological examination following investigation at meat inspection. Of those, 56 were cultured, as TB could not be ruled out by histology.
Lastly, one goat was found negative after histological examination.

<u>Farmed deer</u> (Table 1.1.2)
In 2003, 585 (97%) out of 605 farmed deer herds were affiliated to the voluntary control programme. Since the beginning of the programme, 488 (83%) herds have been declared free from TB; 108 after three whole herd tuberculin tests, 321 after culling of the whole herd and

[1] Commission Decision 03/467/EG, as last amended by 04/230/EG.
[2] Council Directive 64/432/EEC, Annex A, as last amended by 00/20/EC.

subsequent meat inspection, and 59 herds were established with deer originating from TB free herds. Thus, 97 herds in the control programme were not declared free from TB and 20 were not affiliated to the programme. Compared with the previous year, 37 additional herds were declared free during 2003. Two deer from one herd were euthanised as they tested positive in tuberculin test. However, histological investigation and culture were negative. No other animal in the control programme tested positive for *M. bovis*.
Apart from the testing within the control programme, 14 deer were investigated by histology after suspicion at meat inspection, out of those, 10 were cultured. All animals were negative.

Pets and horses (Table 1.1.3)
One cat, one dog and three horses were investigated for TB post mortem. All samples were negative.

Zoo animals (Table 1.1.3)
The last two elephants in the outbreak of *M. tuberculosis* in a Zoo were euthanised during 2003. Both were positive in culture performed on autopsy material. Also, granuloma found at autopsy in one dolphin was investigated for TB and found negative.

Other animals (Table 1.1.3)
A herd of camels has been under investigation since 2002 due to a positive tuberculin test. One camel that was to be exported was positive in tuberculin test and euthanised. No other positive animals were found and no TB was isolated from the dead camel.
34 reindeer were tuberculin tested following export or import and all were found negative.
One alpaca was euthanised and tested as the animal had lost weight after the isolation period following import. The alpaca was negative.
Lastly, three elks were negative following testing after TB suspicion at post mortem inspection.

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 2003 (Table 1.2)
Five 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 remaining case was a 16-year old man that 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 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 (CFT) or milk ELISA. Whereas, in beef cattle, swine, sheep and goats the Rose Bengal plate test (RBT) or complement fixation test is used. The yearly screening of swine is performed by use of the tube agglutination test.

A positive case is defined as an animal from which *Brucella* spp. has been isolated, or an animal giving a significant antibody titre. The herd is the epidemiological unit. If brucellosis were diagnosed eradication measures would be implemented as vaccination is not allowed. Sweden is declared officially brucellosis free (OBF) [3] in cattle since 1995 (former Decision 95/74/EC), and in goats and sheep (OBmF)[4] since 1994 (former amendment 94/972/EC), and fulfils the requirements on control measures in OBF[5]and OBmF[6] member states

Epidemiological history

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

Brucella melitensis has been screened for in 5% (approximately 10.000 animals/year) of the sheep population, and in a number of goats, yearly since 1995. *Brucella abortus*, has also been regularly tested for in cattle since 1988 and since 1997, about 3000 samples (bulk milk and/or serum samples) have been tested yearly. Lastly, *B. suis* has been screened for in 3000 swine since 1997. Out of all these samples, none have been confirmed positive.

Results from 2003 (Tables 2.1.1–2.1.3)

In the yearly screening programme, serum samples from 1000 dairy cows and bulk milk samples from 2012 dairy herds were analysed by use of an indirect ELISA. All herds were negative for *B. abortus*. In total, 909 cattle were investigated serologically at breeding stations and before import or export.

From sheep, 10258 individual serum samples and 272 goats were analysed for antibodies against *B. melitensis* by use of the RBT. All were negative. The samples from the sheep are collected within the voluntary control programme for Maedi-Visna.

3000 sera from pigs were analysed by use of the tube agglutination test and all were negative. Also, 1937 swine were tested serologically at breeding stations, none tested positive.

Out of 33 tested alpaca that were tested before import two were positive in serology and were not allowed to be brought into Sweden. Furthermore, 90 dogs were sampled following export

[3] Commission Decision 03/467/EC, as last amended by 04/230/EC.
[4] Commission Decision 93/52/EEC, as last amended by 04/199/EC.
[5] Council Directive 64/432/EEC, Annex A, as last amended by 00/20/EC.
[6] Council Directive 91/68/EEC, Annex A, as last amended by 94/953/EC.

or import, and all were serologically negative. Apart from this, 67 reindeer, three elks, and 16 other animals tested negative.

In 2003, there were two reported clinical suspicions of *Brucella* infection. One was a male lamb with swollen genitals where brucellosis could not be ruled out. The bacteriological samples were negative in cultivation. Also, there was a dog imported from Greece that showed clinical signs and brucellosis was one differential diagnosis. The dog tested positive in serology but negative in bacteriology.

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. Five cases were reported in 2002.

Results from 2003 (Table 2.3)
In 2003, three cases were reported. Of those, none was known to be domestic.

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

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[7] and has shown that the overall prevalence of *Salmonella* 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 farm animals are found infected, restrictions are put on the farm and are not lifted until the infection has been eliminated and the premises/contaminated houses have been cleaned and disinfected. Feed contaminated with *Salmonella* is treated to

[7] Commission Decision 95/50/EC

eliminate the bacteria. Finally, food that is positive for *Salmonella* is either destroyed or returned to the country of origin.

Salmonella in feeding stuffs

Current situation

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

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

Measures in case of positive findings

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

Heat treatment

All compound feeding stuffs for poultry have to be heat treated to >75°C. In practice, a great amount of feeding stuffs for ruminants and pigs are also heat treated. Non heat-treated feed grains for sale, aimed for poultry on farm, have to originate from a storage plant that has been approved by the SJV. All storage facilities must fulfil certain requirements regarding sampling.

Sampling at feed mills

At the feed mills, samples are taken mainly according to Hazard Analysis Critical Control Point (HACCP) principles, both on the premises and along the production line. The HACCP system was initiated in 1991 and has proven to be effective for detecting and preventing *Salmonella* in feeding stuffs. Feed mills that produce feeding stuffs for poultry are obliged to take a minimum of five samples per week from specified critical control points[8]. Feed mills that produce feeding stuffs for ruminants, pigs or horses, are obliged to take two samples a week[9]. The producer often takes additional voluntary samples. Official feed inspectors sample at specified points at the feed mills[10], one to five times a year, depending on production volume. Also, a so called “hygiene group” makes yearly inspections at feed mills that produce more than 1000 tons of feeding stuffs annually. Feed mills that produce less are visited less frequently. At these inspections, samples are taken at critical points - especially in connection with coolers, aspirators and elevators.

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[8] 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

[9] from the silo and the elevator for feed material

[10] at these visits, dust samples are collected from the top of silos that contain compound feedingstuffs

Sampling of feed materials

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

Feed material of animal origin has to be sampled according to regulation (EC) No 1774/2002. If the production is continuous, the number of samples to be taken is decided by the SJV. Production of classified (as mentioned above) feed materials has to follow a hygiene programme, containing routines for *Salmonella* sampling, should be approved by the SJV.

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

Sampling of compound feeding stuffs traded into Sweden

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

Pet food

Every company producing pet food is regularly inspected and the feed is sampled for *Salmonella* once a year by an official feed inspector. In addition to this, voluntary samples are taken. Every consignment of dog chews from a third country is sampled at the border inspection, even though it must be accompanied by a certificate showing that the pet food has been tested negative for *Salmonella* in compliance with the EU legislation.
Pet food produced by animal by-products have to be sampled for *Salmonella* according to regulation (EC) No 1774/2002.

Results from 2003 (Tables 3.1.1–3.1.4)
In the tables, the compulsory samples, the samples taken in the official control and the voluntary samples that have been reported to the SJV are presented. There is no obligation to report negative results from voluntary samples.

<u>Dog snacks</u> (Table 3.1.4 f)
Results from sampling of dog chews are reported by the border inspection. Dog chews that are found positive for *Salmonella* are rejected. In 2002, there were 15 isolates belonging to five different serotypes of *Salmonella* in dog chews.

<u>Feed material of vegetable origin</u> (Table 3.1.4.c, e)
61 samples of feed material were positive for *Salmonella* from imported feed materials. The isolates came from derived material of soybean, maize, rapeseed and palm kernel. The most common serotypes were *S*. Senftenberg (n=8) and *S*. Mbandaka (n=7). 6 (out of 1252) samples of rapeseed meal produced in Sweden were positive for *Salmonella.* The serotypes were *S*. Cubana (n=3) and *S*. Mbandaka (n=3) and refer to 3 sub samples on each occasion.

From processing plants that produce feed materials of vegetable origin 66 environmental samples were positive for *Salmonella*. Out of those, 51 were of *S*. Cubana and associated with the *S*. Cubana outbreak among pig herds that were caused by contaminated feed (see *Salmonella* in animals).

Feed mills and compound feeding stuffs (Table 3.1.4.d)
In the HACCP control of feed mills, 9548 samples were reported and of those 78 (0.8%) were positive. 7746 samples derive from compulsory sampling and the rest from e.g. follow-up sampling. The most common serotypes were *S*. Cubana (n=39) and *S*. Senftenberg (n=8). During the summer 2003, *S*. Cubana was found in one particular feed mill and spread by contaminated feed to a number of pig farms before being detected. This led to extensive sampling during follow-up.

During the *S*. Cubana outbreak mentioned above compound feeding stuffs and feed material (soy delivered to the farms) were analysed for salmonella. Out of 638 samples 47 (7%) were positive for salmonella. The serotype of the positive samples (n=47) was *S*. Cubana.

Processing plants for animal by-products 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 2539 analysed samples of feed material, 5 [s1](0.2%) were positive for *Salmonella*. 35 (4%) of the 938 analysed samples from critical control points were positive. The figures include follow-up samples and samples taken at specific points because of suspected contamination. The most common serotypes were *S*. Agona (n=12) and *S*. Mbandaka (n=8).

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. This is important concerning broilers 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 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. Vaccination against salmonellosis is not allowed in poultry.
In cattle, pigs and other food-producing animals the control of feed ensures that feed to food producing animals virtually is free from *Salmonella*.

Measures in case of positive findings
Every poultry flock that is 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 source of the infection. Feeding stuffs 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 slaughterhouse.

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 of transport (unless transport to sanitary slaughter), collection of bacteriological samples, and institution of a sanitation plan, i.e. involving elimination of chronically infected animals, cleaning and disinfection, treatment of manure and sludge, and decontamination of feeding stuffs. 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, this is regarded as contamination at slaughter and hygiene measures will be taken at the slaughterhouse.

Every carcass that is contaminated by *Salmonella* is 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.

<u>Poultry and eggs</u>
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 among the grandparents.

Elite-breeding flocks of layers do not occur in Sweden, and broiler breeders are imported as day-old grand parents. During the rearing period, faecal samples are collected five times. Apart from this, caecal samples are also investigated. 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 the greatest, are collected.
All animals that are sanitary slaughtered are tested for *Salmonella*. This also applies for farms where 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 was operational in 2003. The programme is official and supervised by the SBA.

Epidemiological history

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 2002, there were seven poultry farms that were put under restriction due to *Salmonella* infection, six cattle herds, and one pig herd.

Results from 2003

Poultry (Table 3.2.1, 3.2.2, 3.2.4.1)

In total, eleven cases of *Salmonella* in poultry were notified during 2003 (Fig 1.1 and 1.2). Of those, three flocks were layers (*S*. Livingstone, *S*. Agona and *S*. Enteritidis), one was a parent rearing flock with layers that was tested during introduction to Sweden from another EU country *(S*. Montevideo), one broiler flock (*S*. Senftenberg), and one geese/duck holding at three different locations (*S*. Worthington). Also, there was another parent rearing flock that was tested while being introduced to Sweden from another EU country (*S.* Anatum), one commercial flock with turkeys (*S*. Typhimurium phagtype 15A) and one hobbyflock with 5 turkeys (*S*. Typhimurium NST).

There was no postive neck skin sample (*S*. Typhimurium NST) at a slaughterhouse (Table 3.2.4.1 and Fig 1.12, see Salmonella in food).

Pigs (Table 3.2.4, 3.2.4.1)

In 2003, three pig herds, not included in the outbreak described below, were infected with salmonella (Fig 1.3). The isolated serotypes were Typhimurium phagetype104, Muenster and Infantis. However, during the investigation of the *S*. Cubana outbreak (described more in detail below) one pig herd was put under restriction due to *S*. Stanley infection.

In the *Salmonella* control programme, *Salmonella* was isolated from three lymph nodes sampled at three different occasions (Table 3.2.4.1, Fig 1.7, 1.8, 1.10 and 1.11). *Salmonella* Enteritidis phagetype 4 was isolated in a lymph node from a fattening pig and, *S*. Infantis and *S*. Kottbus (respectively) was isolated from adult swine. Serotype Infantis was re-isolated at the farm, which was put under restriction. Table 3.2.4.1 also include voluntary sampling at the pig herds.

Salmonella Cubana outbreak

In the summer of 2003, a feed mill distributed feed contaminated with *S*. Cubana to several pig- and cattle farms, mainly in the county of Östergötland. Tracing of the feed lead to extensive sampling of 137 herds (134 pig herds and 3 dairy herds), due to their purchase of possibly infected feed or, in some cases, due to direct contact with positive herds. In all suspected infected herds faecal samples and samples from the feeding systems were analysed.

In 30 herds, of which all were pig herds, at least one faecal sample was positive for *S*. Cubana. In 18 herds, of which one was a dairy herd, only positive feed samples were found. All these 48 herds were put under restrictions. The restrictions were not lifted until the premises/houses were properly cleaned and disinfected, and all animals in the herd were negative at two consecutive faecal sampling one month apart. This is in accordance with the Swedish *Salmonella* control programme.

In total, more than 50 000 feacal-, environment- and feed samples were analysed. Out of those, 387 (about 0.8%) were positive for *Salmonella*: 248 (64%) were faecal samples, 116 (30%) were feed samples and 23 (6%) environmental (including slurry) samples. From all samplings that gave *Salmonella* positive samples one or more isolates were subtyped.

On three pig farms an additional serotype was isolated apart from *S*. Cubana: *S*. Diarizonae, *S*. Typhimurium and *S*. Stanley. On the farm where serotype Stanley was found, *S*. Cubana was only found in the feed and not in the faecal samples (se above). The two remaining farms were put under restrictions, as *S*. Cubana was isolated in faecal samples.

Cattle (Table 3.4.1, 4.2.4.1)

In 2003, five cattle herds were infected with *Salmonella* (Fig 1.4). Two herds were infected with serotype Dublin, and one each with the serotypes Oritamerin, Tennesse and Diarizonae. Serotype Tennesse was detected in a lymph node in the slaughterhouse surveillance and re-isolated on the farm. The other serotypes were detected at autopsy or at sampling at sanitary slaughter.

There was only one positive lymph node (*S*. Tennessee) from the slaughterhouse surveillance in the *Salmonella* control programme (Table 3.2.4.1, Fig 1.6 and 1.9). Apart from this, *S*. Mbandaka was isolated in swabs from two carcasses from the same slaughterhouse on two consecutive days. No other samples were positive for *Salmonella*. In early 2004, *S*. Mbandaka was isolated on the farm from where the positive pig originated.

In the outbreak of *S.* Cubana caused by contaminated feed, three dairy herds were investigated as they had received potentially contaminated feed from the feed mill (as mentioned above). From one of the herds positive feed samples were found and the farm was put under restriction. There was no positive faecal sample isolated from that particular farm.

Sheep, goats and horses

Salmonella was not detected in sheep, goats and horses during 2003.

Cats (Table 3.2.4)

During early 2003, there was an outbreak of *S*. Typhimurium phagetype 40 among outdoor cats in the southern and middle part of Sweden. In this outbreak, 114 cats were notified as they showed clinical symptoms of salmonellosis (see Table I below). As phagetype 40 is common among passerine birds it was suspected that those were the sources of infection. However, *S.* Typhimurium phagetype 40 was only found in 3 passerine birds. This might reflect that the public only sent a small a few dead birds to the SVA for autopsy.

Other animals (Table 3.2.4)
Salmonella was isolated from 4 dogs, 12 reptiles, 6 wild birds (including the 3 passerine birds mentioned above) and 3 other animals (Table I).

Table I. The number of *Salmonella* serotypes isolated in 2003.

	cats	dogs	reptiles	monkies	wild birds	moose
S. subspecies I			1			
S. subspecies II				1		
S. subspecies IIIb	1		2			1
S. subspecies IV			1			
S. Agona		2				
S. Kisarawe.			2			
S. Montevideo			2			
S. Muenster	1					
S. Newport			2			
S. Oritamerin.					3	
S. Tennessee			2			
S. Typhimurium.	118a	2b			3c	1c

a) Phage type: 40 n=34, NST n=1, not typed n=83 but from the same outbreak
b) Phage type: 40 n=1, not typed n=1
c) Phage type: 40

Antimicrobial susceptibility testing of Salmonella *from animals*

Antimicrobial susceptibility of *Salmonella* is monitored within the Swedish Veterinary Antimicrobial Resistance Monitoring programme, SVARM. Monitoring of antimicrobial susceptibility among *Salmonella* of animal origin has been performed regularly since 1978. Isolates included derive both from active and passive salmonella-monitoring programmes, and both from clinical and non-clinical cases. The first isolate from each food animal species in each notified incident is selected for susceptibility testing. The same inclusion criteria are also used for isolates from other warm blooded animal species, unless the epidemiological situation in a particular year is judged unusual. In year 2003, *Salmonella* was isolated from an unusually large number of cats (116 cases) and therefore only selected isolates were investigated.

Susceptibility to antimicrobials was tested with a microdilution method (VetMIC™) following the recommendations of the National Committee of Clinical Laboratory Standards (NCCLS). Cut-off values are set using microbiological criteria (also called microbiological breakpoints) (Table 3.2.6). The laboratory performing the analyses is accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) to perform antimicrobial susceptibility tests with microdilution methods according to SS-EN ISO/IEC 17025 and regularly participates in external quality assurance.

Results from 2003 (Tables 3.2.5.1–3.2.5.4, 3.2.6, 3.2.7.1)
A total of 101 isolates are included in the material (Table 3.2.5.1). Of these, 54 (53%) were from food-producing animals and the remainder from dogs, cats and wildlife including wild birds. Regarding serotypes, 2 were *S.* Enteritidis, 49 *S.* Typhimurium, 28 *S.* Cubana, 4 *S.*

Dublin, 15 isolates were other serotypes of Subspecies I and 3 isolates were of subspecies IIIb (*diarizonae*). The majority of isolates were from pigs (38%) and cats (39%). The distributions of the MICs for the 101 isolates are given in Table 3.2.7.1.

The low level of resistance among *Salmonella enterica*, as well as in the subset *S.* Typhimurium (Table 3.2.5.3), year 2003 agrees with the results for previous years. Ninety-seven percent of the isolates were susceptible to all tested antimicrobials. One *S.* Typhimurium from a turkey and one *S.* Agona from a dog were resistant to both streptomycin and sulphametoxazole. No multiresistant isolates were demonstrated in year 2003. Among all isolates from food animals isolated from years 1997 – 2003 (n=272), only 7% were resistant to any of the antimicrobials tested and 2% were multiresistant (see SVARM 2003).
In light of this, the overall situation of antimicrobial resistance in *Salmonella* is favourable. There are no indications of spread of multiresistant clones among food-producing animals within the country, nor is there among the notified incidents in wild animals any evidence of spread of such clones.

More information on use of antimicrobials, and on antimicrobial resistance in zoonotic bacteria, indicator bacteria and other bacteria of animal origin can be found in the report SVARM 2003 (available at http://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 2003 (Table 3.3.1–3.3.2)
<u>Sampling at cutting plants</u>
In total, 5541 samples (4411 from beef and pork, and 1130 from poultry) were collected from cutting plants supervised by SLV (Fig 1.13 and 1.14). All samples were negative.

Furthermore, 4209 neck skin samples were collected from poultry at the slaughterhouses, all which were negative (Fig 1.12).

Official control performed by municipalities
243 local municipalities reported 10209 samples being analysed for *Salmonella*. Of those, 17 (0.2 %) were positive. This should be compared with 0.9 % positive samples in 2002 and 0.5% positive samples in 2001. Part of the explanation for this decrease is that the percentage of positive cases of *Salmonella* in poultry and poultry products has decreased from 10.4 % in 2002 to 0.6 % in 2003. Whether this is in fact a permanent improvement in products of foreign origin or a result of changed sampling schemes remains to be seen.
In ready-to-eat foods the municipalities reported only 3 (0.1%) positive samples in 3900 analysed samples.

Spot-checks of consignments originating from EU
13 consignments were found contaminated with *Salmonella* when spot checks were performed on fresh meat originating from various EU-countries. One of the 13 consignments was contaminated with two serotypes. *Salmonella* Typhimurium was isolated from 7 of the 13 consignments. Other serotypes found included *S*. Agona, *S*. Dublin, *S*. St Paul, *S*. Enteritidis, *S*. Derby and *S*. Tennessee. 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. Also, contact persons are sampled when there are cases/outbreaks of *Salmonella*. In this report, both total number of cases and cases based on reports by physicians are reported. Information about country of origin is available only in the reports from the physicians. Investigations to trace the source of the infection are always performed.
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 2002 there were 3892 cases in total, of those were 819 (78%) of domestic origin.

Results from 2003 (Table 3.4.1, 3.4.2)
During 2003 the total number of cases decreased for the forth year in a row to 3794. 3648 were clinical reports by the physicians and of those were 2832 (78 %) infected abroad and 806 (22 %) were domestic (annual incidence 9/100.000). The high number of outbreaks can

explain the relatively high number of domestic cases during the year. Five cases of unknown country of infection were reported. *Salmonella* Typhimurium was the most common domestic serotype reported (n=315) followed by *S.* Enteritidis (n=172) and *S.* Hadar (n=53).

Thirteen food borne outbreaks were reported in 2003:

- *S.* Typhimurium phage type 66: In January, eight persons in different towns in the southern parts of Sweden fell ill after having eaten falafel.
- *S.* Enteritidis NST: In February, 18 persons were infected in the western parts of Sweden. A case-control study was carried out, which showed a higher risk of contracting salmonellosis after having consumed different kind of sprouts. *Salmonella* was never isolated from the food.
- *S.* Anatum: Ten persons were infected during the spring after having eaten in a personnel canteen. A cohort study was carried out, which indicated spits of minced meat as the probable source of infection.
- *S.* Agona: 17 persons fell ill during the first half of the year, most of them connected to the same town. A case-control study was carried out. The only food item that seemed to heighten the risk of getting ill was kebab, but only half of the cases said that they had eaten kebab.
- *S.* Enteritidis phage type 1b: Nine persons who had eaten at a different kindergarten, or at a personnel canteen, contracted salmonellosis in June. The different places had the same egg supplier. *S.* Enteritidis phage type 1b was also isolated from the supplying stock of laying hens.
- *S.* Typhimurium phage type 104: In June, two people were infected after having eaten several layer cake in their home.
- *S.* Haifa: Seven persons contracted salmonellosis. Kebab from a couple of restaurants was the suspected source of infection.
- *S.* Typhimurium phage type 104: 16 persons fell ill in July. They had eaten a buffet arranged at a golf club.
- *S.* Typhimurium phage type 108: 148 persons fell ill during the summer after having consumed kebab produced by Danish loin of pork. A majority of the cases had eaten at the same restaurant in a southern county of Sweden, but also other parts of the country were affected.
- *S.* Typhimurium phage type 104: In September, three persons were infected. They had eaten a buffet at a private party.
- *S.* Oranienburg: In September four members of the same family fell ill. They had eaten kebab at a pizzeria.
- *S.* Hadar: 53 persons were infected in three different clusters during the summer and autumn in the southern and middle parts of Sweden. Many of the cases had consumed food (mainly salad and sandwiches) containing already grilled chicken from the same producer. For the first cluster *Salmonella* was recovered also from chicken from this producer. A case-control study was carried out and indicated already made sandwiches as being a risk factor.
- *S.* Typhimurium phage type 120: 74 persons were infected after having eaten a Christmas buffet at a restaurant in the southern parts of Sweden. The cohort study that was performed did not uncover any risk factors but on the other hand *Salmonella* of the same phage type was isolated from the Danish ham.

Relevance as a zoonotic disease
There is a risk of contracting domestic salmonellosis. As Swedish red- and white meat basically is free from *Salmonella*, it may be considered that the vast majority of cases are secondary to imported cases, or due to consumption of imported contaminated food.

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 pigs, the diaphragm muscle is analysed and from horses the diaphragm muscle or musculus masseter. 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 approximately 5-10% of the Swedish fox population is infected with *T. spiralis*, *T. nativa* or *T. britovi*. *Trichinella nativa* is found from wild boars and lynx. In domestic pigs, trichinosis has not been reported since 1994. However, sporadic cases (<3 per year) have been reported in free living or farmed wild boars between 1997-1999. In 2002, 4 (1%) out of 340 foxes tested positive and 1 (1%) out of 104 lynxes.

Results from 2003 (Table 4.1)
No case was identified among all slaughtered pigs and horses that were tested for *Trichinella.* However, among the slaughtered wild boars, three were positive. In foxes, 7 (3%) out of 215 tested animals were positive, 1 (25%) of 4 wolves, 1 (4%) out of 24 brown bears and 3 (5%) out of 57 tested lynx.

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 has been no reported case of human trichinosis since 1997.

Results from 2003
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, veterinarians and the public are advised to send bats that are found dead to the SVA for rabies investigation, and hunters are encouraged to notify SVA about 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 of animals is only allowed in dogs and cats that are to be 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. From 2000 to 2002, between 11 and 54 bats have been investigated. All have been negative. In 2002, 54 bars were investigated.

Results from 2003 (Table 5.1)
There was no rabies case in Sweden in 2003. 26 bats were tested with negative result, the majority originating from the southern part of Sweden. The number of bats sent to SVA was higher, but due to mummification not all of them could be examined. The decreased number of bats examined at SVA during 2003 compared to 2002 is probably due to the fact that the information campaign during 2003 was less successful compared to previous year.

Eight dogs and 14 cats were examined for rabies; the majority of them were illegally imported to Sweden. Two foxes were also examined and found negative.
Two squirrels illegally imported from Thailand were also examined for rabies after they had bitten the owner and one of the squirrels had died. One of the squirrels first gave a false positive result on FAT but both squirrels were later confirmed negative by repeated FAT and mouse inoculation test.

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 2003
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 was implemented. During that period the prevalence varied between 9-16%. In July 2001 a new and more sampling intensive *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 showed that 760 (20%) flocks, out of 3842, were positive for *Campylobacter*. In 162 (21%) of the investigated flocks, 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%.

Results from 2002 (Table 6.1.1)
In 2003, 3224 flocks were tested. Out of those, 566 (18%) tested positive for *Campylobacter*. During the period with the highest prevalence of *Campylobacter* (August to December), a study was done which showed that the majority of positive flocks were infected during the last week before slaughter. The results showed that 8% of the flocks turned positive one to two weeks before slaughter, 19% 24 hours before slaughter, and 23 % at slaughter.

Antimicrobial susceptibility testing of Campylobacter *from animals*

Antimicrobial susceptibility of *Campylobacter* is monitored within the Swedish Veterinary Antimicrobial Resistance Monitoring programme, SVARM. This year, the monitoring has focused on pigs. Samples for culture of *Campylobacter* spp. were selected from the total number of samples of colon content from healthy pigs collected at abattoirs with the purpose of isolating indicator bacteria (see antimicrobial susceptibility testing of *Escherichia coli*). The selection was made taking the annual volume slaughtered at each abattoir into account, with the aim to isolate approximately equal numbers of isolates of *Campylobacter* from each quartile of the year. The majority of the isolates were identified as hippurate-negative thermophilic *Campylobacter* (n=100; presumably *C. coli*), and only 5 isolates were classified as *C. jejuni*.

Susceptibility to antimicrobials was tested with a microdilution method (VetMIC^{TM}). Cut-off values are set using microbiological criteria (also called microbiological breakpoints) (Table 6.1.5). The laboratory performing the analyses is accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) to perform antimicrobial susceptibility tests with microdilution methods according to SS-EN ISO/IEC 17025 and regularly participates in external quality assurance.

Results from 2003 (Table 6.1.2–6.1.3, 6.1.5)
The distribution of the MICs for the hippurate-negative thermophilic *Campylobacter* isolates is given in Table 6.1.3 and the proportion classified as resistant in Table 6.1.2. All isolates were susceptible to ampicillin, erythromycin and gentamicin, and only one isolate was resistant to tetracycline. The apparent absence of resistance to erythromycin indicates that the prevalence of resistance is very low, which is noteworthy as higher levels are often reported from many other countries. By contrast, resistance to enrofloxacin (16%) and nalidixic acid (18%) was more common than in reports from some other regions. This comparatively high prevalence is difficult to explain as the exposure of Swedish pigs to is assumed to be low. Among the five isolates of *C. jejuni*, one was resistant to erythromycin, nalidixic acid and enrofloxacin.

More information on use of antimicrobials, and on antimicrobial resistance in zoonotic bacteria, indicator bacteria and other bacteria of animal origin can be found in the report SVARM 2003 (available at http://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 2003 (Table 6.2)
The local municipalities reported 602 *Campylobacter* analyses during 2003. 466 samples were from poultry and poultry products of which 57 (12%) were positive. No positive samples were found in any of the other food categories that were sampled but for each of these the total number of samples was so small that no conclusions should be drawn from these results.

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. However, in 2002 the number of reported cases (7137 cases) decreased slightly compared with the preceding years. There is a peak of cases during the summer months. Reasons for this are unknown, but it can be speculated that increased outdoor activities play a role. It may also be suggested that increased travelling leads to increased number of cases acquired abroad.

Results from 2003 (Table 6.3)
During 2003, a total of 7149 cases of campylobacteriosis were reported, which is almost the same number as the year before. Physicians reported 6656 cases and of those 2685 (40%) were infected in Sweden (annual incidence 30/100.000). This is an increase in comparison to the year before, which mainly was observed during the autumn.

Five outbreaks of campylobacteriosis were reported in 2003:

- In January more than 3000 persons got ill after having drunk contaminated water. From 101 of these *Campylobacter* were isolated.
- In June five people were infected. They had eaten badly prepared chicken in connection to a racer competition.
- The same month ten persons fell ill in Stockholm. They had eaten chicken salad.
- In the beginning of the summer seven persons in the western parts of Sweden contracted campylobacteriosis. They had been at a picnic and among other things eaten sausages. There were no sausages left over for sampling.
- In August a woman and her two children fell ill after having swam in a lake. *Campylobacter* were isolated several times from the lake and its outlet.

Relevance as a zoonotic disease
A significant part of the cases of campylobacteriosis are domestic. It is un-known how many of those that are caused by consumption of poultry. It needs to be investigated how effective it would be to implement measures in order to reduce the prevalence of campylobacter in broilers, and which measure that would be most effective.

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 immunohistochemistry 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
Before 1999, there were between 10 and 20 reported listeria infections in animals per year. However, the number of cases increased from 1999 and onward (33-51 per year). An explanation for this may be the increased number of cattle and sheep that are autopsied due to

the TSE surveillance, thereby increasing the chance of finding listeriosis. In 2002, 32 of 51 cases were sheep and 12 were cattle.

Results from 2003
There were 33 reports of *Listeria* infection in animals. Out of those, 24 were sheep, 4 cattle, 2 goats and three wild animals.

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 the food is regarded as unfit for human consumption if of 5 samples 3 or more are found positive or 1 or more contains ≥ 100 *L. monocytogenes*/gram. At retail level, where usually only one sample is taken the food will be regarded as unfit for human consumption if ≥ 100 *L. monocytogenes* /gram is found. Food for young children and sensitive populations are regarded as unfit for consumption if *L. monocytogenes* is found, regardless of concentration.

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 2003 (Table 7.1)
The local municipalities report only 118 analyses altogether for 2003, of those 3 (2,5 %) were positive. Two of these positive samples were fish products; the remaining was a vegetable product.

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). There was an unexplained increase during 2000 (53 cases) and 2001 (67 cases). In 2002, the number of cases decreased to 39.

Results from 2003 (Table 7.2)
A total of 48 cases were reported in 2003. Of those, 71% were older than 65-years of age. The incidence was 0.5/100 000 inhabitants. One of the cases was a pregnant woman. 43 cases were of domestic origin, and five were 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 2003
Altogether 90 samples, representing different categories of food, were reported by the local municipalities being analysed for *Y. enterocolitica*. No positive sample was found.

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. However, since then there has been a steady decrease that probably is due to improved hygienic technique during slaughter of swine and/or less sampling for *Yersinia* spp. in patients. In 2002, a total of 610 cases were reported. There has been a change in the distribution of cases throughout the country with an increase in the northern parts.

Results from 2003 (Table 8.3)
During 2003, a total of 714 cases were reported, which is a great increase from the year before. The physicians reported 648 cases and of those were 536 (83 %) of domestic origin (annual incidence 6/100.000). This is also an increase compared with the previous years. The increase was observed almost exclusively during the summer months June to August. 88 persons contracted the disease abroad.

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, whereas the Copro-Elisa-test and sedimentation is used in foxes. 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. From moose's, there have been two positive findings of *E. granulosus*, one in the early 1980s in the southern part of Sweden and one in 2000 in the central part of the country.

Since 2001 there has been an annual investigation of 300-400 foxes in order to detect *E. multilocularis* and *E. granulosus*. None of the investigated animals tested positive.

Results from 2003 (Table 9.1)

In the annual survey, 394 foxes were investigated for presence of *Echinococcus*, none tested positive. Apart from this, one cattle and three wildlife animals tested 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 since then 3-11 cases have been reported annually, all being infected abroad.

Results from 2003 (Table 9.2)

Four cases were reported, of those, none was known to have contracted the disease in Sweden.

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 for *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 2002, 20 (51%) out of 39 samples from cats were positive, 8 (22%) of 37 sheep and 3 (17%) of 18 horses. 30 samples from dogs, goats and wildlife animals were negative.

Results from 2003 (Table 10.1)
Twenty two (39%) of 56 serologically investigated cats were positive for *T. gondii*, 3 (18%) of 17 sheep, 7 (70%) of 10 goats, and 1 (4%) of 24 tested dogs. None of ten investigated horses were positive. Apart from this, faecal samples were investigated from 100 cats, all which were negative. Two out of three other animals were positive.

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 2003 (Table 10.2)
In 2003, seventeen cases were reported. Of these, eight were known to be of domestic origin.

Relevance as zoonotic disease
Clinical toxoplasmosis is most important in immuno-suppressed persons and in pregnant women. The infection can be transmitted from the mother to the foetus and cause serious and fatal injury. There is little information about the most common sources of infection, however undercooked or raw meat is considered important.

VEROCYTOTOXIC E. COLI O157

VTEC O157 in animals

Animals are sampled if livestock contacts are reported in connection to a human case of VTEC O157 (or *E. coli* O157) infection. VTEC O157 is notifiable in animals if there is an

epidemiological link to human VTEC infection. Apart from this, the meat industry collects swabs annually from carcasses at the slaughterhouse.
A case is defined as an animal from which VTEC O157 is isolated. 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 Pulse Field Gel Electrophoresis (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 VTEC infection (Table II).

In 1998 a survey was conducted at slaughterhouse level in other animals but cattle. The results showed that 0.8 % (4/474) lambs and 0.9 % (1/109) sheep and 0.08% (2/2446) pigs were positive for VTEC O157.

Between 1997 and 2002, around 2000 faecal samples were collected annually from cattle at the slaughterhouses for bacteriological investigation of VTEC O157. The number of samples collected at each slaughterhouse was proportional to the number of slaughtered cattle. Results from theses studies showed that between 0.3% and 1.7 % of collected faecal samples were positive for VTEC O157. The highest prevalence were recorded in young animals. During 2000 to 2002, the mean prevalence among barley-beef calves (7-9 months at slaughter) was 5.3%, compared with 1.6% among young bulls (12-18 months at slaughter) and 0.7% among adult cattle. Results from 2002 showed that 1.4% (29/2032) individuals were positive for VTEC O157. As the situation has been stable between 1997 and 2002, it is from 2003 considered sufficient to perform prevalence studies every 3rd-5th year. Thus, no faecal samples were collected and analysed from cattle in 2003.

Since 1996, the meat industry (Swedish meats) have analysed between 334 and 968 swabs from carcasses at the slaughterhouses (Fig 4.1). During most of the years, no positive samples were found. This was also the case for 2002.

In 2002, there was a human VTEC outbreak in southern Sweden, caused by fermented cold-smoked sausages that were contaminated with VTEC O157. At trace-back it was found that the meat in the food product originated from at least 15 farms in the area. Even if VTEC O 157 was isolated from five of the 15 farms, none of the isolated strains was the same as the VTEC strain that caused the human cases, as shown by PFGE.

Table II. Number of cattle herds with suspected- and confirmed connection with human VTEC O 157 infection between 1996 and 2003.

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]
2003	6	3

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

Results from 2003 (Table 11.1)
755 swabs were collected at the slaughterhouse by the meat industry (Fig 4.1). All samples were negative. No prevalence study of VTEC in faeces from cattle was performed during 2003, as the situation was stable between 1997 and 2002 (see Epidemiological history).

Six cattle farms were sampled for the presence of VTEC O157 in tracing of human VTEC infection. Out of those, three cattle herds were found to be the source of human infection, as shown by use of PFGE. This suggested that the cattle, or products thereof, were the sources of infection. In fact, some patients had fallen ill after having consumed un-pasteurised milk from two of the three farms.

Measures in case of positive findings associated with clinical VTEC infection in man:
There are established guidelines and recommendations of how to handle VTEC O157 in cattle when associations have been made with human VTEC infection. These recommendations include for example 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. The given guidelines and recommendations are to be revised in 2004.

VTEC O157 in food

There is no surveillance system for VTEC O157 in food. However, bacteriological examination for VTEC O157 is performed on a voluntary basis on slaughtered animals originating from infected herds. Isolation of VTEC 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, the SLV will take action, on a case-to-case basis, 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 2003

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

VTEC infection in humans

Infection caused by *VTEC* O157 (EHEC in former reports) is a notifiable disease under the Communicable Disease Act and 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 *VTEC* O157 has been isolated.

Epidemiological history
In late 1995 and early 1996, there was an outbreak of VTEC O157 including approximately 120 cases. The outbreak increased the awareness of VTEC O157 and after this incidence most people with haemorrhagic diarrhoea are investigated for VTEC O157. Between 1998 and 2001, the number of human cases varied between 59 and 97. The majority of cases are reported from the southwest part of Sweden.

During 2002, physicians reported 129 cases. Of those, 108 (87%) were of domestic origin. This sudden increase in number of cases was caused by two outbreaks. The first outbreak included 11 persons that contracted the infection on the beach at the Swedish west coast. However, bacteriological samples from the beach and the water were negative. The other outbreak included 28 persons in the county of Skåne. The source of infection was fermented cold-smoked sausage from a local producer. In this outbreak the same strain of VTEC O157 that was isolated from the food item as in the VTEC patients.

Results from 2003 (Table 11.3)
During 2003, 73 cases were reported. Of those, 70 were clinical reports by the physicians and 58 laboratory reports. 53 (76 %) of the cases reported by the physicians were of domestic origin (annual incidence 0.6/100.000). This is a great reduction of the number (about half) in comparison to the year before, which can be explained by the absence of outbreaks. 16 (23 %) persons were infected abroad.
In 2003, the sex distribution, which was observed previous years (a majority of the cases were women), was changed and an equal number of men and women were infected.

There were seven cases of HUS reported, of which all except one were reported in children <15 years of age. Of the HUS cases, two were infected abroad. VTEC O157 caused six of the HUS cases.

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 VTEC infections in humans. More research is needed

to estimate the true occurrence of these serotypes in animals, food and humans as well as their zoonotic impact.

Food borne outbreaks

The physicians and the laboratories report infections caused by a disease that is notifiable under the Communicable Disease Act. Outbreaks, in turn, are identified at the municipality level, by the Medical County Officer for Infectious Disease Control (smittskyddsläkare) or by the Swedish Institute of Infectious Disease Control (SMI). The municipalities are responsible in conducting investigations of food borne outbreaks. In larger outbreaks, the investigation is often assisted by the SMI.

The figures reported are outbreaks that were identified during 2003. It may be suspected that minor outbreaks that include few cases remained un-detected. Also, the majority of infections caused by zoonotic agents are sporadic with un-known sources of infections.

Result from 2003 (Table 12)
In 2003, 18 outbreaks, caused by agents that this report covers, were detected and reported. Out of those, 13 were caused by Salmonella and five by Campylobacter. The outbreaks are described in detail under the sections "*Salmonella* in humans" and "*Campylobacter* in humans".

Antimicrobial susceptibility testing of *Escherichia coli* from animals

Antimicrobial susceptibility of indicator bacteria (*Escherichia coli* and *Enterococcus* spp) from pigs is monitored within the Swedish Veterinary Antimicrobial Resistance Monitoring programme, SVARM. This year, the monitoring has focused on pigs. The isolates included are from colon content from healthy pigs sampled at seven abattoirs. These abattoirs are geographically separated and accounted for 75% of the total volume of pigs slaughtered in Sweden during 2001. The number of samples collected at each abattoir was proportional to the respective annual slaughter volume. Sampling was performed weekly, with exceptions for holidays and summer vacations, by meat inspection staff or abattoir personnel. Each sample represents a unique herd. By these measures, bacterial isolates included are from randomly selected healthy individuals of Swedish slaughter pig herds.

Susceptibility to antimicrobials was tested with a microdilution method (VetMIC^{TM}) following the recommendations of National Committee of Clinical Laboratory Standards (NCCLS). Cut-off values are set using microbiological criteria (also called microbiological breakpoints) (Table 13.4). The laboratory performing the analyses is accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) to perform antimicrobial susceptibility tests with microdilution methods according to SS-EN ISO/IEC 17025 and regularly participates in external quality assurance.

Results from 2003 (Table 13.1, 13.2, 13.4)
The monitoring includes 303 isolates of *E. coli* from pigs. Isolates were obtained from 83% of 367 samples cultured, a similar isolation frequency as in SVARM 2000 and 2001. The distribution of MICs of the tested antimicrobials is shown in Table 13.2.

The proportions of resistance are low and have been stable over the three years studied (2000, 2001 and 2003; see SVARM 2003 for compiled results). In year 2003, the majority of isolates (78%) were sensitive to all 14 antimicrobials tested but 67 isolates were resistant to at least one substance. Resistance to tetracycline, sulphonamides or streptomycin were the most common traits (9-12%) (Table 13.1). Ampicillin or trimethoprim resistance was less common (3-4%) and only occasional isolates were resistant to amoxicillin/clavulanic acid, chloramphenicol, enrofloxacin, nalidixic acid or neomycin. No isolate was resistant to florfenicol, apramycin, ceftiofur or gentamicin. Thirty-four isolates (11%) were resistant to more than one antimicrobial and 15 isolates (5%) were multiresistant, i.e. were resistant to three or more of the antimicrobials tested (Table 13.1).

More information on use of antimicrobials, and on antimicrobial resistance in zoonotic bacteria, indicator bacteria and other bacteria of animal origin can be found in the report SVARM 2003 (available at http://www.sva.se).

Definitions

Animal data

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

Notification: A passive system to collect data.

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

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

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

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

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

Human data

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

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

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

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

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

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

Table 1.1.1. Bovine tuberculosis, 2003

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.	3*	0
Other routine investigations: tests at AI stations (h):	521**	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):	5***	0

* Positive in tuberculin test, but negative in culture and histological examination

** including breeding animals, import, export and routine testing

*** culture n=3, histology n=5

n.a not available

Table 1.1.2. Tuberculosis in farmed deer, 2003

Sweden

MANDATORY — **FARMED DEER**

Number of herds under official control:	585*	Number of animals under official control:	20 057**

	"OTF" herds	"OTF" herds with status suspended	Herds infected with tuberculosis
Status of herds at year end (a):	488	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:	20	1	0
Routine tuberculin test (c) - data concerning animals:	2 065	2***	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
	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):	16***	0	

*total number of herds 605

**15 538 fallow deer and 4 519 red deer

***Two tuberculin positive deer from one herd. Both were negative in culture and histological examination.

*** culture n=12, histology n=16

Table 1.1.3, 1.2 Tuberculosis in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*M. bovis*	*M. tuberculosis*
Pigs	SVA, SJV	a	animal	78*	0		
Horses	SVA, SJV	a,b	animal	3	0		
Dog	SVA, SJV	b	animal	1	0		
Cat	SVA, SJV	b	animal	1	0		
Elk	SVA, SJV	a,b	animal	3	0		
Other	SVA, SJV	a,b	animal	2	0		
Zoo animal							
Elephant	SVA, SJV	b	animal	2	2		2
Reindeer	SJV	c	animal	34	0		
Other	SVA, SJV	b	animal	2	0		

a) meat inspection of all slaughtered animals

b) autopsy

c) tuberculin test at import and export

*culture n=56

Table 1.2 Bovine tuberculosis in man

	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Tuberculosis						
M. bovis	5	0.06	4		1	

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

Table 2.1.1. Bovine brucellosis, 2003

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	0	0
	Units tested	**Units suspected**	**Units positive**
Routine testing (d1) - data concerning herds:	2012*	0	0
Routine testing (d2) - number of animals tested:	1000	0	0
Routine testing (d3) - number of animals tested individually:	0	0	0
		Herds suspected	**Herds confirmed**
Follow-up investigation of suspected cases: trace, contacts (e):		0	0
	Animals tested	**Animals suspected**	**Animals positive**
Other routine investigations: exports (f):	0	0	0
Other routine investigations: tests at AI stations (g):	909**	0	0
	All animals	**Positives**	**Contacts**
Animals destroyed (h):	0	0	0
Animals slaughtered (i):	0	0	

VOLUNTARY — **CATTLE**

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

* bulk tank milk

**Mainly including breeding animals, but also export, import and routine testing.

Table 2.1.2. Ovine and caprine brucellosis, 2003

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:	n.a.	0	0
Routine testing (d) - data concerning animals:	10530*	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):	18**	0	0

	Holdings tested	Holdings suspected	Holdings positive
Other investigations: holdings at risk (j):	0	0	0

	Samples tested	Brucella isolated
Bacteriological examination (k):	1	0

* 10258 sheep and 272 goats

** 7 sheep and 11 goats. Mainly import, but also including export and routine testing

Table 2.1.3. , 2.3 Brucellosis in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	*B. melitensis*	*B. abortus*	*B. suis*
Pigs	SVA	a	animal	4938	0			
Others								
dog	SVA		animal	90	0			
reindeer	SVA		animal	67	0			
elk	SVA		animal	5	0			
other (mainly zoo animals)	SVA	b	animal	16	0			

a) including 1937 routine samples and 3000 survey samples

b) import or export

Table 2.3. Brucellosis in man, 2003

	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Brucellosis	3	0.03			3	
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	1	1	
45 to 64 years			
65 years and older	1	1	
Age unknown			
All age groups	3	3	0

Table 3.1.1. Salmonella sp. in feed material of animal origin, 2003

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium	*Please specify*		
Milk products	SJV	d,e			n.a.	-					
Land animal products											
Meat meal	SJV	-			-	-					
Meat and bone meal	SJV	b,c,d,e	sample		932	3			See table 3.1.a		
Bone meal	SJV	-	-		-	-					
Greaves	SJV	b,c,d	sample		360	1			See table 3.1.a		
Poultry offal meal	SJV	e			n.a.	-					
Feather meal	SJV	e			n.a.	-					
Blood meal	SJV	-			-	-					
Animal fat	SJV	c,d,e			n.a.	-					
Fish, other marine animals, their products and by-products, other fish-products											
Fish meal	SJV	b,c,d	sample		228	0					
Fish oil	SJV	c,d			n.a.	-					
Fish silage	SJV	e			n.a.	-					
Other fish products	SJV	-			-	-					
Others											
Protein meal*	SJV	b,c,d	sample		833	1			See table 3.1.a		
Blood products	SJV	b,c,d	sample		186	0					
Environmental samples	SJV	a,c	sample		938	35			See table 3.1.4.b		

a) Compulsory sampling (national requirements
b) Compulsory sampling (EU requirements
c) Voluntary sampling
d) Production
e) Import
* Greavemeal added with protein residue
n.a. not avialable

Table 3.1.2. Salmonella sp. in feed material of vegetable origin, 2003

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.	-					
Wheat (and derived)	SJV	c			n.a.	-					
Maize	SJV	c			n.a.	-					
Maize (derived)	SJV	a,c,e	sample		n.a.	3			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.	4			See table 3.1.4.c		
Palm kernel derived	SJV	a,c,e	sample		n.a.	1			See table 3.1.4.c		
Soya (bean) derived	SJV	a,c,e	sample		n.a.	53		2	See table 3.1.4.c		
Cotton seed derived	SJV	-			-	-					
Sunflower seed derived	SJV	c			n.a.	-					
Linseed derived	SJV	c			n.a.	-					
Other oil seeds derived	SJV	c			n.a.	-					
Other materials											
Legume seeds, ...	SJV	c			n.a.	-					
Tubers, roots, ...	SJV	c			n.a.	-					
Other seeds and fruits	SJV	c			n.a.	-					
Forages and roughage	SJV	c			n.a.	-					
Other plants, ...	SJV	c			n.a.	-					
Other sampling											
Environmental samples from domestic wheat storage plants	SJV	a,d	sample		173	0					
Environmental samples from domestic rape seed processing plant	SJV	a,c,d	sample		1083	66			See table 3.1.4.e.		
Rape seed derived samples from domestic processing plant	SJV	a,c,d	sample		1252	6			See table 3.1.4.c.		

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 seperated below

n.a. not avialable

Table 3.1.3. Salmonella sp. in compound feedingstuffs, 2003

Sweden

Categories	Source of information	Remarks	Epidemiological unit	Sample weight	Units tested	Units positive	S. Enteritidis	S. Typhimurium			
Cattle											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Pigs											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Poultry											
Poultry (not specified)											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Poultry - Breeders											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Poultry - Layers											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Poultry - Broiler											
Process control	SJV	a,c,d,f			f	f					
Final product	SJV	c,f			n.a.	-					
Pet food											
Dog snacks (pigs ears, chewing bones)	SJV	a,b,e	sample		n.a.	15	2	3	See table 3.1.4.f		
Other											
Control in feed mills (HACCP)	SJV	a,d	sample		7746	30			See table 3.1.4.d		
Control in feed mills (HACCP)	SJV	c,d,g*	sample		1802	48			See table 3.1.4.d		
Compound feedingstuffs for livestock animals**	SJV	c,d,g	sample		638	47			S. Cubana		

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) Including follow-up samples of positive findings
n.a. not available
* Total number is not known. Samples include those analysed at the National Veterinary Institute and from official control.
** Includes raw material (soya) delivered to farms

Sweden

Table 3.1.4. *Salmonella* serotypes isolated in the feed control 2003

Sorted according to serotype.

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

After heat treatment Serotype	No. of isolates
S. Braenderup	1
S. Give	1
S. Mbandaka	2
S. Montevideo	1
Total	5

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

Serotype	No. of isolates
S. Agona	12
S. Anatum	2
S. Braenderup	1
S. Bredeney	3
S. Lille	4
S. Mbandaka	8
S. Senftenberg	5
Total	35

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

Serotype	No. of isolates
S. Agona	3
S. Anatum	1
S. Cerro	1
S. Cubana	3
S. Gloucester	2
S. Havanna	1
S. Infantis	1
S. Javiana	2
S. Lexington	5
S. Livingstone	3
S. Mbandaka	10
S. Meleagridis	1
S. Montevideo	1
S. Oranienburg	2
S. Orion	1
S. Oukam	2
S. Putten	1
S. Rissen	2
S. Senftenberg	8
S. Subspecies I	6
S. Schwartzengrund	1
S. Tenessee	4
S. Typhimurium	1
S. Typhimurium 99	1
S. Worthington	1
S. Yoruba	2
Unknown	1
Total	67

d. Salmonella serotypes detected in samples from feed mills

Serotype	No. of isolates
S.Agona	2
S Anatum	2
S. Braenderup	1
S. Bredney	3
S. Cerro	1
S. Cubana	39
S. Glostrup	1
S. Havana	1
S. Infantis	1
S. Kentucky	1
S. Kingston	1
S. Lexington	3
S. Mbandaka	3
S. Oritamerin	1
S. Rissen	1
S. Senftenberg	8
S. Subspecies I	1
S. Tennessee	1
S. Tinda	1
S. Typhimurium DT 120	1
S. Umbilo	3
S. Youroba	2
Total	78

e. Salmonella serotypes detected in environmental samples from processing plants producing feed material of vegetable origin

Serotype	No. of isolates
S. Cubana	51
S. Livingstone	2
S. Mbandaka	10
S. Senftenberg	3
Total	66

f. Salmonella serotypes detected in dog snacks

After heat treatment Serotype	No. of isolates
S. Derby	2
S. Enteritidis	2
S. Infantis	4
S. Subspicies I	2
S. Typhimurium	4
Unknown	1
Total	15

Table 3.2.1. Salmonella sp. in poultry breeding flocks (Gallus gallus), 2003

Sweden

Sweden	Source of information	Remarks	Flocks tested	Flocks positive	S. Montevideo	S . Anatum
Egg production line						
Breeding flocks						
Elite	SJV	a				
Grandparents	SJV	b	3	0		
Parents						
Day-old chicks	SJV	b	10	0	0	
Rearing flocks	SJV	b	10	1	1	
Productive period	SJV	b	10	0		
Parents, unspecified						
Meat production line						
Breeding flocks						
Elite	SJV	a				
Grandparents	SJV	b	9	0		
Parents						
Day-old chicks	SJV	b	86	0		
Rearing flocks	SJV	b	86	0		
Productive period	SJV	b	86	0		
Parents, unspecified						
Production line, not specified						
Breeding flocks (turkeys)						
Elite	SJV	a				
Grandparents	SJV	a				
Parents						
Day-old chicks	SJV	b	6	0		
Rearing flocks	SJV	b	6	1		1
Productive period	SJV	b	6	0		
Parents, unspecified						

a) None in Sweden

b) In the health control

Table 3.2.2. Salmonella sp. in other commercial poultry, 2003

Sweden

Animal species	Source of information	Remarks	Flocks tested	Flocks positive	S. Enteritidis	S. Typhimurium	S.Seftenberg	S. Agona	S. Livingstone	S. Worthington
Fowl (Gallus gallus)										
Layers										
Day-old chicks										
Rearing period	SBA		393							
Productive flocks	SBA		785	3	1			1	1	
Layers, unspecified										
Broilers										
Day-old chicks										
Rearing period										
Broilers, unspecified	SPMA		2806	1			1			
Fowl (Gallus gallus), unspecified										
Day-old chicks										
Rearing period										
Productive flocks										
Fowl, unspecified										
Ducks										
Breeders										
Productive flocks										
Ducks, unspecified	SBA		42	1						1
Geese										
Breeders										
Productive flocks	SBA		30	2						2
Geese, unspecified										
Turkeys										
Breeders										
Productive flocks	SPMA		290	2		2				
Turkeys, unspecified										

SBA - Swedish Board of Agriculture

SPMA - Swedish Poultry Meat Association

Table 3.2.4. Salmonella sp. in animals (non poultry), 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	Units positive	S. Enteritidis	S. Typhimurium	S. Dublin	S. Cubana	S. Stanley	S. Other*
Cattle	SJV		herd	n.a.	5			2			3
	SJV	a, b	herd	3	0						
Sheep											
Goats											
Pigs											
Breeding herds											
Fattening pigs											
Pigs, unspecified	SJV		herd	n.a.	4		1			1***	2
Pigs, unspecified	SJV	a, b	herd	134	30				30		
Solipeds											
Other											
Cats	SVA	c	animal	n.a.	120		118				2'
Dogs	SVA		animal	n.a.	4		2				2
Reptiles	SVA		animal	n.a.	12						12
Other animals	SVA		animal	n.a.	9						9

a) Herds analysed in the outbreak caused by *S*. Cubana contaminated feed.

b) feacal- and feed samples. Approximately 50.000 feacal-, feed- and environmental samples were investigated,
Of those, 387 were positive for *S*. Cubana.

c) During 2003 there was an outbreak of *S*. Typhimurium phage 40 among cats.

* See text

** Found in the investigation of the S. Cubana outbreak

Sweden

Table 3.2.4.1. *Salmonella* sp. in cattle, pigs and fowls, results of surveillance at slaughterhouses, 2003

Number of animals/herds sampled in the Swedish 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
Cattle	major sl.h.	ln.	animal	2959(1)	S. *Tennessee*	1		1
	minor sl.h.	ln.	animal	282		0		
	major sl.h.	swab	animal	2919	S. *Mbandaka*	2**		
	minor sl.h.	swab	animal	301		0		
Adult pigs	major sl.h.	ln.	animal	2907(2)	S. *Kottbus*	1		
					S. *Infantis*	1		1
	minor sl.h.	ln.	animal	108		0		
	major sl.h.	swab	animal	2956		0		
	minor sl.h.	swab	animal	109		0		
Fattening	major sl.h.	ln.	animal	2985(1)	S. *Enteritidis*	1	4	
	minor sl.h.	ln.	animal	204		0		
	major sl.h.	swab	animal	3015		0		
	minor sl.h.	swab	animal	201		0		
Fowls	major sl.h.	neck skin	animal	4164		0		
	minor sl.h.	neck skin	animal	45		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 (taken Wednesday pm and Thursday am) from the same slaghterhouse
reisolated from one pooled sample.

Table 3.2.5.1. Antimicrobial susceptibility testing of Salmonella, 2003

Sweden

	***Salmonella enterica* (all serovars)**									
	Cattle		Pigs		Poultry *		Turkeys		Other **	
Isolates out of a monitoring programme (Yes / no)	YES		YES		YES				YES	
Number of isolates available in the laboratory	8		38		8				47	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	8	12,50	38	0,00	8	0,00			47	0,00
Chloramphenicol	8	0,00	38	0,00	8	0,00			47	0,00
Florfenicol	8	0,00	38	0,00	8	0,00			47	0,00
ß-Lactam										
Ampicillin	8	0,00	38	0,00	8	0,00			47	0,00
Cephalosporins										
ceftiofur	8	0,00	38	0,00	8	0,00			47	0,00
Fluoroquinolones										
Ciprofloxacin	Not tested									
Enrofloxacin	8	25,00	38	0,00	8	0,00			47	0,00
Quinolones										
Nalidixic acid	8	25,00	38	0,00	8	0,00			47	0,00
Sulfonamides										
Trimethoprim / Sulfonamide	Not tested									
Trimethoprim	8	0,00	38	0,00	8	0,00			47	0,00
Sulfonamide	8	0,00	38	0,00	8	12,50			47	2,10
Aminoglycosides										
Streptomycin	8	0,00	38	0,00	8	12,50			47	2,10
Gentamicin	8	0,00	38	0,00	8	0,00			47	0,00
Neomycin	8	0,00	38	0,00	8	0,00			47	0,00
Kanamycin	Not tested									
Number of multiresistant isolates										
fully sensitive	7		38		7				46	
resistant to 1 antimicrobial	1***		0		0				0	
resistant to 2 antimicrobials	0		0		1				1	
resistant to 3 antimicrobials	0		0		0				0	
resistant to 4 antimicrobials	0		0		0				0	
resistant to >4 antimicrobials	0		0		0				0	

* Includes 4 isolates from Gallus gallus, 3 from turkeys and 1 from geese

** Includes 3 isolates from dogs, 39 from cats and 5 from wildlife incl. wild birds

*** Resistance to both quinolones and fluoroquinolones counted as resistance to one antimicrobial

Table 3.2.5.2. Antimicrobial susceptibility testing of S. Enteritidis, 2003

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

Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline			1	0,00	1	0,00				
Chloramphenicol			1	0,00	1	0,00				
Florfenicol			1	0,00	1	0,00				
ß-Lactam										
Ampicillin			1	0,00	1	0,00				
Cephalosporins										
ceftiofur			1	0,00	1	0,00				
Fluoroquinolones										
Ciprofloxacin	Not tested									
Enrofloxacin			1	0,00	1	0,00				
Quinolones										
Nalidixic acid			1	0,00	1	0,00				
Sulfonamides										
Trimethoprim / Sulfonamide	Not tested									
Trimethoprim			1	0,00	1	0,00				
Sulfonamide			1	0,00	1	0,00				
Aminoglycosides										
Streptomycin			1	0,00	1	0,00				
Gentamicin			1	0,00	1	0,00				
Neomycin			1	0,00	1	0,00				
Kanamycin	Not tested									

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

Table 3.2.5.3. Antimicrobial susceptibility testing of S.Typhimurium, 2003

Sweden	*S*.Typhimurium									
	Cattle		Pigs		Poultry Gallus gallus		Turkeys		Other (specify)	
Isolates out of a monitoring programme (Yes / no)										
Number of isolates available in the laboratory	1		3		0		2		43	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	1	0,00	3	0,00			2	0,00	43	0,00
Chloramphenicol	1	0,00	3	0,00			2	0,00	43	0,00
Florfenicol	1	0,00	3	0,00			2	0,00	43	0,00
ß-Lactam										
Ampicillin	1	0,00	3	0,00			2	0,00	43	0,00
Cephalosporins										
ceftiofur	1	0,00	3	0,00			2	0,00	43	0,00
Fluoroquinolones										
Ciprofloxacin	Not tested									
Enrofloxacin	1	0,00	3	0,00			2	0,00	43	0,00
Quinolones										
Nalidixic acid	1	0,00	3	0,00			2	0,00	43	0,00
Sulfonamides										
Trimethoprim / Sulfonamide	Not tested									
Trimethoprim	1	0,00	3	0,00			2	0,00	43	0,00
Sulfonamide	1	0,00	3	0,00			2	50,00	43	0,00
Aminoglycosides										
Streptomycin	1	0,00	3	0,00			2	50,00	43	0,00
Gentamicin	1	0,00	3	0,00			2	0,00	43	0,00
Neomycin	1	0,00	3	0,00			2	0,00	43	0,00
Kanamycin	Not tested									
Number of multiresistant isolates										
fully sensitive	1		3				1		43	
resistant to 1 antimicrobial	0		0				0		0	
resistant to 2 antimicrobials	0		0				1		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	0		0		0				0	
resistant to other antimicrobials	0		0		0				0	

** Includes 2 isolates from dogs, 38 from cats and 3 from wildlife incl. wild birds

Table 3.2.5.4. Antimicrobial susceptibility testing of other Salmonella serovars, 2003

Sweden	Salmonella, serovars other than Enteritidis or Typhimurium									
	Cattle		Pigs		Poultry *		Turkeys		Other **	
Isolates out of a monitoring programme (Yes / no)										
Number of isolates available in the laboratory	7		34		5				4	
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline	7	0,00	34	0,00	5	0,00			4	0,00
Chloramphenicol	7	0,00	34	0,00	5	0,00			4	0,00
Florfenicol	7	0,00	34	0,00	5	0,00			4	0,00
ß-Lactam										
Ampicillin	7	0,00	34	0,00	5	0,00			4	0,00
Cephalosporins										
ceftiofur	7	0,00	34	0,00	5	0,00			4	0,00
Fluoroquinolones										
Ciprofloxacin	Not tested									
Enrofloxacin	7	14,30	34	0,00	5	0,00			4	0,00
Quinolones										
Nalidixic acid	7	14,30	34	0,00	5	0,00			4	0,00
Sulfonamides										
Trimethoprim / Sulfonamide	Not tested									
Trimethoprim	7	0,00	34	0,00	5	0,00			4	0,00
Sulfonamide	7	0,00	34	0,00	5	0,00			4	25,00
Aminoglycosides										
Streptomycin	7	0,00	34	0,00	5	0,00			4	25,00
Gentamicin	7	0,00	34	0,00	5	0,00			4	0,00
Neomycin	7	0,00	34	0,00	5	0,00			4	0,00
Kanamycin	Not tested									

Number of multiresistant isolates										
fully sensitive	7		34		5				3	
resistant to 1 antimicrobial	0		0		0				0	
resistant to 2 antimicrobials	0		0		0				1	
resistant to 3 antimicrobials	0		0		0				0	
resistant to 4 antimicrobials	0		0		0				0	
resistant to >4 antimicrobials	0		0		0				0	

* Includes 3 isolates from Gallus gallus, 1 from turkeys and 1 from geese

** Includes 1 isolate from a dog, 1 from a cat and 2 from wildlife incl. wild birds

Table 3.2.6. Breakpoints used for antibiotic resistance testing of Salmonella, 2003

Sweden	*Salmonella enterica*

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

* cut-off values (break-points) set according to microbiological criteria, i.e. based on MIC distribution

Table 3.2.7.1. Antimicrobial susceptibility testing of Salmonella- quantitative data, 2003

Sweden	***Salmonella enterica* (all serovars tested)**
	Cattle, pig, poultry (incl. Gallus gallus, turkey and geese), cats, dogs and wildlife

Isolates out of a monitoring programme (Yes / no)	YES	Agar diffusion	
		Agar dilution	
Number of isolates available in the laboratory	101	Broth dilution	X

Percent of isolates with MICs (mg/L)*

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	>= 512
Tetracycline	101									3,0	73,3	21,8	1,0				1,0		
Chloramphenicol	101										2,0	73,3	23,8	1,0					
Florfenicol	101											76,2	21,8	2,0					
ß-Lactam																			
Ampicillin	101								4,0	77,2	17,8	1,0							
Cephalosporin																			
ceftiofur	101							2,0	5,0	88,1	5,0								
Fluoroquinolones																			
Ciprofloxacin		Not tested																	
Enrofloxacin	101					25,7	69,3	3,0		2,0									
Quinolones																			
Nalidixic acid	101											56,4	41,6					2,0	
Sulfonamides																			
Trimethoprim / Sulfonamide		Not tested																	
Trimethoprim	101							4,0	72,3	20,8	3,0								
Sulfonamide	101														2,0	7,9	54,5	33,7	
Aminoglycosides																			
Streptomycin												2,0	29,7	41,6	21,8	3,0			2,0
Gentamicin	101								14,9	59,4	21,8	4,0							
Neomycin	101										84,2	15,8							
Kanamycin		Not tested																	

* The white fields denote range of dilutions tested for each substance. MICs above the range are given as the concentration closest to the range tested.

Table 3.3.1. Salmonella sp. in meat and meat products, 2003

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								
at processing plant								
at retail level	SLV	a	sample	25	1 217	5*		
Pork								
at slaughterhouse								
at processing plant								
at retail level								
Poultry								
at slaughterhouse								
at processing plant	SLV	d	sample	25	1130	0		
at retail level	SLV	a	sample	25	195	2*		
Other meat								
at slaughterhouse								
at processing plant								
at retail level	SLV	a,c	sample	25	17	0		
Minced meat								
Meat products								
Beef and veal - meat products								
at slaughterhouse								
at processing plant								
at retail level	SLV	a	sample	25	882	2*		
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	117	0		
Other animals - meat products								
at slaughterhouse								
at processing plant								
at retail level	SLV	a,c	sample	25	19	0		
Beef and pork at cutting plants	SLV	d	sample	25	4411	0		

a) Official control by 243 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, 2003

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	4	0		
Ready to eat milk products	SLV	a	sample	25	111	0		
Other milk products	SLV	a	sample	25	194	0		
Eggs and egg products								
Table eggs								
Egg preperations								
table eggs and egg prod.	SLV	a	sample	25	37	0		
Fish and fish products								
Fish and fish products	SLV	a	sample	25	248	0		
Shellfish and Molluscs								
shellfish and molluscs	SLV	a	sample	25	321	0		
Ot Other food								
Soups, sauces etc	SLV	a	sample	25	439	0		
Grain, bakery prod.	SLV	a	sample	25	238	0		
Fruits and vegetables	SLV	a	sample	25	642	1*		
Herbs and spices	SLV	a	sample	25	47	1*		
Ice cream and deserts	SLV	a	sample	25	917	0		
nuts and nut products	SLV	a	sample	25	141	0		
Ready to eat foods	SLV	a	sample	25	3900	3*		
Other foods	SLV	a	sample	25	481	3*		

a) Official control by 243 local municipalities

* Information about isolated serotype is not available.

Table 3.4.1., 3.4.2 Salmonellosis in man, 2003

Sweden	Cases *	Inc.	Autochtone cases**	Inc.	Imported cases**	Inc.	Unknown status**
Salmonellosis	3794	42.3	806	9.0	2832	31.6	10
S. Enteritidis	1559	17.4	172	1.9	1337	14.9	3
S. Typhimurium	610	6.8	315	3.5	264	2.9	2
of these: DT 104***	89	1.0	51	0.6			
other serotypes							
S. Hadar	145	1.6	53	0.6	92	1.0	
S. Agona	66	0.7	24	0.3	42	0.5	
S. Newport	101	1.1	15	0.2	86	1.0	
other	1313		227		1011		

* Reported by physicians and laboratories

** Reported by physicians

*** Reported by laboratories

	Salmonellosis*			*S.* Enteritidis			*S.* Typhimurium		
Age group	**All**	**M**	**F**	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	19	11	8	4	4	0	6	1	5
1 to 4 years	73	40	33	13	6	7	46	27	19
5 to 14 years	75	39	36	17	8	9	29	14	15
15 to 24 years	91	52	39	14	8	6	30	20	10
25 to 44 years	242	132	110	48	27	21	112	67	45
45 to 64 years	215	111	104	54	24	30	72	42	30
65 years and older	90	43	46	21**	10	10	20	7	13
Age unknown	1			1					
All age groups	806	428	376	172	87	83	315	178	137

* Domestic cases

**One person with unknown sex

Table 3.4.2 Salmonellosis in man, seasonal distribution, 2003

	Salmonella sp.	*S.* Enteritidis	*S.* Typhimurium
Month	Cases	Cases	Cases
January	34	4	13
February	47	24	15
March	45	5	20
April	49	10	23
May	42	11	5
June	48	13	8
July	112	19	66
August	178	37	81
September	88	21	35
October	78	9	23
November	47	15	9
December	38	4	17
not known			
Total	806	172	315

Table 4.1. Trichinella, 5.1 rabies in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Animals tested	Animals positive
Pigs	SVA	a	animal	3 283 114	0
Solipeds	SVA	a	animal	4 288	0
Wild boars	SVA	a	animal	817	3
Foxes	SVA		animal	215	7
Other Wildlife					
wolf	SVA		animal	4	1
brown bear	SVA		animal	24	1
lynx	SVA		animal	57	3

a) All slaughtered animals

Table 5.1. Rabies in man, 2003

Animal species	Source of information	Remarks	Animals tested	Animals positive
Cattle				
Sheep				
Goats				
Pigs				
Solipeds				
Wildlife, all				
Bats	SVA		26	0
Foxes	SVA		2	0
Other wildlife				
Dogs	SVA		8	0
Cats	SVA		14	0
Other pets				
Others	SVA	a	2	0

a) Two squirrels that were smuggled from Thailand.

Table 6.1.1. Thermophilic Campylobacter sp. in animals, 2003

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	3224	566				
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, 2003

Sweden

	***Campylobacter* spp. (hippurate-negative)**							
	Cattle		Pigs		Poultry		Humans	
Isolates out of a monitoring programme (Yes / no)			YES					
Number of isolates available in the laboratory			100					
Antimicrobials:	N	% R	N	% R	N	% R	N	% R
Tetracycline			100	1,00				
ß-Lactam								
Ampicillin			100	0,00				
Fluoroquinolones								
Enrofloxacin			100	16,00				
Quinolones								
Nalidixic acid			100	18,00				
Aminoglycosides								
Gentamicin			100	0,00				
Macrolides								
Erythromycin			100	0,00				
Number of multiresistant isolates*								
fully sensitive			82					
resistant to 1 antimicrobial			17					
resistant to 2 antimicrobials			1					
resistant to 3 antimicrobials			0					
resistant to 4 antimicrobials			0					
resistant to >4 antimicrobials			0					

* Resistance to both quinolones and fluoroquinolones counted as resistance to one antimicrobial

Table 6.1.3. Antimicrobial susceptibility testing of Campylobacter - quantitative data, 2003

Sweden	***Campylobacter* spp. (hippurate-negative)**
	Pig

Isolates out of a monitoring programme (Yes / no)	Yes		Agar diffusion	
			Agar dilution	
Number of isolates available in the laboratory	100		Broth dilution	X

	Percent of isolates with MICs (mg/L)*																		
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	>= 512
Tetracycline	100							79,0	10,0	7,0	1,0	1,0	1,0		1,0				
ß-Lactam																			
Ampicillin	100								3,0	9,0	16,0	39,0	32,0	1,0					
Fluoroquinolones																			
Enrofloxacin	100					30,0	44,0	8,0	1,0	1,0	1,0	8,0	7,0						
Quinolones																			
Nalidixic acid	100										4,0	35,0	36,0	7,0	1,0	8,0	9,0		
Aminoglycosides																			
Gentamicin	100							1,0		5,0	68,0	23,0	3,0						
Macrolides																			
Erythromycin	100							1,0	5,0	21,0	34,0	33,0	6,0						

* The white fields denote range of dilutions tested for each substance. MICs above the range are given as the concentration closest to the range tested.

Table 6.1.5. Breakpoints used for antibiotic resistance testing of Campylobacter, 2003

Sweden

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

* cut-off values (break-points) set according to microbiological criteria, i.e. based on MIC distribution

Table 6.2. Thermophilic Campylobacter sp. in food, 2003

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		28	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		425	56				
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		11	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		41	1				
Other - meat products										
at slaughterhouse										
at processing plant										
at retail level										
Other food										
Ready to eat foods	SLV	a	sample		52	0				
Ready to eat milk products	SLV	a	sample		6	0				
Fish products										
Others	SLV	a	sample		34	0				

a) Official control by 243 local municipalities

Table 6.3. Campylobacteriosis in man, 2003

Sweden	Cases*	Inc.	Autochtone cases**	Inc.	Imported cases**	Inc.	Unknown status**
Campylobacteriosis	7149	79.9	2685	30.0	3906	43.6	65
C. jejuni							
C. coli							
C. upsaliensis							

* Cases reported by physicians and laboratories

** Cases reported by physicians (n=6656)

	Campylobacter sp.*		
Age group	**All**	**M**	**F**
< 1 year	22	12	10
1 to 4 years	200	122	78
5 to 14 years **	165	111	53
15 to 24 years	339	199	140
25 to 44 years	956	536	420
45 to 64 years**	682	376	305
65 years and older	320	159	161
Age unknown	1		
All age groups	2685	1515	1167

* Domestic cases

** One person each with unknown sex

Month	Campylobacter Cases
January	69
February	112
March	58
April	58
May	80
June	240
July	553
August	513
September	426
October	274
November	195
December	107
not known	
Total	2685

Table 7.1. Listeria monocytogenes in food, 2003

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			8	0
Pork							
Poultry							
Other							
Other ready to eat food products							
Cheeses	SLV	a	sample			34	0
Other milk products	SLV	a	sample			1	0
Other ready to eat foods	SLV	a	sample			3	0
Fish and fish products	SLV	a	sample			59	2
Shellfish and molluscs	SLV	a	sample			1	0
Others	SLV	a	sample			13	1

a) Official control by 243 local municipalities

Table 7.2. Listeriosis in man, 2003

	Cases	**Inc.**
Listeriosis		
Congenital cases	48	0.5
Deaths	1	
	19	

	L. monocytogenes		
Age group	**All**	**M**	**F**
< 1 year			
1 to 4 years			
5 to 14 years			
15 to 24 years			
25 to 44 years	3		3
45 to 64 years	11	5	6
65 years and older	34	22	12
Age unknown			
All age groups	48	27	21

Table 8.3. Yersiniosis in man, 2003

Sweden	Cases*	Inc.	Autochtone cases**	Inc.	Imported cases**	Inc.	Unknown status
Yersiniosis							
Y. enterocolitica	714	8.0	536	6.0	88	1.0	24
Y. enterocolitica O:3							
Y. enterocolitica O:9							

* Reported by physicians and laboratories
**Reported nu physicians (n=648)

	*Yersiniosis**		
Age group	**All**	**M**	**F**
< 1 year	23	12	11
1 to 4 years**	153	76	76
5 to 14 years	73	40	33
15 to 24 years	54	33	21
25 to 44 years	101	62	39
45 to 64 years	97	47	50
65 years and older	35	14	21
Age unknown			
All age groups	536	284	251

* The vast majority being *E. Enterocolitica*
** One person of unknown sex

	Yersiniosis
Month	Cases
January	29
February	24
March	19
April	19
May	34
June	54
July	86
August	94
September	48
October	55
November	36
December	38
not known	
Total	536

Table 9.1, 9.2 Echinococcus sp. in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*Echinococcus* detected	*E. multilocularis*	*E. granulosus*
Cattle	SVA		animal	1	0		
Sheep							
Goats							
Pigs							
Solipeds							
Dogs							
Cats							
Foxes	SVA		animal	394	0		
Wildlife, other	SVA		animal	3	0		

Table 9.2. Echinococcosis in man, 2003

	Cases	Inc.	Autochtone cases	Inc.	Imported cases	Inc.
Echinococcosis	4	0.04			4	0.04
Cystic echinococcosis						
Alveolar echinococcosis						

	Echinococcus		
Age group	**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	3	1	1
65 years and older			
Age unknown			
All age groups	4	2	1

Table 10.1., 10.2 Toxoplasma gondii in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	*T.gondii*
Cattle					
Sheep	SVA	s		17	3
Goats	SVA	s		10	7
Pigs					
Solipeds	SVA	s		10	0
Dogs	SVA	s		24	1
Cats	SVA	s		56	22
Cats	SVA	f		100	0
Others	SVA	s		3	2

s=serolgy

f= faecal samples

Table 10.2. Toxoplasmosis in man, 2002

	Cases	Inc.
Toxoplasmosis	17	0.19
Congenital cases		

	Toxoplasmosis		
Age group	**All**	**M**	**F**
< 1 year			
1 to 4 years			
5 to 14 years	1		
15 to 24 years	2	1	1
25 to 44 years	10	3	7
45 to 64 years	3	1	2
65 years and older	1	1	
Age unknown			
All age groups	17	6	10

Table 11.1. Verocytotoxic Escherichia coli (VTEC) in animals, 2003

Sweden

Animal species	Source of information	Remarks	Epidemiological unit	Units tested	VT *E.coli* detected	VT *E.coli* O 157	VT *E.coli* O 157:H7	VT *E.coli* Other serotypes
Cattle								
Cattle at slaughter	a	swab	animal	755	0			
Calves								
Beef cattle								
Dairy cows								
not specified	SVA,SJV	faeces	herd	6	3			

a) Swedish meats

Table 11.3. Verocytotoxic Escherichia coli (VTEC) infection in man, 2003

	Cases*	**Inc.**	**Autochtone cases****	**Inc.**	**Imported cases****	**Inc.**
HUS						
- clinical cases	7	0.08	5	0.06	2	0.02
- lab. confirmed cases	6	0.07	4	0.04	2	0.02
- caused by O157 (VT+)	6	0.07	4	0.04	2	0.02
- caused by other VTEC						
***E.coli* infect. (except HUS)**						
- clincial cases***	63	0.70	48	0.54	14	0.16
- laboratory confirmed***	52	0.58	40	0.45	12	0.13
- caused by O157 (VT+)						
- caused by other VTEC						

Only infection with VTEC O 157 is notifiable

	HUS*			*E.coli* infections (except HUS) O157***		
Age group	**All**	**M**	**F**	**All**	**M**	**F**
< 1 year	2	1**	1	3	1	2
1 to 4 years	1	1	0	7	3	4
5 to 14 years	1	0	1	16	9	7
15 to 24 years	0	0	0	6	5	1
25 to 44 years	0	0	0	8	4	4
45 to 64 years	1	0	1	10	4	6
65 years and older	0	0	0	3	1	2
Age unknown	0	0	0	0	0	0
All age groups	5	2	3	53	27	26

* Reported by physicians and laboratories

** Non VTEC O 157

*** Only infection with VTEC O 157 is notifiable

Table 12. Foodborne outbreaks in humans, 2003

SWEDEN Causative agent	General outbreak	Family outbreak	Total number of persons ill	died	in hospital	Source	Sus-pected	Con-firmed	Type of evidence	Location of exposure	Contributing factors
1	2	3	4	5	6	7			8	9	10
S. Typhimurium PT 66	1		8			falafel	yes		epidemiological	several	
S. Enteritidis PT NST	1		18			spouts	yes		epidemiological (case control study)	several	
S. Anatum	1		10			spits of minced meat	yes		epidemiological (cohort study)	personnel canteen	
S. Agona	1		17			kebab	yes			several	
S. Enteritidis PT 1b	1		9			egg		yes	bacteriological	kindergartens and canteen	a
S. Typhimurium PT 104		1	2			several layer cake	yes		epidemiological	household	
S. Haifa	1		7			kebab	yes		epidemiological	restaurants	
S. Typhimurium PT 104	1		16			buffet	yes		epidemiological	restaurant	
S. Typhimurium PT 108	1		148			kebab		yes	bacteriological	restaurants	contaminated raw product
S. Typhimurium PT 104		1	3			buffet	yes		epidemiological	private party	
S. Oranienburg		1	4			kebab	yes		epidemiological	pizzeria	
S. Hadar	1		53			chicken		yes	bacteriological and epidemiological (case control study)	several	
S. Typhimurium PT 120	1		74			christmas buffet		yes	bacteriological and epidemiological (cohort study)	restaurant	
Campylobacter	1		3000			water		yes	bacteriological	households	
Campylobacter	1		5			chicken	yes		epidemiological	un-known	
Campylobacter	1		10			chicken salad	yes		epidemiological	un-known	
Campylobacter	1		7			sausages	yes		epidemiological	picnic	
Campylobacter		1	3			water		yes	bacteriological	lake bath	

a) The same Salmonella serotype was isolated from the supplying flock of lying hens.

Table 13.1. Antimicrobial susceptibility testing of E.coli, 2003

Sweden

	E.coli									
	Cattle		Pigs		Poultry Gallus gallus		Turkeys		Other (specify)	
Isolates out of a monitoring programme (Yes / no)			YES							
Number of isolates available in the laboratory			303							
Antimicrobials:	N	% R	N	% R	N	% R	N	% R	N	% R
Tetracycline			303	11,6						
Chloramphenicol			303	0,7						
Florfenicol			303	0,0						
ß-Lactam										
Ampicillin			303	3,3						
Cephalosporins										
Ceftiofur			303	0,0						
Fluoroquinolones										
Ciprofloxacin	Not tested									
Enrofloxacin			303	0,6						
Quinolones										
Nalidixic acid			303	0,9						
Sulfonamides										
Trimethoprim / Sulfonamide	Not tested									
Trimethoprim			303	4,3						
Sulfonamide			303	8,9						
Aminoglycosides										
Streptomycin			303	9,9						
Gentamicin			303	0,0						
Neomycin			303	1,0						
Kanamycin	Not tested									
Number of multiresistant isolates*										
fully sensitive			236							
resistant to 1 antimicrobial** / resistant to 2 antimicrobials**			52							
resistant to 3 antimicrobials			8							
resistant to 4 antimicrobials			5							
resistant to >4 antimicrobials			2							

* Resistance to both quinolones and fluoroquinolones counted as resistance to one antimicrobial (one isolate)

** Number resistant to one <u>or</u> two antimicrobials given

Table 13.2. Antimicrobial susceptibility testing of E.coli- quantitative data, 2003

Sweden	*E. coli*
	Pigs

Isolates out of a monitoring programme (Yes / no)	YES
Number of isolates available in the laboratory	303

Agar diffusion	
Agar dilution	
Broth dilution	X

Percent of isolates with MICs (mg/L)*

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	>= 512
Tetracycline	303									19,8	53,1	14,9	0,7	0,3	1,0	0,7	9,6		
Chloramphenicol	303										5,3	80,2	13,2	0,7	0,7				
Florfenicol	303											67,7	31,7	0,7					
ß-Lactam																			
Ampicillin	303									6,6	68,0	21,5	0,7		0,7	2,6			
Cephalosporin																			
Ceftiofur	303							23,8	72,3	4,0									
Fluoroquinolones																			
Ciprofloxacin		Not tested																	
Enrofloxacin	303				11,9	78,9	8,3	0,3	0,3	0,3									
Quinolones																			
Nalidixic acid	303									0,3	35,3	61,1	2,0	0,3		0,3	0,3	0,3	
Sulfonamides																			
Trimethoprim / Sulfonamide		Not tested																	
Trimethoprim	303							19,8	59,1	15,2	1,7				4,3				
Sulfonamide	303															71,0	19,1	1,0	
Aminoglycosides																			
Streptomycin	303											5,3	47,5	34,3	3,0	2,0	2,0	3,3	2,6
Gentamicin	303								2,6	50,8	37,3	9,2							
Neomycin	303										59,1	34,7	5,3	0,3	0,7				
Kanamycin		Not tested																	

* The white fields denote range of dilutions tested for each substance. MICs above the range are given as the concentration closest to the range tested.

Table 13.4. Breakpoints used for antibiotic resistance testing of E.coli, 2003

	E. coli
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 E.coli	**Standard for breakpoint (NCCLS,...)**	**Breakpoint µg/ml**		**Disk content**	**Zone diameter (mm)**		
		Susceptible <=	**Resistant >**	**µg**	**Susceptible >=**	**Intermediate**	**Resistant <=**
Tetracycline	Microbiol.*	4	8				
Chloramphenicol	Microbiol.*	8	16				
Florfenicol	Microbiol.*	8	16				
ß-Lactam							
Ampicillin	Microbiol.*	4	8				
Cephalosporins							
Ceftiofur	Microbiol.*	1	2				
Fluoroquinolones							
Ciprofloxacin							
Enrofloxacin	Microbiol.*	0,06	0,12				
Quinolones							
Nalidixic acid	Microbiol.*	8	16				
Sulfonamides							
Sulfonamide/TMP							
Trimethoprim	Microbiol.*	4	8				
Sulfonamide	Microbiol.*	128	256				
Aminoglycosides							
Streptomycin	Microbiol.*	16	32				
Gentamicin	Microbiol.*	4	8				
Neomycin	Microbiol.*	4	8				
Kanamycin							

* cut-off values (break-points) set according to microbiological criteria, i.e. based on MIC distribution

Table 14.1. Animal population and number of slaughtered animals in Sweden 2003

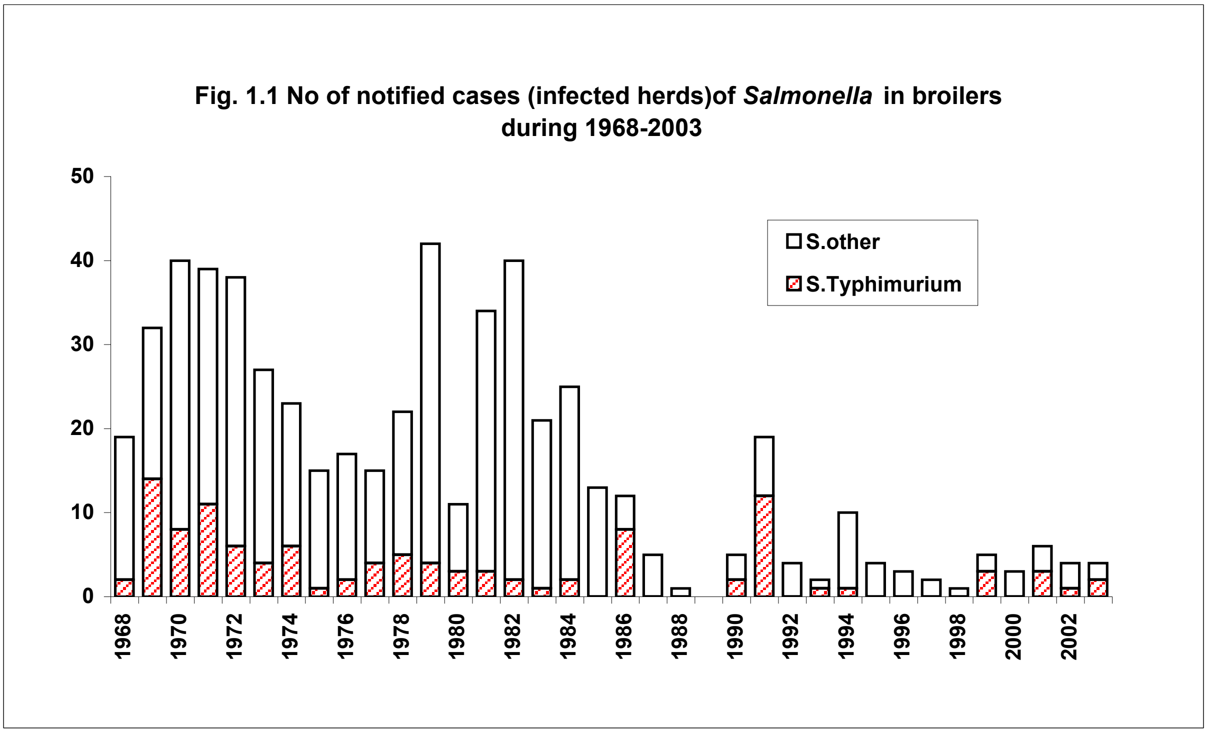
Animal species	Number of animals (in thousands)		Number of herds		Slaughtered		Sanitary slaughtered[2]
Cattle > 1 year	695	5	27 810		471 594	2	1 504
Calves < 1 year	514	5	25 159	8	33 974	2	7
Dairy cattle	403	5	11 270	8	n.a.		n.a.
Total No. of cattle [1)]	1 612	5	29 038	8	505 568	2	1 511
Sows, gilts	208	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

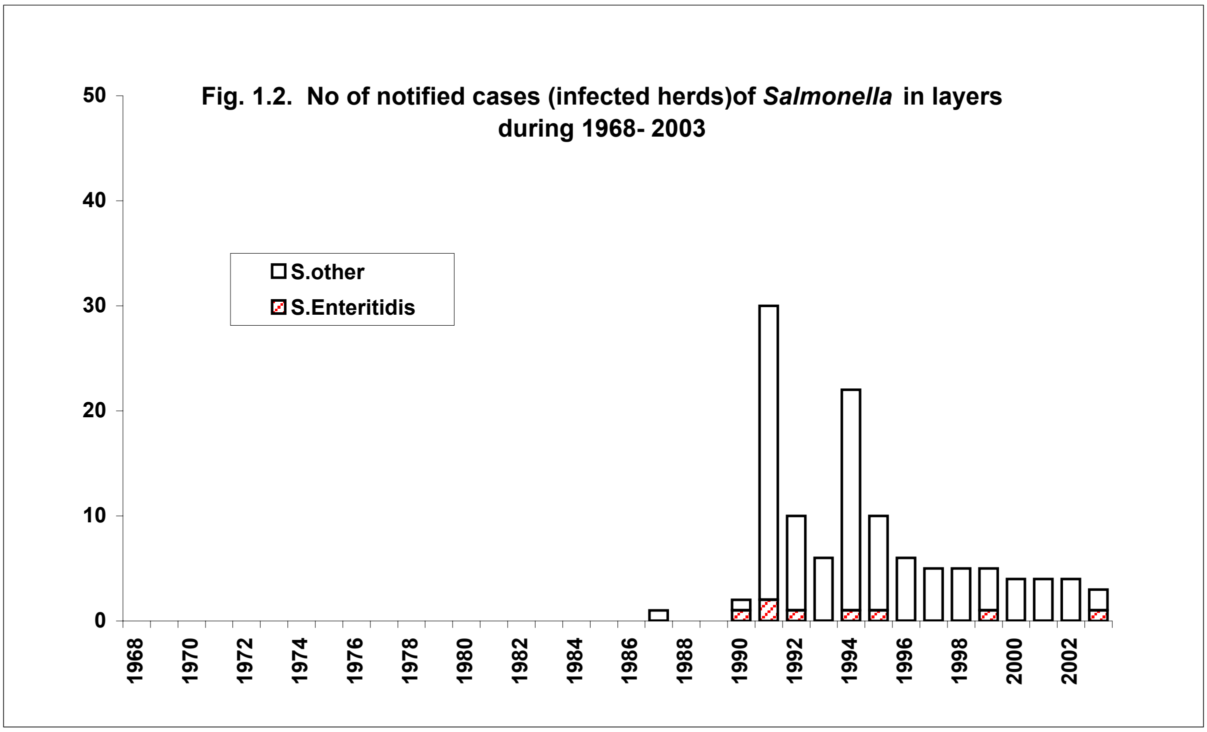
Table 14.2. Human population (in thousands) by age and sex in Sweden

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, Dec 31, 2002

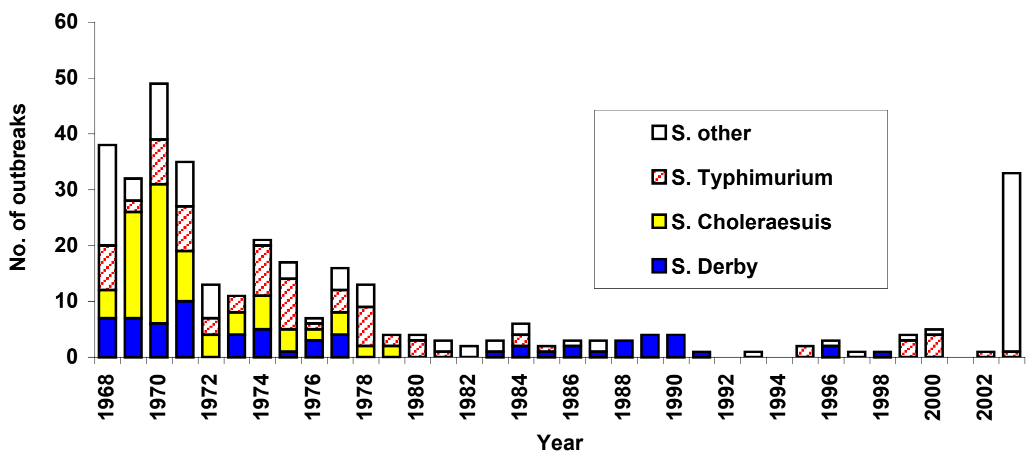


1970: Initiation of voluntary programme. 1984: Initiation of compulsory sampling. Source: SJV
1991: S. Typhimurium spread from a hatchery. 1991: One broiler parent flock infected.



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

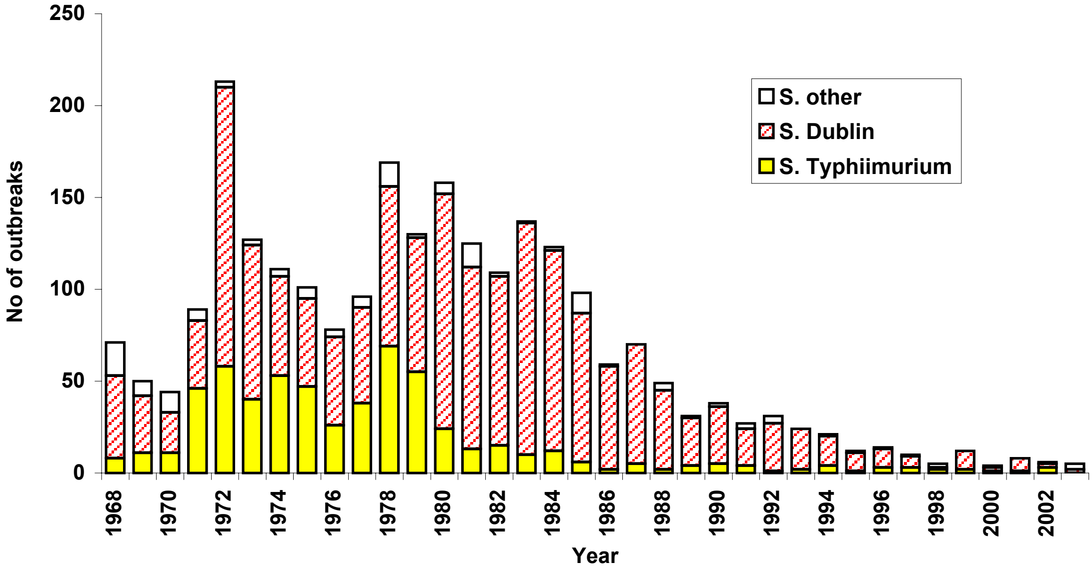
Fig 1.3. Number of notified cases (infected herds) of *Salmonella* in pigs during 1968-2003



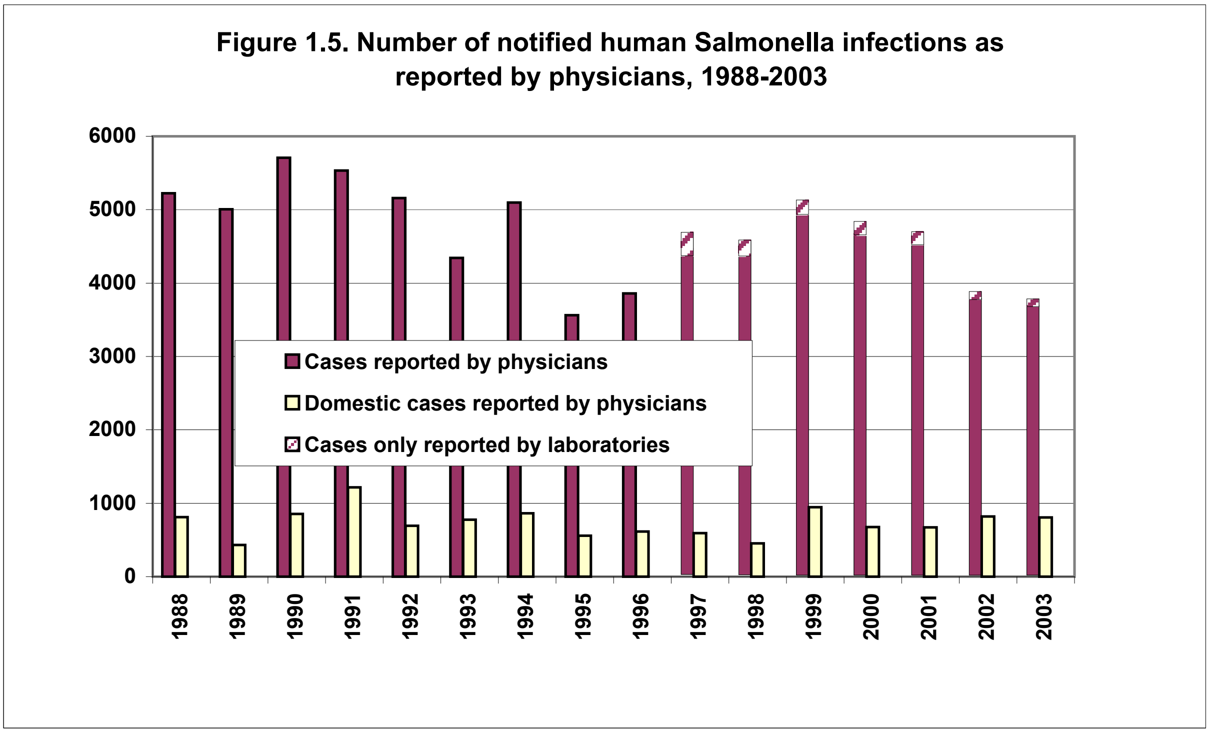
2003: S other: 30 of 32 herds infected by S.Cubana in outbreak related to contaminated feed

Source: SJV

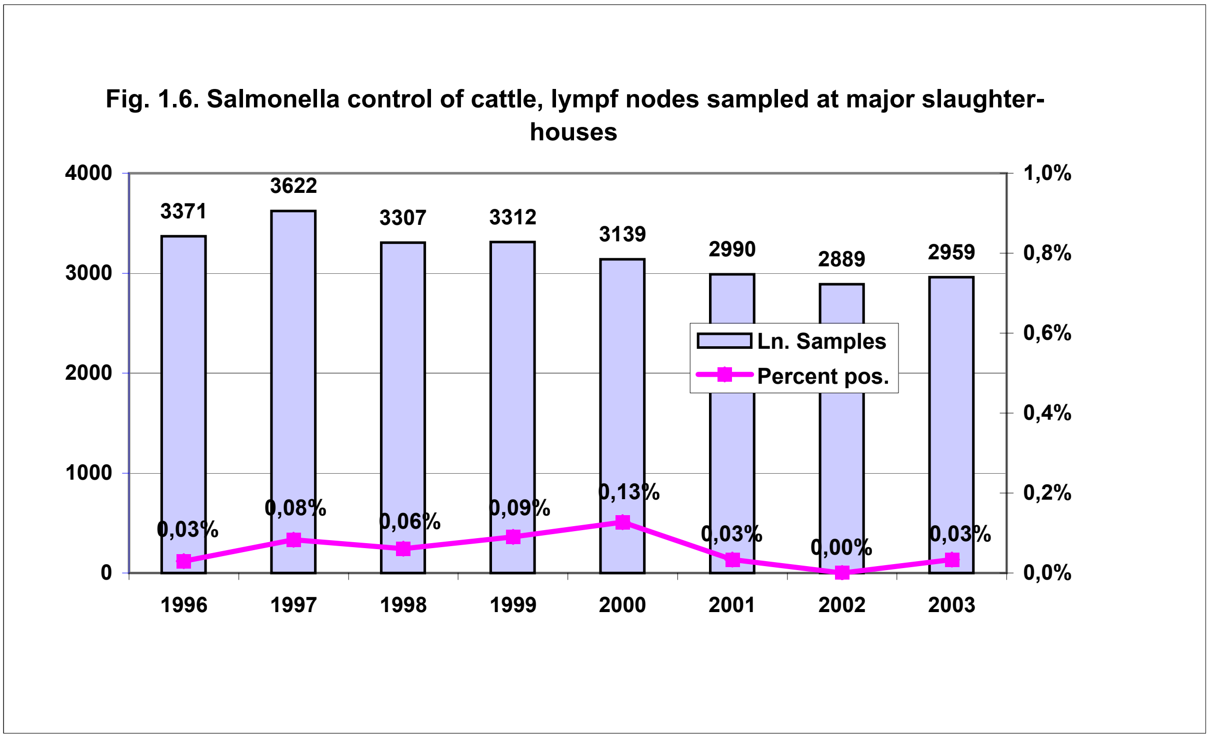
Fig 1.4. No of notified cases (infected herds) of Salmonella in cattle during 1968-2003



Source: SJV

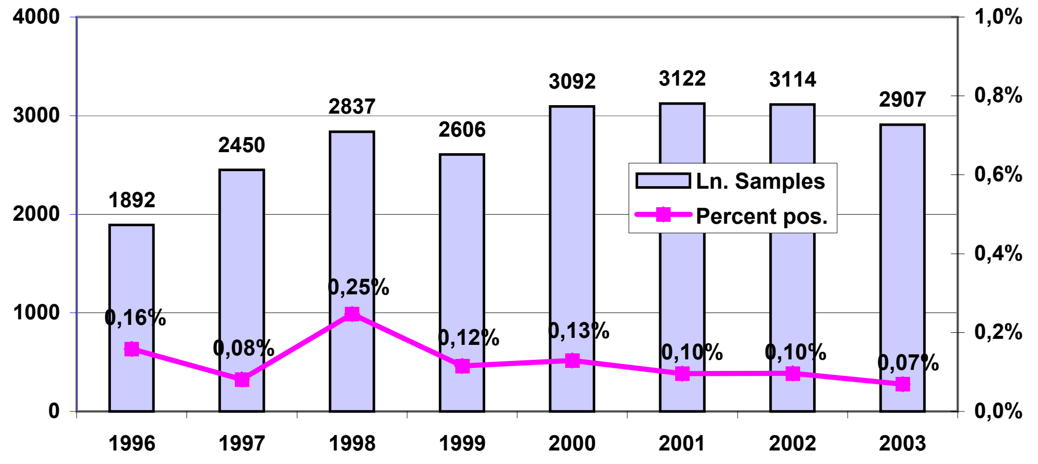


Source: SMI



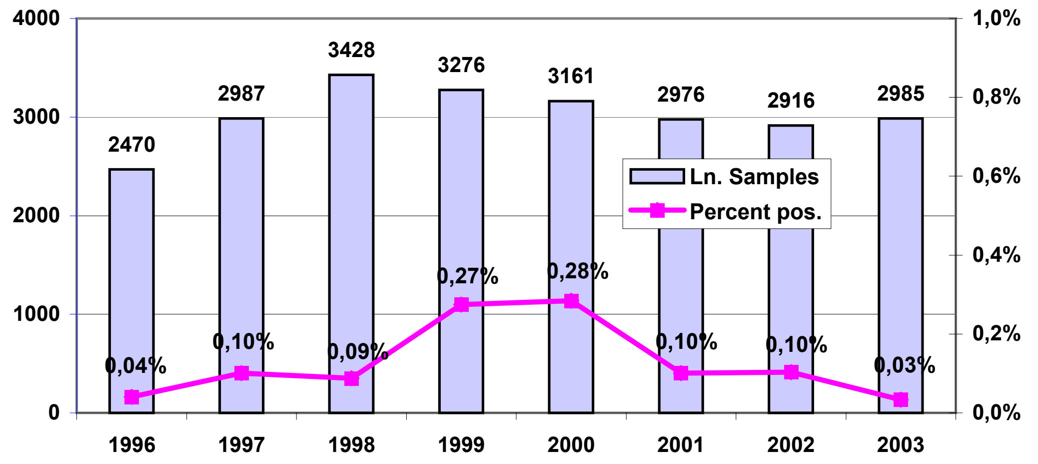
Source: SLV

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



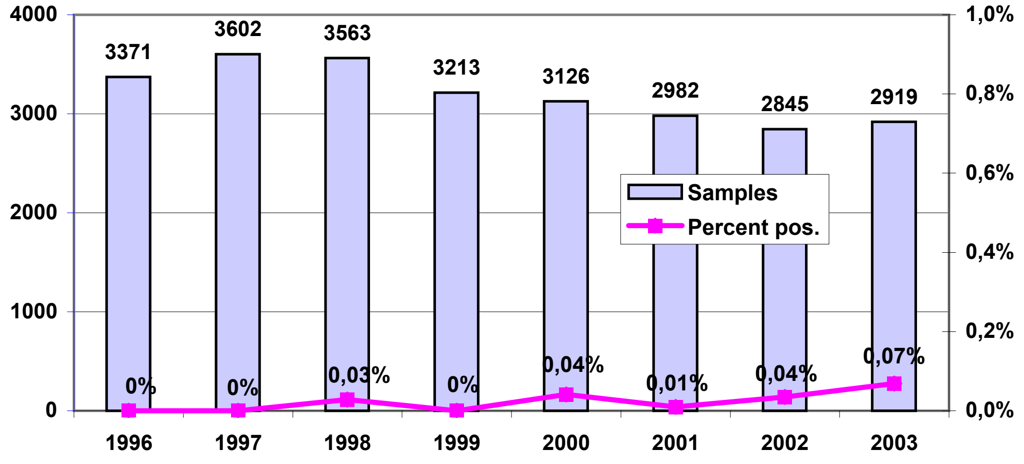
Source: SLV

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



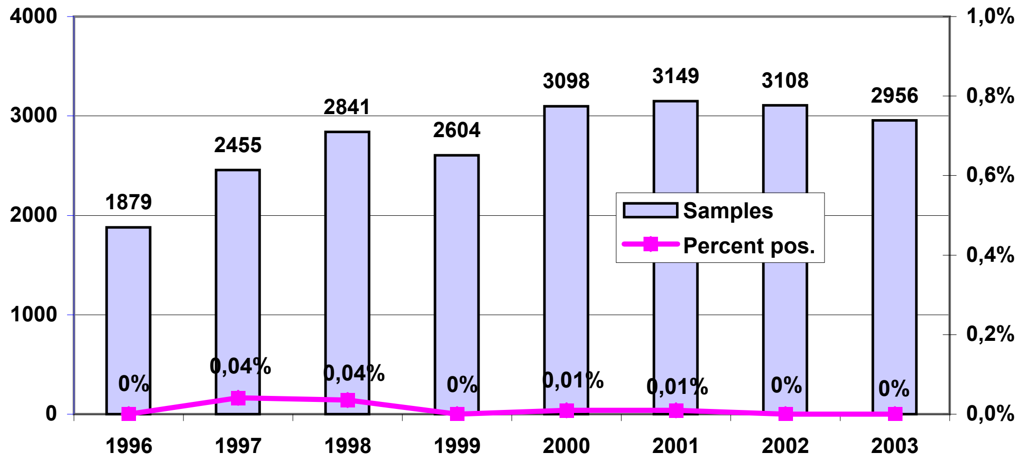
Source: SLV

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



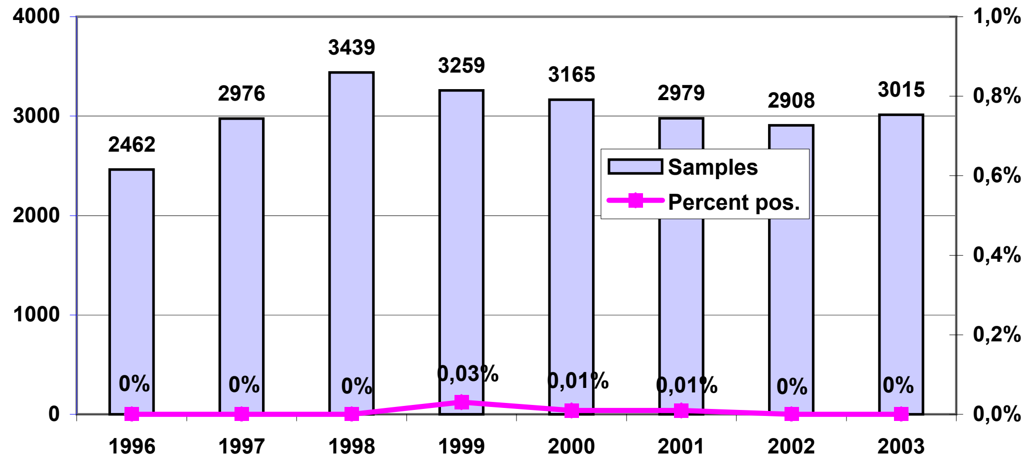
Source: SLV

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



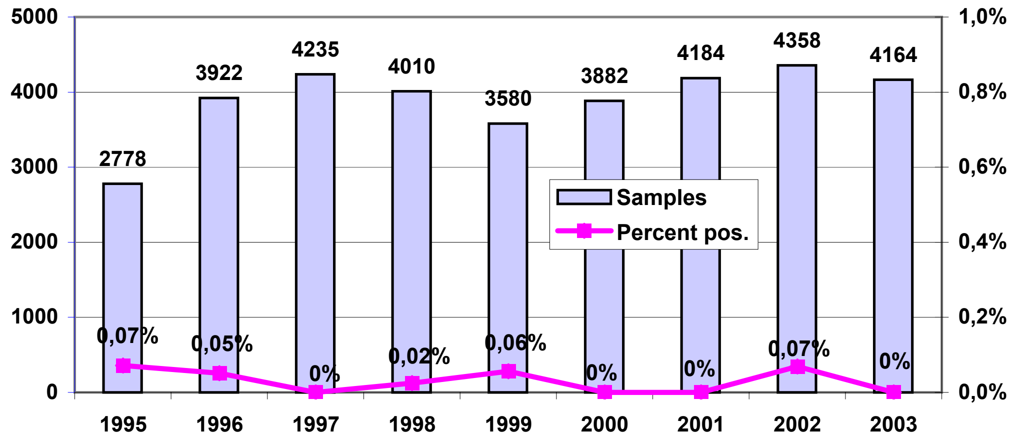
Source: SLV

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

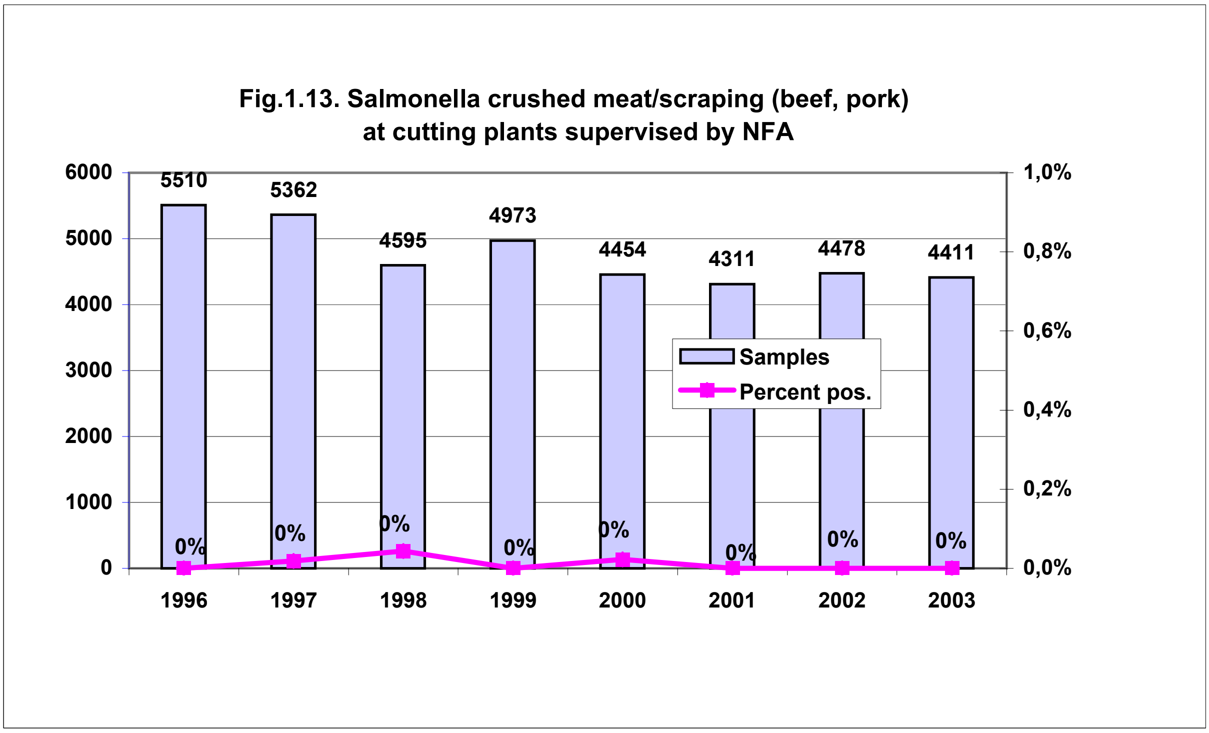


Source: SLV

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



Source: SLV



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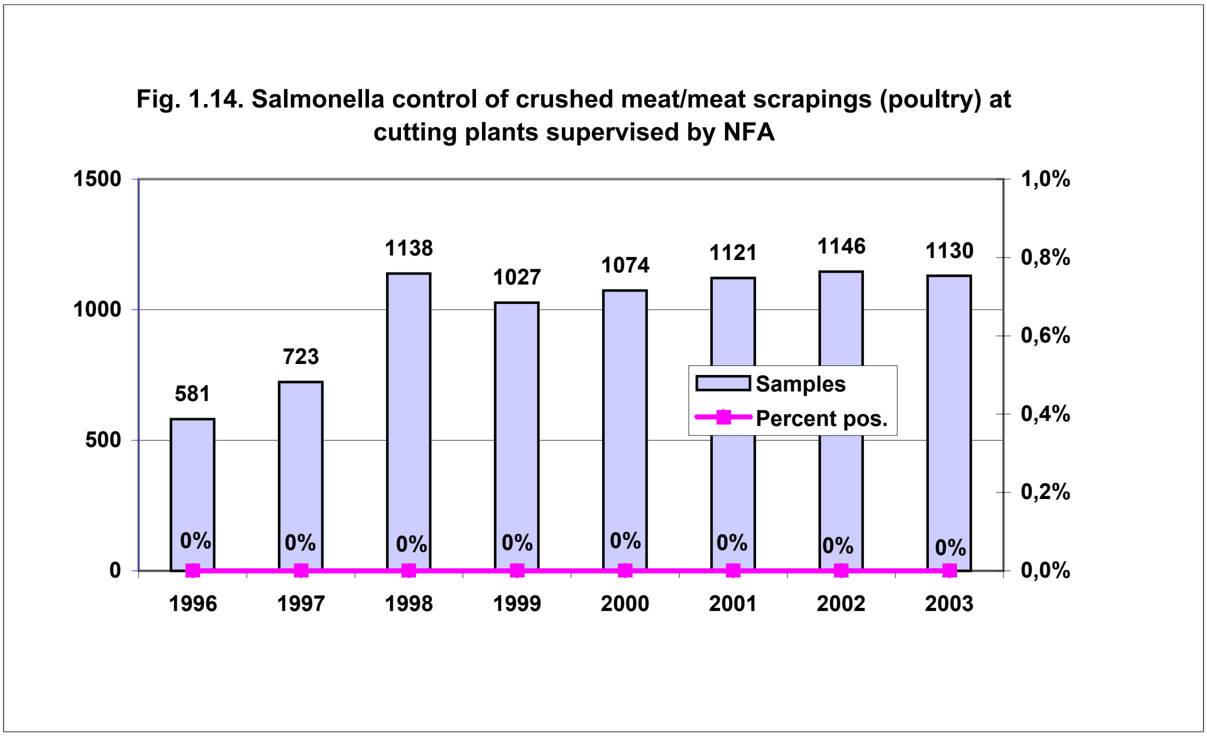
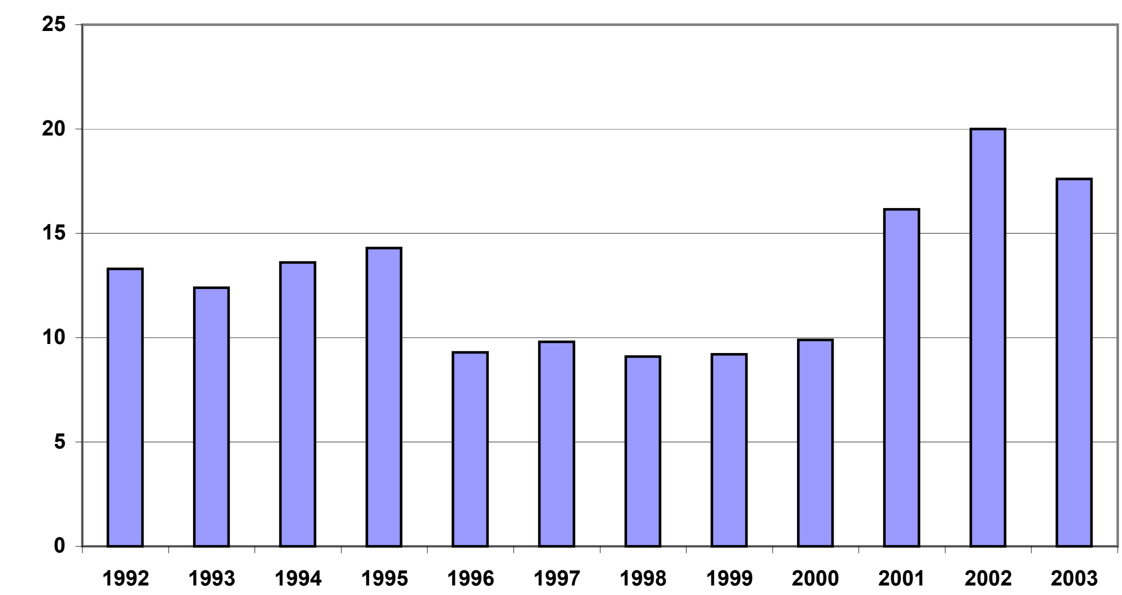


Source: SLV

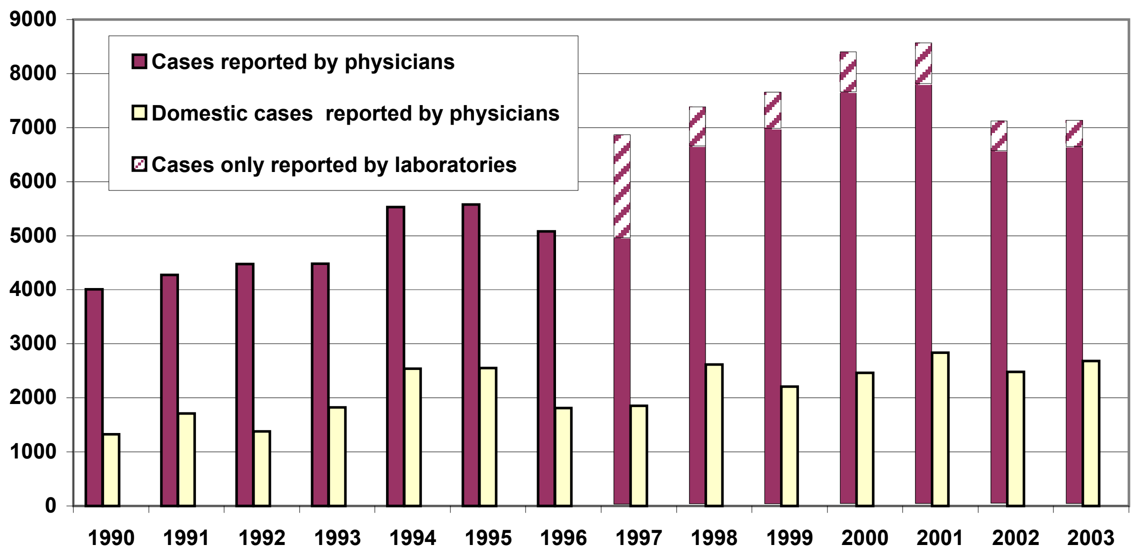
Fig. 2.1. Percent Campylobacter positive broiler flocks at slaughter 1992-2003



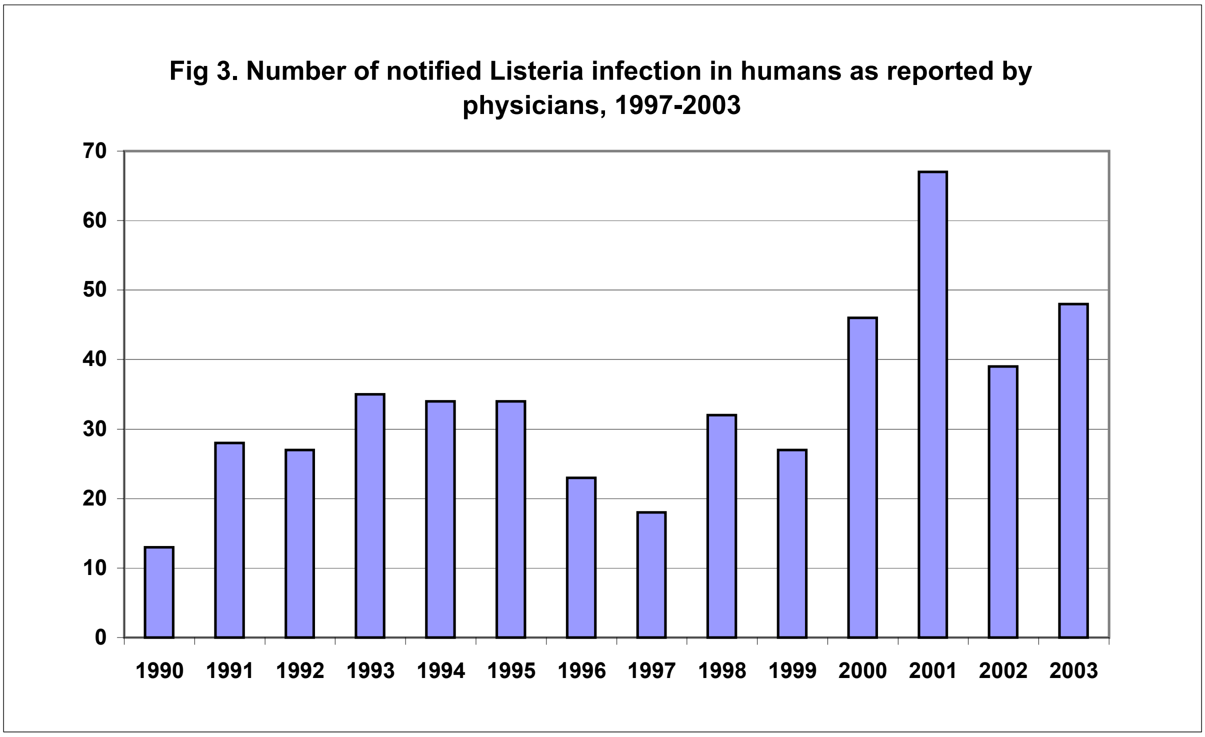
In July 2001, a new campylobacter programme was implented.

Source: Swedish Poultry Meat Association

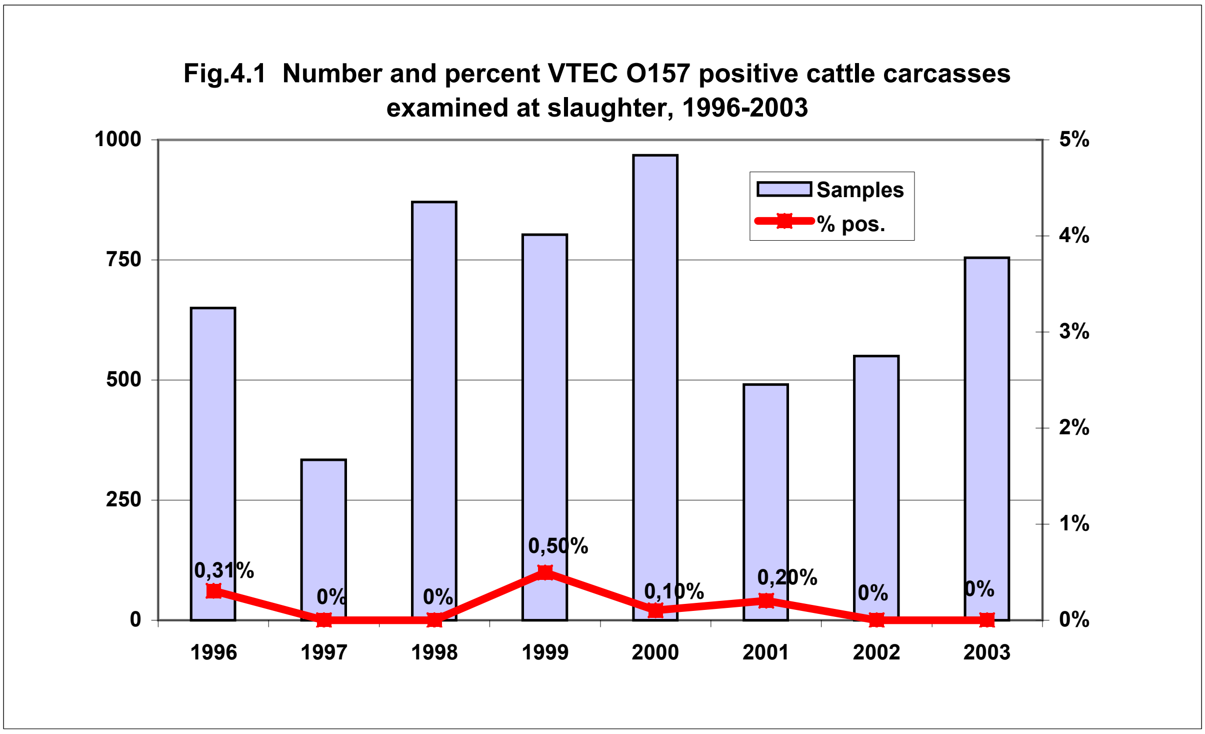
Fig. 2. 2. Number of notified human Campylobacter infections as reported by physicians, 1990-2003



Source: SMI



Source: SMI



Source: Swedish Meats

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