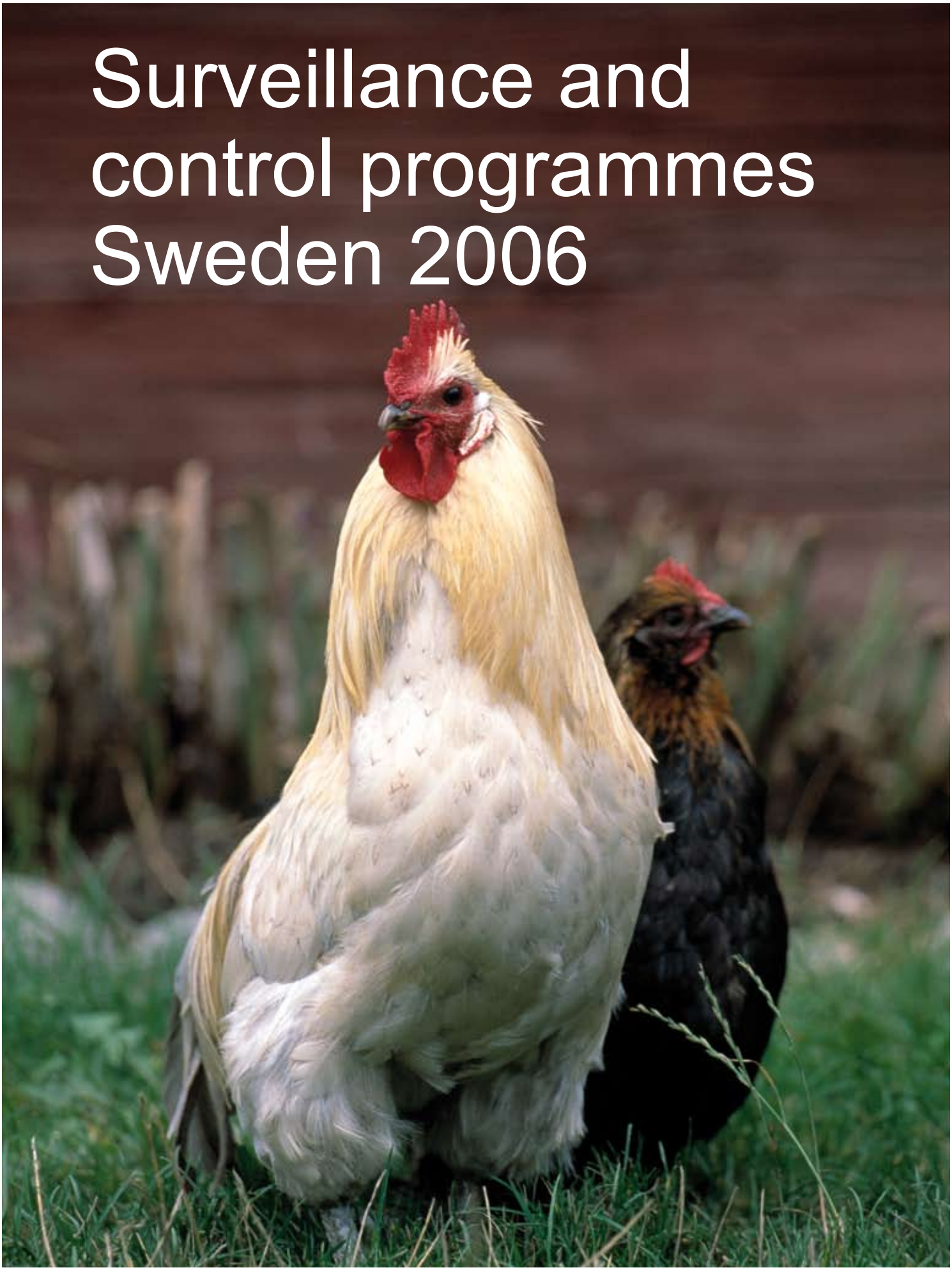
Surveillance and control programmes Sweden 2006



STATENS VETERINÄRMEDICINSKA ANSTALT

Content

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STATENS VETERINÄRMEDICINSKA ANSTALT

Introduction

The aim of this report is to publish the results of the Swedish surveillance and control programmes for certain animal diseases in cattle, pigs, sheep, goats, poultry and fish.

The diseases covered by the report are all notifiable to the Swedish Board of Agriculture and many are included in the Swedish Act of Epizootics. The policy of non-vaccination is used 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.

The number of Swedish farms with livestock has decreased during the last decades as seen in most other European countries. Many of the remaining farms have increased considerably in herd size, with the result that any incursion of an infectious agent can have a big health and economical impact. However, in comparison to many other European countries, Sweden has very rarely experienced any serious outbreaks of epizootic or zoonotic diseases. This is also the situation for a number of other contagious diseases. It is a major challenge for the country to keep this favourable situation.

Sweden has by the European Commission (EC) been granted additional guarantees for infectious bovine rhinotracheitis in cattle and Aujezky's disease in pigs. The Swedish salmonella control program has also been approved by the EC. The additional guarantees given for salmonella are based on national surveillance and control programmes for cattle, pigs and poultry. Furthermore, Sweden's disease free status for bovine brucellosis, enzootic bovine leucosis and tuberculosis is officially stated in the EU legislation. Control programmes are run for porcine reproductive respiratory syndrome, bovine virus diarrhoea virus, paratuberculosis, scrapie and maedi/visna.

In the event 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 Swedish Board of Agriculture. 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 diseases.

A thorough and reliable surveillance is an important tool for the early detection of disease. Movements of animals, domestic or wild, as well as transport of animal products, legal or illegal, has become an increasing threat to the disease situation in any country. Surveillance programs need to be dynamic in order to meet rapid changes in the surrounding world and should be given more attention, not least considering emerging diseases or infections with zoonotic potential.

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

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 2006, but some data are older. Table 1 and 2 give an overview of the livestock population and the number of holdings with animals in Sweden.

Cattle

There are 25,059 herds with a total number of 1.590,409 cattle in Sweden.

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 2006 there were roughly 8,000 farms with dairy cows. This gives an average of 48 cows/herd. Regarding suckler cows, there was a great increase between 1990 (75,000) and 1995 (157,000) and the figure for 2006 is 177,500 cows. The average herd size was 14 cows/herd.

In total, approximately 433,000 adult cattle and 32,500 calves were slaughtered during 2006, which is the same number as during 2005.

Pigs

In 2006 there were approximately 2,400 pig farms in Sweden. 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

Table 1: Livestock in 2006, mid-year estimates, 1000s.

Livestock	Number
Cattle	1590
Dairy cows	388
Suckler cows	177
Other cattle	1025
Sheep and lambs	505
Pigs	1680
Boars, sows	187
Fattening pigs	1493
Fowls (20 weeks or older)	4524
Broilers	7436

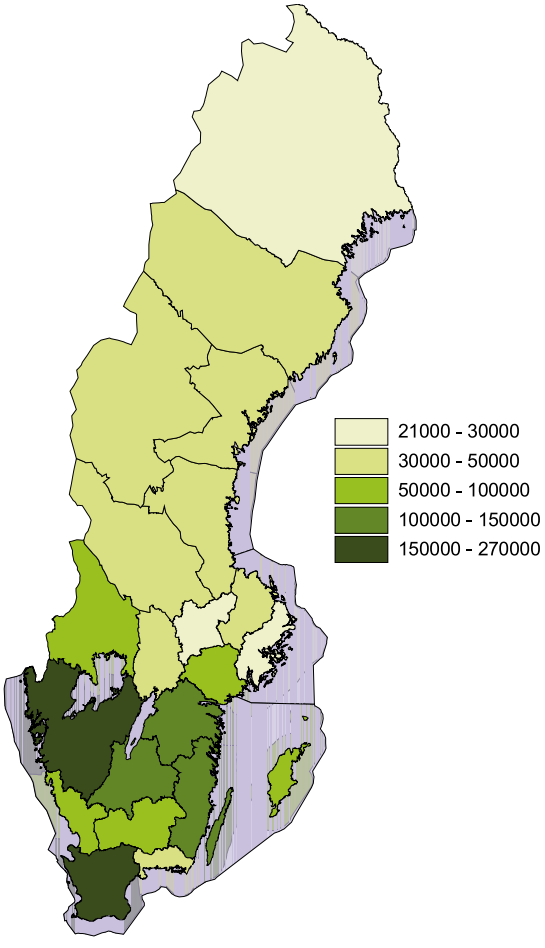
Source: JO 20 SM 0602

Table 2: Number of holdings with different types of animals in June 2006.

Livestock	Number
Cattle	25054
Dairy cows	8027
Suckler cows	12447
Sheep (lambs excl.)	9141
Pigs	2414
Fowls (20 weeks or older)	4877
Broilers	192

Source: JO 20 SM 0602

Figure 1: Geographical distribution of cattle in June 2006.



of sows is approximately 170,000 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

The structure of sheep industry has been stable for the last ten years. In 2006, there were roughly 9,152 sheep holdings in Sweden with a total of approximately 244,000 ewes and rams and 262,000 lambs. There was an increase of number of sheep between 2005 and 2006. The increase was partly due to a real increase but partly due to a change in the database (LBR) system. Sheep farms in Sweden are usually small-scale enterprises. One farm in three has nine adult sheep at most. Approximately 183,000 lambs were slaughtered in 2006, which is an increase from the years before.

Goats

In 2003 the number of goats was approximately 5,500. About 20 % of them were located in the county of Jämtland.

Poultry

The number of holdings with broilers is slowly decreasing. In 2006, there were approximately 192 holdings. However, the number of chickens for slaughter has been rather stable during the last years with approximately 73 million chickens slaughtered in 2006.

There were approximately 400 holdings with approximately six million productive laying hens in 2006.

In 2005 the number of turkeys was 122,000 in roughly 300 enterprises, most of them located in the county of Skåne.

The Swedish commercial market of ducks is limited with only one producer on the market. In 2006, the number of slaughtered ducks was 20,700.

Figure 2: Geographical distribution of pigs in June 2006.

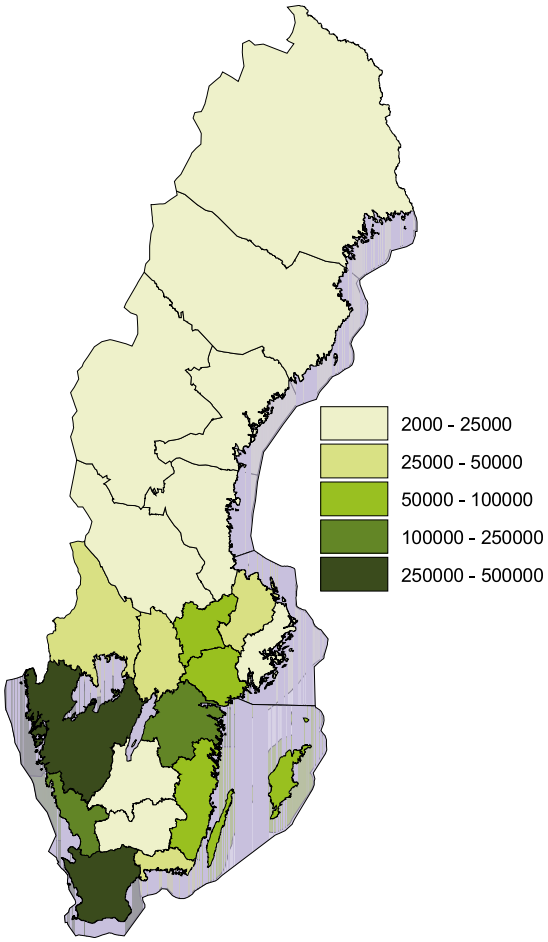
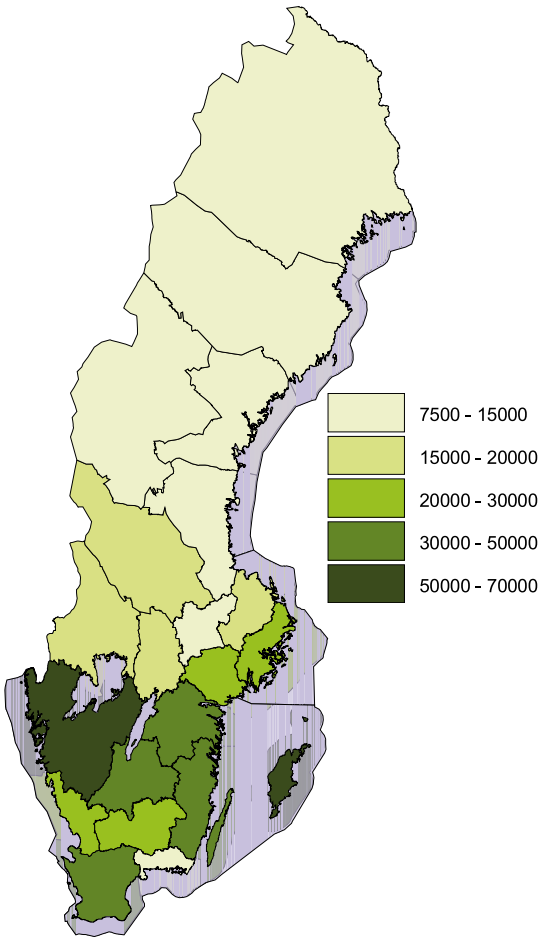


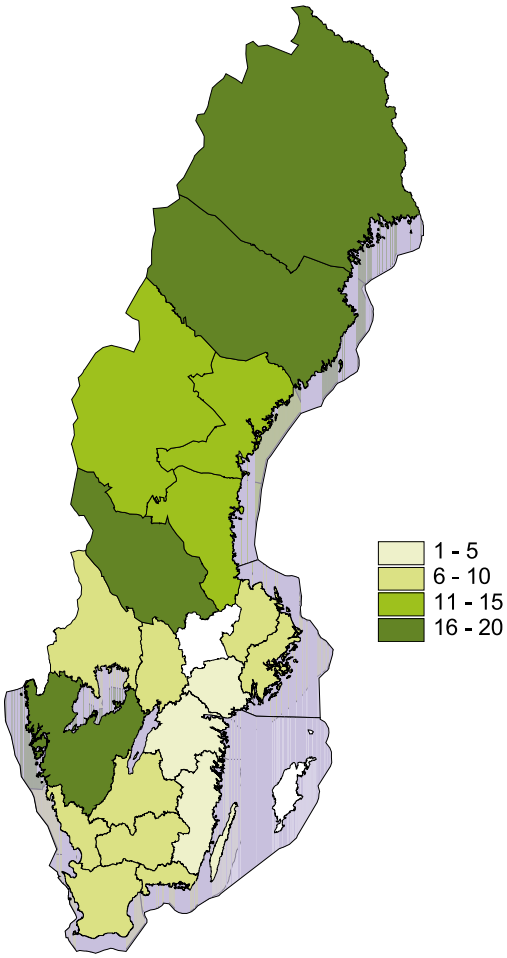
Figure 3: Geographical distribution of sheep and goat in June 2006.



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 middle and south parts. 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.

Figure 4: Geographical distribution of farmed fish in June 2006.



Imports and exports of live animals

The number of imported animals is low. In 2005, no cattle, sheep or goats were imported. Approximately 230,000 poultry and 118 pigs were imported. Regarding pigs this is a twelve-fold increase since 2003.

The export of live animals exceeds the import. In 2005, 1,954 cattle, 10,182 pigs, no sheep or goats and about 3 million poultry were exported.

Animal databases

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, number of pigs 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 and is financed by fees (per report).

The central register of holdings

The Swedish Board of Agriculture is responsible for the register. Each holding is allocated a unique identification number. The register contains information on all activities concerning bovine animals, pigs, sheep and goats with details on holding number, visiting address, species, permanent possession of dams and estimated number of offspring per year. Any change in the present situation shall be reported within a month after the change.

The central database for bovine animals (CDB)

The CDB Division at 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 database is financed by fees (per report).

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 responsibi-

lity 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), eight 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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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. This is followed by thorough cleaning and disinfection, and environmental sampling before repopulation is permitted. In other animal species, 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

Breeding animals, imported as grandparents, were kept isolated and repeatedly tested for *Salmonella* before entering the production chain. 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. Breeding animals were sampled every month throughout their lives and every batch of eggs was sampled in the hatchery. Hens for commercial egg production were sampled twice during the rearing period, three times during the laying period and once before slaughter. Broilers, ratites, turkeys, ducks and geese were sampled before slaughter.

The number of samples was calculated so as to detect a flock prevalence of 5% with 95% confidence level.

Cattle and swine

No regular sampling was done on pig or cattle farms. Voluntary surveillance was performed in breeding pigs. This surveillance included all herds within an industry certification programme (BIS) that comprises about 60-65% of all slaughtered pigs.

Furthermore, lymph node samples were taken at random of all cattle and pigs for slaughter.

In case of clinical or post mortem suspicion of *Salmonella* infection, relevant samples must be taken for culture. In practice, *Salmonella* samples were taken at most post-mortem investigations of cattle and pigs.

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 a 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.

Diagnostic procedures

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, material from 5 animals was usually pooled.

In case *Salmonella* was isolated from a pooled sample, individual analysis of stored samples was 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 was the NMKL 71:1999, ISO 6579 (Decision 2003/470/EC). In addition, for cattle faeces, cystein and selenite broth was sometimes used as well.

Results and discussion

Poultry

In December 2006, an outbreak of *S*. Typhimurium was detected involving ten breeding flocks for meat production and broiler flocks. The outbreak most likely started in a grandparent flock and spread to four parents flocks and five broiler flocks. Two phagetypes were isolated: NST and DT 120. The source of the outbreak is unknown. The outbreak continued in 2007.

In addition to this, *S*. Typhimurium was isolated from one flock with laying hens and *S*. Senftenberg from one grandparent flock for meat production line. From ducks, two serotypes (*S*. Worthington and *S*. Java) were isolated from one meat production flock and *S*. Typhimurium from two smallholdings, respectively.

Table 3: Results from surveillance at slaughterhouses in the Swedish *salmonella* control programme, 2006.

Animal species	Place of sampling	Type of sample	Sampling unit	No. of samples (no. pos)	Sero and phagetype	No. of isolates	*Salmonella* reisolated in the herd of origin
Cattle	Major sl.h.	ln.	ind.	3313 (2)	*S*. Typhimurium NST	2	
	Minor sl.h.	ln.	ind.	205 (0)			
	Major sl.h.	swab	ind.	3301 (1)	*S* Typhimurium DT 104	1	
	Minor sl.h.	swab	ind.	209 (0)			
Adult pigs	Major sl.h.	ln.	ind.	2766 (7)	*S* Typhimurium DT 40	3	
					S Typhimurium DT 120	1	1
					S Agona	1	
					S. Braenderup	1	
					S. Oranienburg	1	
	Minor sl.h.	ln.	ind.	28 (0)			
	Major sl.h.	swab	ind.	2739 (0)			
	Minor sl.h.	swab	ind.	28 (0)			
Fattening pigs	Major sl.h.	ln.	ind.	2913 (3)	*S*. Typhimurium DT 41	1	
					S. Typhimurium NT	1	
					S. Agona	1	
	Minor sl.h.	ln.	ind.	240 (0)			
	Major sl.h.	swab	ind.	2911 (0)			
	Minor sl.h.	swab	ind.	240 (0)			
Poultry	Major sl.h.	ns.	ind.	3340 (4)	*S*. Agona	3	
					S. Rubislaw	1	
	Minor sl.h.	ns.	ind.	29 (0)			

sl.h.=slaughter house; ln.= lymph node; ns.=neck skin

Salmonella was not detected in any other poultry.

Results from the surveillance at slaughterhouses (neck skin samples) are presented in table 3.

Cattle

Nine cattle farms were infected with *Salmonella*: five farms with *S*. Dublin, two with *S*. Typhimurium (NT and susceptible DT 104), one with *S*. Dusseldorf and one with *S*. Agona. *Salmonella* Typhimurium DT 104 was also isolated at a neighbouring farm with fattening pigs.

For results of sampling of lymph nodes and carcass swabs in the salmonella control programme, table 3 .

At five occasions, *Salmonella* was isolated from animals at necropsy, meat inspection and sale of live animal, but could not be traced back to a herd. The serotypes isolated were *S*. Duesseldorf, *S*. Dublin and *S*. Typhimurium DT at necropsy, *S*. Duesseldorf at meat inspection and *S*. Typhimurium DT 10 at sale of a live animal.

Pigs

Five pig herds were infected with *Salmonella*. *S*. Typhimurium DT 104 was detected at one farm with slaughter pigs. The same serotype was detected at a neighbouring cattle farm. On another herd, *S*. Typhimurium DT 40 was re-isolated after a positive finding in a lymph node sampled in the control programme.

The last three herds were found in investigation of a *Salmonella* outbreak in imported feed. In this outbreak, *Salmonella* was detected in the feeding system in 25 herds, however only in three herds *Salmonella* was detected in the animals. At each herd two serotypes were isolated: the first herd with *S*. Livingstone and *S*. Agona, the second with *S*. Livingstone and *S*. Scwarzgrund, and at the third *S*. Livingstone and *S*. Infantis.

For results of sampling of lymph nodes and carcass swabs in the salmonella control programme, table 3.

A consistently low prevalence (<0.1%) of *Salmonella* has been documented through the years and the results from 2006 demonstrate that this favourable situation remains.

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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 Act 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 to 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 2006, serum samples from 1 000 cattle and bulk tank milk samples from 2 000 dairy herds were analysed for antibodies to *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 stations. During 2006, the numbers of such samples were 734 serum samples and 4 semen samples.

Four cattle herds with increased abortion rate were investigated for bovine brucellosis during 2006.

Diagnostic testing was performed at SVA, Department of Bacteriology, Uppsala, Sweden. The diagnostic test 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. Culture was performed on aborted foetuses from three of the farms with a clinical suspicion of bovine brucellosis. 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

One of the tank milk samples tested positive for the presence of antibodies. The herd, from which the positive sample originated, had no individuals with clinical signs indicative of *Brucella* infection. Serum samples were collected from all cows within the herd. Of these, two cows tested positive on the initial indirect ELISA and one of these was also positive on confirmatory testing. This cow was culled and necropsy with culture from the uterus, the liver, blood and lymph nodes was performed. This resulted in no growth of *B. abortus*. In conclusion the positive test result was interpreted as a cross reaction with antibodies other than *B. abortus*.

Culture was performed from three aborted foetuses from three different farms with increased number of abortions. A fourth herd with increased number of abortions was examined with culture of the urine from one of the cows that had aborted and serology from three cows that had aborted. None of the examinations showed signs of *Brucella* infection.

In summary no herd or individual was diagnosed with *B. abortus*. infection during 2006.

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Bovine tuberculosis

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. 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 2002:16, with amendments, SFS 1999:657, 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 Act 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 2006, the status in Sweden was officially free of bovine tuberculosis.

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 inspection. 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 M-110 (T3100) and are read once a week for eight weeks. Microscopy of all suspect colonies is performed. If deemed necessary, re-culture is carried out at four weeks. In case mycobacteria in the M. tuberculosis-complex is isolated the strain is further sub typed.

Skin fold tuberculin tests are performed according to SJVFS 2003:33, K62. The comparative intra dermal 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, 8 cattle were investigated for M. *bovis* in 2006, all with negative results (1). In seven 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 tested for bovine tuberculosis in 2006. Following suspicion at meat inspection, 19 pigs were investigated by histology, 14 of these were cultured. All were negative for bovine TB, but some of the samples were positive for *Mycobacterium avium* subsp avium. Furthermore, three sheep, two mufflon sheep, 1 alpacka, 16 deer, one horse, eight dogs and four cats were investigated for *M. bovis,* all with negative results (1).

Within the control programme for farmed deer, another 33 herds were considered free of disease in 2006 (i.e. when the herd has undergone three consecutive herd tests with negative results) adding up to a total of 570 herds considered free of disease. This is approximately 90% of the farmed deer herds in Sweden.

From zoos there were one dolphin, one antelope, one penguin and two giraffes examined for *M. bovis*. From one of the giraffes´ *M. tuberculosis* was cultured. This infection could be traced to a zoo outbreak 2001 (1).

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

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Bovine spongiform encephalopathy (BSE)

Background

BSE is a notifiable disease under the Swedish Act 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 were 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 (7) 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).

Surveillance programme in 2006

The Swedish surveillance programme regarding BSE is based on Regulation (EC) No 999/2001 and consists of active monitoring and passive surveillance. BSE is also included in the Swedish Act of Epizootics (SFS 1999:657 with amendments).

Testing within the Swedish surveillance programme in 2006 include 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 (SFS 1999:657 with amendments) 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. According to Regulation (EC) 999/2001, Annex III, Chapter A, 2.3. Sweden was until 15th of June 2006 allowed to examine a random sample of at least 10 000 bovine animals per year at slaughter. The random sampling was carried out at all slaughterhouses in the country and every 15th animal was sampled. 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 Departments of Pathology and Virology, are responsible for the laboratory analyses. During 2006 three regional laboratories in Sweden has been approved to perform rapid tests on healthy slaughtered animals.

Clinically suspect animals

The samples have been examined with histopathology and immuno histochemistry 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 immuno histochemical staining for PrPSc was performed using a monoclonal antibody, Mab PrPres F89/160.1.5 (8).

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 TeSeEâ ELISA, Bio-Rad) as described by the manufacturer. In case of positive or inconclusive results the material was prepared and examined by histopathology and immuno histochemistry 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 TeSeEâ 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 manufacturer. 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 2006 the National Veterinary Institute examined approximately 132 000 samples for BSE (table 4) and all samples but one were negative.

The first Swedish case of BSE was detected in a 12 years old mixed-Charolais cow in February 2006. The cow was in late pregnancy and had difficulties rising for approximately 2 weeks. She was euthanized and sent for destruction and was tested within the surveillance programme. The rapid test (Bio-Rad TeSeEâ ELISA) gave positive results in repeated tests. The positive case was confirmed by histopathology, immunohistology and immunoblot (Western Blot, Bio-Rad) at SVA and also by immunohistology, histopathology and immunoblot (OIE SAF Western blot and VLA Hybrid Western blot) at the Community Reference Laboratory (VLA, Weybridge). The PrPSc from the Swedish case show some molecular differences compared to classical BSE (9). These differences are in accordance with atypical type-H BSE cases that

Table 4: Total tests performed within the Swedish surveillance programme for BSE in 2001-2006 (1, 2, 3, 4, 5, 6).

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

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

have been described in old cattle. The co-horts were traced and euthanized and all tested negative.

Six 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.

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Bovine viral diarrhoea

Background

Bovine viral 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 surveillance 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 2006. The control programme has been successful. At the end of 2006, 98.7% of the herds were certified BVD-free and 0,3 % or less were infected by BVD-virus.

In 2006, the total number of herds in Sweden was 20,301 and at the end of the year 20,029 herds were certified as free from the disease. Of the remaining herds, 60 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 2006.

Further reading and references.

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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.

Materials and methods

At the end of 2006, 8,632 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 during November within the quality control programmes of the dairies. The sampling for EBL is synchronised with sampling for BVD and IBR.

At the end of 2006, 12,080 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 cattle above two years of age in herds which have previously tested positive and in the remainder of tested herds a random sampling of cattle less than two years of age is performed.

In addition to the testing done within the programme 272 individuals, 11 organs and 261 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 indirect ELISA BLV-ab from Svanova®. This test is based on antigen coated micro titre plates with the entire virus used as antigen. Another indirect sandwich ELISA (SVANOVIRTM BLV-gp51-Ab, Svanova®) was used for confirmatory testing. This test uses a protein, gp51 as antigen, which makes this test more specific than when the entire virus is used as antigen.

Results and discussion

During two weeks at the end of February and beginning of March, coinciding with a new batch of SVANOVIRTM BLV-gp51-Ab, Svanova® being used, 17 samples tested positive for EBL. The following investigation concluded that there were problems with the delivered test batch in conjunction with the cut-off being changed to a level recommended by the manufacturer. In total, the samples with positive test results added up to 40. The herds from which the positive samples originated were identified. In herds that had been declared free of leucosis for ten years or more in combination with not having purchased animals for at least five years, the test results were considered false positives. In all of the remaining herds, with the exception of one, repeated samples were collected and tested. All of these repeated samples tested negative. In one herd, repeated sampling has not yet been performed due to specific circumstances. This herd is planned to be retested in 2007. Until proven otherwise, the test results from this herd are considered as false positives.

In conclusion, no herd or individual animal was diagnosed with EBL during 2006.

During 2006, 9 dairy herds and 402 beef herds were declared free of disease. At the end of the year a total of 8 628 dairy herds and 12 017 beef herds were declared free of disease (2).

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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 Act 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 during November 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, 3 637 beef cattle sera from 440 herds, collected within the surveillance program for EBL were tested (1).

In addition to the testing performed within the surveillance programme, one investigation due to clinical suspicion of IBR was conducted in a cattle herd.

Another 803 samples (754 blood samples and 49 semen samples) were examined for IBR at the National Veterinary Institute, SVA. (Samples from the herd with a clinical suspicion of IBR have been included in these numbers).

Diagnostic 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 gB (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

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Leptospirosis

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.

Results and discussion

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

Paratuberculosis

Background

Paratuberculosis (Johne's disease) is included in the Swedish Act 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 focussing 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 624 herds during 2006. 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.

Screening of dairy herds

No screening of dairy herds was performed during 2006. 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.

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 all cattle and sheep above 1 year of age submitted to autopsy. Samples are taken as above and submitted for culture.

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 2006, samples were taken from 72 herds distributed throughout the country with exception for the county of Norrbotten.

In addition, culture is performed on all 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 2006, 498 herds had been sampled for five years and found negative, thus achieving the so called A-status.

Nine suspicions of bovine paratuberculosis were raised during 2006. These were cases with chronic diarrhoea and the suspicion arose on live animals or at post mortem examinations. None of these cases were positive on culture.

No paratuberculosis was detected in the necropsy samples from cattle and sheep during 2006.

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 and 2006.

Paratuberculosis has never been detected in Swedish wildlife. During 2006 there was one suspicion of paratuberculosis in a raw deer at post mortem examination and another suspicion in a bison with chronic weight loss and diarrhoea. These cases were negative on culture.

The investigations undertaken show that the prevalence of paratuberculosis in Swedish cattle 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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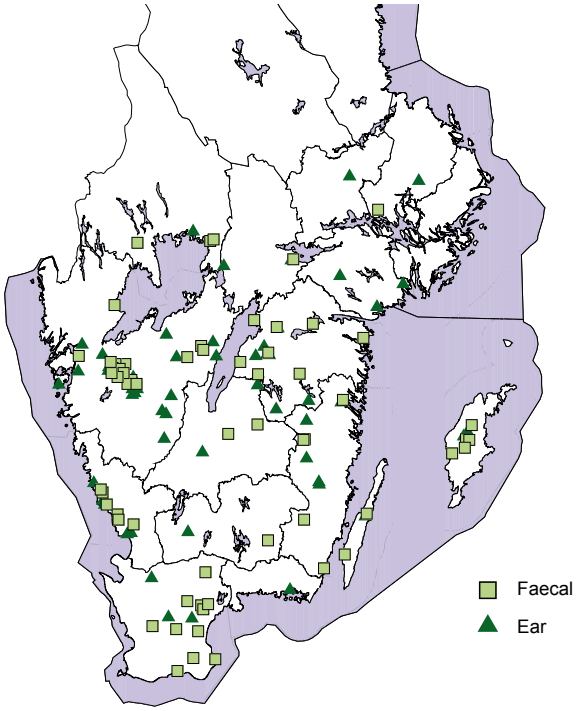
Vero-Toxinproducing Escherichia Coli (VTEC)

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 O157 or of any other serotype. Prevalence studies performed at the major slaughterhouses for VTEC O157 have been performed between 1996 and 2002. As the prevalence changed very little during these years, it was decided unnecessary to conduct such studies every year. Instead, it is thought sufficient to perform a study every third year. The last prevalence study was conducted autumn 2005 – autumn 2006. The Swedish Board of Agriculture has financed all studies, but planning, sampling and evaluation of the results have been performed by the National Veterinary Institute.

Figure 5: Geographical distribution of VTEC 0157 positive faecal and ear samples collected att slaughter during 2005/2006.



Aim

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

Material and methods

The studies have been designed as nationwide monitoring, with the aim to detect a prevalence of at least 0.1% with a 90% confidence interval. In each study, around 2000 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%). I addition to faecal samples, ear samples were also collected. Out of 451 samples analysed, 55 (12%) were positive. This result can not be interpreted on an indivicual level as a positive sample can be due to contamination by another animal in the herd or on the transport to the slaughter house (figure 5) There was no positive sample 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.

References

1. Trends and sources of zoonoses and zoonotic agents in humans, foodstuffs, animals and feedingstuffs 2006.

Contagious agalactiae

Background

Contagious agalactiae is caused by *Mycoplasma agalactiae* and is encompassed by Decision 1991/0068/EEC, 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 status. 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.

Material and methods

Starting from 2006, the plan is to sample and test for antibodies for *Mycoplasma agalactiae* every third year.

During 2005 a number of 3000 sheep from 403 different herds were sampled. Sera were selected from the voluntary Maedi/Visna programme. The sampling for contagious agalactiae is synchronised with sampling for the Ovine Brucellosis programme.

Diagnostic testing was performed at the National Veterinary Institute, SVA, by complement fixation.

Results and discussion

All 3 000 samples were negative for antibodies against *Mycoplasma agalactiae.*

Maedi/Visna

Background

Maedi /visna (M/V) is caused by a lentivirus in the Retrovirus family. The disease was first described in Iceland in 1939 (1). It is now reported from several European countries, as well as other continents. Only in New Zeeland, Australia and Finland there is no occurrence of the disease (2). In Sweden M/V was detected in 1974 by post mortem examination at slaughter. A serological screening performed at seven Swedish abattoirs in 1989 showed that 8,2 % of the represented herds were seropositive (2). In 1993 a voluntary control programme for M/V was launched by the Swedish Animal Health Service (2). The conditions applying to this programme are stated in the Swedish legislation (SJVFS 1999:25). At the end of 2005 the Swedish Animal Health Service started a second M/V programme that is not regulated within the Swedish legislation and does not require the same obligations from the farmers. These two programmes are now running parallel. Since 1993 more than 240 herds have been diagnosed with M/V, of which 186 herds have been culled and in 60 herds eradication measures have been performed (3).

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 the 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.

Material 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.

During 2006 the number of herds affiliated to the initial programme increased with 22 % and at the end of the year 2 010 herds with in total 86 204 sheep, were in the programme (3). A number of 22 500 samples from 720 herds were analysed within the initial programme during the year (3).

Within the new M/V programme, slightly more than 27 000 samples from 1 200 herds were analysed during 2006 (3).

Diagnostic testing was performed at the National Veterinary 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 2006, 90 new herds with sheep positive for M/V were detected. The herds were located predominately in the counties of Gotland, Skåne, Kalmar and Gävleborg (4).

A number of 150 herds reached M3-status during the year, making the number of herds with M3-status 1 654 at the end of the year, with a total of 73 360 sheep (3).

In conclusion, the intensified work with the programmes during 2006 has resulted in a large increase in herds being tested, which has led to detection of a large number of infected herds. This is important in the work aiming to get the Swedish sheep population free of M/V.

References

1.Pálsson PA. Maedi-visna. History and clinical description. In: Pétursson G, Hoff-jorgensen R (editors). Maedi-visna and Related Diseases. Boston: Kluwer Academic Publishers: 1990. p. 3-17.

2. Lindqvist Å. Maedi-visna – en lentivirusorsakad sjukdom hos får, SVT nr 8-9 1993, vol 45.

3. Swedish Animal Health Service, Verksamhetsrapport för år 2006 över kontollprogrammen avseende Maedi-Visna hos får.

4. Swedish Animal Health Service, Annual report 2006

Ovine brucellosis

Background

Brucellosis, which is encompassed by Directive 91/68/EEC, has never been diagnosed in Swedish sheep and 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 from 1995 (Decision 94/972/EC).

Brucellosis in food producing animals is included in the Swedish Act 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 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 2006, 9996 serum samples from 1.466 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 7 samples from each flock. In flocks with less than seven animals, serum from all animals within the flock were collected.

An additional 428 serum samples from goats were analysed for *Brucella melitensis*. The samples were collected within the CAE programme.

One clinical case, a sheep with an abscess, was examined with culture for *Brucella* in 2006.

Diagnostic testing was performed at SVA, Department of Bacteriology. The diagnostic test used was a buffered antigen test (Rose Bengale). For confirmation a complement fixation test was used.

Results and discussion

All samples were negative when tested for the presence of antibodies. The bacterial culture from the clinical case showed no growth of *Brucella*. Thus, all samples tested negative.

References

1. Report on trends and sources of zoonoses, Sweden 2006.

Scrapie

Background

Scrapie is since 1970 a mandatory notifiable disease under the Swedish Act 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 15 cases has been diagnosed until the end of 2006.

Surveillance programme for Scrapie in 2006

The surveillance programme in 2006 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 goats older than 18 months at healthy slaughter (this category was included in the surveillance programme during 2005)
- all sheep older than 18 months at healthy slaughter (this category was included in the surveillance programme in November 2006)

In 2005 one case of BSE was confirmed on a French goat and due to this the European Commission proposed to increase the testing of goats to be able to determine if this was an isolated event. In 2006 there were three cases of TSE in sheep (two in France and one in Cyprus) where the initial tests failed to rule out BSE. The European Community Reference Laboratory (CRL) has at the moment submitted these three samples to the third level of discriminatory testing (mouse bio-assay) and normally 12-18 months will be required to conclude this investigation. Due to the fact that BSE could not be completely ruled out in these three cases, the member states within the EU decided to test all sheep older than 18 months at slaughter. The increased surveillance programme in small ruminants has not detected any additional cases of BSE within the European sheep and goat population.

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 in order to derogate from the requirements for breeding programmes for TSE resistance in sheep in accordance with Decision 2003/100/EC.

Material and Methods

The Swedish Board of Agriculture finances the surveillance programme and the National Veterinary Institute, Department of Pathology and Department of Virology, Uppsala, Sweden 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 tree 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. The Western Blot (TeSeE sheep/goat WB, Bio-Rad) is carried out at the National Veterinary Institute in Oslo, Norway.

Surveillance of fallen stock

The samples has been examined by rapid testing as described by the manufacturer (Bio-Rad TeSeEâ 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. The WB (TeSeE sheep/goat WB, Bio-Rad) is carried out at the National Veterinary Institute in Oslo, Norway.

Surveillance of healthy slaughtered animals

The samples has been examined by rapid testing as described by the manufacturer (Bio-Rad TeSeEâ 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. The WB (TeSeE sheep/goat WB, Bio-Rad) is carried out at the National Veterinary Institute in Oslo, Norway.

Results and discussion

Sheep

Approximately 8800 samples from sheep were examined for TSE in 2006 (table 6).

During 2006, atypical scrapie variant Nor98 was diagnosed in eight sheep from different flocks in Sweden. Three of the cases were sampled as fallen stock and four were sampled as healthy slaughtered animals. One was sampled as a clinical suspect and was showing signs of neurologic disease (tremors of the head and neck and lack of limb coordination).

In three of the flocks the potentially susceptible animals were killed and those older than 12 months were examined for PrPSc (a total of 20 animals), but no additional positive cases were detected. The other flocks are at present put under movement restrictions, i.e. no animals are allowed to enter or leave the holding, awaiting amendments of the legislation concerning how to handle flocks with atypical scrapie.

Material from the brainstem and cerebellum from six sheep with clinical signs consistent with scrapie were examined by histopathology and immunohistochemistry but no case of TSE was detected in these. All Nor98 positive cases were genotyped (table 5)

Goats

Approximately 250 samples from goats were examined for TSE in 2006 (table 7). All analyses were negative for TSE.

Table 5: The age and genotypes of the Nor98 positive cases.

Age (years)	Genotype
5	ARQ/ARQ
7-10	ARQ/ARQ
8	ARQ/ARQ
8	ARQ/ARR
8	AHQ/AHQ
13	ARR/ARQ
16	Not possible
Unknown	Unknown

Table 6: Total tests performed on samples from sheep within the surveillance programme for Scrapie during 2002-2006.

	2002	2003	2004	2005	2006
Fallen stock	1230	2861	2984	2939	3713
Healthy slaughter	3995	5176	166*	2*	5100**
Animals killed under scrapie eradication	0	84	62	33	20
Clinical suspects	26	29	4	0	7
Total	**5251**	**8150**	**3216**	**2974**	**8800****
Total positives	0	4	2	1	8

*) A few samples were taken by mistake but there were no requirements for testing at healthy slaughter within the surveillance programme in 2004 and 2005.

**) Approximate number. Data from the Swedish Board of Agriculture. Sampling performed at several regional laboratories.

Table 7: Total tests performed on samples from goats within the surveillance programme for Scrapie during 2002-2006.

	2002	2003	2004	2005	2006
Fallen stock	45	67	87	140	153
Healthy slaughter	33	51	0	72	95
Clinical suspects	0	3	1	1	0
Total	**78**	**121**	**88**	**213**	**248**
Total positives	0	0	0	0	0

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 8).

Further reading and references

1) Wallgren, P., S. Mattsson, J. Rabe, M. Lindblad, B. Molander and M. Wierup (1994) Age distribution of pigs carrying toxin-producing Pasteurella multocida in herds affected with atrophic rhinitis. Proc. IPVS 13: 122.

2) Wallgren, P., S. Mattsson, M. Stampe, B. Molander, M. Lindblad and M. Wierup, (1994) Control of infections with toxin-producing Pasteurella multocida in herds affected with atrophic rhinitis. Proc IPVS 13: 123.

3) Wierup, M. and P. Wallgren (2000) Results of an intensive control of atrophic rhinitis in elite breeding and multiplyier herds in Sweden. Proc. IPVS16:158.

Table 8: 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

Aujeszky's disease

Background

Aujeszky´s disease (AD) was described for the first time in Sweden in 1965 (1). 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 (2). 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 2006 the Swedish Animal Health Service was responsible for the surveillance programme and reported to the Swedish Board of Agriculture. Within the surveillance programme blood samples were collected from 1000 boars for breeding and a minimum of 4000 sows at slaughter. The disease is included in the Swedish Act 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 765 boars and 3679 sows at slaughter. The number of samples was proportionally divided between 11 large slaughterhouses in Sweden. All serum samples were tested for antibodies in a blocking ELISA (SvanovirTM, PRV-Gb-Ab ELISA). All analyses were performed at the National Veterinary Institute, SVA, Department of Virology.

Results and discussion

All serum samples were negative for antibodies to AD.

The results from the surveillance programme for AD give additional documentation of freedom from this infection in the Swedish swine population.

References

1. Estola T, Obel AL, Rutqvist L, 1965. "An outbreak of Aujeszky´s disease in Sweden" Ett utbrott av Aujeszky´s sjukdom i Sverige (in Swedish). Nord. Vet. Med. 17, 649-656.

2. Engel M, 1999. Eradication of Aujeszky´s Disease (Pseudorabies) Virus from Pig Herds: Alternatives to Depopulation. Acta Universitatis Agriculturae Sueciae, Veterinaria 58. Swedish University of Agricultural Sciences, Uppsala, Sweden

Influenza (pig)

Background

Influenza H1N1 affected the Swedish pigs for the first time in 1982. The clinical signs were obvious in the previously naïve pig population but got milder over time. The H1N1 virus is since then present in the country, though the clinical signs are now much milder than in 1982.

Also influenza H3N2 is present in the country. It is less clear when this strain was introduced since the clinical signs were not as evident as in 1982. The H3N2 strain was only found in a serologic screening performed 1999 (table 9). Despite this, H3N2 has also been correlated to severe respiratory illness.

Presently, a combination of these two viruses (H1N2) is spreading through Europe and has now reached Denmark. Sweden is likely to be affected, but nobody knows when, or how the clinical effects will be.

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

Aim

The aim of the screenings is to document the disease status of the country, and to try to see any alterations in disease pattern 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 all three screenings. The tests used are hemagglutinin inhibition tests (HI-tests). They are more expensive than ELISA-tests, but also more sensitive with respect to genetic drift of the virus.

Results and discussion

The incidence of influenza is low with respect to H1N1 and H3N2. Serovar H1N2 and avian strains of influenza are non-present. 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 9). 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 repeatedly 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

1) Wallgren, P. (2004) Evidence of both virus and bacteria during an acute outbreak of respiratory disease in a fattening pig herd. Proc. IPVS 18: (1) 201.

Table 9: 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	H1N 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 (1) and the virus was identified in 1991 (2). The disease is considered to be one of the most economically important viral diseases in swine production. During the 1990s the disease has spread throughout Europe but it has so far never been reported from Sweden. The risk of introducing the virus in Sweden is high since the disease is occurring in Denmark. The Swedish Animal Health Service started a control programme in 1998 and The National Veterinary Institute is performing the analyses. The disease was included in the Swedish Act of Epizootic Diseases in 1999 (SFS 1999:657 with amendments).

Aim

The purpose of the control programme 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 of 20 pigs from each of 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 20 pigs from each of these herds are tested every year. In addition to this about 1000 samples are selected from the control programme for Aujeszky´s disease to be analysed for PRRS.

All serum samples were tested for antibodies to the PRRS virus with Idexx HerdChekâ PRRS 2XR (Idexx Laboratories) at the National Veterinary Institute, SVA. For confirmation the IPMA-serum neutralisation test was used.

Results and discussion

In total 4444 samples were tested for the presence of antibodies in 2006 and none of the samples were positive.

The results from the surveillance programme for PRRS in Sweden during 2006, give additional documentation of freedom from the infection in the Swedish swine population. To date, there have been no verified clinical recordings indicating the presence of PRRS virus in the Swedish swine population. The surveillance programme provides solid documentation of the good health situation regarding PRRS in the Swedish pig population.

References

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Surveillance for a selection of infectious diseases in pig herds

Background

During 2006 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) and brucellosis (*Brucella suis*). The National Veterinary Institute, SVA, was responsible for collection, test analysis and reporting to the Swedish Board of Agriculture. Since 2006, samples for Porcine epicemic diarrhoea (PED) and *Leptospira pomona* are not analysed on a yearly basis. Results from the survey 2005 for PED and *Leptospira pomona* is shown in tables 10 and 11.

CSF has not been diagnosed since 1944 in Sweden and TGE,/PRCV, PED 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 Act of Epizootics (SFS 1999:657) and TGE/PRCV are notifiable diseases according to SJVFS 2002:16.

Table 10: Serological screening regarding PED in Sweden 1993-2004.

Year	Material	Number of samples	Positive	Test used
1993	Serum samples, sows	4859	1	ELISA
1996	Serum samples, sows	1500	0	ELISA
1997	Serum samples, sows	3000	0	ELISA
1998	Serum samples from sows, gilts and hogs	3000	0	ELISA
1999	Serum samples from sows	3000	0(27)[1)]	ELISA
2000	Serum samples from grown pigs	3000	0(38)[1)]	ELISA
2001	Serum samples from sows	3016	0 (4)[1)]	ELISA
2002	Serum samples from grown pigs	1522	0	ELISA
2003	Serum samples from grown pigs	1994	0	ELISA
2004	Serum samples from grown pigs	3000	0(5)[2)]	ELISA
2005	Serum samples from grown pigs	3000	0	ELISA
2006	Not performed			

1) Confirmed negative at the University of Zürich, Switzerland

2) Three samples were confirmed negative at the University of Zürich, Switzerland. The additional two was evaluated as inconclusive.

Table 11: Serological screening regarding antibodies to *Leptospira pomona* in Swedish swine 1993-2004.

Year	Material	Number of tests performed	Positive	Test used
1993	Serum samples	4873	0	MAT
1995	Serum samples	3000	0	MAT
1996	Serum samples	3000	0	MAT
1997	Serum samples	3000	0	MAT
1998	Serum samples	3000	0	MAT
1999	Serum samples	3000	0	MAT
2000	Serum samples	3000	0	MAT
2001	Serum samples	3000	0	MAT
2002	Serum samples	3000	0	MAT
2003	Serum samples	3000	0	MAT
2004	Serum samples	3030	0	MAT
2005	Serum samples	3096	0	MAT
2006	Not performed			

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 2006, 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 2999 pigs were analysed regarding antibodies to SVD. An ELISA (Brochi et. Al) 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 with negative results regarding antibodies to CSF. The samples were analysed by an indirect ELISA (IDEXX® HerdChek CSFV Antibody Test Kit and Ceditest® CSFV). 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 2999 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 entire 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 (SAT). 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 3096 pigs were analysed regarding *Leptospira pomona* during 2005 using a microscopic agglutination test (MAT).

PED

Serum samples from 3000 pigs were analysed during 2005 regarding antibodies to PED with an ELISA (Idexx-Bommeli ELISA-test). Positive samples were sent to a laboratory in Zürich, Switzerland for a confirming serum neutralization test.

Results and discussion

The results from the serological screening in Sweden regarding these pig diseases during 2006 give additional documentation of freedom from the mentioned infections in the Swedish commercial pig population.

SVD

For SVD, 2953 samples tested negative in the first test and 46 were regarded as positive. Of these 46 samples 44 were regarded negative in the second confirmative test. The 2 remaining samples were sent to the CRL, IAH in Pirbright, England. One became negative and the other was regarded as inconclusive.

CSF

All samples tested negative.

TGE/PRCV

All samples tested negative.

Brucellosis and Leptospirosis

All samples tested negative regarding antibodies to *Brucella suis* in 2006 and *Leptospira pomona* in 2005 (no sampling done in 2006).

PED

All samples tested negative.

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 Epidemic Diarrhoea (PED), Porcine Reproductive and Respiratory Syndrome (PRRS), Swine Vesicular Disease (SVD), Teschen/Talfan disease (TT), Transmissible Gastroenteritis (TGE)/Porcine coronavirus (PRCV), Brucellosis (*Brucella suis*) and Leptospirosis (*Leptospira pomona*).

Material and methods

During 2006 a total of 231 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 in Swedish pig herds. The aim was to analyse all samples for all diseases mentioned above. Due to insufficient amount of sampling material only 211 samples were analysed for antibodies to (TT) and 182 for antibodies to (PED). For the other diseases all 231 samples were analysed..

Results and discussion

All samples were tested negative for AD, CSF, PED, PRRS, SVD, TT, TGE/PRCV, *Brucella suis* and *Leptospira pomona.*

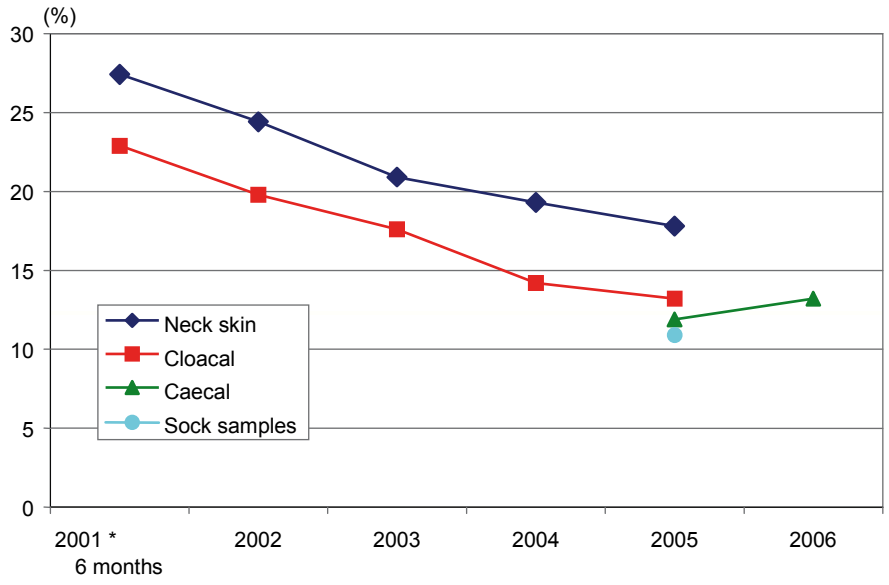
The material is to small for statistical evaluation. However, together with the absence of reports of clinical signs typical for the chosen diseases, it indicates that these diseases are not present in the Swedish wild boar population.

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. 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 Swedish Board of Agriculture's regulation 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).

Figure 6: Annual incidence of campylobacter at farm level (sock samples) and at slaughter (neck skin, cloacal and ceacal samples) in the Swedish Campylobacter Programme in broilers, 2001-2006.



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 13% in 2006 (figure 6). 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 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.

References

Hansson, I., Plym Forshell, L., Gustafsson, P., Boqvist, S., Lindblad, J., Olsson Engvall, E., Andersson, Y., Vågsholm, I. 2007. Summary of the Swedish Campylobacter programme in broilers 2001-2005. J of Food Protection

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 organisation responsible for the control programme is the Swedish Poultry Meat Association (Svensk Fågel).

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 intestinal 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 pigs, poultry and ruminants 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. Svensk Fågel 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 2006 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 investigated for *Mycoplasma meleagridis* and investigations regarding egg drop syndrome and infectious laryngotracheitis were only performed in chicken.

All diseases within the programme are notifiable 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 Commission Decision 95/98/EEC. In 2006 one outbreak of ND was detected in a layer flock in the county of Östergötland. In one other holding (layers) antibodies against the virus were detected, but no virus could be detected. All birds in both holdings were euthanized and the holdings cleaned and disinfected. Restriction zones were established in accordance with Council directive 92/66/EEC around the confirmed outbreak.

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. 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 through 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 12 to 16. The blood samples were sent by mail to the Department of Virology, National Veterinary Institute, SVA, and analysed as described below. The samples were investigated 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 2006 breeding flocks from three companies (North Chicken, Blenta and Swe-Chick) were included in this exception. Tables 12 to 16 give an overview of all samples taken in chicken and turkeys and methods used during 2006.

Results and discussion

The results from the serological screening in the Poultry Health Control Programme in 2006 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 one turkey parent flock a positive sample was detected. The flock was re-sampled and the new samples turned out negative. The conclusion is that the positive sample was due to an unspecific serological reaction.

Paramyxovirus type 1

All samples tested negative.

Egg drop syndrome

In samples from nine flocks (two grandparent and seven parent chicken flocks) there were a few positive samples detected. New samples were taken from the flocks. The testing of these samples turned out negative. The conclusion is that the positive samples were due to unspecific serological reactions.

Avian pneumovirus

Positive samples were found from three chicken parent flocks. However, no antibodies against APV were detected in new samples taken from these flocks.

Infectious laryngotracheitis

In eleven chicken flocks (three grandparent and eight parent flocks) there were positive samples detected. No clinical signs were seen in these flocks and new samples taken from the flocks were all negative.

References

Annual Report: Poultry Health Control Programme 2006.

Table 12: Sampling schedule in turkey parent flocks. Number of blood samples tested at different weeks of age.

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

Source: Statens jordbruksverks föreskrifter (SJVFS 1995:123) om obligatorisk hälsoövervakning av fjäderfä

Table 13: Sampling schedule in chicken parent flocks. Number of blood samples tested at different weeks of age.

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

Table 14: Sampling schedule in chicken grandparent flocks. Number of blood samples tested at different weeks of age.

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

Table 15: Chickens. Number of grandparent-(GP) and parentflocks(P) tested and total number of samples tested.

Agent	Nr of flocks		Nr of samples		Method
	GP	P	GP	P	
S. Pullorum/ S. Gallinarum	9	82	540	4 860	Rapid plate agglutination*
Mycoplasma gallisepticum	61	427	3 660	25 560	ELISA(Svanovir Mg antibody test, SVANOVA)
Mycoplasma synoviae	46	168	2 760	10 080	ELISA(Svanovir Ms antibody test, SVANOVA)
Paramyxovirus -1	12	82	720	4 860	Haemagglutination inhibition test**
Egg drop syndrome	20	82	600	2 460	Haemagglutination inhibition test***
Avian pneumovirus	3	51	180	3 000	ELISA(Svanovir APV antibody test, SVANOVA)
Infectious laryngotracheitis	13	83	260	1 680	ELISA(Svanovir ILT antibody test, Biocheck)

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

** Ref: Council directive 92/66/EEC

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

Table 16: 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	22	1 320	ELISA(Svanovir Mg antibody test, SVANOVA)
Mycoplasma synoviae	12	720	ELISA(Svanovir Ms antibody test, SVANOVA)
Mycoplasma meleagridis	22	1 320	Rapid plate agglutination*
Paramyxovirus -1	6	360	Haemagglutination inhibition test**
Avian pneumovirus	6	360	ELISA(Svanovir APV antibody test, SVANOVA)

*Ref: Manual of Diagnostic Tests and Vaccines for terrestial Animals

** Ref: Council directive 92/66/EEC

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

Background

Sweden has two control programs for fish, a national compulsory and a 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 14ºC.

The voluntary program prescribes an additional inspection at a water temperature of over 14ºC, 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

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 2006, 529 pools of samples (spleen, kidney, heart/brain) were tested by a cell culturing method. A pool consists of samples from up to ten fishes. Approximately 5 000 individuals from both continental and coastal zone were tested.

SVC

In 2006, 339 carp fish (spleen, kidney, heart/brain) were tested for virus by a cell culturing method.

BKD

Kidneys from 2 520 fish were tested by a polyclonal ELISA. Positive cases were verified by PCR.

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 2006 sampling in Sweden regarding fish diseases give basic data of freedom from these infections in the Swedish aqua culture.

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. The period ends 2007. During 2006 a risk assessment about introducing 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 29 per year and if EM is introduced into Sweden there is a high risk for serious consequences. 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).

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 – 2006 approximately 1900 foxes from all over Sweden were examined for EM without any positive findings (table 17).

Material and methods

Three hundred 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 200 foxes feacal samples were taken and sent to the Institute for Parasitology, Zurich University for CoproAntigen ELISA (CoA- ELISA). The bowel from the foxes which turned out positive in CoA-ELISA and the bowels from the 100 foxes which had not been examined with CoA-ELISA were examined with sedimentation for detection of the parasite.

Table 17: Number of red foxes examined for EM during 2001 - 2006.

Year	Number
2001	321
2002	313
2003	401
2004	401
2005	200
2006	300

Results

All 300 red foxes were negative for *Echinococcus Multilocularis*.

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 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.

References – Risk assessment

Vågsholm Ivar et al 2006, An assessment of the risk that EM is introduced with dogs entering Sweden from other EU countries without and with anthelmintic treatments

Avian Influenza surveillance programmes in poultry and wild birds

Background

The Swedish Avian Influenza surveillance programmes in poultry and wild birds are based on Commission decision 2006/101/EC, which 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 2006/101/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 programmes 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 in eight different places along the Swedish east coast and in the island of Gotland. One infected mallard was also detected in a game bird holding. All measures taken were in accordance with legislation in force. HPAI had never been detected in Sweden before 2006.

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 Virological department, the National Veterinary Institute, SVA, Uppsala, Sweden. All poultry were sampled at slaughter except for the breeders, which were bled in their production period within the Poultry Health Control Programme. The samples were analysed using a haemagglutination-inhibition test described in Directive 92/40/EEC, Annex III.

Within the programme sampling has been performed in layers, turkeys, breeders, geese, ducks, ratites and small-scale broiler production. Ten blood samples from each holding were collected except for holdings with geese and ducks, where 40 samples from each flock were collected. In flocks with less than 10 respectively 40 birds, all birds were sampled. In total 2317 birds were sampled. Table 18 gives an overview of all poultry flocks sampled in 2002 to 2006.

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 2006/101/EC, Annex X. In total 4821 birds were sampled. The five species that were most frequently sampled were

Table 18: Number of flocks of different poultry categories sampled in 2002-2006.

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

* Virological examination of stool sample

** Organic farming

*** Free range holdings

Source: SVA´s annual report 2005

Report on the Swedish Avian Influenza surveillance in poultry and wild birds in 2006

mallard (1916 birds), crane (303), canada goose (289), mute swan (222) and common tern (221). The passive surveillance was performed by the National Veterinary Institute, Uppsala, Sweden. The active surveillance was performed by the National Veterinary Institute and by Kalmar Bioscience at different important wild bird habitat in the south of Sweden.

Most of the samples were swab samples. Whenever possible both cloacal and oropharyngel/tracheal swabs were taken from every bird and analysed separately. In some cases fresh feaces from the ground were collected. From dead birds that were autopsied, swab samples and/or organ samples were used for PCR analyses.

The samples were analysed for the detection of avian influenza virus genome by using a M-gene real-time PCR (Spackman et al). Positive samples were further analysed for detection and identification of H5 and H7 viruses, including virus pathotyping by amplicon sequensing (Slomka et al). To determine the neuraminidas subtype virus isolation and antigenic subtyping of the grown virus using highly specific antisera was performed.

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 a M-gene real-time PCR (Spackman et al) 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. If the initial M-gene real-time PCR was negative at SVA, no further testing was performed.

Results and discussion

Poultry

All 2317 samples analysed within the survey were negative regarding antibodies to avian influenza virus subtype H5 and H7.

Wild birds

Out of 4821 sampled wild birds 234 were positive for avian influenza virus. Further analyses showed that, out of these samples, 85 samples from 12(13) species were positive for avian influenza subtype H5, see table 19. Eight samples were determined to be HPAI subtype H5N1. The remaining 77 H5 positive samples were not tested for pathogenicity nor for neuraminidase subtype. However, since these samples originated from within the restriction areas, the authorities acted as all H5 positive birds from established restriction areas were HPAI H5N1.

In May 2005 the first big outbreak of HPAI among wild birds was reported from China. Since then, 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 and it is not unlikely that the highly pathogenic avian influenza virus still is circulating in the Swedish fauna, even though at a very low prevalence. Preventive measures in Sweden and the rest of Europe has been focused on increasing the biosecurity in poultry holdings to prevent the introduction of the virus from wild birds to poultry. Moreover, other ways of introducing avian influensa virus into the poultry holdings, such as via infected live animals and contaminated products,should not be forgotten. It is important to continue the surveillance of avian influenza for better understanding and preparedness.

References

Report on the Swedish Avian Influenza surveillance in poultry and wild birds during 2006, SJV Dnr 33 538/06

Figure 7: The green dots inidcate were avian influensa (H5N1) positive wild birds were found.

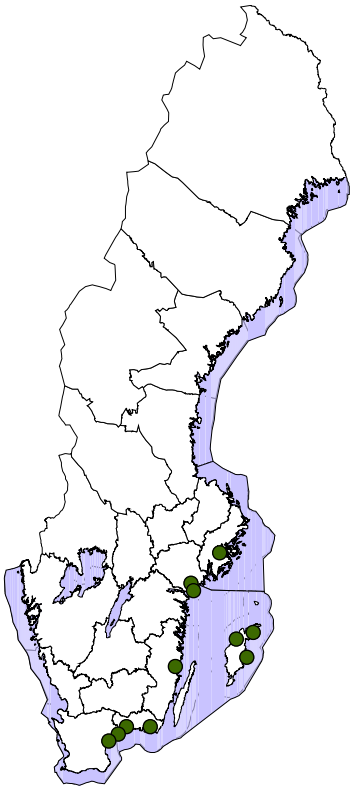


Table 19: Species positive for avian influenza virus subtype H5.

Species	Nr of birds sampled	Nr of birds positive for AIV	Nr of birds positive for AIV subtype H5	Nr of birds positive for HPAI H5*	Nr of birds positive for HPAI H5N1*
Aythia marila	9	4	3	3	
Aythia fuligula	115	46	37	36	3
Buteo buteo	13	2	2	2	
Mergus albellus	3	3	3	3	1
Mergus merganser	35	7	6	6	
Anas platyrhynchos	1916	124	18	1	
Anas penelope	174	2	1	0	
Branta canadensis	289	3	2	2	2
Cygnus sp.	4	1	1	1	
Cygnus olor	222	8	6	6	1
Bubo bubo	17	4	3	3	1
Larus argentatus	58	2	2	2	
Anser fabalis	198	3	1	0	

* All samples within restriction areas were not tested for HP.

Source: Report on the Swedish Avian Influenza surveillance in poultry and wild birds during 2006, communication, SJV Dnr 33 538/06

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 2006, thirteen animals (bats excluded) have been examined for rabies (table 20). They were examined because of clinical suspicions or because it couldn't be excluded that the animals were smuggled into Sweden from a country with known endemic rabies or unknown rabies status.

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 dead bats have been examined for the presence of rabiesvirus. 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.

Material and methods

31 dead or wounded and euthanized bats, mainly from the southern parts of Sweden, were sent to the National Veterinary Institute (SVA) for rabies examination. The contributors were mostly private persons. Five bats were in too bad condition to be examined, mostly due to decomposition.

The diagnostic method used was based on the detection of antigens in brain tissue by use of a fluorescent antibody test, FAT

Results and discussion

All 26 bats examined were negative for EBLV. All other animals tested were negative for rabies.

Sweden has been free from animal rabies for more than 100 years. Bat rabies has never been diagnosed in Sweden. 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.

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

References

Hallgren Gunilla *et al* 2005. Risk assessment for the likelihood of introduction of rabies by dogs smuggled into Sweden. www.sva.se

Hallgren Gunilla, et al 2006, Risk assessment for the likelihood of introduction of rabies into Sweden by legally introduced dogs and cats. www.sva.se

Table 20: Number of animals tested for rabies in 2006.

Animal	Number
Dog	4
Cat	4
Red fox	1
Mink	2
Cattle	1
Squirrel	1

Post mortem examinations in food-producing animals

Background

During the last three decades the number of post mortem examinations has fallen with more than 50% compared to earlier figures (3). 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 animals 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, but this has not yet been met. However, the programme has been of crucial importance to keep the laboratories in southern Sweden in business (1). During 1998-2001 the number of post mortems performed on different species did not correlate to the size of the population in each region (3). 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 2005.

Material and methods

During 2005 post mortem examinations were performed at six different sites throughout the southern part of the country; Skara (AnalyCen AB), Kristianstad (AnalyCen AB), Kalmar (HS Miljölab), Stenstorp (Konvex), Uppsala (SVA) and Visby (Swedish Meats) (5). Large animals, such as adult cattle, could be examined at three of these sites; Uppsala, Stenstorp and Visby (3).

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 (1).

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 2005 a total of 3 241 post mortem examinations were performed within the programme. Of these 799 were cattle, 1 883 swine, 526 sheep, 12 goats, 20 farmed deer, 1 horse, 45 poultry and 1 "other" species (5). Out of these cases, 90 were diagnosed with a notifiable disease (table 21).

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.

Referenses

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3. Wahlström H et al. Sjukdomsövervakning hos animalieproducerande djur, en översyn på uppdrag av Jordbruksverket och Köttböndernas Forskningsprogram, 2003.

4. Uppgifter från Jenny Lundström, Svenska Djurhälsovården.

5. Svenska Djurhälsovårdens årsredogörelse 2005.

Passive surveillance

Table 21: Notifiable diseases diagnosed within the post mortem programme (poultry not included) Year 2005.

Disease	Index case	Following cases	Un-known	Total
Malignant catarrhal fever (B114)	5	0	1	6
Lymphoma (S103)	12	0	0	12
Listeriosis (C611)	27	0	3	30
Salmonellosis (S109)	7	0	0	7
Hemorrhagic necrotizing enteritis, *Clostridium perfringens* type C (S505)	1	3	0	4
Blackleg, *Clostridium chaveoi* (C614)	13	1	1	15
Infectiuos laryngotracheitis (ILT) B302	11	5	0	16
Total	**76**	**9**	**5**	**90**

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