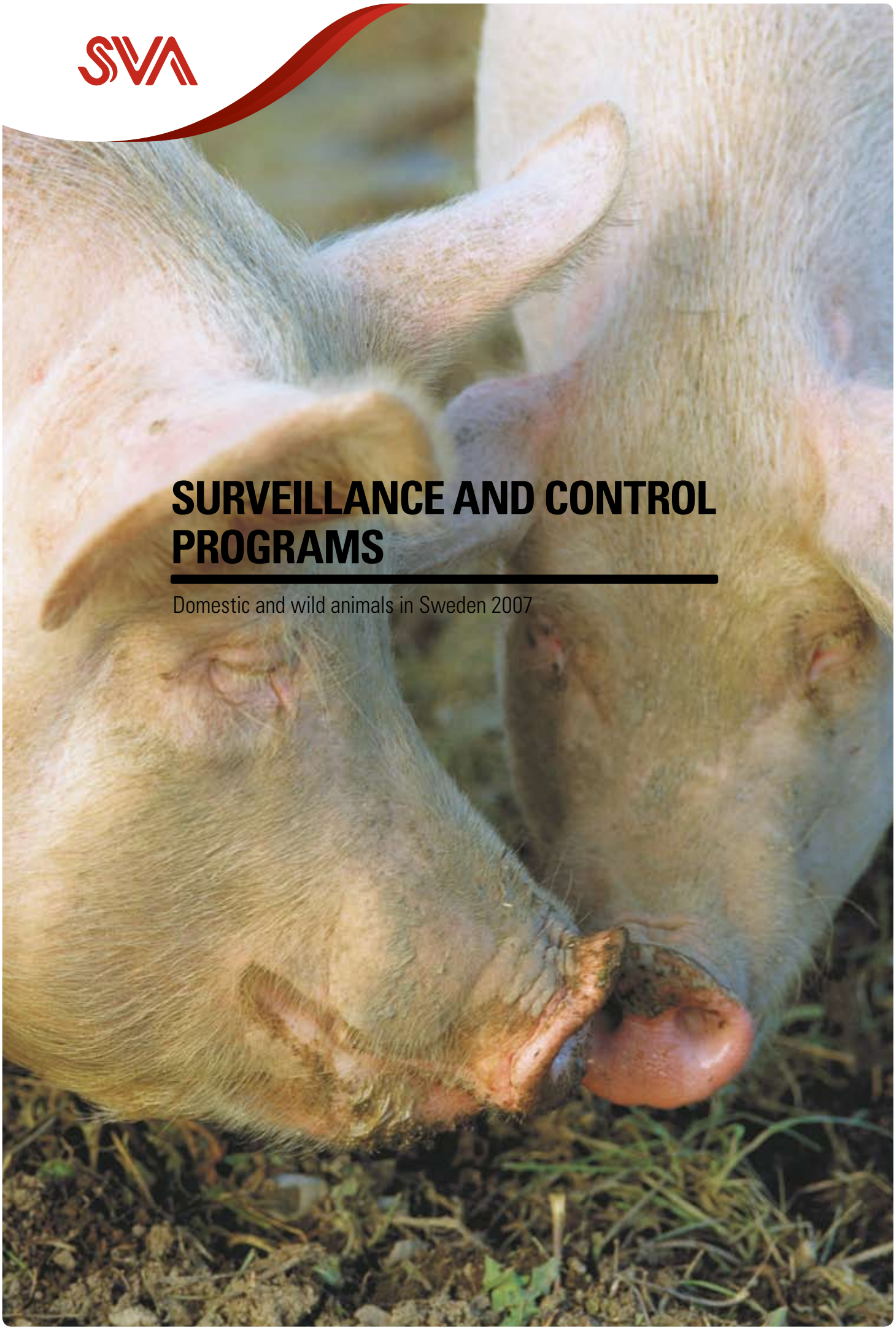

SURVEILLANCE AND CONTROL PROGRAMS

Domestic and wild animals in Sweden 2007

CONTENT

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SVAs rapportserie 4 ISSN 1654-7098

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Introduction

This report is one in a series of yearly reports that started in 2005. The aim is to publish the results of the Swedish surveillance and control programs for certain animal diseases in domesticated and wild animals.

The diseases covered by the report are all notifiable to the Swedish Board of Agriculture and many are included in the Swedish Law of Epizootics. A non-vaccination policy is practiced in Sweden, thus it is prohibited to vaccinate against any epizootic disease except under very specific circumstances after approval of the Swedish Board of Agriculture (SBA).

In case of a suspicion of an epizootic disease, samples taken should be sent to Statens Veterinärmedicinska Anstalt (SVA), the National Veterinary Institute in Sweden, for analysis, or another laboratory approved by the SBA. Apart from being the laboratory performing the analysis mentioned in this report, SVA is an authority with expert knowledge in prevention and control of infectious animal diseases.

The number of Swedish herds with livestock has decreased whereas the herd size has increased during the last decades. Any disease outbreak would thus have a greater health and economical impact on affected herds. Compared to many European countries, Sweden has rarely experienced any serious outbreaks of epizootic or other contagious diseases. Due to the increased movement of animals, goods and people it is of major challenge for Sweden to keep this favourable situation. However, during 2007 porcine reproductive and respiratory syndrome, PRRS, was detected for the first time in Sweden. Due to early detection and prompt actions taken the disease was successfully eradicated and the country is again free from the disease.

Sweden has by the European Commission (EC) been granted additional guarantees for infectious bovine rhinotracheitis, IBR, in cattle, Aujezky's disease, AD, in pigs and infectious pancreatic necrosis, IPN, spring viraemia of carp, SVC and renibakterios in fish. The Swedish salmonella control program has also been approved by the EC. Further, Sweden is officially stated in the EU legislation as free from bovine brucellosis, enzootic bovine leucosis and tuberculosis and has an approved disease free zone status for viral hemorrhagic septicemia, VHS and infectious haematopoietic necrosis , IHN, in fish.

Moreover, Sweden has a very favourable situation concerning paratuberculosis and 99% of the bovine herds were certified free from bovine virus diarrhoea virus at the end of 2007. Further, an application has been submitted to the EC where Sweden demonstrates freedom from infection with *Mycobacterium bovis* in Swedish herded deer.

A thorough and reliable surveillance is an important tool for the early detection of emerging diseases in times of globalisation and climate changes. Surveillance programs need to be dynamic in order to meet rapid changes in the surrounding world and should be given more attention.

The role of various institutions, organizations and laboratories involved in the monitoring work is listed as well as supporting animal databases.

Note: Following a recommendation of the OIE scientific commission for animal diseases, the international committee of the OIE approved on 30 May 2008 that Sweden be classified by the OIE as a country having a negligible risk for bovine spongiform encephalopathy.

The livestock population

Demographic data show that most farms are located in the south and central parts of Sweden and animal husbandry is the major line of production. In the north of Sweden there are mostly small farms. The number of holdings with livestock has decreased during the last decades, whereas those remaining have increased in size. Since 1995 the average pig herd size has more than tripled. Most data relates to 2007, but some data are older. Figure 1-3 give an overview of the livestock population and the number of holdings with animals in Sweden.

CATTLE

There are 23,878 herds with a total number of 1.559,725 cattle in Sweden, Map 1.

The dairy sector is playing a central role in Swedish agriculture. The number of dairy cows has, however, been decreasing over a long period of time. In 2007 there were roughly 7,000 farms with dairy cows. This gives an average of 52 cows/herd. Regarding suckler cows, there was a great increase between 1990 (75,000) and 1995 (157,000) and the figure for 2007 is 185,717 cows. The average herd size was 15 cows/ herd.

In total, approximately 420,000 adult cattle and 30,000 calves were slaughtered during 2007, which is the same number as during 2005.

PIGS

In 2007 there were approximately 2,300 pig farms in Sweden, Map 2. The number of holdings has been continuously decreasing from being more than 25,000 in 1980. Also, the numbers of pigs are declining, with the greatest decrease during the 1980's. The number of sows is approximately 179,000 with a farrowing interval of 2.2 times per year. Artificial insemination is used in over 90 % of matings and the number of live mature boars is less than 300. Approximately three million pigs are slaughtered annually, at an age of six to seven months. Thus, there are constantly around 1.5 million live growers in Sweden.

SHEEP

In 2007, there were roughly 8,000 sheep holdings in Sweden with a total of approximately 242,000 ewes and rams and 267,000 lambs, Map 3. The number of ewes and rams has increased with 24 % since 1995.

Sheep farms in Sweden are usually small-scale enterprises. One farm in three has nine adult sheep at most. Approximately 198,000 lambs were slaughtered in 2007, which is an increase from the years before.

GOATS

In 2007 the number of goats was approximately 5,500, of which the majority were Swedish Landrace. There were ninety cheese producing herds, having their own dairy.

POULTRY

The number of holdings with broilers is slowly decreasing. In 2007, there were approximately 120 holdings. However, the number of chickens for slaughter has been rather stable during the last years with approximately 71 million chickens slaughtered in 2007.

There were approximately 200 holdings with more than 5,000 birds. There were approximately six million productive laying hens in 2007.

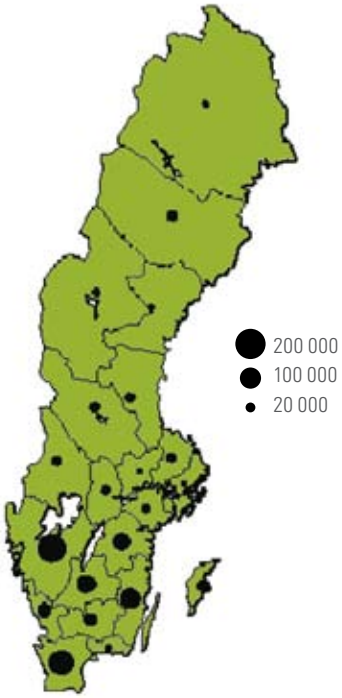
In 2007 430,000 turkeys were slaughtered in Sweden.The Swedish commercial market of ducks and geese is limited. In 2007, the number of slaughtered ducks and geese was about 30,000.

FISH

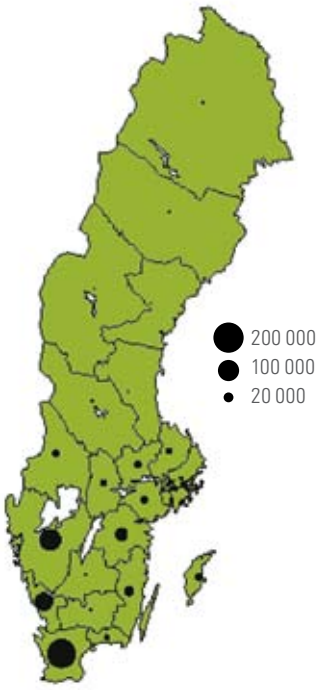
Sweden is a very small country when it comes to aqua culture. The farms are evenly distributed over the country with a slight predominance to the

THE LIVESTOCK POPULATION

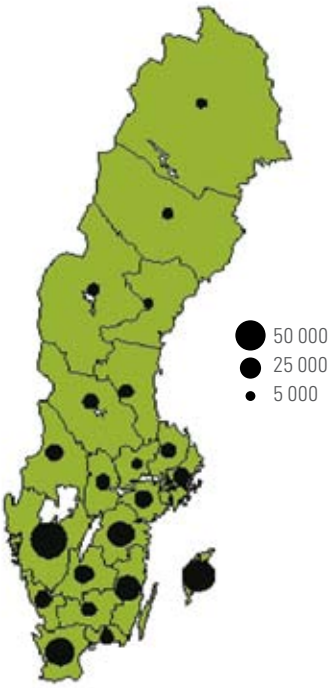
Map 1. Geographical distribution of cattle in 2007.



Map 2. Geographical distribution of pigs in 2007.



Map 3. Geographical distribution of sheep in 2007.



Map 4. Geographical distributions of fish farms in Sweden including places for caught of feral broodfish 2007

middle and south parts, Map 4. Rainbow trout are the most frequently farmed fish followed by salmon, brown trout and char. Salmon and brown trout mainly for restocking feral populations. Eels are imported from Severn in the UK through quarantine for the restocking of feral populations. A minor part, is farming of pike-perch and perch. The main tonnage is produced in the continental zone. Many of the farms are quite small compared to European standard, but there is a trend towards bigger units. During the last five to ten years there has been an increased foreign ownership, mainly Finnish.

TRADE IN LIVE ANIMALS

In 2007, 4,265 pigs were brought in to Sweden (from Norway and Finland only), 25 Bison Bison (from Denmark) and 27 sheep (from Denmark).

The number of animals leaving the country during 2007 consisted of 2,626 cattle, 12,494 pigs, of which 12,304 were sent for slaughter to Germany, and finally 390 sheep and goats wich were sent for slaughter to Denmark.

Regarding the trqade in poultry no figures are available.

ANIMAL DATABASES

The central register of holdings

The Swedish Board of Agriculture is responsible for the register. Each holding is allocated a unique identification number (holding number). The register contains information on all activities concerning bovine animals, pigs, ovine and caprine animals with details on holding number, visiting address, species. Any change in the present situation shall be reported within a month after the change. The register provides the specific animal databases with information.

The central database for porcine animals (GRIS)

The Swedish Board of Agriculture is responsible for the database. It contains data on all holdings with pigs and movements of pigs between holdings. The data encompasses address and registration number of the holding as well as name and phone number of the keeper, type of production, capacity and the geographical coordinates of the holding. Regarding movements, the receiving holding is responsible for reporting the movements of the animals within seven days. The register's purpose is to allow swift and efficient tracing of contagious diseases.

The central database for bovine animals (CDB)

The Swedish Board of Agriculture is responsible for the Central Database for Bovine Animals, to which all bovine births, deaths and movements shall be reported. The keeper is responsible to report any changes within seven days of the occurrence. The purpose of the register is to allow swift and efficient tracing of a contagious disease, verification of the country of origin of a meat product, as well as control and administration of cross compliance. The system enables the scanning of animal disease forms into the data system.

The slaughter register (SLAKT)

The register is administrated by the Swedish Board of Agriculture, but it also provides statistics for the National Food Administration (NFA). The slaughterhouses are responsible for reporting all slaughtered animals including wild game. All discards shall be reported and information about the discards stated according to the codes of NFA. The producer's organization number or personal code number must be reported for all species. The holding number of the supplier is compulsory information for all species except horses and wild game. Reports shall be made every week.

The register of laying hens

The register is administrated by the Swedish Board of Agriculture and is financed by fees. All egg producers who have a capacity of at least 350 laying hens and who sell eggs for consumption shall be registered according to Directive 1999/74/EC. The register contains information about address, production method, capacity, geographic coordinates and the number of houses and sections on the holding. The purpose of the register is to allow efficient tracing of the eggs in case of a contagious diseases and to ensure good food safety.

The poultry register

The register is administrated by the Swedish Board of Agriculture and includes all holdings with commercial poultry production. An exception is holdings with at least 350 laying hens, which are registered separately. The purpose of the registers is to allow efficient tracing and eradication of contagious diseases. The name and address of the

holding, name of animal keeper, information on all houses and sections, production method, maximum capacity, species and geographic coordinates shall be registered.

The database for dairy herds (Ko-databas)

The Swedish Dairy Association is responsible for this comprehensive database. It forms the bases for the development of different management tools used by the farmers. It is also a valuable tool for research concerning feeding, genetics etc. Approximately 90 % of all dairy cows in Sweden are included in this recording programme.

Swedish Animal Health Service's registers

The Swedish Animal Health Service runs different control and monitoring programs. The holdings that are associated with any of the programs are included in the respective registers for cattle, sheep, pigs and farmed deer.

The animal health database (vet@)

The database is used by the veterinary services for the documentation of the health situation on farms, including details about health status, treatment and vaccinations of individual animals. It is based on reports from practitioners to the Swedish Board of Agriculture. All veterinarians are obliged to report their various practice activities. It is mandatory for District veterinarians to report continuously. Private practitioners have the choice to report pet treatments either continuously or once a year. The purpose is to monitor the animal health situation in Sweden and use it as a base for preventive measures.

INSTITUTIONS, ORGANISATIONS AND LABORATORIES INVOLVED IN MONITORING

Swedish Board of Agriculture

The Swedish Board of Agriculture is the Government's expert authority for agricultural and food policy, and is responsible for agriculture, horticulture and reindeer husbandry. This includes monitoring, analysing and reporting to the Government on developments in these areas, and implementing policy decisions within its designated field of activities.

The Swedish Board of Agriculture promotes animal health by strict animal welfare requirements and by combating and preventing the spread of contagious animal diseases.

The Swedish Board of Agriculture is also the chief authority for the Swedish District Veterinarians.

National Veterinary Institute

The National Veterinary Institute, SVA, is a Swedish national authority that strives for good animal and human health, a good environment and sustainable food production.

SVA is an expert authority within the field of risk assessments, prevention, diagnosis and the control of infectious diseases. SVA assists other authorities, organisations, veterinarians and the general public with support in decision-making, advice and help, as well as carrying out research in relevant areas.

Diagnostic capacity for most of the epizootic diseases and many other contagious animal diseases is available at SVA. Several control- and monitoring programs are being conducted in cooperation with animal owner organisations and relevant authorities.

National Food Administration

The National Food Administration, NFA, is the central supervisory authority for matters relating to food, including drinking-water and has a direct responsibility to the Government.

The NFA has the task of protecting the interests of the consumer by working for safe food of good quality, fair practices in the food trade, and healthy eating habits. Fair practices in the food trade imply that the consumer can rely on the labelling as regards, for example, the composition, weight, keeping qualities and origin of the food.

County Administration

Sweden is divided into 21 counties, each of which has its own County Administration and County Governor. The County Administrations function as representatives of the state in their respective counties, and as links between the inhabitants, the municipal authorities, the Central Government, the Swedish Parliament and the central state authorities. The County Administrations have important coordinating functions regarding prevention, surveillance and eradication of contagious diseases.

The Swedish Dairy Association

The Swedish Dairy Association is the national industry organisation for Swedish dairy farmers and the Swedish dairy industry. The Swedish Dairy Association works on behalf of its owners, who are the seven largest dairy companies (jointly representing more than 99 percent of Swedish milk production), seven livestock cooperatives, two semen-producing companies, and nine breeder societies. The Swedish Dairy Association gathers, develops and communicates knowledge relating to the entire chain from cow to consumer, including issues concerning animal health. The Swedish Dairy Association is responsible for surveillance programs regarding bovine leucosis, IBR, BVD and salmonellosis in bovines.

Swedish Animal Health Service

The Swedish Animal Health Service is a veterinary organization providing animal health service to all breeders of pigs, beef and sheep in Sweden. The objective is to further a sound production of healthy animals on an economically competitive basis. Health control and health service is provided at all stages of the production chain. The Swedish Animal Health Service runs several control- and monitoring programs e.q. Maedi Visna in sheep, salmonellosis in pigs, bovine tuberculosis in farmed deer, Aujeszky´s disease and PRRS in pigs and paratuberculosis in cattle. They are also in charge of the organisation of post mortem investigations for livestock as a part of passive surveillance.

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Paratuberculosis

BACKGROUND

Paratuberculosis (Johne's disease) is included in the Swedish Law of Epizootics since 1952 (SFS 1999:657, with amendments). Vaccination is according to this law prohibited and notification of the infection is mandatory based on clinical suspicion. Whole-herd slaughter is performed if *Mycobacterium avium* subsp. paratuberculosis is detected in a herd. The prevalence of paratuberculosis in Sweden is extremely low, but sporadic cases in cattle have occurred, most recently in 2000. Paratuberculosis has never been detected in other ruminants in Sweden.

In 1993, bovine paratuberculosis was diagnosed in an animal imported to Sweden. Before this, there had been no known cases of this disease for several decades. In the investigation made to trace the infection, 52 herds and 500 contact herds were sampled. Infection was found mainly in beef herds of the Blonde d'Áquitaine and Limousin breeds. In an extended investigation in 1995-1996, all herds that had imported cattle between 1980 and 1994 were included. In the same period, a screening of sanitary slaughtered cattle that involved culture from internal organs was made. All these investigations resulted in three confirmed cases with consecutive eradication measures taken in the herds. A control programme focusing on pedigree beef herds was initiated in 1998.

Bovine paratuberculosis has never been found in Swedish dairy herds. Surveys to investigate dairy herds have been performed in 2001, 2003 and 2005.

AIM

The overall purpose of the control programme is to document freedom from bovine paratuberculosis and to prevent possible spread by early detection of the infection.

In the programme, the target population is beef herds that sell animals for breeding. The control programme is managed by the Swedish Animal Health Service and financed by the Swedish Board of Agriculture. The active surveillance in dairy cattle is financed by the Board of Agriculture and performed by the Swedish Dairy Association in co-operation with the Swedish Animal Health Service.

MATERIAL AND METHODS

Control programme

In total, the control programme for bovine paratuberculosis encompassed 611 herds during 2007. These included all main breeding beef herds and a smaller number of dairy herds. In affiliated herds, yearly faecal samples are collected from all cattle from two years of age and all purchased animals from one year of age. After five years of negative results, sampling is reduced to faecal sampling of 20 % of the animals in the herd, or a minimum of ten animals, every second year. The samples are pooled five and five, except for imported animals that are cultured individually. In 2007 the number of sampled herds within the control programme were 301 encompassing samples from 4 556 individuals.

Screening of dairy herds

No screening of dairy herds was performed during 2007. In previous screenings, in 2001, 2003 and 2005, faecal samples were collected from 20 older cows in 200 dairy herds. The herds were selected as a stratified random sample, to achieve a representative geographical distribution. The herds selected for sampling 2005 were different from the herds sampled in 2001 and 2003. Sampling from selected slaughtered cows is planned for 2008.

Clinical suspicions and necropsies

Animals of any ruminant species showing symptoms that lead to clinical suspicion of paratuberculosis are further investigated. Sampling includes

faecal samples from live animals and post-mortem samples from dead or culled animals. The latter include samples from the ileal wall, ileal content and ileocaecal lymph nodes as well as any macroscopic lesions in the intestines. Since 2004, sampling is performed on cattle and sheep above one year of age submitted to necropsy. Samples are taken as above and submitted for culture. In 2007 there were 88 cattle and 36 sheep sampled at post mortem examinations.

Other animal species

Since 1993, yearly screenings of the sheep population has been undertaken. For 10 years serology (AGID) was used, but in 2004 this was replaced by faecal culture. Serum samples were collected from the Maedi-Visna programme, the number varied between the years but an average of 2000 samples per year were analysed. Since 2004, faecal samples have been taken in 60-70 sheep herds, from the 10 oldest animals in the herd. In 2007, samples were taken from 56 herds distributed throughout the country. In addition, culture is performed on suspect cases found at post-mortem investigations in wildlife.

Culture

All cultures were performed at the National Veterinary Institute. After pre-treatment with NaOH and oxalic acid, samples were cultured on modified Löwenstein-Jensen medium supplemented with mycobactin and on Herrolds Egg Yolk medium for up to 4 months. Faecal samples from sheep were cultured for up to 6 months, on both modified L-J with mycobactin and modified Middlebrook 7H10 with mycobactin.

RESULTS AND DISCUSSION

None of the samples from the control programme were positive for bovine paratuberculosis. At the end of 2007, 494 affiliated herds had the so called A-status*. (A small number of herds that have achieved A-status has left the programme, therefore this number is slightly reduced as compared with last years 498 affiliated herds with A-status.)

Three clinical suspicions of paratuberculosis were raised during 2007. These were cases with chronic diarrhoea and weight loss. The suspicion arose on live animals, two cattle and one bison, and two of these were necropsied after the initial sampling in the herd. None of the clinical suspicions were positive on culture.

No paratuberculosis was detected in the necropsy samples from cattle and sheep during 2007. In the sheep surveys up to 2004, an average of one seropositive sample was found every year, but further investigations into these herds, including slaughtering of the positive animal and testing of all other animals in the herd, revealed no paratuberculosis.

No positive faecal samples have been found 2004, 2005, 2006 and 2007.

Paratuberculosis has never been detected in Swedish wildlife.

The investigations undertaken show that the prevalence of paratuberculosis in Swedish ruminants remains at a very low level. However, due to the lack of sensitivity of available tests for live animals, freedom from the infection is difficult to demonstrate.

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*Herds that have undergone 5 annual whole herd samplings with negative results.

Salmonella in food-producing animals

BACKGROUND

The control of *Salmonella* in Swedish animal production was initiated more than 50 years ago. This was, among other things, prompted by a major food borne outbreak in 1953, involving more than 9000 people. All serotypes of *Salmonella* are regarded as equally unacceptable and the legislation on salmonella control includes all serotypes. The present Swedish salmonella control programme was approved by the EU in 1995 (95/50/EC) and is supervised by the Swedish Board of Agriculture and the National Food Administration. The *Salmonella* control is governed by the Law on Zoonoses (SFS 1999:658, with amendments) and several regulations. Any suspicion of *Salmonella* in animals is notifiable, and restrictions must be put on the *Salmonella* infected holding, such as a ban on all animal movements. In case of positive samples, trace back and trace forwards investigations are made. A stamping out policy is practised whenever *Salmonella* is detected in poultry (excl. ostriches). This is followed by thorough cleaning and disinfection, and environmental sampling before repopulation is permitted. In other animal species (incl. ostriches), the on-farm eradication strategy depends on the situation and type of production. Restrictions are not lifted until cleaning procedures are completed and two whole herd samplings four weeks apart have shown negative results. A separate feed legislation regulates *Salmonella* control in feed production plants, and mandatory actions in case of positive feed samples. Several regulations describe surveillance procedures in different animal species as well as on-farm eradication procedures. Preventive hygiene measures and restrictions regarding animal purchases are included in voluntary programmes that allow affiliated producers a higher level of compensation for losses caused by eradication measures in case *Salmonella* is detected. The majority of all pig producers and many of the large dairy operations as well as beef cattle breeders are affiliated to the programmes.

AIM

The overall strategy of the Swedish salmonella control programme is to prevent *Salmonella* in any part of the production chain, from feed to food of animal origin, to monitor the whole chain, and to eliminate infection/contamination with salmonella whenever found.

MATERIAL AND METHODS

Poultry

Sampling was performed at different frequencies in different stages in the production chain depending on the impact an undetected infection in the specific stage would have on the end product. Sampling was performed by the food business operator and by the competent authority. Breeding animals were sampled during the rearing period and every second week throughout their production period. The same requirements were applied to imported breeding animals. Every batch of eggs was sampled in the hatchery. Hens for commercial table egg production were sampled during the rearing period, every 15th week during the laying period and before slaughter. Poultry for slaughter were sampled before slaughter. Depending on poultry production type faecal samples were collected or boot/sock swabs were used for sampling. In the hatchery meconium samples were collected. The number of samples was calculated so as to detect a flock prevalence of 5% with 95% confidence level. Furthermore, the control programme for fresh poultry meat comprises analyses of neck skin samples from poultry carcasses. Neck skin samples were sampled from all slaughtered flocks and the sampling was designed to detect a 0.1% prevalence (95% confidence interval).

Cattle and swine

No regular sampling was done on pig or cattle farms. Voluntary surveillance was performed in breeding pig herds within an industry certification programme (BIS).

In case of clinical or post mortem suspicion of *Salmonella* infection, relevant samples must be taken for culture. In addition all calves up to six months of age are sampled at post mortem examination.

At each one of the high intensity slaughter houses, that slaughter approximately 90% of cattle and pigs, the number of samples were chosen to detect at least 5% (95% confidence interval) *Salmonella* infected/ contaminated carcasses. Sampling was performed daily, evenly distributed over time. In case of separate slaughter lines, each line was sampled separately.

In low intensity slaughterhouses, slaughtering approximately 10% of all cattle and pigs, enough samples were taken to detect 1% prevalence (90% confidence interval). Furthermore, quantitative monitoring of the slaughter hygiene was performed in all slaughterhouses by the collection of carcass swabs. Sampling was designed to detect a 0.1% prevalence (95% confidence interval) of salmonella contaminated carcasses.

A baselinestudy was performed on pigs during October 2006 until September 2007, according to Comission decision 2006/668/EC. Randomly selected pigs on eight slaughterhouses were sampled. The selected eight slaughterhouses slaughter 80 % of fattening pigs in Sweden. Lymph node samples and carcass swabs were collected for culture and meat juice samples were collected and analysed for antibodies within this baselinestudy.

DIAGNOSTIC PROCEDURES

Poultry

Before analysis the boot/sock swabs were pooled to one or two samples. Faecal samples were pooled to one sample. During investigation or before restocking in infected premises dust samples and / or environmental swabs were used for environmental sampling.

The detection method used for analysis was MSRV which is the method recommended by Community Reference laboratory for Salmonella in Bilthoven. The method is described in the current version of annex D of ISO 6579 (2002): ”Detection of *Salmonella* spp. in animal faeces and in samples in primary production stage”

Cattle and swine

Before analysis, samples from slaughterhouses were pooled in batches of 10 to 15. For sampling of live animals, a minimum of 10 g of faeces from each individual, and 50 g from each pen of calves/young stock, was collected. At the laboratory, materials from 5 individual animals were usually pooled. In case *Salmonella* was isolated from a pooled sample, individual analysis of stored samples could be performed. Handling and preparation of lymph node samples and carcass swabs are described in detail in the Zoonosis reports from Sweden to the European Union. The bacteriological method used for analysis of samples collected within the Swedish Salmonella control programme was the NMKL 71:1999, ISO 6579 (Decision 2003/470/EC). In addition, for cattle faeces, cystein and selenite broth was sometimes used.

RESULTS AND DISCUSSION

Poultry

22 poultry flocks and one hatchery were detected infected with *Salmonella* during 2007. All flocks were detected through on farm sampling. The results from the surveillance at slaughterhouses (neck skin samples) are as follow: From 3,907 samples taken only one was positive (turkey).

In December 2006, an outbreak of *S.* Typhimurium was detected involving broiler breeding flocks and broiler flocks. The outbreak most likely started in a grandparent (GP) flock and spread to one hatchery, four parents flocks (rearing period) and five broiler flocks. Two different phagetypes were isolated in the outbreak: NST and DT 120. The source is unknown. The outbreak continued in 2007, the hatchery and four of the infected flocks are included in the statistics for 2007.

Except the flocks infected in the outbreak there were eleven other poultry flocks infected with *S.* Typhimurium during 2007, two holdings with geese, one holding with ostriches, four broiler flocks, one flock with broiler parents and three flocks with layers (one infected during rearing).

Two broiler flocks were infected with the same phagetypes in the same time period as the outbreak, but could not be epidemiologically connected with it.

Four poultry flocks (two organic layer flocks, the ostrich holding and one holding with geese) were most probably infected by small birds as the phage-types detected (40 and NST U277) are frequently found among small birds and the production systems involved allows only low bio security levels.

Other serotypes isolated from poultry flocks during 2007 were S. Livingstone (layers), *S.*Agona (broilers), S. Worthington (breeding ducks and turkeys in the same enterprise), S. Reading (ducks) and S. Java (ducks).

During 2007 there are a higher number of salmonella positive flocks in poultry compared to previous years, but it is still at a low level. No of notified cases of *Salmonella* in layers and broilers are shown in Fig 1 and 2. A number of the flocks are due to an outbreak 2006/ 2007 where a contaminated hatchery and a delay in finding an infected broiler grand parent flock caused infection in several other poultry flocks. Even so, there were seventeen other poultry flocks infected during the year. It is too early to conclude if this reflects a true increase or if it is an occasional finding.

Fig. 1 No of notified cases (infected herds)of *Salmonella* in layers during 1968-2007

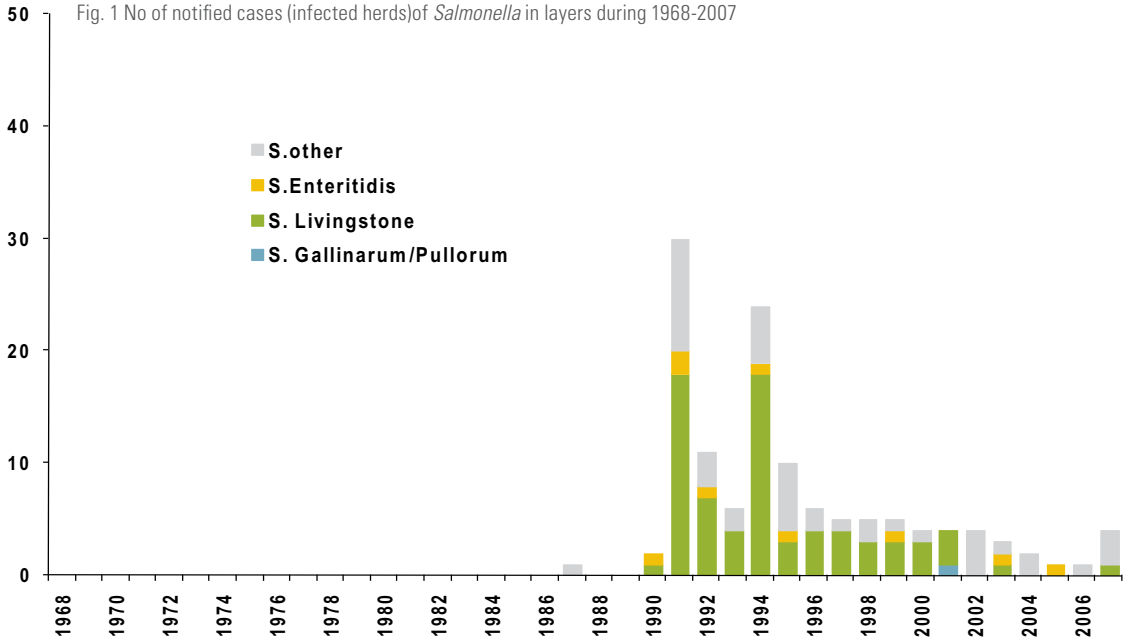
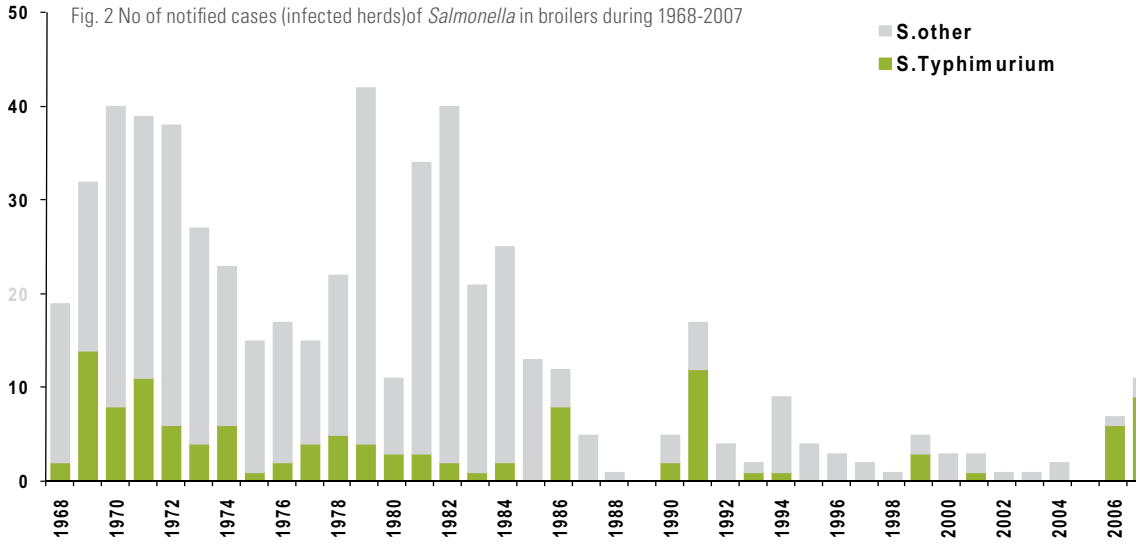


Fig. 2 No of notified cases (infected herds)of *Salmonella* in broilers during 1968-2007



The outbreak shows the importance of tracing. The infection was not found in the GP flock though frequent sampling. Instead it was detected in a rearing flock (broiler parents) and traced backwards to the GP flock.

Cattle

In 2007, *Salmonella* was isolated from five new cattle herds, see Fig 3. The following serotypes were isolated:

- 3 herds with S. Dublin detected in a calf at necropsy and sampling at meat inspection.
- 1 herd with S. Reading detected at sampling at slaughter within the control programme.
- 1 herd with S. Typhimurium DT 104 detected by tracing from human cases.

Eight additional farms were under restrictive measures in 2007 after an infection of *Salmonella* detected in 2006 and 2007. Five of these farms were infected with S. Dublin, one with S. Agona, one with S. Typhimurium DT 104 and one with S. Typhimurium NST. During 2007, six of these farms were declared free of *Salmonella*: three fully free and three partly free of *Salmonella*.

A total of 3853 lymph nodes from cattle were analysed from samples taken at slaughter within the Salmonella control programme (Table 1). *Salmonella* was isolated from five of these lymph nodes (S. Agona, S. Duesseldorf, S. Reading and S. Typhimurium NST U277 and 01:26).

Salmonella was also isolated from two individual animals at necropsy (S. Duesseldorf and S. Typhimurium NST U277) but sampling of the animals in the originating herd revealed no salmonella infection. One feedborne outbreak was detected during 2007. Salmonella Putten was isolated at the feedplant and in the feeding system of two cattle herds and one pig herd.

Pigs

Salmonella was detected in 11 new pig herds in 2007, see Fig 4. These were herds were *Salmonella* was reisolated from animals within the originating herd. The initial isolation of *Salmonella* was as follows:

- In seven herds *Salmonella* was initially detected within the control program: S. Infantis (3

Fig 3. No of notified cases (infected herds) of *Salmonella* in cattle during 1968-2007

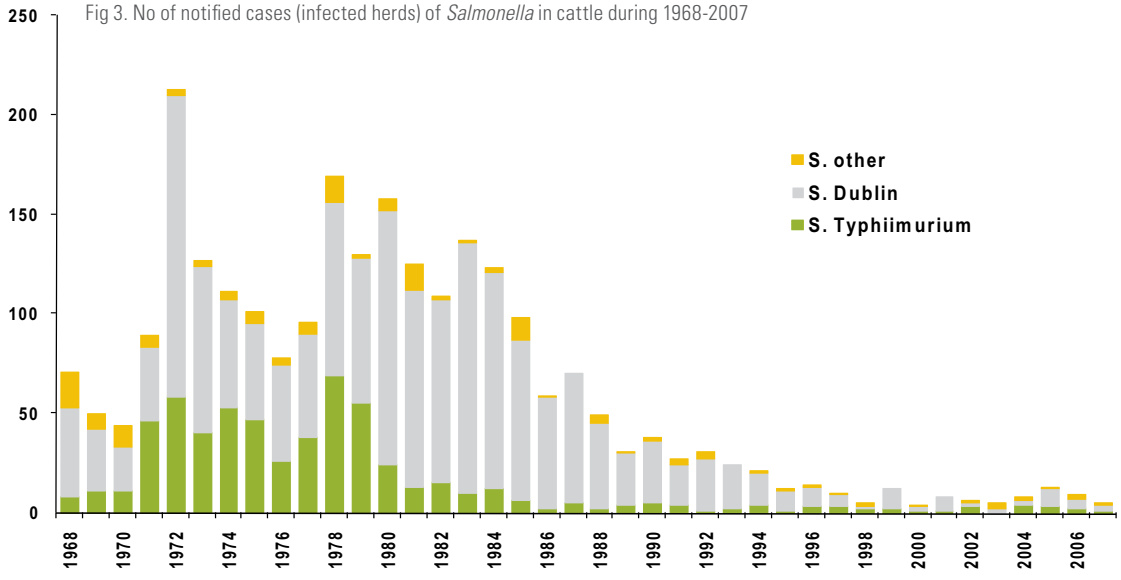


Table 1. Samples of lymph nodes taken at slaughter within the Salmonella control programme.

	No samples	No positive (%)
Cattle	3,853	5 (0,13)
Adult pigs	2,890	11 (0,38)
Slaughter pigs	3,354	9 (0,27)

farms), S. Typhimurium (6 farms, phagetypes DT 40, DT 104, DT 120, NST U277 and NST 06:08, NT).

- In one herd S. Putten was detected in the feeding system at a pig herd after detctection at a feedplant. Two cattle herds were also affected (See Salmonella cattle).
- In two herds salmonella was initially isolated in the baseline study. S. Typhimurium DT 40 was detected in one herd and S. Infantis in the other herd.
- S Typhimurium DT 104 was isolated from one herd sampled when tracing from a cattle herd. A sow from this farm had previously been positive at slaughter, but sampling within the herd at that time did not result in findings of *Salmonella*.

One herd infected with Salmonella Typhimurium DT 104 in 2006 was declared free in 2007.

In the EU baseline study on the prevalence of *Salmonella* in slaughtered pigs, *Salmonella* was isolated from five pigs in 2007 (S. Infantis from two pigs, S. Typhimurium DT 40 from two pigs and S. Typhimurium U277 from one pig) and from one pig in 2006 (S. Typhimurium DT 41). *Salmonella* was isolated at herd level in two of these cases (se above).

In the control programme, 6244 lymph nodes from swine were analysed (Table 1). Of these, 21 were positive. Eleven of the positive samples were taken from adult swine: S. Infantis (n=4), S. Typhimurium DT 40 (n=2), S. Typhimurium DT 104, S. Typhimurium DT 99, S. Typhimurium NST 1:03, S. Typhimurium NST and S. subspecies I. Ten of the positive samples were taken from fattening pigs: S. Typhimurium NST U277 (n=3), S. Infantis (n=2), S. Typhimurium DT 40 (n=2), S. Typhimurium NST 1:26, S. Typhimurium NT and S. Typhimurium DT 120.

The *Salmonella* situation in Sweden has been favourable and continues to be so. However, the number of infected pig herds was higher 2007 than previous years. As with poultry, it is too early to conclude if this reflects a true increase, but it is important to follow the development and take necessary preventive measures if an increase of Salmonella is detected.

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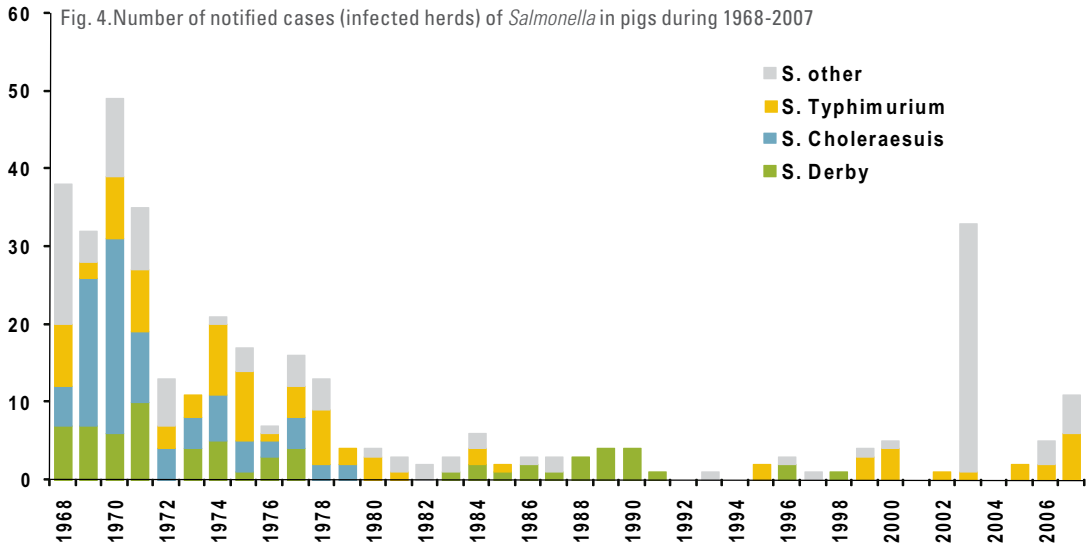

Fig. 4.Number of notified cases (infected herds) of *Salmonella* in pigs during 1968-2007

Tuberculosis (TB)

BACKGROUND

Sweden was declared officially free from bovine tuberculosis in 1958. Since then, sporadic cases have occurred in cattle, the most recent in 1978. Compulsory tuberculin testing of all cattle was abolished in 1970 and the national tuberculosis control in cattle is based on meat inspection and passive clinical surveillance. Suspect cases of infection with Mycobacterium bovis, M. tuberculosis, or other mycobacteria in the M. tuberculosis-complex, is compulsory notifiable in all animal species (SJVFS 1999:102 and 2002:16, with amendments). If tuberculosis is confirmed in a food producing animal, eradication measures are implemented, including depopulation of the whole herd, in accordance with the Swedish Law of Epizootics (SFS 1999:657, with amendments). When Sweden joined the European Union in 1995, the status of OTF (officially tuberculosis free) was obtained (former Decision 95/63/EC, Commission Decision 03/046/EG, as last amended by 04/230/EG). Sweden fulfils the requirements for control measures in OTF member states (Council Directive 64/432/EEC, Annex A, as last amended by 00/20/EC).

In 1987, M. bovis infection was introduced into the farmed deer population via imported fallow deer. After further investigation and eradication measures, a voluntary control programme for tuberculosis in farmed deer was introduced in 1994. Since 2003, the control programme is compulsory for all deer farms. The programme is based on regular whole-herd tuberculin testing, or whole-herd slaughter and meat inspection. Deer may only be sold for direct slaughter unless they originate from a herd that have undergone three consecutive herd tests and continue to test regularly. The most recent case was detected in 1997. TB vaccination of animals is not allowed in Sweden. During 2007, the status in Sweden was officially free of bovine tuberculosis. A scenario tree model performed in 2007 showed that a claim for freedom from tuberculosis in farmed deer is also valid (manuscript submitted for publication).

AIM

The aim of the programme is to document freedom from bovine tuberculosis, according to Council Directive 64/432/EEC and to contribute to the maintenance of this favourable situation.

MATERIAL AND METHODS

Animals sampled

Monitoring is performed by meat inspections at slaughter of food producing animals. Veterinary officers of the National Food Administration perform the inspections. If TB is suspected, samples are collected and analysed at the National Veterinary Institute. Furthermore, tuberculin tests are performed at artificial insemination centres and at export/import of animals as required according to EU-legislation (Council Directive 64/432/EEC). In addition, sampling is performed in case of clinical suspicion or if any other reason to suspect exposure of animals to bacteria of the *M. tuberculosis*-complex.

Methods of sampling and diagnostic methods

If tuberculosis is suspected at necropsy, at meat inspection, in case of clinical suspicion or if a tuberculin test is positive, lymph nodes from five different areas (retropharyngeal, submandibular, mediastinal, mesenterial and inguinal) and organs with macroscopic lesions are collected. Histology and direct smears are performed on all materials, and fresh material is stored in a freezer until the results of these tests are available. If TB cannot be ruled out by histology or if direct smears are positive, culture is performed. For culture, lymph nodes are pooled (including at least two lymph

nodes from each region) whereas organs with pathological lesions are cultured separately. Cultures are performed according to the method SVA4122 and are read once a week for eight weeks. Microscopy of all suspect colonies is performed. If acid-fast rods are found, test with an *M. tuberculosis*-complex specific genetic probe is performed. In case mycobacteria in the *M. tuberculosis*-complex are isolated the strain is further subtyped. Skin fold tuberculin tests are performed according to EC 1226/2002 (amending annex B of EC 64/432) and SJVFS 2003:33, K62. The comparative intradermal test is used, mostly at the neck site except for camelids where the auxilliary site is used. In case of a positive tuberculin test, the animal is culled and sampled as stated above. In the case of tuberculin reactors, culture is always performed on all samples.

RESULTS AND DISCUSSION

In total, 5 cattle were investigated for tuberculosis in 2007, all with negative results. In 4 of these cases TB was ruled out by histopathology and direct smears. In one case culture was performed and found negative. The suspicions arose at necropsy or meat inspection. In addition to the tested cattle mentioned above, some other species were also investigated for tuberculosis in 2007. Following suspicion at meat inspection, 34 pigs were investigated by histology, 24 of these were cultured. All were negative for bovine TB, but some of the samples were positive for *Mycobacterium avium* subsp *avium*. Furthermore, 1 sheep, 1 alpacka, 16 deer, 2 horses, 4 dogs and 5 zoo animals of various species were investigated for TB, all with negative results.

Within the control programme for farmed deer, a total of 526 herds were considered free of TB based on whole-herd testing or slaughter, while 16 herds were exempted from testing and allowed to perform meat inspections and necropsies for 15 years to obtain free status. These categories represent 93% of the farmed deer herds in Sweden. For herds not within the voluntary control programme, a deadline for control by whole-herd testing or slaughter was set in April 2007 and herds who had not complied with this will be slaughtered by official orders.

The situation in Sweden remains favourable. The risk of contracting tuberculosis from livestock and other animals in Sweden is negligible.

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Bluetongue

BACKGROUND

Bluetongue is a vector borne disease transmitted by midges (*Culicoides spp*). Until 1998 Bluetongue was considered to be restricted to areas with a tropical and temperate climate as far as 40°N and had not been detected in any of the European countries. Since 1998 outbreaks of five different serotypes have been detected in several Mediterranean countries. In August 2006 a new serotype for Europe (BTV-8) was diagnosed in Holland. During 2006 and 2007 this outbreak spread to a large number of countries in northern and western Europe. In October 2007 one case was reported in Denmark and the restriction zone around the Danish case encompassed the south-west part of the county of Skåne.

The control, monitoring, surveillance and restrictions on movements of certain animals of susceptible species are governed by Directive 2000/75/EG with amendments. Bluetongue is included in the Swedish Law of Epizootics (SFS 1999:657 with amendments) and notification and investigation of suspect cases is mandatory.

AIM

Two screenings were performed during 2007; one screening of vectors aiming to evaluate if culicoides species competent of transmitting bluetongue are present in Sweden, and if present document the activity of these throughout the different seasons of the year. And one serological screening of dairy herds in the county of Skåne in accordance with Directive 2000/75/EG, after the restriction zone around the Danish case was laid down. The Swedish National Veterinary Institute has been responsible for these screenings, which have been financed by the Swedish Board of Agriculture.

MATERIAL AND METHODS

Fifteen Onderstepoort blacklight suction traps were placed in 15 different herds in the counties of Bohuslän, Halland, Västergötland, Skåne, Blekinge, Småland, Gotland and Uppland, covering and area of 25 000- 30 000 km2 (Map 5). The traps were in place from July 2007 and onwards. Two additional traps were placed within the restriction zone in the county of Skåne in the beginning of December, in order to fulfill the requirements in directive 2000/75/EG. The traps were activated one night (from 6 pm until 10 am the next day) each week, and the maximum and minimum temperatures from this night was recorded. The captured insects were analysed at the University of Roskilde, Denmark. Species and number were recorded, and females were classified as nullipar, gravid, bloodfilled or gonoactive.

In November, bulk milk samples were collected from all dairy herds in the county of Skåne, in total 662 herds. The samples were collected within the quality control programs of the dairies.

Diagnostic testing was performed at SVA. Serum samples were analysed with a competitive ELISA (ID Screen® Bluetongue Competition ELISA kit) and milk samples were analysed with an indirect ELISA (ID Screen® Bluetongue Milk). These ELISAs test for antibodies directed against the VP7 protein. The VP7 is a major core protein possessing the serogroup-specific antigens common to the 24 serotypes. Organs and blood were analysed with realtime PCR for BTV-8 (the Hoffman rRT-PCR).

RESULTS

In total 51 339 insects were captured in the traps, of which 50 898 were *Culicoides spp*. Of these 2 076 were males. Of the remaining 48 498 female *Culicoides spp* 45 498 (93 %) were species that are considered to be potential vectors of bluetongue.

Map 5. Distribution of 15 blacklight suction traps.

The number of Culicoides varied between the traps. The proportions of different species were similar in all traps with exception of the two traps in the county of Gotland. *C. obsoletus* was the dominating species.

All samples within the bulk tank milk screening were negative.

Five clinical suspicions arose during 2007; these were all cattle with erosions in the oral cavity and/or swellings in the head. Samples from these animals were analyzed with negative results.

Animals that have been moved out of the restriction zone in the county of Skåne have been sampled in accordance with the regulations, in summary serum samples from animals originating from 45 different herds have been analysed at SVA. Another six herds have sent in bulk milk samples for analyses in order to fulfill requirements when moving animals out of the restriction zone. Further samples have been analysed in Denmark.

In conclusion, there were no findings to indicate presence of circulating BTV in Sweden during 2007. The vector surveillance demonstrates that culicoides species capable of transmitting BTV are present in the southern parts of Sweden, no surveillance has been performed in the northern parts. How efficient these midges will be as vectors for BTV under the climatic conditions in Sweden is still unclear and might vary between years. However, the conditions in the southern parts of the country are likely to be favorable for the spread of BTV, during the warmest months of the year.

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Bovine brucellosis

BACKGROUND

Brucellosis in Swedish cattle was eradicated during the first half of the last century. The infection has never been diagnosed in any other animal species in Sweden. The last Swedish bovine case was recorded in 1957 (OIE) and Sweden's disease free status is officially stated in EU legislation since 1994, Decision 2003/467/EC last amended by Decision 2005/764/EC (originally in Act of Accession of Austria, Finland and Sweden and in former Decisions 94/972/EC and 95/74/EC). Brucellosis in food producing animals is included in the Swedish Law of Epizootics (SFS 1999:657, with amendments). Vaccination is according to this law prohibited and notification of suspect cases is mandatory. Bovine brucellosis is on the OIE list of infectious diseases and current surveillance standards for bovine brucellosis are given in EU legislation, Directive 64/432/EEC. Screening for bovine brucellosis has been conducted regularly in Sweden since 1988. From 1997 and onwards, approximately 3000 samples (bulk milk and/or serum samples) have been tested each year. Out of all these samples, none has been confirmed positive.

AIM

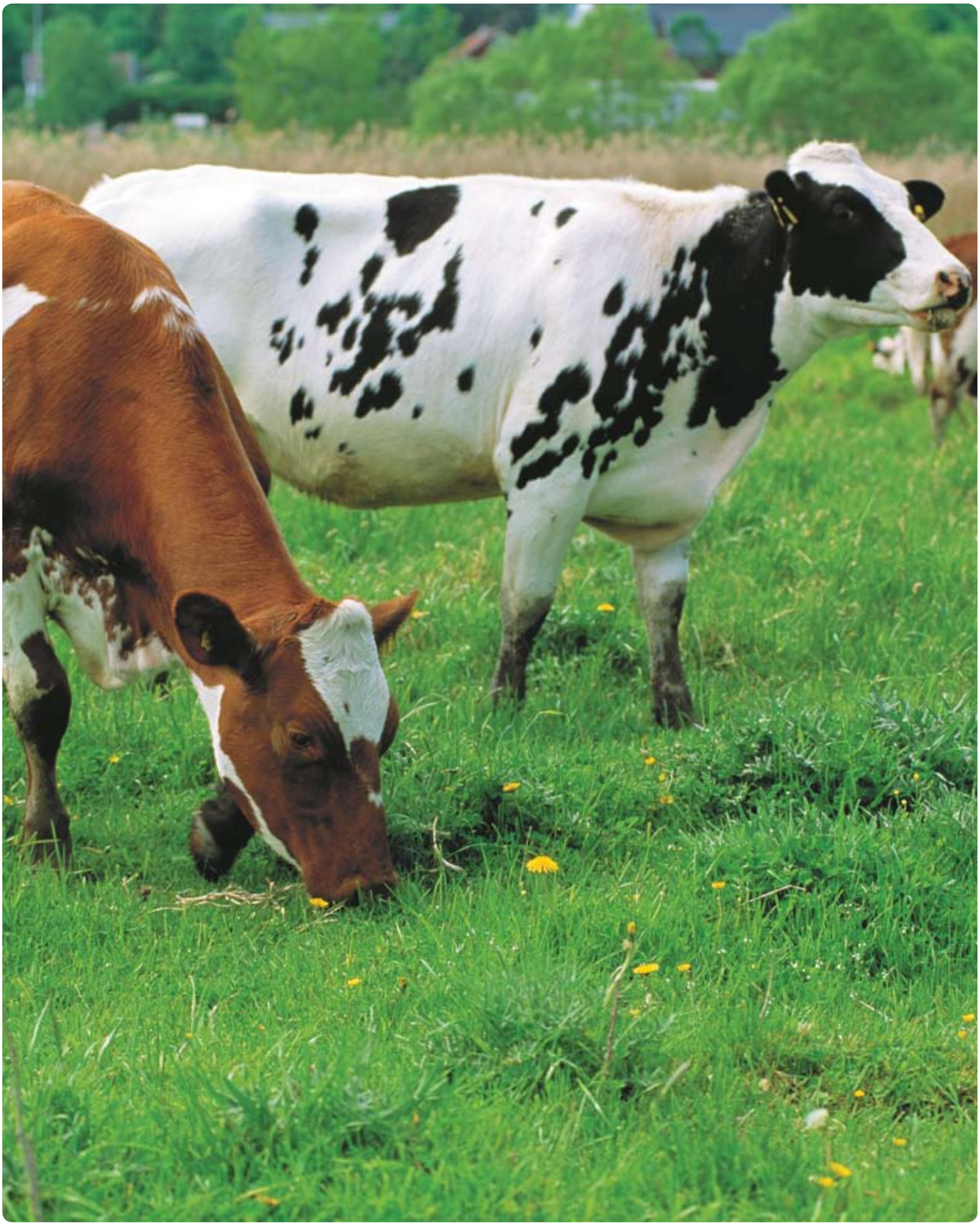
The purpose of the surveillance is to document freedom from bovine brucellosis in Sweden in accordance with Directive 64/432/EEC. The Swedish Board of Agriculture finances the surveillance, which is planned and executed by the National Veterinary Institute, SVA.

MATERIAL AND METHODS

During 2007, serum samples from 1 000 cattle and bulk tank milk samples from 2 000 dairy herds were analysed for antibodies against *B. abortus*. The serum samples were collected within the surveillance programme for bovine leucosis, and were obtained by convenience sampling (in other words not strictly random), evenly distributed throughout the sampling period. In addition to the surveillance, serological testing for brucellosis of cattle is performed prior to import and export, and at breeding centres. During 2007, a total of 351 animals were tested for such reasons. The number of samples exceeds this figure, as some animals are tested several times in AI centres. Two cattle herds with increased abortion rate were investigated for bovine brucellosis during 2007. Moreover, one herd was investigated as a follow-up to positive reactions in exported heifers that were tested in the importing country. Diagnostic testing was performed at SVA, Department of Bacteriology, Uppsala, Sweden. The diagnostic tests used was an indirect ELISA (SVANOVIR ® Brucella-Ab I-ELISA, Svanova, Biotech, Uppsala, Sweden). For confirmation, the complement fixation test, and sometimes the tube agglutination test, were used. If relevant material is available (e.g. aborted foetuses), culture is performed. A positive case is defined as an animal from which *Brucella* spp. has been isolated, or an animal giving a significant antibody titre.

RESULTS AND DISCUSSION

Two of the tank milk samples tested positive for the presence of antibodies. The herds of origin had no individuals with clinical signs indicative of *Brucella* infection. Serum samples were collected from lactating cows within the herd and none of these were positive. The investigations in the herd from which the seropositive heifers had been exported showed no indications of brucellosis. Moreover, all of the pregnant heifers calved normally after export and the calves remained healthy. The positive test results were interpreted as false positives. None of the examinations of



clinically suspect cases were positive. In summary no herd or individual animal was diagnosed with *B. abortus*. infection during 2007.

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Bovine spongiform encephalopathy (BSE)

BACKGROUND

BSE is a notifiable disease under the Swedish Law of Epizootics (SFS 1999:657, with amendments) and all suspicions of BSE (bovine animals not responding to treatment, with clinical signs that are compatible with BSE symptoms) must be reported to the authorities. The obligation to report applies for animal owners, veterinarians and everyone else who is responsible for the animals.

Until December 31, 2000, Sweden had a surveillance program according to Decision 98/272/EC with amendments, that implied that 60 cattle were to be tested every year. The target population was to be above 20 months of age with neurological symptoms or above four years of age with signs of chronic disease. No positive case of BSE was detected.

Since July 1, 2001, the surveillance programme is governed by Regulation (EC) No 999/2001 as described below. During a transitional period (January 1, 2001, until June 30, 2001), all emergency slaughtered cattle and fallen stock over 30 months of age and clinically suspect cases irrespective of age were tested.

GBR

In 2003 the European Food Safety Authority (EFSA) made a re-assessment of the Geographical Bovine spongiform encephalopathy Risk (GBR) in Sweden. EFSA:s scientific report in 2004 describes the GBR of Sweden based on data covering the period 1980-2003. They conclude that ”the current geographical BSE-risk (GBR) level is II, i.e. it is unlikely but cannot be excluded that domestic cattle are (clinically or pre-clinically) infected with the BSE-agent”. The Swedish system is regarded to be optimally stable, which means that the probability that cattle become newly infected with the BSE-agent is extremely low. One of the reasons for the favourable situation in Sweden could be that the industry voluntarily decided on a ban on meat- and bone meal (MBM) in feedstuff intended for dairy cows as early as 1987. In June 1988 all imports of livestock and MBM from the United Kingdom were banned. In 1991, MBM was banned from feedstuff for all cattle according to Swedish law. A similar ban on the feeding of mammalian proteins to cattle, sheep and goats was introduced within the European Union in 1994 (Commission Decision 94/381/EC). Due to the risk of cross-contamination a total ban on use of processed animal protein in feeds for any animals farmed for the production of food was introduced within the EU, and thus also in Sweden, in 2001 (Regulation (EU) No 999/2001).

The OIE Scientific Commission for Animal Diseases (Scientific Commission) has accepted the recommendation made by the ad hoc Group set up to evaluate country dossiers with respect to BSE status and proposed that the International Committee accept Sweden to be recognised as negligible BSE risk countries in accordance with the provisions of Article 2.3.13.3. of the 2007 Terrestrial Animal Health Code.

SURVEILLANCE PROGRAMME IN 2007

The Swedish surveillance programme regarding BSE is based on Regulation (EC) No 999/2001 and consists of active monitoring and passive surveillance. Testing within the Swedish surveillance programme in 2007 includes the following categories:

Passive surveillance

- Clinical suspects. Farmers and veterinarians are responsible of reporting clinically suspect animals irrespective of age to the Swedish Board of Agriculture and to the Swedish County Administration and the animals that meet the conditions to be regarded as clinical

suspects are tested for BSE at the National Veterinary Institute, SVA, Uppsala, Sweden.

Active monitoring

- All fallen stock (animals dead or killed on farm but not slaughtered for human consumption) above 24 months of age and all emergency slaughtered cattle above 24 months of age. EU Member States may decide to derogate from the requirement of monitoring in animals not slaughtered for human consumption in remote areas with a low animal density, where no collection of dead animals is organised. This has been applied in Sweden in remote areas and the bovine population in these areas does not exceed more than 10% of the total bovine population in Sweden.
- Animals with clinical signs at ante mortem inspection.
- Testing of bovine animals over 30 months of age at slaughter. Due to the first case of BSE in Sweden in 2006 the Regulation (EC) 999/2001 was amended and a full testing programme of bovine animals over 30 months at slaughter was implemented from 15th of June 2006.
- All imported cattle over 30 months of age at slaughter regardless of country of origin. All imported animals have special ear marks to identify them as imported.

AIM

The aim of the national surveillance and control programme is to document continued low prevalence of BSE in the Swedish cattle population (in accordance with the requirements for surveillance in regulation EC/999/2001).

MATERIAL AND METHODS

The Swedish Board of Agriculture is responsible for the surveillance programme, which is carried out in cooperation with the National Veterinary Institute, SVA. SVA is appointed National Reference Laboratory, NRL (Regulation (EC) 999/2001, annex X, Chapter A, 3 with amendments) and The Department of Pathology and Wildlife Diseases as well as the department of Virology, Immunobiology and Parasitology are responsible for the laboratory analyses. Three regional laboratories in Sweden have been approved to perform rapid tests on healthy slaughtered animals.

Clinically suspect animals

The samples have been examined with histopathology and immunohistochemistry in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, 3.1, a) as amended. The material was formalin-fixed, embedded in paraffin and sectioned at 5µm. Selected sections were stained by haematoxylin eosin (HE). All parts of the test were carried out in accordance with a standard protocol and immunohistochemical staining for PrPSc was performed using a monoclonal antibody, Mab PrPres F89/160.1.5.

Table 2. Total tests performed within the Swedish surveillance programme for BSE in 2001-2007 (1, 2, 3, 4, 5, 6).

	2001	2002	2003	2004	2005	2006*	2007
Fallen stock	22248	23607	22476	23849	24005	20576	16.500
Healthy slaughter	4433	12073	9850	10318	10095	111319	155.858
Clinical signs at AM	2	0	0	0	0	0	0
Emergency slaughter	1393	1788	2234	1924	1169	327	297
Clinical suspects	29	29	16	20	8	6	9
BSE eradication	0	0	0	0	0	4	0
Total	28105	37497	34576	36111	35277	132232	172.664
Total positives	0	0	0	0	0	1	0

*) Data from the Swedish Board of Agriculture, personal communication Lena Hult.

Risk population (fallen stock, emergency slaughter and imported animals)

The samples were examined with rapid tests at SVA in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, as amended. Unfixed brain tissue from the obex area was prepared to be tested with the ELISA (Bio-Rad TeSeE ELISA, Bio-Rad) as described by the manufacturer. In case of positive or inconclusive results the material was prepared and examined by histopathology and immunohistochemistry using the same protocol as for specimens from clinical suspects.

Healthy slaughtered animals

The samples were examined with rapid tests at SVA and three regional laboratories in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, as amended. Unfixed brain tissue from the obex area was tested with rapid test (Bio-Rad TeSeE ELISA, Bio-Rad, Idexx HerdChek BSE-Scrapie Antigen Test Kit, Idexx Laboratories, Enfer TSE Kit version 2.0 Method B, Enfer Scientific Limited, Kildare) as described by the manufacturers. In case of positive or inconclusive results the material was prepared and examined by histopathology and immunohistochemistry at the NRL using the same protocol as for specimens from clinical suspects.

RESULTS AND DISCUSSION

In 2007 the National Veterinary Institute examined 23 280 samples for BSE and all samples were negative. Of these, 16 500 were from fallen stock and 297 from emergency slaughter. Nine animals were investigated as clinical suspects. None of these had clinical symptoms that lead to a strong suspicion of BSE and they were tested as clinical cases although there were fairly reasonable explanations for the symptoms. Animals with diseases related to the central nervous system are also likely to have been examined as either fallen stock or emergency slaughtered animals and are thus included in those categories. In total, 172 664 healthy slaughtered animals were examined for BSE in Sweden 2007. None of these were positive (Table 2).

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Bovine virus diarrhoea

BACKGROUND

Bovine virus diarrhoea (BVD) is a notifiable disease (SJVFS 2002:16 with amendments). A voluntary surveillance and control programme with the objective to eradicate BVD without vaccination was launched by the Swedish Dairy Association in 1993 (SJVFS 1993:42) and has been running since then. The National Veterinary Institute, SVA, perform the laboratory analyses and the government together with the farmers bear the costs for sampling and testing. Since 1 June 2001 there is also a compulsory control programme (SJVFS 2002:31) requiring all cattle herds to be tested for BVD on a regular basis.

AIM

The purpose of the programme is to eradicate the disease from the Swedish cattle population without vaccination.

MATERIALS AND METHODS

The eradication programme is based on a strict non vaccination policy. Sampling depends on type of production and status of the herd. The programme relies upon the ability to distinguish infected herds from non infected herds. Herds that are free from infection are monitored to demonstrate continuous freedom and certified as being free from infection. Herds that are infected are screened and persistently infected virus carriers are identified and removed. Another important part of the programme is creating a positive attitude to biosecurity in the farming community and to protect the free herds from introducing the BVD-virus.

For screening, an indirect antibody ELISA (Svanovir® BVDV-Ab ELISA) for serum, milk and bulk milk sample is being used.

RESULTS AND DISCUSSION

All herds in Sweden were affiliated to the voluntary or compulsory programmes during 2007. The control programme has been successful. At the end of 2007, 99.0% of the herds were certified BVD-free and 0.2% or less were infected by BVD-virus.

In 2007, the total number of herds in Sweden was 19 522 and at the end of the year 19 332 herds were certified as free from the disease. Of the remaining herds, 31 are considered to still be infected, the others only have to be tested further before being able to be certified free from the disease. Five herds were discovered to be newly infected by the virus during 2007.

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Enzootic Bovine Leucosis

BACKGROUND

Sweden was declared officially free from enzootic bovine leucosis (EBL) by the European Union (EU) in January 2001 (former Decision 2001/28/EC, currently Decision 2003/467/EC last amended by Decision 2005/764/EC). Before this, a voluntary control programme had started in 1990 and a mandatory eradication programme had been running since the autumn of 1995.

EBL is included in the Swedish legislation regarding notifiable diseases (SJVFS 2002:16) and the control is specifically regulated in SJVFS 2003:64. According to these regulations vaccination is prohibited and all animals that are found EBL positive shall be slaughtered within six months. EBL is also on the OIE list of infectious diseases and current surveillance standards are given in EU legislation, Directive 64/432/EEC.

AIM

The purpose of the surveillance is to document freedom from EBL in accordance to Directive 64/432/EEC.

The Swedish Dairy Association is responsible for this surveillance, which is approved and financed by the Swedish Board of Agriculture.

MATERIAL AND METHODS

At the end of 2007, 7 978 dairy herds were affiliated to the programme, although some of these were no longer active as producers. All herds are tested with a yearly milk tank sample, pooled milk samples or individual serological samples. Milk samples are collected within the quality control programmes of the dairies. The sampling for EBL is synchronised with sampling for BVD and IBR.

At the end of 2007, 11 479 beef herds were affiliated. The surveillance programme in beef herds is performed by sampling at least 2300 herds every year. Serum is collected from all slaughtered cattle above 2 years of age in sampled herds.

In addition to the testing done within the programme 89 blood samples were examined for EBL at the National Veterinary Institute, SVA.

Diagnostic testing was performed at SVA, Uppsala, Sweden. Both milk and sera were analysed using an antibody ELISA (IDEXX CHEKIT, Bovine Leucosis Virus (BLV) Antibody test kit).

RESULTS AND DISCUSSION

During 2007, one animal was diagnosed with EBL and relevant control measures are ongoing in the herd. At the end of the year a total of 7 973 dairy herds and 11 453 beef herds were declared free of disease.

REFERENCES

Personal communication, Sofie Andersson, Swedish Dairy Association statistics for 2007

Infectious Bovine Rhinotracheitis

BACKGROUND

Infectious bovine rhinotracheitis (IBR) was for a long period of time considered to be absent in Swedish cattle. However, examination of bulk milk samples during the early nineties showed the presence of a small number of seropositive herds. No signs of clinical disease were present in these herds. An eradication program was initiated in 1994 and the last seropositive animal was found in 1995. The EFTA Surveillance Authority and EU approved the programme in 1994 (Decision 73/94/COL and Decision 95/71/EC). Sweden had additional guarantees relating to IBR in 1995 (Decision 95/109/EC) and was officially declared free from IBR in 1998 (former Decision 98/362/EC, current Decision 2004/558/EC). In 2004, all neighbouring Nordic countries had additional guarantees relating to this disease (Decision 74/94/COL and Decision 95/71/EC). IBR is included in the Swedish Law of Epizootics (SFS 1999:657, with amendments). Vaccination is according to this law prohibited and notification on clinical suspicion is mandatory. IBR is on the OIE list of infectious diseases.

AIM

The purpose of the surveillance is to document freedom from IBR. The Swedish Board of Agriculture is responsible for this surveillance, which is coordinated by the Swedish Dairy Association.

MATERIAL AND METHODS

All dairy herds are tested with a yearly milk tank sample or, in farms with more than 50 cows, pooled milk samples are used. These samples are collected within the Dairy association's quality control programme. The sampling for IBR is synchronised with sampling for the Bovine virus diarrhoea (BVD) and enzootic bovine leucosis (EBL) programmes (1). Furthermore, 2 423 beef cattle sera from 351 herds, collected within the surveillance program for EBL were tested (1). In addition to the testing performed within the surveillance programme, another 687 samples (625 blood samples and 62 semen samples) were examined for IBR at the National Veterinary Institute, SVA. Testing was performed at SVA. Both milk and sera were analysed using an indirect ELISA (SVANOVIRTM IBR-ab, Svanova®). In case of positive or intermediate reactions, a blocking-ELISA IBR/BHV-1 gB Ab ELISA kit (IDEXX) was used for confirmatory testing. If necessary a serum neutralisation test could be performed.

RESULTS AND DISCUSSION

None of the samples were positive when tested for presence of antibodies for IBR.

REFERENCES

Personal communication, Sofie Andersson, Swedish Dairy Associations statistics for 2007

Leptospira hardjo

BACKGROUND

Since July 2004, leptospirosis is a notifiable disease in Sweden (SJVFS 2002:16, with amendments). However, serological screenings for antibodies to *Leptospira hardjo* in bovines have been performed since 1992. The Swedish Board of Agriculture finances the surveillance, but planning, sampling and evaluation of results is done by the National Veterinary Institute, SVA. In addition to the screening programme, serological tests are performed prior to import and export of bovine animals.

AIM

The purpose of the surveillance programme is to document freedom from bovine leptospirosis in Sweden.

MATERIALS AND METHODS

Diagnostic tests were performed at the National Veterinary Institute, Department of Bacteriology, Uppsala, Sweden. The test kit used was an indirect ELISA (ID-DLO, Lelystad, Holland).

During 2006, 1000 sera from cattle and 2000 bulk tank milk samples from dairy herds were analysed for antibodies to *Leptospira hardjo*. Samples were selected from within the surveillance programme for bovine leucosis. The samples were obtained by convenience sampling (in other words not strictly random) and evenly distributed throughout the sampling period. Since 2006 sampling and testing for antibodies to *Leptospira hardjo* will only be performed every second or third year.

RESULTS AND DISCUSSION

All samples were negative in the ELISA-test for antibodies to *Leptospira hardjo* within the screening programme during 2006.

Vero-Toxin producing Escherichia Coli (VTEC)

BACKGROUND

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 in animals are only notifiable when associated with human VTEC infection.

There is no surveillance programme of VTEC in animals. Prevalence studies for VTEC O157 in cattle were performed at the major slaughterhouses between 1996 and 2002. As very small changes in the prevalence were noticed during these years, it was decided to conduct such studies every third year. The latest prevalence study in cattle was conducted autumn 2005 – autumn 2006. A prevalence study in sheep was initiated in October 2007 and will last for one year. The Swedish Board of Agriculture has financed all studies. Planning, sampling and evaluation of the results have been performed by the National Veterinary Institute.

AIM

The aims of these studies are to monitor the prevalence and to study variations in geographical distribution of VTEC O157, and different subtypes of this serotype, among cattle and sheep at slaughter.

MATERIAL AND METHODS

The studies have been designed as a nationwide monitoring, with the aim to detect a prevalence of at least 0.1% with a 90% confidence interval. In each study, around 2000 cattle faecal samples have been randomly selected from the 15 slaughterhouses slaughtering ca 90% of all cattle in Sweden. Diagnostic analyses were performed at the Dept of Bacteriology, National Veterinary Institute using immunomagnetic separation (IMS) followed by bacteriological culture. PCR was used to identify genes coding for verotoxin.

RESULT AND DISCUSSION

Results from the study 2005/06 showed that 61 (3.4%) out of 1779 faecal samples were positive for VTEC O157. Of the positive samples, the majority were from older calves (16.2%), followed by young stock (3.5%) and adult cattle (1.7%). There were no positive samples from northern Sweden.

Previous studies have shown an overall prevalence of around 1%, but due to an improvement in one analytical procedure the results from earlier conducted studies cannot be compared with the results obtained from 2005-2006. Also, in the earlier studies it was establish that the bacterium was isolated from cattle in the south of Sweden, but very rarely in the northern two thirds of the country. There is no indication in the new study that there has been a geographical spread of VTEC O157 to the north of Sweden (Map 6).

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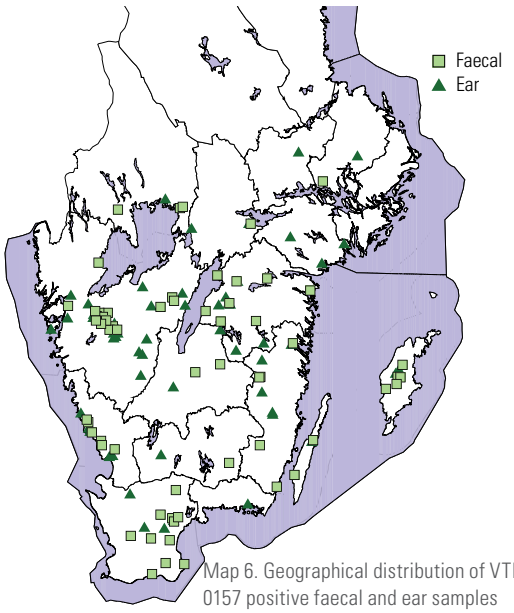

Map 6. Geographical distribution of VTEC 0157 positive faecal and ear samples collected att slaughter during 2006/2007.

Contagious agalactiae

BACKGROUND

Mycoplasma agalactiae is a causative agent of contagious agalactiae in small ruminants. The disease is encompassed by Decision 1991/0068/EEC and has never been diagnosed on animals in Sweden. It is a disease from which a Member State can be declared free when appropriate supporting documentation has been presented to the Commission. In 1995 Sweden applied for a free of disease state. Contagious agalactiae is included in the Swedish legislation regarding notifiable diseases (SJVFS 2002:16 with amendments) stating that it is mandatory to report the disease when it has been diagnosed.

AIM

The purpose of the surveillance is to document freedom from contagious agalactiae in Sweden.

MATERIALS AND METHODS

During a decade approximately 3000 samples were tested on a yearly basis without finding any positive samples. Starting from 2006, the plan is to sample and test for antibodies for *Mycoplasma agalactiae* every third/fourth year. The sampling is synchronized with the sampling for the ovine Brucellosis programme. During 2005 sera from 3000 sheep in 403 herds were tested. Sera were selected from the voluntary Maedi/visna programme. Diagnostic testing was performed at the National Veterinary Institute, SVA, by complement fixation.

Maedi/Visna

BACKGROUND

A lentivirus in the Retrovirus family is the causative agent of maedi/visna (M/V). The disease was first described in Iceland in 1939, and is now reported from several European countries, as well as other continents. In Finland, New Zeeland and Australia there is no occurrence of the disease. In Sweden M/V was diagnosed in 1974 by post mortem examination at slaughter. A serological screening performed at seven Swedish abattoirs in 1989 demonstrated 8,2 % seropositive herds. A voluntary control programme for M/V was launched by the Swedish Animal Health Service in 1993. The conditions applying to this programme are stated in the Swedish legislation (SJVFS 1999:25). A second M/V programme, that is not regulated within the Swedish legislation and does not requires the same obligations from the farmers, started by the Swedish Animal Health Service at the end of 2005. The initial and the second M/V programmes are running parallel. Since 1993 more than 370 herds have been diagnosed with M/V, of which 242 herds have been culled and in 130 herds eradication measures have been performed.

Decision 1991/0068/EEC encompasses M/V. It is a disease from which a Member State can be declared free after appropriate supporting documentation has been presented to the Commission. M/V is included in the Swedish legislation regarding notifiable diseases (SJVFS 2002:16) stating that the disease shall be reported when it has been diagnosed.

AIM

The purpose of the programme is to create a pool of M/V free breeding stock. For a majority of breeds, this initial goal was reached in the early 2000. In a second phase the aim will be to eradicate M/V from the Swedish sheep population.

MATERIALS AND METHODS

Farmers joining the initial programme sign a contract where they agree that all animals have to be individually identified and the farmers have to keep a record of the flock. Blood samples are collected from all sheep older than 12 months of age. If the serology is negative, the flock gets an M1-status. 12-16 months later, a second sampling of all individuals older than 24 months is performed and if all samples are negative for M/V antibodies M2-status is granted. This procedure is repeated 12-16 months later and a negative result grants M3-status, which means that the flock is declared free of M/V. Farmers within the programme are only allowed to bring in animals from flocks with the same or higher M/V status.

In flocks where antibodies are detected, depending on the prevalence of positive animals, either a whole herd cull or eradication measures including selective slaughter is performed.

At the end of 2007 2 326 herds with in total 100 213 sheep were in the programme. A number of 42 500 samples from 1 092 herds were analysed within the initial programme during the year. Within the new M/V programme, 15 000 samples from 870 herds were analysed during 2007.

Diagnostic testing was performed at the National Veterianry Institute, SVA. Sera were analysed using an AGID-test (agar-gel-immune-diffusion) for which the antigen was purchased from VLA or with an ELISA-test (Synbiotic´s Elitest MVV/CAEV).

RESULTS AND DISCUSSION

During 2007, 56 new herds with sheep positive for M/V were detected. A number of 249 herds reached M3-status during the year, making the number of herds with M3-status 1 903 at the end of the year, with a total of 83 674 sheep.

In conclusion, the intensified work with the two M/V programmes has resulted in a large increase in herds being tested. In total, almost 25 % of the sheep population was tested during 2007. This is important in the work aiming to get the Swedish sheep population free of M/V.

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Ovine brucellosis

BACKGROUND

Brucellosis, which is encompassed by Directive 91/68/EEC, has never been diagnosed in Swedish sheep or goats. It is a disease from which a Member State can be declared free when appropriate supporting documentation has been presented to the Commission. Sweden was declared officially free of brucellosis in sheep and goats in 1995 (Decision 94/972/EC). Brucellosis in food producing animals is included in the Swedish Law of Epizootics (SFS 1999:657 with amendments). Vaccination is according to this law prohibited and notification of suspect cases is mandatory. Brucellosis in sheep and goats is on the OIE list of infectious diseases and current surveillance standards for brucellosis in sheep and goats are given in the EU legislation, Directive 91/68/EEC. Screening for brucellosis in sheep and goats has been regularly conducted in Sweden since 1995 with approximately 10 000 samples tested each year, representing approximately 5% of the sheep population.

AIM

The purpose of the surveillance is to document freedom from brucellosis in sheep and goats in Sweden, in accordance to Directive 91/68/EEC. The Swedish Board of Agriculture finances this surveillance, which is planned and performed by the National Veterinary Institute, SVA.

MATERIAL AND METHODS

During 2007, 7000 serum samples from 1400 sheep flocks were analysed for *Brucella melitensis*. The serum samples were collected within the surveillance programme for Maedi/Visna. The samples were obtained by collecting 5 samples from each flock. An additional 312 serum samples from goats were analysed for *Brucella melitensis*. Moreover, 19 sheep and 12 goats were tested for brucellosis before export and 6 sheep were tested after import. Diagnostic testing was performed at SVA, Department of Bacteriology. The diagnostic test used was a buffered antigen test (Rose Bengale). For confirmationa complement fixation test was used.

RESULTS AND DISCUSSION

One of the samples in the screening was positive when tested for the presence of antibodies. The positive animal was re-tested and found negative. All other samples taken in 2007 were negative. There were no clinical suspicions of brucellosis in sheep or goats during 2007.

REFERENCES

Report on trends and sources of zoonoses, Sweden 2007.

Scrapie

BACKGROUND

Scrapie is since 1970 a mandatory notifiable disease under the Swedish Law of Epizootics (SFS 1999/657, with amendments). All suspicions of scrapie (ovine or caprine animals with clinical signs that are compatible with scrapie symptoms) must be reported to the authorities. The obligation to report applies for animal owners, veterinarians and everyone else who is responsible for the animals. Since 1998 scrapie surveillance has been performed in accordance with Commission decision 98/272/EC and from 2001 in accordance with Regulation (EC) No 999/2001. Scrapie has only been confirmed once in Sweden. In 1986 scrapie was suspected on clinical grounds in two ewes on a small holding consisting of 36 sheep. The ewes were euthanized and diagnosed as scrapie positive. All remaining susceptible animals on the holding were stamped out and tested with negative results. The origin of the disease could not be established. No further cases of classical scrapie have been detected in Sweden. In 2002 a large-scale surveillance programme for TSEs in small ruminants was introduced within the EU. The surveillance programme is governed by Regulation (EC) No 999/2001, with amendments. In addition, Sweden has a national scrapie control programme, which was launched in 2003 (Regulation (EC) No 1874/2003 (EG) nr 1874/2003 with amendments). In 2003 the first case of atypical scrapie variant Nor98 was detected in Sweden and in total 17 cases have been diagnosed until the end of 2007.

SURVEILLANCE PROGRAMME FOR SCRAPIE IN 2007

The surveillance programme in 2007 according to Regulation (EC) No 999/2001 and the Swedish national scrapie control programme include examination of the following categories of small ruminants:

- all sheep and goats with clinical signs consistent with scrapie, irrespective of age
- all sheep and goats older than 18 months, which had died or been killed on the farm, but not slaughtered for human consumption (fallen stock)
- all sheep and goats older than 18 months at healthy slaughter (until June 2007 when, according to Regulation 727/2007, member states with small populations were exempted from testing such animals at healthy slaughter)

AIM

The purpose of the surveillance is to obtain data in order to exclude the possible presence of BSE in the sheep and goat population. The Swedish national scrapie control programme goes beyond the requirements set out in Regulation (EC) No 999/2001, Annex III, and the intention is to improve surveillance in order to document freedom or very low incidence of the disease.

MATERIAL AND METHODS

The Swedish Board of Agriculture finances the surveillance programme and the National Veterinary Institute, Department of Pathology and Wildlife Diseases and Department of Virology, Immunobiology and Parasitology is responsible for doing laboratory analyses and is also appointed National Reference Laboratory, NRL (Regulation (EC) 999/2001, annex X, Chapter A, 3). In addition there are also three approved regional laboratories performing rapid tests on healthy slaughtered animals.

Clinically suspect cases

Material from brainstem and cerebellum from clinical suspect cases are examined by histopathology in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, 3.1, a) as amended. Immunohistochemistry and Western Blot are used as confirmative tests.

Surveillance of fallen stock

The samples have been examined by rapid testing as described by the manufacturer (Bio-Rad TeSeE ELISA, Bio-Rad) in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, 3.1, b) as amended. In cases of positive or inconclusive results material from the brainstem and cerebellum is prepared for confirmatory analyses with immunohistochemistry and Western Blot.

Surveillance of healthy slaughtered animals

The samples have been examined by rapid testing as described by the manufacturer (Bio-Rad TeSeE ELISA, Idexx HerdChek BSE-Scrapie Antigen Test Kit, Enfer TSE Kit version 2.0) in accordance with Regulation (EC) No 999/2001 Annex X, Chapter C, 3.1, b) as amended. In cases of positive or inconclusive results material from the brainstem and cerebellum is prepared for confirmatory analyses with immunohistochemistry and Western Blot (TeSeE sheep/goat WB, Bio-Rad).

RESULTS AND DISCUSSION

Sheep

A total of 3377 samples from sheep were examined for TSE at the National Veterinary Institute in 2007. Of these, 2684 were from fallen stock, killed in Nor98 eradication or one investigated as a clinical suspect. In Sweden altogether 7427 samples from healthy slaughtered animals were investigated during the year. Atypical scrapie variant Nor98 was diagnosed in two sheep from different flocks in Sweden. One was found at healthy slaughter and the other one from fallen stock. In the latter herd, two more animals were culled because of mastitis and examined for TSE with negative results. The two flocks were put under restrictions according to Regulation (EC) 999/2001 so that no animals are allowed to enter or leave the holding except for slaughter. All dead animals must be sampled and samples must also be taken at slaughter of all animals >18 months from these flocks.

Material from the brainstem and cerebellum from one sheep with clinical signs consistent with scrapie was examined by histopathology and immunohistochemistry but TSE was not detected.

Goats

A total of 86 samples from goats were examined for TSE at the National Veterinary Institute in 2007. Of these, 78 were from fallen stock. All analyses were negative for TSE.

Atrophic rhinitis

BACKGROUND

Atrophic rhinitis (AR) is a notifiable disease (SJVFS 2002:16 with amendments) caused by toxin producing strains of *Pasteurella multocida* (PMT). Since PMT is a secondary invader not capable of penetrating an intact mucosa it is dependant on other infections. Traditionally *Bordetella bronchiseptica* has been considered the most important precursor for PMT, but also other bacteria and virus may precede PMT.

When PMT penetrate the nasal mucosa the nose mussels are destroyed and inhaled air will reach the respiratory organs without being sealed or warmed, which in turn increases the risk for other infections. Further, the bone building process is affected and the snout may become obliquely in young pigs. Affected pigs will also show a retarded growth.

AR used to be a common disease, but as improvements in rearing and disease preventing measures have been made the disease have gradually faded away. The Swedish Animal Health Service effectuates a control program since 1995.

AIM

The purpose of the control program is to declare herds selling breeding stock free from infections with PMT, and thereby decrease the incidence of AR in all herd categories. Eradication of PMT is not realistic since it is an ubiquitarious bacterium that can affect all mammals.

MATERIALS AND METHODS

Diagnostic tools developed by DAKO (Copenhagen, Denmark) and evaluated at SVA during the late 80ies and early 90ies offered a possibility to combat AR in an effective way. Nasal swabs are cultivated on special media overnight. The entire microbial growth is harvested and diluted into water and the toxin of PMT is demonstrated by an ELISA system.

Nucleus and multiplying herds are controlled for presence of PMT at an annual basis. And anytime AR is suspected in a herd, it should be controlled for presence of PMT. If PMT is demonstrated the health declaration is withdrawn and restrictions on sale of pigs are effectuated until the herd is sanitised and declared free from the disease.

RESULTS AND DISCUSSION

AR used to be a rather common disease, but due to efforts made in the early 90ies and to the control program initiated in 1995 the disease is now very rare, Table 3.

Table 3. The total number of samples and the outcome of nasal swabs analysed for PMT. The samples have been collected in all nucleus and multiplying herds, as well as in production herds suspected for AR.

Year	Samples	Positive samples	Deemed herds
2002	2472	0	0
2003	3020	167	2
2004	2413	29	2
2005	1975	13	3
2006	1836	2	0
2007	1878	1	0

FURTHER READING AND REFERENCES

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Aujeszky's disease

BACKGROUND

Aujeszky´s disease (AD) was described for the first time in Sweden in 1965. Since then the disease has been notifiable, based on isolation of the virus. Until the 1980s the number of outbreaks in Sweden was limited to a few every year but after this the incidence was increasing. A national control programme was introduced in 1991 and it was supported by the government and operated by the Swedish Animal Health Service. The control programme was open to all the pig-producing herds and participation in the programme was voluntary. However there were strong motives to participate because towards the end of the programme the industry refused to slaughter pigs from herds that did not participate and insurance companies did not pay compensation to herds outside the programme. In 1995 all herds had at least been tested twice and declared officially AD-free. In 1996 the European Commission officially recognised the swine population in Sweden as free from AD (Commission Decision 96/725/EU with amendments). In 2007 the Swedish Animal Health Service was responsible for the surveillance programme and reported to the Swedish Board of Agriculture. The disease is included in the Swedish Law of Epizootic Diseases (SFS 1999:657). Sweden has been granted certain additional guarantees by the European Commission regarding AD (Commission Decision 92/244/EEC, with amendments), to protect the Swedish swine health status.

AIM

The purpose of the surveillance is to document continued freedom from the disease and to contribute to the maintenance of this situation.

MATERIAL AND METHODS

Blood samples were collected from 779 boars and 3751 sows at slaughter. The number of samples was proportionally divided between 11 large slaughter-houses in Sweden. All serum samples were tested for antibodies in a blocking ELISA (SvanovirTM, PRV-gB-Ab ELISA) and in case of a positive reaction an ELISA (Svanovir, PRV-gE-Ab/PRV-gE-Ak) was used for confirmation. All analyses were performed at the National Veterinary Institute, SVA, Department of Virology, Immuno-biology and Parasitology.

RESULTS AND DISCUSSION

4529 serum samples tested negative and one was regarded as positive for antibodies to AD in the first test. The one positive sample was regarded negative in the second confirmative test. The results from the surveillance programme for AD give additional documentation of freedom from this infection in the Swedish swine population.

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Influenza (pig)

BACKGROUND

Influenza H1N1 was isolated from Swedish pigs for the first time in 1982. The clinical signs were severe in the previously naive pig population but got milder over time. The H1N1 virus is since 1982 endemic in the country.

Influenza H3N2 is also present in the country and was observed in a serologic screening performed 1999. It is less clear when this strain was introduced since the clinical signs were not as evident as for H1N1, but H3N2 has also been correlated to severe respiratory illness.

At present, yet another influenza type, H1N2 is spreading through Europe and has now reached Denmark. Sweden is likely to be affected in time, but it is difficult to foresee when, or how, the clinical effects will be.

Today there is no control program or regular monitoring for influenza in pigs, but SVA has managed to run serological screenings during 1999, 2002 and 2006 for the presence of serum antibodies in 1000 porcine sera. The screening in 2006 also included analyses for antibodies to H5 and H7 (avian influenza).

AIM

The aim of the screenings is to document the disease status of the country, and to recognize alterations in disease patterns or introduction of new types of influenza at an early stage.

MATERIAL AND METHODS

Sera collected within the control program for Aujeszky´s disease have been used in the three screenings mentioned above. The tests used are hemagglutinin inhibition tests (HI-tests). These tests are more sensitive with respect to genetic drift of the virus than ELISA-tests.

RESULTS AND DISCUSSION

The incidence of influenza is low with respect to H1N1 and H3N2. All antibody reactors against the avian strains of influenza (H5N1, H7N1) were of low magnitude (1:32 or less), and only 0.6% of the sera exceeded this magnitude with respect to the ”new” porcine strain H1N2. These low reactions rather indicate unspecific reactions than presence of these influenza strains (Table 4). In herds with documented outbreaks of influenza antibodies to the relevant serovar can always be detected in serum dilutions of 1:128 or higher.

SVA has repeatedly applied for research grants to monitor influenza in pigs due to the risk for new serovars and for genetic drift within existing serovars. These applications have been written in companionship with the Swedish Institute for Infectious Disease Control (SMI) due to the zoonotic aspects of influenza. However, prior to 2005 this has not been a prioritised field for research.

FURTHER READING AND REFERENCES

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Table 4. Results from the serosurvey performed 2006. The table shows the overall prevalence of seroreactors to five strains of influenza. The table also divides these reactors into low and significant reactors.

Seropositve samples	H1N1 n = 999	H1N2 n = 999	H3N2 n = 999	H5N1 n = 200	H7N1 n = 200
Overall	48.1%	7.6%	25.5%	5.5%	4.5%
Level of antibodies					
Low [1]	15.1%	7.0%	18.8%	5.5%	4.5%
Significant [2]	33.0%	0.6%	6.7%	0	0

1 Reacting in a serum dilution of 1:32 or less 2 Reacting in a serum dilution of 1:64 or higher

Porcine Respiratory and Reproductive Syndrome

BACKGROUND

Porcine Respiratory and Reproductive Syndrome (PRRS) was described for the first time in USA in 1987 and the virus was identified in 1991. The disease is considered to be one of the most economically important viral diseases in swine production. The Swedish Animal Health Service started a surveillance program in 1998 and The National Veterinary Institute is performing the analyses. The disease was included in the Swedish Law of Epizootics in 1999 (SFS 1999:657 with amendments). During the 1990s the disease has spread throughout Europe and was in 2007 diagnosed for the very first time in Sweden.

The first case of PRRS in Sweden was confirmed in July 2007. The finding was made through routine sampling within the surveillance program mentioned above. An initial targeted serosurveillance was immediately conducted in the affected region, in contact herds and in all breeding herds. The result indicated that the infection was not widespread. Based on that finding, a decision was made to combat the disease. A modified stamping out procedure was implemented which encompassed slaughtering or killing and destroying of pigs. The infected premises were cleaned and disinfected followed by a vacancy period before repopulation was allowed. The actions taken to eradicate the disease proved to be effective and in the fall of 2007 efforts to obtain freedom from PRRS in Sweden was intensified, see below.

AIM

The purpose of the control program is to document freedom from PRRS and to be able to detect introduction of the disease before it has been widely spread in the population.

MATERIAL AND METHODS

The surveillance is focused on sampling pigs from all nucleus and multiplying herds and all boars at breeding stations yearly. Veterinarians at the Swedish Animal Health Service also make a selection of 50 herds in the County of Skåne and Halland and pigs from each of these herds are tested every year.

Serology and virus identification tests were performed at the National Veterinary Institute, SVA. Serum samples were tested for antibodies to the PRRS virus with Idexx HerdChek PRRS 2XR Ab ELISA (Idexx Laboratories). For confirmation the IPMA-serum neutralisation test was used.

RESULTS AND DISCUSSION

In 2007 a total of 2133 samples were taken within the control program and tested for the presence of antibodies to PRRS. A number of antibody positive samples were, as mentioned above, found within the program and the first herd was confirmed PRRS positive in July. In the following outbreak investigation a total of seven infected herds were found and 5498 samples were taken. When the eradication process was completed in the fall of 2007 the efforts to certify freedom from PRRS at a national level was intensified. A slaughterhouse survey was carried out with another 16739 samples taken. No further infected herds was found. Based on the extensive surveillance work performed during the last half of 2007 Sweden could with a high probability declare freedom of the disease (99,8%).

The results from the surveillance program for PRRS in Sweden during 2007 proves the importance of an efficient surveillance and that the Swedish program fulfilled its purpose in early detection of introduction of the disease to the

Swedish pig population. After the outbreak in 2007 the surveillance program has been revised in order to enable an even earlier detection of an introduction of the disease.

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Surveillance for a selection of infectious diseases in pig herds

BACKGROUND

During 2007 serological investigations were performed regarding a selected number of pig diseases such as swine vesicular disease (SVD), classical swine fever (CSF), transmissible gastroenteritis (TGE)/porcine corona virus (PRCV), leptospirosis (*Leptospira Pomona)* and brucellosis *(Brucella suis*). The National Veterinary Institute, SVA, was responsible for collection, test analysis and reporting to the Swedish Board of Agriculture. CSF has not been diagnosed since 1944 in Sweden and TGE/PRCV and SVD have never been detected in Swedish pigs. Sweden is considered free from these diseases. CSF, brucellosis and SVD are included in the Swedish Law of Epizootics (SFS 1999:657) and TGE/PRCV are notifiable diseases according to SJVFS 2002:16.

AIM

The aim of the survey is to, through serological surveillance, document freedom from these infectious diseases in the Swedish pig population and to contribute to the maintenance of this situation.

MATERIAL AND METHODS

All serological analyses were performed at the National Veterinary Institute, SVA. In 2007, sera for analyses were collected from both the AD-programme and the PRRS-programme. These surveillance and control programmes are operated by the Swedish Animal Health Service. All together 3000 pig sera were chosen for analyses regarding bacterial diseases and 3000 samples regarding viral diseases in pigs.

SVD

Serum samples from 3000 pigs were analysed regarding antibodies to SVD. An ELISA was used to perform the analyses and in case of a positive reaction the ELISA was used a second time. For confirmation of positive or inconclusive samples a serum neutralization test (SN) was performed.

CSF

Serum samples from 3000 pigs were analysed regarding antibodies to CSF. The samples were analysed by an indirect ELISA (IDEXX® HerdChek CSFV Antibody Test Kit). In case of a positive reaction a confirming neutralization peroxidase-linked assay (NPLA) for detection of antibodies against CSFV was performed.

TGE/PRCV

Serum samples from 3042 pigs were analysed regarding antibodies against TGE/PRCV with an ELISA (SvanovirTM TGEV/PRCV-Ab ELISA). Positive samples were re-tested with the ELISA. No confirming tests are available. It is known that false positive samples can occur. In case of a positive sample, a new sample should be taken at least 10-14 days after the first to evaluate if the titre is rising or if the result is a false positive. If the animals are no longer available for testing the herd would be investigated.

Brucellosis

Serum samples from 3000 pigs were tested for antibodies against *Brucella suis*. The diagnostic test used was a serum agglutination test (RBT). A positive case is defined as an animal from which *Brucella* spp. has been isolated, or an animal giving a significant antibody titre.

Leptospirosis

Serum samples from 3000 pigs were analysed regarding *Leptospira pomona* during 2007 using a microscopic agglutination test (MAT).

RESULTS AND DISCUSSION

The results from the serological screening in Sweden regarding these pig diseases during 2007 give additional documentation of freedom from the mentioned infections in the Swedish commercial pig population.

SVD

For SVD, 2949 samples tested negative in the first test and 51 were regarded as positive. All of these 51 samples were regarded negative in the second confirmative test.

CSF

2998 samples tested negative in the first test and 2 were regarded as positive. These 2 samples were regarded negative in the second confirmative test.

TGE/PRCV

3040 samples, out of 3042, tested negative for TGE/PRCV and 2 were regarded as positive. These 2 samples were followed up by testing of the herds that the animals originated from and these testings came out with negative results.

Brucellosis and Leptospirosis

All samples tested negative regarding antibodies to *Brucella suis* and *Leptospira pomona* in 2007.

Campylobacter in broilers

BACKGROUND

Campylobacteriosis is a zoonosis and an important public health problem in most areas of the world, with considerable socio-economic implications. Campylobacteriosis has been highlighted as the most frequently reported zoonotic disease in humans within the EU. In most European countries, the number of reported cases of campylobacteriosis increased during the 1990s. *Campylobacter* spp. can be transferred from animals to man directly after contact with animals or through consumption and handling of contaminated food products or water. A number of *Campylobacter* species have been implicated in human disease, with *C. jejuni* and *C. coli* being the most common. In many animal species, *Campylobacter* spp. occurs as commensals in the gastro-intestinal tract. *Campylobacter jejuni* is predominantly found in poultry but has also been isolated from cattle, pigs and sheep. Birds appear to be the main reservoir for thermophilic *Campylobacter* spp. presumably because of their high body temperature. All kinds of birds can be colonised with *Campylobacter* spp. and they host *Campylobacter* without showing any symptoms of disease. *Campylobacter* infection in animals is not a notifiable disease in Sweden, except for bovine genital campylobacteriosis caused by *C. fetus subsp. veneralis.* However, a monitoring programme for broilers operated by the Swedish Poultry Meat Association (SPMA) commenced in 1991 and involved sampling of all flocks at slaughter. An extended programme was initiated on 1 July 2001, based on the regulation of the Swedish Board of Agriculture 1993:42 on organised health control and financed by the Swedish Board of Agriculture, the Swedish Poultry Meat Association and the European Commission (2001-2005).

AIM

The purpose of the *Campylobacter* programme was to reduce the occurrence of *Campylobacter* in the food chain through preventive measures, starting with primary production, and in the long run to develop a *Campylobacter* free production system.

MATERIAL AND METHODS

All broiler flocks delivered by the members of Swedish Poultry Meat Association are sampled and analysed at slaughter. During 2001-2005, cloacal swabs and neck skin samples were analysed. Since 2006 sampling is performed from each flock of broilers, by intact caecal collected during slaughter.

RESULTS AND DISCUSSION

The annual incidence of *Campylobacter* positive slaughter batches has progressively decreased from 20% in 2002 to 14% in 2007. During all the years, a seasonal peak of incidence was observed in the summertime. Most of the positive batches had a high within-flock prevalence of *Campylobacter*. However, around 18% of the positive batches had a low within-flock prevalence where *Campylobacter* spp. were found in at most 50% of the cloacal samples.

The incidence of batches contaminated at slaughter ranged between 6 and 9% during 2001-2005. In an additional study, quantitative analyses were performed on neck skin samples and carcass rinse samples. Those results were compared with the positive/negative findings of the cloacal, caecum and neck skin samples at slaughter. When *Campylobacter* was found in the caecum, there was a higher level of *Campylobacter* in the quantitative analyses of the carcass samples compared with those batches were *Campylobacter* were found only in the cloacal and/or neck skin samples. Those

flocks where *Campylobacter* had already been found at farm level, had a higher number *Campylobacter* per carcass compared to broilers contaminated during transport and processing. This high number may represent a higher risk for the consumer.

About one-third of the producers seldom delivered *Campylobacter* positive groups, on the other hand about one sixth of the producers often delivered *Campylobacter* positive slaughter groups. In an additional study the environmental *Campylobacter* load was rather equal comparing high and low incidence farms, which indicate that hygienic regimes are of greater importance than an environmental load. Thus, it is possible to produce *Campylobacter* free broilers in Sweden.

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Coccidiosis and clostridiosis in broilers

BACKGROUND

The Swedish programme for control of coccidiosis and clostridiosis within the broiler industry started 1999 and is regulated by SJVSF 1998:131. The organization responsible for the control programme is the Swedish Poultry Meat Association (SPMA).

AIM

The purposes of the programme is to control the efficacy of the coccidiostatics used for preventing coccidiosis and clostridiosis in broilers on an ongoing basis, to continuously supervise the consumption of coccidiostatics in the broiler production and finally, in the long perspective to replace the preventive medication with coccidiostatics by other methods.

METHODS USED FOR SURVEILLANCE:

Field control of coccidiosis is performed by means of lesion scoring of birds in 20 farms twice a year. Total occurrence of hepatic and intestinal disease in slaughtered broilers is reported from the slaughterhouses four times a year.

When hepatic or intenstinal disease observed at the slaughterhouses is exceeding a certain level (0,5%) in a single flock, samples are taken for diagnosis and the case will be reported.

RESULTS AND DISCUSSION

Results from all parts of the control programme are sent to the Department of Animal Health and Antimicrobial Strategies at SVA for compilation. Svensk Fågel decides, after consultation with the reference group, whether special investigations have to be performed or whether special measures have to be taken on the basis of reports from the field control and reports from the slaughterhouses. SPMA reports to the Swedish Board of Agriculture on a yearly basis.

The occurrence of these diseases has been on a very low level since the start 1999.

Poultry Health Control Programme

BACKGROUND

The Poultry Health Control Programme in its present form started in 1994 and is based on provisions issued by the Swedish Board of Agriculture (SJVFS 1995:123) The programme involves serological sampling for several infectious diseases in grandparent and parent flocks of layers, broilers and turkeys, rules concerning biosecurity, standard of the houses, management and clinical surveillance.

The serological screening within the programme is administered by the National Veterinary Institute and financed by the Swedish Board of Agriculture and the participating companies. The results of the serological investigations are compiled and reported four times a year to participating companies, their official veterinarians and the Swedish Board of Agriculture. In 2007 eleven different breeding companies participated in the programme, five broiler- , five laying hen- and one turkey breeding company. Serological investigations were performed according to the same sampling schedule as previous years. *Salmonella* Gallinarum, *Salmonella* Pullorum, *Mycoplasma gallisepticum*, *Mycoplasma synoviae*, paramyxovirus type 1 and avian pneumovirus in chicken and turkeys. Only turkeys were tested for *Mycoplasma meleagridis* and investigations regarding egg drop syndrome and infectious laryngotracheitis were only performed in chicken.

All diseases within the programme are notifiable diseases according to provisions issued by the Swedish Board of Agriculture (SJVFS 2002:16 with amendments).

In addition Newcastle disease (ND, caused by paramyxovirus type 1) is included in the Swedish Act of Epizootics (SFS 1999:657). Sweden is a Newcastle free country and has the status as a non-vaccinating country for this disease according to Com. Dec. 95/98/EEC. No outbreak of ND occurred in Sweden in 2007 (the last outbreak was detected in 2006).

S. Gallinarum (causing Fowl typhoid) and *S.* Pullorum (causing Pullorum disease) was eradicated from the Swedish commercial poultry population in the beginning of the 1960's. *S.* Gallinarum has not been detected in Swedish poultry since 1984 when a backyard flock was found to be infected. *S.* Pullorum was last detected in two back yard flocks in 2001. *M. gallisepticum*, *M. synoviae* and Infectious laryngotracheitis are present among backyard poultry in Sweden. Positive serological reactions against avian pneumovirus have previously been seen among fattening turkeys in a limited area in the south of Sweden (county of Skåne). Clinical signs, typical for this disease, have however not been observed in these flocks and during the last serological surveillance in 2007 all fattening turkey flocks tested were negative. Following an outbreak of avian rhinotracheitis, which is caused by avian pneumovirus, in 1998 some of the broiler breeding flocks are still vaccinated against the disease.

AIM

The aims of the programme are to document freedom from the diseases included, to contribute to the maintenance of the disease free situation by detecting disease introduction and to facilitate trade from the participating companies.

MATERIAL AND METHODS

In accordance with the provisions, sixty blood samples were taken from the breeding flocks included in the programme once during the rearing period and several times during the production period. The sampling and testing schemes are presented in Table 5-6. The blood samples were sent by mail to the Department of Virology, Immunobiology and Parasitology,

National Veterinary Institute, SVA, and analysed as described below. The samples were tested in accordance with provisions issued by the Swedish Board of Agriculture (SJVFS 1995:123) with the exception that breeding flocks vaccinated for avian pneumovirus were not tested for this disease. In 2007 breeding flocks from three companies (North Chicken, Blenta and Swe-Chick) were included in this exception. Table 7 to 8 give an overview of all samples taken in chicken and turkeys and methods used during 2007.

RESULTS AND DISCUSSION

The results from the serological screening in the Poultry Health Control Programme in 2007 supports the freedom from these infections of the Swedish breeding poultry population.

Salmonella Gallinarum and Salmonella Pullorum

All samples tested negative.

Mycoplasma gallisepticum

All samples tested negative.

Mycoplasma synoviae

All samples tested negative.

Mycoplasma meleagridis

In two turkey parent flocks a few positive samples were detected. The flocks were resampled and the new samples turned out negative. The conclusion is that the positive samples were due to unspecific serological reactions.

Paramyxovirus type 1

All samples tested negative.

Egg drop syndrome

In samples from five flocks (chicken parents) there were a few positive samples detected. New samples were taken from the flocks. No clinical signs were seen in these flocks and the testing of these samples turned out negative. The conclusion is that the positive samples were due to unspecific serological reactions.

Avian pneumovirus

In april 2007 antibodies against APV were detected in samples from a turkey parent flock. The positive flock was euthanized and sanitation was performed. Serological sampling of contact flocks and the following flock in this house were negative.

In addition positive samples were found from three chicken parent flocks. The birds did not show any clinical signs of APV and no antibodies against APV were detected in new samples taken from these three flocks. The conclusion is that the positive samples in these chicken flocks were due to unspecific serological reactions.

Infectious laryngotracheitis

Positive samples were detected in two chicken parent flocks. No clinical signs were seen in these flocks and new samples taken from the flocks were negative.

REFERENCES

Annual Report: Poultry Health Control Programme 2007

Table 5. Sampling schedule in chicken parent flocks. Number of blood samples tested at different weeks of age.

Age in weeks	**16**	**24**	**36**	**48**	**before slaughter**
Agent					
S. Pullorum/ *S.* Gallinarum		60			
Mycoplasma gallisepticum	60	60	60	60	60
Mycoplasma synoviae		60			60
Paramyxovirus type 1		60			
Egg drop syndrome		30			
Avian pneumovirus			60		
Infectious laryngotracheitis			20		

Table 6. Sampling schedule in chicken grandparent flocks. Number of blood samples tested at different weeks of age

Age in weeks	16	24	36	48	54	before slaughter
Agent						
S. Pullorum/ *S.* Gallinarum		60				
Mycoplasma gallisepticum	60	60	60	60	60	60
Mycoplasma synoviae		60	60	60		60
Paramyxovirus type 1						60
Egg drop syndrome		30				30
Avian pneumovirus						60
Infectious laryngotracheitis			20			

Table 7. Sampling schedule in turkey parent flocks. Number of blood samples tested at different weeks of age.

Age in weeks	20	32	44	before slaughter
Agent				
S. Pullorum/ *S.* Gallinarum		60		
Mycoplasma gallisepticum	60	60	60	60
Mycoplasma synoviae		60		60
Mycoplasma meleagridis	60	60	60	60
Paramyxovirus type 1		60		
Avian pneumovirus			60	

Table 8. Chickens. Number of grandparent(GP) and parent (P) flocks tested and total number of samples tested.

	Nr of flocks		Nr of samples		Method
Agent	GP	P	GP	P	
S. Pullorum/ *S.* Gallinarum	9	81	540	4 830	Rapid plate agglutination*
Mycoplasma gallisepticum	45	427	2 700	25 470	ELISA (Svanovir Mg antibody test, SVA-NOVA)
Mycoplasma synoviae	28	171	1 680	10 290	ELISA (Svanovir Ms antibody test, SVA-NOVA)
Paramyxovirus type 1	5	83	300	4 950	ELISA (Svanovir NDV antibody test, SVA-NOVA)
Egg drop syndrome	14	83	420	2 520	Haemagglutination inhibition test**
Avian pneumovirus	0	62	0	3 620	ELISA (Svanovir APV antibody test, SVA-NOVA)
Infectious laryngotracheitis	7	84	140	1 700	ELISA (ILT antibody test kit, Biocheck)

*Ref: OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals

**Ref: A laboratory manual for the isolation and identification of avian pathogens published by AAAP, 1998

Table 9. Turkeys. Number of breeding flocks (only parents) tested and total number of samples tested.

Agent	Nr of flocks	Nr of samples	Method
S. Pullorum/*S.* Gallinarum	6	360	Rapid plate agglutination*
Mycoplasma gallisepticum	23	1 380	ELISA (Svanovir Mg antibody test, SVANOVA)
Mycoplasma synoviae	11	660	ELISA (Svanovir Ms antibody test, SVANOVA)
Mycoplasma meleagridis	23	1 380	Rapid plate agglutination*
Paramyxovirus type 1	6	360	ELISA (Svanovir NDV antibody test, SVANOVA)
Avian pneumovirus	6	360	ELISA (Svanovir APV antibody test, SVANOVA)

*Ref: OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals

Avian Influenza surveillance programs in poultry and wild birds

BACKGROUND

The Swedish Avian Influenza surveillance programs in poultry and wild birds are based on Council directive 2005/94/EC and Commission decision 2007/268/EC. The latter determines the general and specific requirements and criteria about sampling, target populations, survey design, laboratory testing, reporting etc. for both poultry and wild birds. The programme for poultry is administered by the National Veterinary Institute, SVA, and the programme for wild birds is administered by the Swedish Board of Agriculture. Both programmes are partly financed by the European Commission in accordance with Commission decision 90/424/EC. The Swedish Board of Agriculture finances the remaining costs. The survey programmes have been carried out on a yearly basis in all member states since 2002 to determine the prevalence of avian influenza, in particular avian influenza virus subtypes H5 and H7.

In accordance with the decision the programs shall be submitted to the Commission for approval and the Community's financial contribution shall be 50 % of the costs incurred in member states up to a maximum level. All results shall be sent to the Community Reference Laboratory for Avian Influenza (CRL) for collation.

In early spring 2006 highly pathogenic avian influenza (HPAI) of subtype H5N1 was detected in wild birds for the first time in Sweden. One infected mallard was also detected in a game bird holding. During 2007 HPAI H5N1 was reported in wild birds and in poultry from five and six countries respectively within the European Union. No HPAI infected birds were detected in Sweden.

AIM

The survey in wild bird shall contribute to the knowledge of avian influenza ecology and the threats from wildlife to animal health as well as to serve as an early warning system of avian influenza strains that may be introduced into poultry flocks from wild birds.

The aim of the survey in poultry is to detect infections of avian influenza virus subtype H5 and H7 in different species of poultry.

MATERIAL AND METHODS

Poultry

The serological analyses were performed at the Department of Virology, Immunobiology and Parasitology, the National Veterinary Institute, SVA, Uppsala, Sweden. All poultry were sampled at slaughter except for the breeders and the game birds. The breeders were bled in their production period within the Poultry Health Control Programme. The game birds were bled at the holding. The samples were analysed using a haemagglutination-inhibition test described in the diagnostic manual for avian influenza as provided for in Council Directive 2005/94/EC.

Within the programme sampling has been performed in game birds (mallard ducks and pheasants), layers, turkeys, breeders, geese, ducks, ratites and small-scale broiler production. Ten blood samples from each holding were collected except for holdings with geese, ducks and mallard ducks where 40 samples from each flock were collected. In flocks with less than 10 and 40 birds respectively, all birds were sampled. In total 2673 birds were sampled. Table 10 gives an overview of all poultry flocks sampled in 2002 to 2007.

Wild birds

The survey in wild birds consists of both active surveillance on living and hunted birds and passive surveillance on birds found dead or diseased. The surveillance was primarily targeting high risk species in accordance with Commission decision

2007/268/EC, Annex II. In total 4936 birds were sampled, whereas 306 of them where sampled within the passive surveillance.

The passive surveillance was performed by the National Veterinary Institute, Uppsala, Sweden. The active surveillance was performed from April and until December by the National Veterinary Institute in cooperation with the Swedish University of Agricultural Sciences in Umeå and by Kalmar Bioscience at three different wild bird habitats in Sweden (Map 7). Most of the samples were cloacal swab samples. In some cases fresh faeces from the ground were collected. From dead birds that were autopsied, swab samples (mostly both cloacal and tracheal) were used for PCR analyses. The samples were analysed for the detection of avian influenza virus genome by using an M-gene realtime PCR. Positive samples were further analysed for detection and identification of H5 and H7 viruses, including virus pathotyping by amplicon sequensing.

From the birds sampled within the surveillance performed by Kalmar Bioscience two swabs were always taken. One swab was analysed for the detection of avian influenza virus genome by using an M-gene real-time PCR at the Kalmar Bioscience. If the sample was positive the other swab from the same bird was sent to the Virological department at SVA for further testing.

RESULTS AND DISCUSSION

Poultry

All samples analysed within the survey were negative regarding antibodies to avian influenza virus subtype H5 and H7 except for samples from mallard ducks in three game bird holdings. The results from the positive holdings are presented in Table 11. The holdings were further investigated for ongoing avian influenza infection by performing virus swab sampling. 60 birds of each bird category in the holdings were sampled with both cloacal and oropharyngeal swabs. The samples were analysed for the detection of avian influenza virus genome by using an M-gene realtime PCR. All samples were negative and the holdings were regarded as not infected.

Wild birds

Out of 306 sampled dead wild birds only two (one mallard duck and one mute swan) were positive for avian influenza virus. Further analyses showed that none of these samples were positive for avian influenza subtype H5 or H7. The actual subtypes were not determined.

Within the active surveillance 4630 birds were sampled and no HPAIV positives were detected. Samples from four widgeons (*Anas penelope*) and 52 mallard ducks (*Anas plathyrhynchos*), all sampled in the autumn (Oct-Nov) in the south of Sweden,

Table 10. Number of flocks of different poultry categories sampled in 2002-2007.

	2002/03	2004	2005	2006	2007
Layers	60	58	60	60	60
Turkeys	30	22	35	26	23
Ducks	13*	19	16	2	3
Geese	30*	25	22	28	16
Broilers***	2**	0	0	7	17
Breeders	0	40	45	44	44
Ratites	0	11	7	15	10
Mallard ducks****	0	0	0	0	7
Pheasants****	0	0	0	0	23

* Virological examination of stool sample

** Organic farming

*** small-scale broiler production

**** Game bird holdings

Source: SVA´s annual report 2007

were H5 LPAIV positive. Only one bird, a teal (*Anas crecca*), was detected positive for H7 LPAIV. In addition samples from 150 birds were positive for avian influenza virus, but not for avian influenza subtype H5 or H7. The actual subtypes were not determined in these cases.

Map 7. Map showing three wild bird habitats in Sweden (Umeå, Ottenby, Hornborgasjön).

In May 2005 the first big outbreak of HPAI among wild birds was reported from China. Since then, for consecutive years, infected wild birds have been detected in Europe. There has not been any great mortality in wild birds, but the threatening picture has changed, as this virus is directly pathogenic in poultry. The knowledge about HPAI in wild birds is still limited. It is not unlikely that the highly pathogenic avian influenza virus still is circulating among wild birds in Europe, even though at a very low prevalence. Preventive measures in Sweden and the rest of Europe have been focused on increasing the biosecurity in poultry holdings to prevent the introduction of the virus from wild birds to poultry holdings. These measures are still very important but once introduced to poultry the virus is more likely to be spread in between poultry flocks via infected live animals, contaminated vehicles and products etc. Therefore, when combating the disease focus should be on preventive measures reducing transmission of virus between poultry flocks. It is important to continue the surveillance of avian influenza for better understanding and preparedness.

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Table 11. Number of HI positive/ sampled mallard ducks in game bird holdings with serologically positive birds

	Holding 1	Holding 2	Holding 3
LPAIV H5+	28/40	40/40	28/38
LPAIV H7+	3/40	1/40	6/40

Chronic Wasting Disease survey in cervids

BACKGROUND

Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy (TSE) of free-ranging and farmed cervids. CWD has been recognized only in North America, except for a single case of an infected elk exported to Korea. CWD has not been reported in Europe.

Even though there is no evidence that CWD may affect humans, it is recommended that consumption of meat of products derived from infected animals be avoided. This is a precaution in view of the similarities between human and animal transmissible spongiform encephalopathies and of the yet unknown aspects of CWD. CWD is laterally transmitted. Infection may also be contracted from the environment which becomes contaminated by the shedding of prions (PrP^{CWD}), probably into faeces and saliva. CWD affects the North American mule deer (*Odocoileus hemionus)*, white-tailed deer (*Odocoileus virginianus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*). Subspecies of these hosts, such as the red deer (*Cervus elaphus elaphus*), are probably also susceptible. It is not known if the European cervids are susceptible to natural infection with CWD.

A significant proportion of the meat consumed in Europe is derived from hunted cervids, cervid-game-farms and semicaptive kept reindeer. There is limited information on the import of live cervids from North America into Europe.Till now, the level of testing conducted specifically for TSEs in cervids in Europe has been very limited, mostly applied to passive surveillance, and insufficient to exclude the possible occurrence of CWD.

Regulation (EC) No 999/2001 lays down rules for the prevention, control and eradication of TSEs in animals. This Regulation, as amended by Regulation (EC) No 1923/2006 of the European Parliament and of the Council of 18 December 2006, lays down provision for monitoring programmes for TSEs in cervids. According to the Commission Decision SANCO 960/2006 all Member States had to carry out a survey to detect the presence of CWD. The survey was limited in time, and conducted during the hunting season 2007. Cervids (species of the deer family) over 18 months of age should be tested. Minimum requirements were specified. All Member States were required to take samples for CWD from clinical/sick cervids and fallen/culled cervids, as a priority, as well as from road-injured or killed animals of all cervid species. The competent authorities of the Member States would endeavour to maximise awareness of these cervids and to ensure that as many such cervids were tested for CWD as possible. Only Member States with sufficient target species, i.e. wild and farmed red deer (*Cervus elaphus*) and/or wild white-tailed deer (*Odocoileus virginianus*) populations to allow statistically required sample sizes to be achieved, were requested to test healthy slaughtered/shot cervids. The population size of the target deer species in Sweden is small and Sweden was therefore required to test only sick, fallen and/or culled animals of all cervid species.

AIM

Member States shall carry out a survey to detect the presence of CWD in cervids in accordance with the minimum requirements specified above.

MATERIAL AND METHODS

Hunters, deer farmers and other interested groups were informed by various means. A brochure with information of CWD, explaining the purpose of survey and providing instructions for the submission of material for testing was distributed. Special efforts were made to obtain males and animals with clinical disease for testing.

Sampling and laboratory testing

The head of cervids were submitted to SVA, Uppsala, Sweden, were the sampling and analyses were conducted. A sample of obex was collected and tested for each cervid. At least a portion of each sample was kept fresh or frozen until a negative result was obtained, in case bioassay would be required. Additionally, samples of brainstem which had been collected and kept frozen before the implementation of the survey were also tested. All samples were tested applying a rapid test, the Biorad TeSeE ELISA

The following information was collected for each sample submitted for testing: species of cervid, farmed or wild, target group (traffic-dead/found dead, sick/clinical signs), sex, age (based on dentition), and geographical location.

Table 12. Cervids tested for CWD during the hunting season 2007

Farmed	Wild
Fallow deer 10	Roe deer 100
Reed deer 5	Moose 76
	Fallow deer 2
	Red deer 2

RESULTS

The number of samples tested during the hunting season of 2007 (spilling over on 2008) for each species of cervid and each category (farmed or wild) are shown in Table 12. All 195 samples tested negative.

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Echinococcus Multilocularis

BACKGROUND

Echinococcus Multilocularis (EM) has never been detected and diagnosed in Sweden. Detection of the parasite is notifiable in all animals according to SJVFS 2002:16.

Since 2004 all dogs and cats that are brought from other countries (except certain selected countries) into Sweden have to be treated with praziquantel as a preventive measure. The EU Regulation 998/2003 gives a transitional period for Sweden to keep these rules until 30 June 2010. During 2006, a risk assessment for the introduction of EM with dogs from other EU countries was performed. The risk assessment showed that without any anthelmintic treatment the expected number of EM infected dogs entering Sweden would be around 15 per year and if EM is introduced into Sweden the consequences are serious. It also showed that the efficiency and compliance regarding anthelmintic treatment needs to be very high (over 99%) to reduce the probability of introducing at least one infected dog per year to a low level (0,05 – 0,3).

Table 13. Number of red foxes examined for EM during 2001 - 2007.

Year	Number
2001	321
2002	313
2003	401
2004	401
2005	200
2006	300
2007	245 (pending)

SURVEILLANCE FOR ECHINOCOCCUS MULTILOCULARIS IN RED FOX

Background

As a response to the finding of EM in Denmark in both foxes and intermediate hosts, an active monitoring programme of the definite host red fox (Vulpes vulpes) was implemented in Sweden. During the years 2001 – 2007 approximately 2180 foxes from all over Sweden were examined for EM (Table 13).

Material and methods

During 2007, 245 hunted red foxes were received from hunters from different parts of Sweden. The hunters were compensated economically. The foxes were examined by post mortem and the bowel from each fox were put in the freezer (-80°C) for at least seven days to kill all possible viable eggs before examination. From all foxes feacal samples were taken and sent to the Institute for Parasitology, Zurich University for CoproAntigen ELISA (CoA-ELISA). In addition the bowel from 100 foxes, including bowel from the foxes which turned out positive in CoA ELISA, were examined with sedimentation for detection of the parasite.

Results

Results for 2007 are pending.

DISCUSSION

So far Echinococcus Multilocularis has never been diagnosed in Sweden. The parasite is present in several other European countries. There is a risk of introducing the parasite with EM infected pets from theses areas. How large the risk is depends on the compliance and efficiency of the antihelminthic treatment that Sweden can require over the transitional period. If Sweden no longer may retain these rules (or other similar rules) after the transitional period there will be an increased risk of

Photo Torsten Mörner

introducing the parasite. If EM is introduced into Sweden there is a high risk for serious consequences especially because the parasite will probably remain undetected for several years following introduction.

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Rabies

BACKGROUND

Since 1886 Sweden has been free from animal rabies. Bat rabies has never been diagnosed in Sweden. Sylvetic rabies in multiple species and bats infected with European Bat Lyssa virus are found regularly in several other European countries.

GENERAL SURVEILLANCE FOR RABIES

Material and methods

During 2007, three cats and one cattle were examined for rabies due to clinical suspicion. The diagnostic method used was based on the detection of antigens in brain tissue by use of a fluorescent antibody test, FAT

Results

All animals tested were negative for rabies.

SURVEILLANCE FOR RABIES IN SWEDISH BATS

Background

Since 1998, a passive surveillance programme has been in place were dead bats have been examined for the presence of rabies virus. Annual information about the survey has been sent to different interested parties with an appeal to send in bats and with instructions how to handle the dead bats to reduce the risk of rabies infection.

Table 14. Bat species represented in 2007*

Brandt's myotis *Myotis brandtii*
Whiskered bat *Myotis mystacinus*
Soprano pipistrelle *Pipistrellus pygmaeus*
Noctule *Nyctalus noctula*
Northern bat *Eptesicus nilssonii*
Brown big-eared bat *Plecotus auritus*

* Determination of species was performed by The Swedish Museum of Natural History

Material and methods

32 dead or wounded and euthanized bats were sent to the National Veterinary Institute (SVA) for rabies examination. The contributors were mostly private persons. The diagnostic method used was based on the detection of antigens in brain tissue by use of a fluorescent antibody test, FAT. The bats were sent to The Swedish Museum of Natural History, Stockholm, for species determination (see Table 14).

Results and discussion

26 bats were negative for EBLV. The result from one bat could not be determined due to too lack of material and five bats were in too bad condition to be examined, mostly due to decomposition.

There are 18 different species of bats in Sweden, all insectivorous belonging to the family of Vespertilionidae. Some of them are migrating. There are species migrating to the Netherlands, Germany and Denmark, countries where bat rabies have been diagnosed. It is possible that EBLV could be introduced to Sweden by migrating bats.

Regarding the rabies risk in pet animals there has been an increasing problem with illegal importation of pets since 2004, mostly dogs. Illegally imported dogs are probably the greatest threat to the rabies free status of Sweden even though the risk of introducing rabies is rather low.

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Wild Boars, surveillance for certain infections

BACKGROUND

The diseases screened for in the surveillance of Swedish pig herds could affect and be spread by the wild boar population of the country, and vice versa. Therefore, blood samples from hunted wild boars were, as in previous years, analysed by the National Veterinary Institute, SVA, for antibodies to the following infections: Aujeszky´s disease (AD), Classical Swine Fever (CSF), Porcine Reproductive and Respiratory Syndrome (PRRS), Swine Vesicular Disease (SVD), Teschen/Talfan disease (TT), Brucellosis (*Brucella suis*) and Leptospirosis (*Leptospira pomona*).

MATERIAL AND METHODS

During 2007 a total of 337 blood samples were taken from dead hunted wild boars in connection with slaughter. All serological analyses were performed at SVA, as described in the surveillance programme for certain infections in Swedish pig herds. The aim was to analyse all samples for all diseases mentioned above. Due to insufficient amount of sampling material not all 337 samples were analysed for antibodies to AD (334), TT (335), SVD (336), Leptospira pomona (333) and for antibodies to Brucella suis (333). For the other diseases all 337 samples were analysed.

RESULTS AND DISCUSSION

Concerning Teschen/Talfan disease 11 samples out of 335 were serologically positive with low titres (1:20). Similar positive results have been seen in recent years. Teschen disease has not been diagnosed in Sweden, but Talfan virus is thought to be endemic in Swedish pigs. The positive sero reactions may also be due to cross reactions to other enteroviruses. Six samples were considered non conclusive.

One sample out of 334 was positive (weak titre) for Aujeszky´s disease. The positive sample, which was in bad condition, came from a yearling. Within the same area and fortnight four other wild boars were sampled with negative results. Pig herds in the area were investigated and there were no signs of disease.

In 1996 the European Commission officially recognised the swine population in Sweden as free from AD and a surveillance programme is running.

All samples were negative for CSF, PRRS, SVD, *Brucella suis* and *Leptospira pomona*. Especially interesting and gratifying are the negative results concerning PRRS. During 2007 there was an outbreak of PRRS in the south of Sweden in a region with growing numbers of wild boars. The disease was successfully eradicated from the pig population and there are no indications of transmission to the wild boar population. It would be devastating if the virus was transmitted to wild boars.

The material is too small for statistical evaluation. However, together with the negative testing during the last decade and the absence of reports of clinical signs typical for the chosen diseases, it indicates that these diseases are not present in the Swedish wild boar population.

The surveillance and control programmes for a selection of infectious diseases in fish in Sweden

BACKGROUND

Sweden has two control programs, the national compulsory and the voluntary.

The national compulsory program is regulated by the Swedish Board of Agriculture and practically organized by the Swedish Fish Health Control Program. It prescribes two inspections and autopsy of 30 fish each year, and virus and BKD testing of at least 30 fish every second year. The inspections are to be performed at a water temperature below 14°C.

The voluntary program prescribes an additional inspection at a water temperature of over 14°C, and a yearly sampling for BKD in farms with breeding program.

Several Swedish rivers have dams in their reaches due to hydropower stations. These are very effective migrations barrier for feral fish and are of a great help to protect the continental zone from existing and emerging coastal diseases. This gives a different health situation at the coast compared to the continental zone. All transport of live fish from the coastal to the continental zone is forbidden. Due to the migration barriers Sweden has a national conservatory program for salmonids. Migrating brood fish are caught at the first barrier and kept until ready to spawn. In connection with stripping, the fish are sampled for virus and BKD. After fertilization and disinfection the eggs are placed in quarantine and kept there until the results from the tests are available. The quarantines are supplied with water from the continental zone and outlets are made to the coastal. All eggs from positively tested parents are destroyed. After hatching and rearing, in freshwater emanating from the continental zone, the offspring's are released to the coastal zone.

Sweden has approved disease free zone status (2002/308/EC) for Viral hemorrhagic septicemia (VHS) and Infectious haematopoietic necrosis (IHN) and received additional guaranties (2004/453/EC) for Infectious pancreatic necrosis (IPN), Spring viraemia of carp (SVC) and Renibakterios (BKD)

Sampling and diagnostics for these diseases have encompassed all Swedish fish farms since the late 80ies, and since 1994 according to EU directive 92/532 (2001/183). All testing for virus are performed by cell culture techniques and for BKD by ELISA.

Herpesvirus in Koi (KHV) is widely distributed throughout Asia since two decades and during the last five to ten years also in Europe. Clinical symptoms and high mortalities occur in Koi and common carp (Cyprinus carpio). Studies have shown that other cyprinid species can act as vectors. The disease can probably give rise to big consequences in feral waters with populations of common carp. KHV is therefore a disease that ought to be handled strictly and with consideration. Another aspect of this is that Koi carp has become a highly appreciated pet animal, with very high economical value. The first case of KHV in Sweden was found during early summer in 2007 in a private pond.

AIM

The aims of the programmes are to document freedom from these infectious diseases in the Swedish fish population and to contribute to the maintenance of this situation.

MATERIAL AND METHODS

All analyses were performed at the National Veterinary Institute, SVA.

VHS, IHN, IPN

In 2007, 621 pools of samples (spleen, kidney, heart/brain) were tested by a cell culturing method. A pool consists of samples from up to ten

Sampling in fishfarm

Photo Suzanne Martelius-Walter

fishes. Approximately 6 000 individuals from both continental and coastal zone were tested.

SVC

In 2007, 24 pools, 10 fish in each (spleen, kidney, heart/brain) were tested for virus by a cell culturing method.

BKD

Kidneys from 3 121 fish were tested by a polyclonal ELISA. Positive cases were verified by PCR.

KVH

102 samples from gills of koicarp were tested by PCR regarding KHV.

RESULTS AND DISCUSSION

All samples were found to be negative for VHS, IHN, SVC, IPN.

One case of BKD was found.

The results from the 2007 sampling in Sweden regarding fish diseases give basic data of freedom from these infections in the Swedish aqua culture.

15 cases of KHV were tested positive. The infective agent was traced to a local dealer of ornamental fish imported from Thailand. The disease was eradicated; all fish were stamped out and the pond was disinfected.

Post mortem examinations in foodproducing animals

BACKGROUND

During the last three decades the number of post mortem examinations has decreased with more than 50% compared to earlier figures. The main reason for the decline is that several sanitary slaughterhouses have been closed down. Other contributing factors are the reduction in the number of premises where post mortem examinations can be performed, the decrease in the number of food-producing herds and increased costs for transport of carcasses to the laboratories. As post mortem examinations are considered an important part in the early detection of contagious diseases a specific programme, funded by the Swedish Board of Agriculture, started in the early nineties. Since 1992 almost all post mortem examinations performed on cattle, swine, sheep, goat and farmed deer have been financed by these funds. Approximately 3000 animals have been examined yearly, and since 2003 the numbers are increasing. The quantitative aim of the programme is to perform 4000 post mortems every year, which was almost achieved in 2006. The programme has been of crucial importance to keep the laboratories in southern Sweden in business. During 1998-2001 the number of post mortems performed on different species did not correlate to the size of the population in each region. The highest frequency of post mortems for cattle, sheep and swine was found in the Uppsala region.

AIM

The aim of the programme is to register the health situation among Swedish food-producing animals and, if present, detect infectious diseases. The Swedish Board of Agriculture finances the programme and the Swedish Animal Health Services (SvDHV) is responsible for the organization of the programme. Results presented below are from 2006.

MATERIAL AND METHODS

During 2006 post mortem examinations were performed at six different sites throughout the southern part of the country; Skara (AnalyCen AB), Kristianstad (AnalyCen AB), Kalmar (Eurofins/Steins, no activity since june -06), Stenstorp (Konvex, closed since may -06), Uppsala (SVA and SLU) and Visby (Swedish Meats). Large animals, such as adult cattle, could be examined at three of these sites; Uppsala, Stenstorp and Visby. For farmers affiliated to the SvDHV the post mortems are performed without costs for the farmers, for others a small cost is charged. Transportation of the carcasses to the laboratories is arranged and financed by the owner, which with large animals can be a problem.

The programme also includes further education of the veterinary employees at the post mortem facilities. Yearly courses are held and quarterly newsletters are produced.

RESULTS AND DISCUSSION

During 2006 a total of 3 985 post mortem examinations were performed within the programme. The distribution between species is shown in (Table 15). Out of these cases, 72 were diagnosed with a notifiable disease of which 63 were primary cases (Table 16). For the individual farmer the programme is important for solving animal health problems at the farm, and during recent years there has been an increasing interest for performing post mortem examinations. It is of great importance to preserve this interest among the farmers, as disease surveillance is dependent on getting animals examined.

POST MORTEM EXAMINATIONS

Table 15. Number of examinations divided on species:

Species	Total in 2006
Swine	2540
Cattle	733
Sheep	629
Goat	7
Farmed deer	38
Horse	0
Poultry	38
Bison	0
Other	0
Total	**3985**

Table 16. Notifiable diseases

Disease	Index case	Following cases	Un-known	Total
Botulism (C615)	1	0	0	1
Malignant catarrhal fever (B114)	4	0	0	4
Black leg, Clostridium chaveoi (C614)	11	1	0	12
ILT (B302)	4	1	1	6
Listeriosis (C611)	33	5	0	38
Lymphoma (S103)	5	0	0	5
Salmonellosis (S109)	5	1	0	6
Total	**63**	**8**	**1**	**72**

* Please notice that PMWS is reported after investigating a herd taking both clinical data and findings at post morten examinations into consideration. A post morten diagnosis of PMWS might not lead to a herd diagnosis of PMWS and vice versa. Therefore PMWS is not reported here. The Swedish Board of Agriculture has information on the number of herds diagnosed with PMWS.

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Post mortem examinations in wild birds and mammals

BACKGROUND

The Swedish surveillance program for wildlife diseases was initiated in the 1940s. The program is based on examination of dead animals submitted to the National Veterinary Institute by regional authorities, hunters and the general public. The program is funded by hunting fees and the Swedish Environmental Protection Agency. Examinations are performed free of charge to the submitting party. Within the framework of the wildlife disease surveillance program, targeted investigations for specific disease agents and disease syndromes are also performed as well as forensic investigations concerning wildlife criminality. Each year about 1500 dead wild birds and mammals are examined. The submitting party and, in the case of notifiable diseases, regional and national authorities, are informed of the results and a yearly report is compiled for the Environmental Protection Agency and published on the internet.

AIM

The aim of the program is to monitor the health situation among wild birds and mammals and, if present, detect infectious and toxic disease agents. The investigations provide key information for wildlife management and serves as an indicator of environmental health as well as a means to safe-guard domestic animal production and human health.

MATERIAL AND METHODS

In Sweden, post mortem examinations of fallen wild birds and mammals are only performed at the National Veterinary Institute wildlife department in Uppsala. The program also provides expertise in wildlife diseases and training of veterinary students.

RESULTS AND DISCUSSION

During 2007 a total number of 1763 samples representing individual animals, including 991 whole carcasses of wild birds and mammals were examined at the wildlife department. Of the 991 carcasses; 593 were mammals comprising mainly carnivores (448), of which 243 were red foxes. The 398 birds included birds of prey (86), gulls (83), passerines (75) and auks (55).

Of the cases investigated, 84 were diagnosed with a notifiable disease according to OIE or National standards (Table 17).

The results indicate a favorable disease situation in Swedish wildlife and that disease prevention programs are effective. In 2007 the number of salmonella cases was elevated compared to the previous year due to large numbers of cases diagnosed amongst passerines around garden feeders in late winter and to likely secondary infections of foxes and birds of prey in the same environment.

Table 17. Notifiable diseases

Salmonellosis 71 (mainly passerines, red fox, birds of prey)
Trichinellosis 8 (7 lynx, 1 wolf)
Tularemia 2 (brown hare)
Myxomatosis 2 (rabbits)
Fowl cholera (Pasteurella multocida) 1 (rook)

Antimicrobial resistance in bacteria from animals

BACKGROUND

Data on antimicrobial resistance in bacteria from animals and data on sales of antimicrobials for use in animals are since 2000 presented in a yearly report from the Swedish Antimicrobial Resistance Monitoring Programme (SVARM). SVARM is organized and run at the Department of Animal Health and Antimicrobial Strategies at SVA. The reports from SVARM are available at www.sva.se.

The remit of SVARM is to regularly monitor antimicrobial resistance in bacteria from animals and present and analyse the results in relation to data on use of antimicrobials. The objectives are to detect trends in resistance and to provide a basis for recommendations on appropriate choice of therapy. In a wider perspective, data could be used for risk analysis in the field of antimicrobial resistance.

Details on methodology used in SVARM are available in SVARM 2007 (www.sva.se). Briefly, three types of bacteria are monitored: zoonotic bacteria, specific animal pathogens and indicator bacteria (*Escherichia coli* and *Enterococcus* spp.) from healthy animals. The rationale for monitoring indicator bacteria, i.e. commensal bacteria from the normal intestinal flora of healthy animals, is that resistance among these bacteria reflects the selection pressure of use of antimicrobials in a population. Moreover, these bacteria constitute a reservoir of mobile resistance genes. By using harmonised methodology for studies on indicator bacteria, data on resistance can be compared on an international level and over time. Thereby valid conclusions on trends in resistance can be made.

SUMMARY SVARM 2007

The eight report from SVARM shows that the situation regarding antimicrobial resistance in bacteria of animal origin remain favourable from an international perspective. The situation can rapidly change however, as illustrated by emergence of methicillin resistant *Staphylococcus aureus* (MRSA) in companion animals and methicillin resistant *Staphylococcus (pseudo)intermedius* (MRSP) in dogs. These findings are cause for concern from a zoonotic and an animal health perspective, respectively, and emphasize the need for continuous vigilance in this dynamic field.

The total amount of antimicrobials used for animals 2007 was 17 106 kg, which is similar to year 2000. The amount of antimicrobials for in-feed or in-water medication has decreased by 94 % since 1984 and is today but 13 % of the total sales. However, from year 2004, an increase in sales of pleuromutilins, macrolides and tetracyclines formulated for in-feed or in-water medication is noted. These products are mainly used for medication of groups of pigs, and among plausible explanations for this trend are increased problems with acute respiratory infections caused by *Actinobacillus pleuropneumoniae*. The sales of products for medication of individual animals have remained relatively unchanged over the last decade. Trends in the sales of certain classes, such as the cephalosporins, are heavily influenced by use for dogs. Until year 2007, the sales of this increased steadily. However, in 2007 a decrease by 22% compared with the previous year is noted.

In aquaculture, a prominent decrease in use of antimicrobials over time is noted. Over the last eight years, the total amounts prescribed have been around or below 40 kg and in year 2007 the estimated number of daily doses per kg was only 3% of the number in year 1995. The marked reduction correlates with an increased use of effective vaccines.

Methicillin resistant *Staphylococcus aureus* (MRSA) was in 2007 isolated from a horse. The isolates belonged to spa-type t011. This is the first confirmed finding of MRSA in horses in Sweden. In 2007, five MRSA (spa-type t032) from dogs were

confirmed. In total, until December 2007 seven cases in dogs and one case from a horse had been confirmed since the first isolation of MRSA in animals in Sweden 2006.

Salmonella is rare in Swedish farm animals, most probably a result of the strategies in the Swedish Salmonella control programme. Few incidents involve strains resistant to antimicrobials. This year, seven of seventy-one incidents in major food producing animals involved resistant strains. Three of these strains were multiresistant *Salmonella* Typhimurium (DT104, 120 or NT). No isolate from companion animals or wildlife was multiresistant. Resistance to fluoroquinolones or third generation cephalosporins was not observed in isolates from food producing animals.

Indicator bacteria, i.e. *Escherichia coli* and *Enterococcus* spp., from broilers sampled at slaughter were monitored 2007. In agreement with the limited use of antimicrobials effective against *E. coli* in this animal species, resistance was rare and few isolates were multiresistant. No isolate of *E. coli* was resistant to third generation cephalosporins by production of extended spectrum beta-lactamases (ESBL). Resistance in enterococci was more common but there are no trends towards a higher prevalence of resistance neither in *Enterococcus faecalis* nor in *E. faecium*. Instead, resistance to tetracycline or virginiamycin in *E. faecium* has declined over the period studied in SVARM.

Vancomycin resistant enterococci (VRE) were isolated from 27% of 339 samples of intestinal content from broilers when cultured on media supplemented with vancomycin. The proportion of samples positive for VRE is of the same magnitude as in 2006 but lower than in 2005. This indicates that the gradual increase in prevalence of VRE observed 2000-05 has levelled off.

Escherichia coli from diagnostic submissions were often resistant to ampicillin, streptomycin, tetracycline or trimethoprim-sulphonamides, irrespective of source (pig, horse, dog, and cat). Resistance to these substances also occurred in *E. coli* from poultry, but the frequencies of resistance were lower. Multiresistance commonly involved these substances with prevalence ranging from 1% in isolates from poultry to 26% in isolates from pigs.

In *Brachyspira* spp. from pigs, resistance to tiamulin occurred in *B. pilosicoli* but was not observed in *B. hyodysenteriae*. The majority of both *B. pilosicoli* and *B. hyodysenteriae* were resistant to tylosin.

Resistance was rare in *Actinobacillus pleuropneumoniae* and in *Pasteurella multocida* from the respiratory tract of pigs as well as in *Pasteurella* spp. from the respiratory tract of calves.

Staphylococcus aureus from milk of ewes with clinical mastitis were mostly susceptible to antimicrobials. Only one isolate was resistant to penicillin through penicillinase production.

Streptococcus zooepidemicus from the respiratory tract of horses were uniformly susceptible to penicillin, but resistance to trimethoprim-sulphonamides was common.

Most *Staphylococcus intermedius* from dogs were resistant to penicillin. Resistance to clindamycin, erythromycin, fusidic acid, streptomycin or tetracycline was also common (between 18 and 32%). One third of S. intermedius were multiresistant and 6% were resistant to at least five antimicrobials.

Methicillin resistant *Staphylococcus (pseudo)intermedius* (MRSP) in Swedish dogs were confirmed for the first time in 2006. During 2007, six times more MRSP were confirmed than in 2006. A majority of these, in total 100 isolates, have the same antibiogram and molecular typing indicate that they belong to the same clone. Most of the isolates are from dogs and spread throughout Sweden.

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