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Description

Publisher	Finnish Food Safety Authority Evira
Title	Animal Diseases in Finland 2016
Authors	Finnish Food Safety Authority Evira
Abstract	This publication contains information on the incidence of animal diseases to be combated and the prevalence of certain other infections in various animal species in Finland in 2016. The publication also describes the measures taken to prevent and combat animal diseases. The animal disease situation remained good overall, even though there was an increased threat of the situation worsening. At the end of the year an outbreak of highly pathogenic avian influenza H5N8 amongst wild birds emphasized the importance of the protection of poultry against diseases and preparedness against animal diseases. African swine fever continued to spread in areas neighbouring Finland, but the disease was not found in Finland. New cases of salmonella were found on 16 farms. Finland remained free of strategically important animal diseases such as enzootic bovine leucosis, brucellosis and bovine tuberculosis, IBR and BVD infections, PRRS infections in swine and *Echinococcus multilocularis* infection. *Mycoplasma bovis* spread on cattle farms and the RHD virus killed a large number of the wild rabbits in the area in and around the capital. The preparedness was especially targeted at combating African swine fever, avian influenza and rabies.
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Tekijät	Elintarviketurvallisuusvirasto Evira
Tiivistelmä	Tämä julkaisu sisältää tietoa Suomen eläintautitilanteesta vuonna 2016. Julkaisuun on koottu ajankohtaista tietoa vastustettavien eläintautien ja eräiden muiden tartuntojen esiintymisestä eri eläinlajeilla maassamme. Julkaisussa kuvataan myös tehtyjä toimenpiteitä eläintautien ennaltaehkäisemiseksi ja torjumiseksi. Eläintautitilanne säilyi pääosin hyvänä, vaikka uhka tilanteen huononemisesta kasvoi. Marraskuun lopussa ja joulukuussa luonnonlinnuissa todetut korkeapatogeenisen H5N8-tyypin lintuinfluenssan tautitapaukset korostivat siipikarjan tautisuojauksen ja eläintauteihin varautumisen merkitystä. Afrikkalainen sikarutto jatkoi leviämistään Suomen lähialueilla, mutta tautia ei todettu Suomessa. Uusia salmonellatapauksia todettiin 16 tuotantotilalla. Suomi säilyi vapaana strategisesti tärkeiksi katsotuista eläintaudeista, kuten nautaleukoosista, luomistaudista ja nautatuberkuloosista, nautojen IBR- ja BVD-tartunnoista, sikojen PRRS:stä sekä *Echinococcus multilocularis* –tartunnoista. *Mycoplasma bovis* levisi nautatiloilla ja RHD-virus tappoi suuren määrän pääkaupunkiseudun luonnonvaraisia kaniineja. Varautumista kohdistettiin erityisesti afrikkalaisen sikaruton, lintuinfluenssan ja raivotaudin torjuntaan.
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Beskrivning

Utgivare	Livsmedelssäkerhetsverket Evira
Publikationens titel	Djursjukdomen i Finland 2017
Författare	Livsmedelssäkerhetsverket Evira
Resumé	Denna publikation innehåller information om djursjukdomsläget i Finland år 2016. Publikationen innehåller aktuell information om förekomsten av djursjukdomar som ska bekämpas samt vissa andra infektioner hos olika djurarter i landet. I publikationen beskrivs också de åtgärder som vidtagits för att förebygga och bekämpa djursjukdomar. Djursjukdomsläget förblev till största delen gott, även om hoten mot det goda läget ökade. I slutet av november och i december påvisades sjukdomsfall hos vilda fåglar som orsakats av högpatogen fågelinfluensa av typen H5N8, vilket betonade vikten av sjukdomsskydd för fjäderfä och beredskap för djursjukdomar. Afrikansk svinpest fortsatte att spridas i Finlands närområden men sjukdomen påvisades inte i Finland. Nya fall av salmonella påvisades på 16 produktionsenheter. Finland är fortfarande fritt från djursjukdomar som ses som strategiskt viktiga, såsom bovin leukos, brucellos och bovin tuberkulos, IBR och BVD hos nötkreatur, PRRS hos svin samt *Echinococcus multilocularis* –infektion. *Mycoplasma bovis* spreds på nötkreatursgårdarna och RHD-viruset dödade en stor mängd vilda kaniner i huvudstadsregionen. Beredskapen var särskilt inriktad på bekämpning av afrikansk svinpest, fågelinfluensa och rabies.
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Contents

1 Animal disease situation in Finland in 2016

The animal disease situation remained good overall, even though there was a notable increase in the threat of the situation worsening. At the end of the year an outbreak of highly pathogenic avian influenza H5N8 amongst wild birds emphasized the importance of the protection of poultry against diseases and preparedness against animal diseases. As a result, poultry kept outside had to be moved indoors. The Decree issued by the Ministry of Agriculture and Forestry requiring poultry to be kept indoors was advanced to enter into force at the start of December, and the importance of protecting poultry against diseases was emphasized in related communications. Avian influenza was detected in December at a bird park in Mariehamn in the Åland Islands, but the infection did not spread to poultry. Apart from avian influenza, Finland remained free from animal diseases that spread easily such as foot and mouth disease, swine fevers and Newcastle disease. A case of bat rabies (EBLV-2) was confirmed in one bat, while five wild boars living in the wild were confirmed to be infected with *Brucella suis*. However, the infections did not spread to domestic animals, and no other cases of dangerous animal diseases were confirmed. Finland also remained free of strategically important animal diseases, such as enzootic bovine leukosis, bovine tuberculosis infectious bovine rhinotracheitis (IBR), bovine viral diarrhoea (BVD), PRRS (porcine reproductive and respiratory syndrome) and *Echinococcus multilocularis*. Rabbit haemorrhagic disease (RHD), which is classified as an animal disease to be reported, killed a large number of wild rabbits in the area in and around Helsinki over a short period of time in the spring. Evira received a total of 180 reports of suspected animal disease cases. In 2015, the number of reports was 236, while in 2014 the number was 141. The main reason for the increase in reports in 2015 was the spread of *Mycoplasma gallisepticum* in non-commercial poultry, whereas in 2016 factors contributing to the number of reports included suspected diseases in wild birds and general preparedness for African swine fever and avian influenza.

African swine fever continued to spread in the Baltic countries. The large number of cases detected in Estonia in particular caused concerns in Finland due to the large volume of passenger traffic between Estonia and Finland. Efforts to prevent the spread of the disease to Finland included providing hunters headed to Estonia for hunting trips with information about how to avoid the disease. In addition to this, Evira also inspected the hauls of hunters returning to Finland and screened passengers arriving from other Baltic countries for illegal wild boar meat. The screenings resulted in one case where meat was confiscated from a passenger who was not a hunter. The communication targeting regular tourist travelling to the Baltic countries was also intensified to minimise the risk caused by souvenirs. To help speed up the response to animal diseases, Evira organised a preparedness exercise called 'Joulupossu 2016' (Christmas Pig 2016). The sampling of wild boars living in the wild succeeded better than in previous years due to collaboration with hunters. The collaboration yielded a larger number of samples than in previous years, all of which tested negative for the disease. The distribution of vaccine baits to combat rabies, another viral disease threatening Finland, was continued in an expanded area along the eastern border.

New salmonella cases were detected on a total of six cattle holdings, three pig holdings and seven poultry holdings. The number of new cases on cattle and pig holdings decreased, but increased on poultry holdings. In 2016, the total number of new salmonella cases identified was 16, while in 2015 the total number of cases was 21. The incidence of salmonella remained well below the target level of 1%.

The European Union recognised Finland as a Member State with negligible risk of classical scrapie. Cases of classical scrapie have never been confirmed in sheep in Finland. However, two cases of atypical scrapie in sheep were detected in 2016. The number of *Mycoplasma bovis* infection detected on dairy farms increased compared to previous years. The overall disease situation amongst production pigs and poultry remained good, although problems with colibacillosis in broilers continued.

The disease situation amongst aquaculture animals remained good. The implementation of the viral haemorrhagic septicemia (VHS) eradication programme in Åland was continued. An outbreak of the disease was last detected there in 2012.

The number of animals imported into Finland continued to increase, as has been the trend in the past years. The number of imported parent flocks of poultry in particular remained high. Evira and other Finnish authorities continued to pay particular attention to detecting and preventing the illegal import of animals, as it is considered the greatest threat to the animal diseases situation in Finland, along with wild animals. Cases of illegal import of companion animals in particular are uncovered regularly. It is likely that non-commercial poultry is also being transported to Finland in violation of legislative requirements.

Finland's geographically isolated location, relatively small number of animal imports and exports and the distances between animal holdings help keep the animal disease situation good. Most serious animal diseases are detected in other countries before Finland, which provides time for preparation and improving protection against the diseases in question. On the other hand, the global movement of people and goods gives rise to rapidly changing and difficult-to-control risks in regard to the spread of infections, highlighting the importance of sharing information. In Finland, domestic animals are usually kept in well-insulated shelters due to harsh winters, which usually prevent the animals from coming into contact with wild animals. Furthermore, cattle markets and common pastures are uncommon in Finland, which also helps prevent the spread of contagious animal diseases. While disease prevention varies on backyard and non-commercial holdings, productive animals are kept completely separated from non-commercial animals of the same species.

Finland implemented a new NORA rapid risk assessment tool, which allows for the preparation of a rough expert assessment of the risk of an animal disease entering the country. The tool was used to assess the risk of introduction of CWD (chronic wasting disease), ASF (African swine fever) and LSD (lumpy skin disease) into Finland. Since then the tool has also been scientifically published (Kyyrö J, Sahlstrom L, Lyytikäinen T: Transboundary and emerging diseases. 2017: 1–13). Based on the NORA assessments, the risk of African swine fever introduction into Finland is high. The results of the risk assessment concerning CWD introduction into Finland were inconclusive, ranging from moderate to very high depending on whether the disease has also spread to the mule deer populations of Northern Norway. The risk of introduction of LSD was assessed to negligible.

The latest incidences of several serious animal diseases in Finland are listed in the tables presented in Appendix A. Data on long-term disease surveillance is collected in the tables presented in Appendix B, while the numbers of animals and animal holdings in Finland can be found in Appendix C.

For information about zoonosis incidences in Finland and zoonosis monitoring programmes in animals and foodstuffs, please visit the website of Zoonosis Centre, a joint expert network of Evira and the National Institute for Health and Welfare, at www.zoonoosikeskus.fi (in Finnish and Swedish).

2 Cattle diseases

The disease situation amongst cattle remained good, and no cases of dangerous animal disease or diseases that spread easily were detected. New salmonella infections were detected on six cattle holdings. The most common reasons for conducting tests on cattle were the disease surveillance of bovine viral diarrhoea (BVD), infectious bovine rhinotracheitis (IBR), bluetongue disease, enzootic bovine leukosis and bovine spongiform encephalopathy (BSE); artificial insemination operations; determining the cause of respiratory infections, calf diarrhoea or abortions; meat inspection and the import and export of cattle.

Mycoplasma bovis infections increased

Mycoplasma bovis cases continued to increase. So far *M. bovis* infections have been identified on a total of 40 dairy farms. Of these cases, 20 were identified in 2016. In nearly all the cases detected in dairy cows, the infection manifested as mastitis and was first detected in a milk sample. *M. bovis* infections on beef cattle holdings were identified from respiratory infection samples.

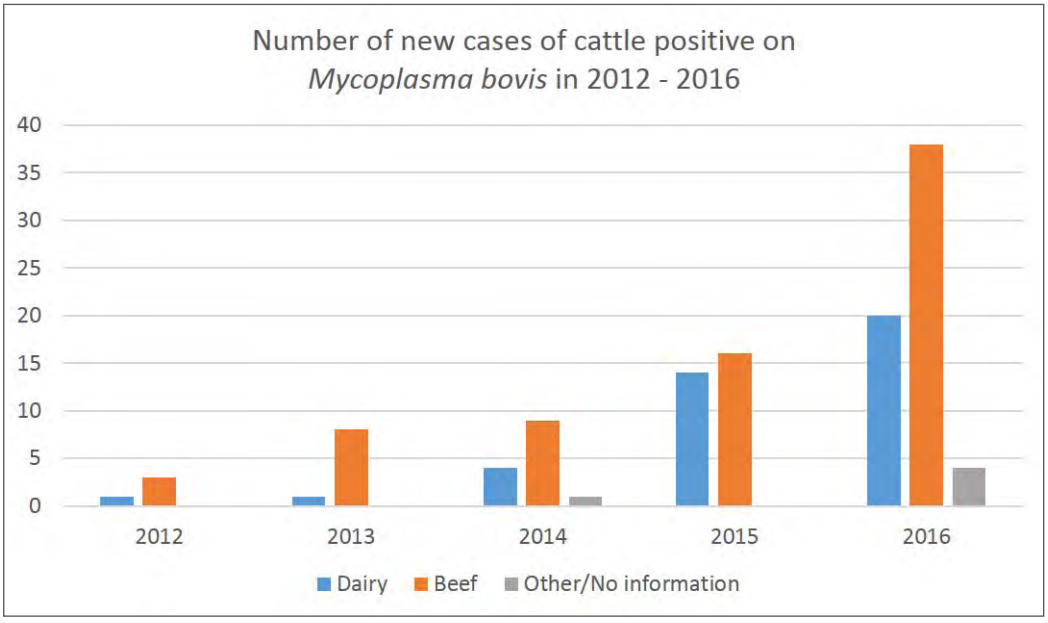


Figure 1. Number of new cattle testing positive for *Mycoplasma bovis* 2012–2016.

Schmallenberg virus not detected

The first cases of the Schmallenberg virus (SBV), previously unknown in Europe, were detected in Germany in 2011, and the virus spread to Finland in the summer of 2012. SBV is a virus transmitted by midges that affects ruminants. The virus is not contagious to humans. In Finland, the first deformed lambs that tested positive for the virus were born in late December in 2012, while the first deformed calf was born in February 2013. Tests performed on calves submitted to Evira for abortion diagnosis in 2013 revealed cases of Schmallenberg virus on 19 holdings (6.7% of the holdings tested), while tests on lambs revealed cases on 14 holdings (10% of the holdings tested).

No new cases of Schmallenberg virus were detected in 2014–2016. In 2016, SBV antibodies were only detected in 4% of a total of 169 cows tested, meaning that the majority of Finland's cattle population is once again susceptible to the virus. The situation has remained largely the same since 2014; the virus has not been detected, and antibodies have only been detected in older cows born before 2014.

Diagnostics

In 2016, Evira examined a total of 492 whole carcasses or organ samples of cows submitted for pathological testing (Table 1). The number of samples submitted increased slightly compared to the previous year (428 samples in 2015). A quarter of the samples consisted of foetuses, full-term stillborn calves and calves that died within a day of birth that were submitted for abortion diagnosis. The number of samples tested in the context of meat inspection was 66.

As in previous years, the most common cause of abortion was bacterial infections. The most common isolates were the same as the ones identified in previous years: *Trueperella pyogenes, Ureaplasma diversum* and *Listeria monocytogenes*. No abortions caused by Schmallenberg virus were identified. *Neospora caninum* protozoan parasite infections were detected in aborted foetuses from four holdings, and antibodies were detected in the blood samples of six holdings submitted for abortion diagnosis. *Neospora caninum* is detected each year on a few new holdings. A total of 641 blood samples were tested for *Neospora* using ELISA. Some of the samples were from holdings that had previously tested positive, in which case testing was conducted to determine the extent of the outbreak. A total of 118 bovine blood samples from 25 holdings were tested for Q fever using ELISA. Two cows on one holding tested positive for Q fever antibodies, but the animals in question were asymptomatic. Animals from the same holding have also tested positive for Q fever antibodies in previous years.

Table 1. Numbers of pathological samples of cattle tested in 2009–2016 by reason for testing.

Reason for testing	2009	2010	2011	2012	2013	2014	2015	2016
Disease diagnosis	243	239	255	257	362	253	250	306
Abortion diagnosis	88	89	78	257	368	98	106	120
Meat inspection	128	91	79	61	108	109	72	66
Total	**459**	**419**	**412**	**575**	**838**	**460**	**428**	**492**

As in previous years, the majority of samples submitted for determining the cause of a disease consisted of calves under the age of six months (approx. 45% of the samples). The most common findings were, as in previous years, respiratory tract infections, calf diarrhoea and other gastrointestinal diseases and systemic bacterial infections in young calves. Samples from six holdings were tested for malignant catarrhal fever (MCF), with samples from four of the holdings testing positive.

A total of 154 deep pharyngeal swab kits collected from calves (one kit contains four samples) as well as paired serum kits collected from three farms (one kit contains paired sera of five animals) and nasal mucus samples collected from two holdings (one kit contains nasal mucus samples of five animals) were tested for respiratory tract infections (Table 2).

Table 2. Results of deep pharyngeal swabs collected from cattle in 2009–2016. Numbers of positive samples.								
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total number of samples submitted	**23**	**21**	**26**	**39**	**93**	**66**	**108**	**154**
Respiratory Syncytial Virus	5	9	8	8	24	13	33	28
Coronavirus	7	12	9	15	59	32	58	75
Mycoplasma bovis	0	0	0	3	7	8	18	43
Pasteurella multocida	11	15	18	30	74	52	96	120
Histophilus somni	3	2	3	2	16	9	18	17
Mannheimia haemolytica	3	2	4	3	33	12	36	57
Ureaplasma diversum	13	13	19	24	46	40	62	99

The most common findings in the respiratory tract infection samples (pathological and clinical samples) were bovine respiratory syncytial virus and coronavirus, *Histophilus somni*, *Pasteurella multocida*, *Mannheimia haemolytica* and *Trueperella pyogenes* bacteria and ureaplasma. *Mycoplasma bovis* bacteria were detected in deep pharyngeal, lung, joint and ear infection samples. Antibiotic resistance was detected in *Pasteurella multocida* and *Mannheimia haemolytica* strains on several holdings.

Total of 246 sets of samples were sent in the framework of calf diarrhoea test package (one package includes testing of five faecal samples), containing a total of 717 samples. The results for calves under six months old are presented in Table 3. As in previous years, the most common causes of diarrhoea (pathological and clinical samples) were rotavirus and *Eimeria* sp. coccidia. The zoonotic *Cryptosporidium parvum* protozoan that causes diarrhoea in calves was detected on a total of 57 holdings, either in pathological tests or diarrhoea samples. People working with calves were also infected with cryptosporidiosis. Enterotoxigenic *E. coli* F5 bacteria was detected in the diarrhoea calf of one dairy farm in connection with a pathological examination. Enterotoxigenic *E. coli* bacteria have rarely been detected in calves in the studies conducted by Evira, with the most recent previous finding being from 2009.

Additionally, 15 bovine faecal samples submitted to Evira were tested for coronavirus, with seven of the samples testing positive.

Table 3. Results of calf diarrhoea diagnostic test packages from calves under six months old between 2010 and 2016. Numbers of positive samples. The tests were conducted according to the age of the calves.							
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total number of samples submitted	**153**	**203**	**191**	**229**	**178**	**211**	**246**
Salmonella	0	1	0	1	0	1	1
Rotavirus (ELISA)	61	83	78	83	76	74	98
Corona (ELISA)	2	0	3	6	4	1	1
E.coli F5	0	0	0	0	0	0	0
Eimeria, over 10,000 OPG	27	35	29	38	32	40	34
Cryptosporidium spp. (staining)	22	30	23	26	31	36	76
Cryptosporidium parvum	5	7	13	20	24	30	41
Strongylida	2	4	3	6	3	2	3

Salmonella

The salmonella monitoring of cattle is a part of the national Salmonella programme in Finland. The incidence of salmonella is low in Finland, and it has remained under the target of 1%. In 2016, new cases of salmonella were detected in the faecal and environmental samples of six cattle holdings: four dairy farms and two suckler cow herds. The detected serotypes were *S*. Typhimurium (three samples), *S*. Enteritidis (one sample) and *S*. Hessarek (one sample), with one sample from a dairy farm containing both *S*. Derby and *S*. Konstanz. In addition to this, an infection (*S*. Typhimurium) detected on one salmonella positive holding had already been detected in 2015. In 2015, new infections were identified on 12 holdings. All the salmonella infections detected in 2016 were detected in the holdings' self-monitoring samples, with one exception. On one holding the infection was first detected in people and also in the holding's hobby chickens. In addition to this, three lymph node samples collected from cows in slaughterhouses tested positive for *S*. Enteritidis and one such sample tested positive for *S*. Typhimurium, but faecal samples collected from the holdings tested negative for salmonella. Cattle brought to artificial insemination centres and their holdings of origin as well as the bulls in the quarantine are also tested for salmonella. In 2016, these tests yielded no positive salmonella results.

Cattle disease surveillance

The disease situation amongst cattle was surveyed with monitoring programmes organised by the authorities for monitoring bluetongue disease, leukosis, infectious bovine rhinotracheitis (IBR), bovine viral diarrhoea (BVD), bovine spongiform encephalopathy (BSE) and brucellosis in dairy cattle and suckler cows. The bluetongue disease (BTV) situation remained calm in the areas neighbouring Finland. The BTV-4 outbreak that began in 2014 in the eastern parts of the EU and the BTV-8 outbreak that began in France in autumn 2015 continued, but did not draw closer to Finland to any significant degree. Samples collected from slaughtered suckler cows were also tested for Bluetongue disease all over Finland throughout the year.

The monitoring programme also included risk-based testing of dairy cattle for BVD, IBR, leukosis and brucellosis. The targeted cattle population consisted of dairy cows that had experienced an exceptionally high number of abortions over the last year or that had undergone embryo transfer using embryos of foreign origin. In addition to bluetongue disease, samples collected from slaughtered suckler cows for monitoring purposes were also tested for BVD and IBR. Samples were also tested in the context of artificial insemination operations, imports and exports.

A total of 141 cattle serum samples were tested for leptospirosis. Of these samples, 132 were collected from artificial insemination bulls within the health monitoring programme for AI-bulls, while nine were collected for export purposes. All of the samples tested negative for leptospira antibodies.

Table 4. Viral and bacterial infection samples collected from cattle, sorted by reason for testing and test (serology, virus detection). Number of positive samples in parentheses.

	BVD		IBR		Leukosis	Bluetongue disease		Brucellosis	Schmallenberg virus infection	
	Sero-logy	Virus detec-tion	Sero-logy	Virus detec-tion	Sero-logy	Sero-logy	Virus detec-tion	Sero-logy	Sero-logy	Virus detec-tion
Dairy cattle monitoring/ bulk milk sample	920	0	920	0	920	0	0	810	0	0
Suckler cow monitoring/ individual blood sample	7,901	0	7,901	0	0	7,901	0	0	0	0
Artificial insemination operations	539[a)]	258	539[a)]	0	539[a)]	0	0	539[a)]	0	0
Disease diagnosis	158	128	158	124	37	2	5	171	91 (7)[c)]	13
Import (cattle, semen, embryos)	128[b)]	57	51	10	0	3	3	0	0	0
Other (animal trade, export)	842	42	0	0	0	15	0	0	78	1,345
Total	**10,486**	**485**	**9,567**	**134**	**1,496**	**7,919**	**8**	**1,520**	**169 (7)[c)]**	**1,358**

a) Includes both milk and serum samples.
b) 101 samples from recipients of imported embryos.
c) Schmallenberg virus antibodies were detected in cows that most likely contracted the infection between 2012–2013 based on their date of birth.

BSE tests performed in 2016 are presented in Table 5 by reason for testing. The number of BSE tests performed was of the same order as in 2015. The total number of cattle tested for BSE was 11,234, the majority of which had died spontaneously or been put down. The testing age limit for emergency slaughtered animals that died spontaneously or were put down is still 48 months. However, animals of all ages will be tested if the animal is suspected of having BSE.

Table 5. BSE tests in 2016. All test results were negative.

Healthy slaughtered	Clinical suspicions at holdings	Emergency slaughtered	Spontaneously died or put down at holdings	Disease symptoms in ante-mortem inspections	Total
4	1	39	11,190	0	**11,234**

Data on dairy cattle disease surveillance (Table B1), suckler cow herd disease surveillance (Table B2), tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and surveillance of BSE in cattle (Table B4) between 2007 and 2016 is presented in the summary tables in Appendix B.

3 Pig diseases

The disease situation amongst domestic pigs remained unchanged. No animal diseases that spread easily or dangerous animal diseases were detected in pigs. Salmonella was detected on a total of three pig holdings, two of which had already tested positive for salmonella in 2015. The most common reasons for testing pig samples were surveillance of Aujeszky's disease, TGE (transmissible gastroenteritis), PRRS (porcine reproductive and respiratory syndrome), classical swine fever (CSF), African swine fever (ASF) and *Brucella suis* infections in pigs; artificial insemination operations; and disease diagnosis, particularly for the purpose of identifying pathogens causing gastrointestinal and respiratory tract infections in growing pigs. The threat of African swine fever in areas neighbouring Finland grew as the disease continued to spread in the Baltic countries. Examinations of wild boars living in the wild are covered in greater detail in Chapter 12.

Salmonella

The salmonella monitoring of pigs is a part of the national salmonella programme in Finland. By law, salmonella infections in pigs are considered animal diseases to be combated. The incidence of salmonella is low in Finland, and it has remained under the target of 1%. Salmonella was detected on a total of three pig holdings. One case of *S*. Derby was detected on a combination pig holding, in addition to which one case of *S*. Typhimurium was identified on a breeding farm. Both of these holdings had already tested positive in 2015. A combined lymph node sample consisting of samples collected by a slaughterhouse from the sows of five holdings tested positive for *S*. Mbandaka, and on one of these holdings the strain was also detected in faecal samples.

Trichinellosis not found

Trichinellosis, which is classified as an animal disease to be reported, was not identified in rearing pigs or farmed wild boars in 2016, so the situation remained the same as in 2014 and 2015. The incidence of trichinellosis in pigs and wild boars is monitored by way of sampling conducted in connection with meat inspection.

Diagnostics

In 2016, Evira conducted pathologic-anatomical examinations of a total of 365 pig samples, corresponding with the sample numbers of previous years. The majority of the samples consisted of whole carcasses (234 samples), with the rest consisting primarily of organ samples. Over 80% of pig samples are submitted for disease diagnosis, and in most cases the reason for submitting a sample is to determine the pathogen causing gastrointestinal or respiratory tract infections in a specific age group on a holding. The majority of the examinations have to do with diagnosing diseases in piglets or young pigs. A number of samples are also sent in for testing conducted in connection with meat inspections, for abortion diagnosis and for determining the cause of death of individual pigs.

Of the identified causes of respiratory tract infections, *Actinobacillus pleuropneumoniae* bacterium was the major cause of pneumonia in growing pigs, as in previous years. Influenza A virus was detected in samples from two holdings. In total, lung and nasal mucus samples received from 40 holdings were tested for influenza virus. The most recent case of swine influenza occurred in 2014, when influenza A was detected in the samples of three holdings.

In the current situation, annual antibody monitoring of porcine enzootic pneumonia is only mandatory for holdings designated as special level breeding farms according to the Sikava health classification register. In addition to this, samples from holdings with suspected cases of porcine enzootic pneumonia are tested when necessary. In 2016, Evira tested a total of 1,940 samples from 74 holdings for porcine enzootic pneumonia antibodies, as a result of which porcine enzootic pneumonia was detected on three new holdings. The number of samples tested was significantly higher than in 2015 (1275 samples) due to examinations related to porcine enzootic pneumonia infections.
Porcine enzootic pneumonia cases are rare in Finland; in 2015, the disease was detected on one new holding.

Table 6. Results of gastrointestinal infection diagnostic test package (faecal samples) of weaned piglets and pigs in 2016.

Pathogen	Sample submissions tested (number)	Number of positive sample submissions (percentage of those tested)
Toxigenic *Escherichia coli*	24	9 (38%)
Lawsonia intracellularis	22	12 (55%)
Brachyspira pilosicoli	26	13 (50%)
Brachyspira intermedia	26	13 (50%)
Brachyspira hyodysenteriae	34	0
Salmonella sp.	23	0

A total of 628 faecal samples from 38 holdings were bacteriologically tested for the *Brachyspira hyodysenteriae* bacterium, which causes swine dysentery, and other pathogens that cause diarrhoea in pigs. Nearly all of the faecal samples tested were from weaned or older pigs, with only a few holdings submitting faecal samples from piglets. All the samples tested were negative for swine dysentery. As in previous years, pathogens that cause gastroenteritis identified in pig samples included *Brachyspira pilosicoli*, *Brachyspira intemedia*, toxigenic *Escherichia coli* and *Lawsonia intracellularis* bacteria. The number of faecal samples tested was lower than in 2015, when 1,278 faecal samples were bacteriologically tested. The number of faecal samples tested in 2014 was 2,335; the difference in the number of samples is explained by the fact that in 2014 swine dysentery was detected on five holdings, which resulted in a higher number of samples being collected as part of the investigations conducted.

Surveillance

The disease situation amongst pigs was surveyed with monitoring programmes organised by the authorities for the purpose of monitoring Aujeszky's disease, TGE, PRRS and classical swine fever. Blood samples for the monitoring were collected from sows in slaughterhouses so that approximately 700 samples were collected from seven slaughterhouses in proportion with the number of animals slaughtered; the maximum number of samples collected per holding was eight. Samples from farmed wild boars were collected during slaughter. In addition to the diseases mentioned above, the samples collected from farmed wild boars were tested for African swine fever and brucellosis. All test results were negative.

Tests for significant swine diseases were also conducted in the context of artificial insemination operations, sampling in relation to the special level health classification of pig farms, disease diagnosis and import. Tests were also conducted on samples collected from wild boars living in the wild.

Table 7. Numbers of tests performed on pig blood samples for significant viral diseases in 2016 by reason for testing. None of the diseases tested for were detected.

	Aujeszky's disease		TGE		PRRS		CSF		ASF	
Pigs	Sero-logy	Virus detec-tion	Sero-logy	Virus detec-tion***	Sero-logy	Virus detec-tion	Sero-logy	Virus detec-tion	Sero-logy	Virus detec-tion
Surveillance	729		729		772	41	729			
Artificial insemination operations*	954		602		972	17	723			
Holdings with special level health classification			312		388	20				
Disease diagnosis**	8	70	7	21	28	90	27	104	24	128
Export										
Import	162		162		240		162			
Farmed wild boars (surveillance)	53		55		55		58	13		60
Wild boars living in the wild	234	362					230	366		366
Total	**2,140**	**432**	**1,867**	**21**	**2,455**	**168**	**1,929**	**483**	**24**	**554**

*Including holdings of origin
** Rearing pigs, pigs kept for non-commercial purposes and farmed wild boars
*** Also for PED virus

Hunters have contributed actively to the monitoring of African swine fever by submitting blood and tissue samples from wild boars living in the wild to Evira. The disease has never been detected in Finland. Examinations of wild boars living in the wild are covered in greater detail in Chapter 12.

Summaries of tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and serological tests for viral diseases and leptospirosis in pigs (Table B7) conducted between 2007 and 2016 are presented in Appendix B.

Numerous African swine fever cases in the Baltics in 2016

African swine fever (ASF) is an easily spreading haemorrhagic fever caused by the asfivirus that infects domestic pigs and wild boars. The disease causes major financial losses, but does not infect humans. A total of 23 genotypes (gt) of the virus have been identified. There is no known vaccine or cure for the ASF virus.

African swine fever is endemic in Africa, and the disease was first described in Kenya in 1921. In 1957, ASF (gt I) spread out of Africa for the first time, when it was reported in Portugal. ASF was detected in Portugal again in 1960, at which point the virus also spread to Spain. The countries were not declared free from the disease until 1995. African swine fever has also been present on the island of Sardinia since 1978 (gt I).

In 2007, the disease (gt II virus) spread to Georgia, most likely in the food waste of a ship arriving from Africa. Since then, ASF has spread to a number of countries, including Russia, Ukraine, Belarus, and in 2014 to EU member states Poland, Lithuania, Latvia and Estonia.

ASF virus is extremely persistent and survives well in organic material, such as undercooked meat and blood. The disease typically spreads from country to country in food waste that contains pork or pork products contaminated with the virus. The virus may also spread to new areas by being transmitted in live pigs and sperm as well as transport vehicles, humans and wild boars. The disease is also maintained and transmitted in Africa by soft ticks of the *Ornithodoros* genus, which have not been found in northern or central Europe.

4 Poultry diseases

Since the import of grandparent stock of broilers ended in 2015, all broiler parent stock has been imported from abroad, which has resulted in an exponential increase in the import of poultry in the past few years. The increase in imported birds also increases the risk of diseases spreading. Imported flocks are kept quarantined by industry operators for at least 12 weeks and continuously monitored for serious infectious diseases, in order to make sure that imported birds do not introduce serious infectious diseases to Finland. The highly pathogenic avian influenza virus of subtype H5N8 that spread to Finnish wild birds in late 2016 forced industry operators to check their protection measures against diseases and keep outdoor poultry indoors. No cases of serious infectious diseases, such as avian influenza or Newcastle disease, were detected in poultry.

Highly pathogenic avian influenza detected for the first time in Finland

Highly pathogenic avian influenza was detected in Finnish wild birds for the first time in 2016 (see Chapter 12). In the Åland Islands, H5N8 avian influenza was detected not only in wild birds, but also in a bird park located in Mariehamn, where the virus infected both peacocks and ornamental chickens. The disease advanced rapidly, and the infected birds died soon after contracting the disease. An order was issued for the rest of the birds to be put down. The health of the park's caged birds, which were kept in a separate building, was monitored, and samples from the birds were repeatedly tested for avian influenza, but none of the samples tested positive. A restricted zone (a protection and surveillance zone) was set up around the bird park for the purpose of restricting the movement of poultry and other birds, as well as poultry products. The poultry holdings located in the zone were inspected by the area's official veterinary surgeon. At the bird park, all the facilities used to keep the ornamental chickens and peacocks were cleaned and disinfected. The restricted zone and the movement restrictions imposed on the bird park were lifted in March 2017.

Highly pathogenic avian influenza H5N8 spread widely in Europe

The first case of H5N8 avian influenza was detected in October 2016 in wild birds in Hungary. This particular strain of the virus is highly pathogenic, meaning that it causes high mortality rates in wild birds and poultry. Soon after the first case was detected, highly pathogenic H5N8 avian influenza was also detected in poultry, first in Hungary and afterwards in other countries as well. By the end of 2016, H5N8 avian influenza had spread widely throughout Europe. Cases were confirmed in several European countries, in both wild birds and poultry, as well as in other birds kept in captivity, such as zoo birds. In addition to subtype H5N8 of the virus, some cases of subtype H5N5 of highly pathogenic avian influenza were also detected.

In Europe, the H5N8 virus has been detected in many different species of waterfowl (such as whooper and mute swans, tufted ducks, herring gulls, great black-backed gulls, black-headed gulls, mallards, European wigeons and cormorants). In addition to these, avian influenza has also been identified in wild birds of prey and corvids. In poultry, the virus has been detected in chickens, turkeys, ducks and geese, among others. Based on the wide variety of affected bird species, it is likely that nearly all species of birds are at risk of infection, though there are differences in the susceptibility of different bird species to influenza viruses. Some birds may travel long distances before succumbing to the virus, and long-distance migratory birds have been found to have played a role in the spread of avian influenza, both globally and to Europe.

Avian influenza is easily transmitted between individual birds. Infected birds spread the virus via airborne secretions and particularly in their faeces. The virus may remain pathogenic for long periods in the environment, especially in humid conditions and low temperatures. Highly pathogenic H5N8 avian influenza has caused high mortality rates in poultry. In wild birds, the virus has caused mass deaths of waterfowl, such as tufted ducks.

Due to the avian influenza situation, preparedness was improved from the end of the year onwards. The Ministry of Agriculture and Forestry's decree requiring poultry to be kept indoors entered into force at the start of December. In addition, Evira advised poultry farms to make sure that their disease protection was effective and to immediately report any suspected cases of avian influenza to the official veterinarian. Furthermore, Evira advised restricting the carrion feeding in coastal areas. Evira also tested samples collected from poultry holdings due to symptoms indicative of avian influenza, such as in- creased mortality and decreased egg production. However, no cases of avian influenza were identified on poultry holdings, as in all cases the cause of the symptoms turned out to be something else. For example, on one non-commercial poultry holding the cause of increased mortality was determined to be salt poisoning. Examinations of wild birds are detailed in Chapter 12.

Diagnostics

In 2016, Evira examined poultry samples collected from a total of 221 holdings in the context of pathologic-anatomical examinations, voluntary health monitoring programme and import operations. Pathologic-anatomical examinations were performed on a total of 2,467 poultry samples. The number was significantly lower than in the previous year (5,116 samples), when the number of samples examined rose particularly due to the colibacillosis epidemic in broilers. The scope of the colibacillosis problem remained the same in 2016 as in the previous year. The majority of colibacillosis cases were assessed by health care veterinarians operating in the field, who in some cases submitted samples to Evira in order

to rule out serious infectious diseases as causes of increased mortality. The majority of the samples were broilers (2,085), in addition to which a total of 171 turkeys and 229 laying hens were also tested.

Mycoplasma gallisepticum infections were detected on nine non-commercial poultry holdings in different parts of Finland. *Mycoplasma synoviae* infections were detected on 14 non-commercial poultry holdings and in a parent flock of laying hens of one commercial holding, where suspicion of *M. synoviae* arose based on blood samples taken as part of the voluntary health monitoring programme. While *M. synoviae* can remain identifiable on the mucous membranes of birds' upper respiratory tracts for long periods, not all the birds in an affected flock produce antibodies if the bacteria does not penetrate the mucous membrane. Apart from the chicken breeder holding mentioned above, no cases of *Mycoplasma synoviae*, *M. gallisepticum* or *M. meleagridis* were detected in productive poultry. The testing of non-commercial poultry for *Mycoplasma gallisepticum* decreased after 1 August 2016, from which point onward *M. gallisepticum* was no longer classified as an animal disease to be combated on holdings of under 100 chickens and/or turkeys. Since then, the testing of non-commercial poultry for *M. gallisepticum* has been conducted within the framework of the health monitoring programme for preservers of native breeds of chicken and other non-commercial keepers of chickens and turkeys, or at the request of owners.

The factors behind the colibacillosis epidemic in broilers were investigated in cooperation with the poultry industry. The only factor that all the infections were identified to have in common was *E. coli* bacterium. Evira examined *E. coli* isolates collected in connection with the colibacillosis cases, most of which consisted of APEC (Avian Pathogenic *Escherichia coli*) bacteria. Out of the *E. coli* strains isolated in 2016, 66% were determined to consist of serotype O78, and the same bacterium was identified in both hens and their offspring. The same strain has also caused problems for the broiler industry in Denmark and Norway, which have parent stock produced from the same grandparent generation as Finland. In Denmark, colibacillosis increased the use of antibiotics in poultry in 2015, due to which the country started to vaccinate parent stock against *E. coli*. The results of the vaccinations have been positive, and the use of antibiotics decreased in Denmark in 2016. In Finland, broilers have not been medicated with antibiotics in response to colibacillosis, and work to bring the vaccine to the Finnish market began at the end of the year.

Necrotic enteritis caused by *Clostridium perfringens* bacterium was detected on seven commercial turkey holdings. Swine erysipelas was identified on two turkey holdings and one laying hen holding. On one of the turkey holdings, birds were vaccinated against swine erysipelas, but in spite of the vaccination the birds contracted the disease again just a few months later. Roundworms were found in eggs in isolated cases, and Evira, in collaboration with the poultry industry, is planning to integrate roundworm monitoring into the voluntary health monitoring programme from the start of 2018. Roundworms occurring in poultry cannot be transmitted to humans.

Mild respiratory tract symptoms of infectious bronchitis (IB) were identified on one laying hen holding, in addition to which an asymptomatic IB virus infection was detected in one broiler parent flock. The IB virus strains in question were similar to vaccine viruses that have occasionally been found in imported flocks over the years. IBV is a common virus in non-commercial poultry, in which outbreaks of a highly pathogenic strain of the virus (QX) also occur. However, this strain has not been detected in commercial poultry since 2011. The scheme launched in the spring of 2012 to vaccinate parent flocks of laying hens against IB with an inactivated vaccine was continued.

No cases of clinical (symptomatic) infectious bursal disease (IBD or Gumboro disease) were identified. Ten case of Marek's disease were identified in non-commercial poultry, but no cases of the disease were detected in commercial poultry. Laying hens and parent

stock are vaccinated against Marek's disease. Due to problems concerning the supply of vaccine, Chicken infectious anaemia (CAV or Blue wing disease was detected on seven holdings, when in the previous year no cases of the disease were identified. Infectious avian encephalomyelitis (AE) was detected on two poultry holdings. Parent stock is vaccinated against AE due to the fact that contracting the virus during egg production results in a 5–10% decrease in egg production, lasting for a few weeks. Chicks hatching from the eggs of hens infected with AE develop encephalomyelitis, resulting in a mortality rate as high as 25–50%.

The two new diagnostic test packages offered by Evira starting at the beginning of the year, a respiratory tract diagnostic test packages and a test package to diagnose drop in egg production were well received. The package include diagnostics tests for the most common diseases that decrease egg production and cause respiratory tract symptoms.

Surveillance

The disease situation amongst poultry is monitored with programmes maintained by the authorities for monitoring avian influenza (AI), Newcastle disease (PMV-1) and salmonella. Appendix B contains a summary of serological tests performed to detect avian influenza, Newcastle disease and avian pneumovirus (APV) in poultry between 2007 and 2016 (Table B8).

The collection of samples for avian influenza testing was directed at different species of poultry in accordance with the EU Commission Decision 2010/367/EC. All holdings rearing parent and grandparent flocks were sampled for Newcastle disease. Facilities approved for intra-community trade follow the programme defined in the Ministry of Agriculture and Forestry Decree No 1036/2013 for monitoring the incidence of the following pathogens: *Salmonella* Gallinarum/Pullorum, *Salmonella* Arizonae, *Mycoplasma gallisepticum* and *Mycoplasma meleagridis*.

Table 8. Test results of the EU surveillance programme for avian influenza in poultry in 2016. No avian influenza viruses or avian influenza antibodies were identified on any poultry holdings.

	Chicken breeder holdings[1)]	Conventional laying hen holdings	Organic and free range laying hen holdings	Organic broilers	Geese and ducks[2)]	Turkey breeder holdings	Fattening turkey holdings	Farmed game birds	Ratite holdings	Total
Samples	390	515	390	20	85	40	400	160	4	**2,004**
Holdings	36	51	40	2	5	3	40	13	1	**191**

[1)] Includes parent flocks of both laying hens and broilers.
[2)] Includes both parent flocks and production flocks.

Avian influenza antibodies were not detected on any poultry holdings. PMV-1 antibodies were detected on one holding. The holding's animals displayed no clinical symptoms and the virus was not detected.

Table 9. Viral disease test results in poultry[1] in 2016 by reason for testing.					
	Avian influenza		Newcastle disease		APV[4]
Reason for testing	Serology (Pos. holdings/ pos. samples)	Virus detection (Pos. holdings/ pos. samples)	Serology (Pos. holdings/ pos. samples)	Virus detection (Pos. holdings/ pos. samples)	Serology (Pos. holdings/ pos. samples)
EU surveillance	2,004 (0/0)	12 (0/0)	7,038 (2/8[2])	20 (0/0)	0
Imports	1,399 (0/0)	0 (0/0)	1,720 (2/2[2][3])	0	1,569 (3/43[3])
Disease diagnosis	499 (0/0)	298 (0/0)	419 (0/0)	284 (0/0)	159 (0/0)
Total	**3,902 (0/0)**	**310 (0/0)**	**9,177 (4/10[2][3])**	**304 (0/0)**	**1,728 (3/43[3])**

[1]) Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or the breeding programmes of the previously mentioned birds.
[2]) Serology positive, virus detection negative, no symptoms.
[3]) Maternal (transferred from mother to offspring) antibodies in imported birds.
[4]) Virus detection not used at Evira.

Salmonella

Finland's statutory salmonella monitoring programme covers all generations of broilers, turkeys and laying hens. The incidence of salmonella is low in Finland, and it has remained under the target of 1%. Salmonella was detected on a total of seven poultry holdings (four holdings in 2015). *Salmonella* Tennessee was identified in one production flock of broilers, while *S*. Typhimurium was identified in two flocks of parent stock broiler chicks imported from Sweden. *S*. Poona was identified in one production flocs of turkeys. In laying hens, one flock of laying hens and one laying parent flock tested positive for *S*. Typhimurium. In addition to this, *S.* Enteritidis was identified on one non-commercial poultry holding, where the disease was first identified in humans.

Voluntary health monitoring programme also for non-commercial poultry

As of the start of 2016, Evira has been maintaining a health monitoring programme for non-commercial poultry farmers as well. The programme is primarily aimed at preservers of native breeds of chicken and backyard poultry farmers who breed chickens and turkeys for non-commercial use. The programme includes testing for the antibodies of *Mycoplasma gallisepticum*, infectious bronchitis (IB) and infectious laryngotracheitis (ILT). IB virus antibodies were found to be very common in the samples tested in the context of the programme, whereas *Mycoplasma gallisepticum* antibodies were detected on only a few holdings. None of the holdings that participated in testing in 2016 tested positive for ILT antibodies.

Information on the disease situation amongst commercial poultry is also collected through voluntary health monitoring programme. The programme is used to survey parent flocks of both broilers and laying hens by testing blood samples for the antibodies of infectious bronchitis (IB), infectious laryngotracheitis (ILT), avian pneumovirus (APV) as well as *Mycoplasma gallisepticum* and *M. synoviae* infections. Chickens are also tested for the antibodies of vaccines against infectious bursal disease (IBD, also known as Gumboro disease), avian encephalomyelitis (AE) and blue wing disease caused by chicken anaemia virus (CAV). APV disease is not present Finland. A total of 175 batches of samples were submitted within the health monitoring programme, the majority of which (150) were from the parents of broilers and the rest (25) from the grandparents and parents of laying hens. The levels of AE antibodies in poultry samples shifted significantly when the AE vaccine had to be changed due to supply issues. The new vaccine does not raise the level of antibodies as high, and the response develops slower than before. However, no increase in the number of AE cases has been observed, so the response is still adequate for protecting birds against the disease.

Table 10. Health monitoring samples of chickens and broilers between 2008 and 2016.								
Year	**AE**	**CAV**	**IB**	**IBD**	**APV**	**ILT**	***M. gallisepticum***	***M. synoviae***
2008	1,306	1,563	2,358	3,151		893	4,077	3,936
2009	1,061	3,096	1,764	3,078		661	4,194	3,930
2010	994	2,532	2,054	2,492	1,260	794	4,542	3,762
2011	1,137	3,096	3,654	3,056	1,056	1,120	4,672	4,453
2012	1,187	2,746	2,899	2,716	1,100	1,032	4,250	4,150
2013	980	2,717	2,020	2,717	980	739	3,600	3,600
2014	1,020	2,320	2,206	2,440	938	940	3,458	3,458
2015	840	1,759	1,682	1,759	920	702	2,460	2,481
2016	1,728	2,713	1,141	1,913	980	1,001	980	980[1)]

[1)] Positive samples from one chicken parent holding.

In the health monitoring programme for turkeys, blood samples are tested for the antibodies of PMV-3 infection and avian pneumovirus (APV), as well as *M. gallisepticum*, *M. synoviae* and *M. meleagridis* infections. PMV-3 antibodies were detected on four turkey parent holdings. Three of the infected parent flocks exhibited a clear reduction in egg production, but the infection has not been observed to cause symptoms in pullet holdings. Antibodies of this disease have been identified for years in some turkey parent flocks. All parent flocks imported to Finland are examined in accordance with the programme, and samples were submitted on a total of 11 occasions in the context of the programme. The disease situation amongst turkeys is currently so good in Finland that turkeys do not need to be vaccinated against any infectious diseases. Only in some individual cases turkey flocks have been vaccinated against swine erysipelas.

Table 11. Health monitoring samples of turkeys between 2008 and 2016.					
Year	**APV**	**PMV-3**	***M. gallisepticum***	***M. synoviae***	***M. meleagridis***
2008	514	573	514	514	514
2009	577	580	565	573	567
2010	700	719[1)]	559	559	599
2011	382	382[2)]	400	400	400
2012	418	418[3)]	438	438	438
2013	653	613[4)]	595	595	595
2014	480	480[5)]	480	480	480
2015	459	459[6)]	459	459	459
2016	120	220[7)]	120	120	120

[1)] A total of 114 positive samples on five holdings.
[2)] A total of 25 positive samples on two holdings.
[3)] A total of 81 positive samples on three holdings.
[4)] A total of 38 positive samples on three holdings.
[5)] A total of 55 positive samples on two holdings.
[6)] A total of 11 positive samples on one holding.
[7)] A total of 44 positive samples on four holdings.

5 Sheep and goat diseases

The disease situation amongst sheep and goats has remained good, and no cases of dangerous or easily spreading animal diseases were identified. The most common reasons for conducting tests on sheep and goats were disease monitoring (maedi/visna in sheep and CAE in goats, as well as scrapie), diseases or abortion diagnosis, meat inspections and parasite surveillance.

Diagnostics

In 2016, Evira performed pathologic-anatomical examinations on a total of 146 sheep samples and 20 goat samples. The number of samples was of the same order as in the previous year (138 samples). The number of samples tested in the context of meat inspection was 24.

A total of 12 samples collected from five sheep holdings and two samples from a goat holding were tested to diagnose abortions. Infectious causes of abortions were *Escherichia coli* on one sheep holding and *Listeria monocytogenes* on the goat holding. In addition, blood samples collected from ten nanny goats on one goat holding were tested for the antibodies of diseases included in the abortion diagnostic package (brucellosis, Q fever, *Chlamydophila*, Border disease/BVD, Schmallenberg virus and Bluetongue). No antibodies were detected in any of the samples.

The majority of the samples submitted for disease diagnosis were whole animals, mostly young lambs and kids. A common finding was a parasite infection in the abomasum or intestines (*Strongylida* suborder roundworms or *Eimeria* sp. coccidia) and subsequent diarrhoea or emaciation. *Haemonchus contortus* roundworms were detected on 11 holdings. Cysts caused by *Cysticercus tenuicollis* were found in samples collected from the sheep of two holdings for meat inspection, as well as one autopsy sample.

Listeriosis of the central nervous system caused by *Listeria monocytogenes* bacteria was detected on four sheep holdings and in one goat. In addition to this, a general infection caused by listeriosis was identified in a kid on one goat holding. Pneumonia caused by *Mannheimia haemolytica* bacteria was detected on five sheep holdings. *Clostridium perfringens* type D enterotoxemia was identified on five sheep holdings and one goat holding. *Bibersteinia trehalosi* bacterium was identified as the cause of infection in three sheep, and a kidney infection caused by *Histophilus somni* bacterium was identified in one sample taken from a sheep for meat inspection.

Orf virus was detected on 23 sheep holdings over the year, out of 33 holdings sampled.

Faecal samples from sheep and goats were tested from a total of 59 holdings. Samples from 20 of the holdings were tested in order to determine the cause of diarrhoea or a disease, while the samples of the other 39 holdings were tested for parasite survey purposes. The most common findings were eggs of intestinal roundworms (*Strongylida* and *Strongyloides* sp.) and *Eimeria* sp.coccidia.

Surveillance

The disease situation amongst sheep and goats in regard to lentivirus infections in small ruminants (Maedi Visna in sheep and CAE in goats) is monitored with a voluntary health control programme. In autumn 2016, Finland was recognised as having negligible risk of classical scrapie in sheep and goats. As a result, the voluntary surveillance of scrapie became unnecessary. From autumn 2016 onwards, surveillance will be conducted as before by testing all sheep and goats over 18 months of age that have died in the carcass collection area for scrapie. In addition, holdings with at least 50 ewes or nanny goats located outside of the carcass collection area must also submit at least one sheep or goat over 18 months of age that died or was killed during the year for testing. Slaughterhouses also collect samples from all sheep and goats aged 18 months and above that show signs of emaciation or neurological symptoms and ones that have been emergency slaughtered. In 2016, no cases of classical scrapie were detected. Atypical scrapie was detected on two sheep holdings. The research into sheep genotypes was continued in accordance with Regulation (EC) No 999/2001, and a total of 100 genotype analyses were performed as required in the regulation. The most common genotype in Finnsheep was ARQ/ARQ, which is susceptible to scrapie. Only one Finnsheep with the resistant ARR/ARR genotype was found.

The results of the scrapie surveillance programme between 2007 and 2016 are presented in Appendix B (Table B5).

A total of 4,165 samples collected from 106 holdings were tested for Maedi Visna and CAEV in sheep and goats (Table 12). No Maedi Visna/CAEV infections were detected in the tests. Brucellosis (Brucella melitensis) surveillance was conducted for example by testing samples collected in the voluntary health control programme for small ruminants. All samples were negative.

Table 12. Results of sheep and goat health control programmes in 2016. All Maedi Visna/CAEV and scrapie tests were negative. Atypical scrapie was detected on two sheep holdings.

	Maedi-visna/CAEV				Scrapie	
	Serology		Virus detection			
Animal	Samples	Holdings	Samples	Holdings	Samples	Holdings
Sheep	4,124	106	7	6	1,368**	475
Goat	41	6*	3	2	124	54
Total	**4,165**	**106**	**10**	**8**	**1,492**	**529**

* All six holdings have both sheep and goats.

** Atypical scrapie was detected on two holdings.

Table 13. Testing for vector-borne viral diseases in sheep and goats in 2016. The majority of the tests were conducted in connection with exports. Bluetongue disease and Schmallenberg virus were not detected.

	Bluetongue disease				Schmallenberg virus			
	Serology		Virus detection/ isolation		Serology (pos.)		Virus detection/ isolation	
Animal	Samples	Holdings	Samples	Holdings	Samples	Holdings	Samples	Holdings
Sheep	114	3	12	4	13	6	116	5
Goat	10	1	2	1	0	0	0	0
Total	**124**	**4**	**14**	**5**	**13**	**6**	**116**	**5**

Summaries of the brucellosis surveillance of cattle, sheep, goats and pigs (Table B3) and Maedi Visna/CAEV and scrapie tests of sheep and goats (Table B9) conducted between 2007 and 2016 are presented in Appendix B.

6 Fish and crustacean diseases

The health situation amongst fish and crustaceans was good in 2016, and no serious infectious diseases were detected. The incidence of bacterial diseases typically occurring during the warm water period remained unchanged from previous years, but in regards to diseases combated with vaccines, the situation was very good. The European Commission declared the inland water areas of Finland free from salmonid alphavirus infections (SAV). Skin disorders in the wild salmon of the Tornio River were studied in a joint Finnish-Swedish project.

Diagnostics

In 2016, Evira tested a total of 7,526 fish submitted for disease diagnosis or for testing as routine samples as part of the fish health service. The number of bacterial infections detect- ed in farmed fish was low, especially infections prevented with vaccination such as vibriosis, furunculosis and yersiniosis. Conversely, flavobacterial infections were detected on approximately the same number of fish farms as in previous years on average. Water mould continued to cause problems. The use of antibiotics in Finnish fish farming remained consistent, but was higher than in 2015, when the amount of antibiotics given to fish was at an all-time low.

The skin disorders and mortality rates of migrating salmon migrating up the Tornio River decreased from the previous year, though mortality rates remained higher than normal. Evira studied the mortality rates of the migrating salmon in a special project in collaboration with the Swedish National Veterinary Institute (SVA). Salmon with skin lesions were detected in the Bay of Bothnia even before the fish started migrating upstream to spawn. However, skin lesions are also appearing during the migration upstream. The studies conducted as part of the project revealed that there are several factors behind the skin lesions. Some of the lesions were found to be the result of trauma – caused by fish traps, hook fishing or seals. The results of whole genome sequencing also indicated herpes and iridoviruses, among others, as potential causes of the lesions. Viruses belonging to these groups may cause symptoms similar to the changes observed, but further studies will need to be conducted to determine the incidence and pathogenicity of the viruses. Another new finding was superficial necrotic skin changes that have not been previously described in literature on fish diseases. The significance of the aforementioned factors as causes of the skin lesions is as of yet uncertain. Conversely, the significance of UDN (Ulcerative Dermal Necrosis), which was previously suspected of being the cause of the lesions, was determined to be minor, at least in 2016. The final cause of death of affected salmon is often water mould or some other secondary fungal infection. Viral diseases classified as to be combated were not detected in the migrating salmon of the Tornio River.

Previous studies conducted by Evira have revealed the presence of liver flukes that can also be transmitted to humans in foxes caught in the Kymenlaakso area, as well as seals and white-tailed eagles in Finnish coastal areas. Since cyprinid fish are known to serve as intermediate hosts for these parasites, Evira conducted studies on cyprinids from the eastern

Salmon parasite *Gyrodactylus salaris* spread closer to the Teno River, prevention remains important

Gyrodactylus salaris is an approximately 0.5 mm long parasite that lives on the skin of salmon (*Salmo salar*). It has sharp hooks that it uses to attach itself to the skin and fins of salmon fry. While feeding on the skin of its host, the parasite causes small wounds, leaving the salmon fry vulnerable to diseases, such as water mould. *G. salaris* produces live offspring. The parasite carries the next two generations inside itself, so it can reproduce very quickly under favourable conditions.

Mortality rates vary based on conditions and the resistance of the host fish. The parasite is dangerous for salmon stocks migrating to the Atlantic and the Arctic Ocean. In Norway, it has decimated salmon populations in rivers. Wild salmon in the Baltic Sea catchment area and fish grown in Finnish fish farms are resistant to the parasite. *G. salaris* is quite common in rainbow trout farms in Finland and Russian Karelia.

The parasite has not been found for two decades in rivers draining to the Arctic Ocean in Finland or the Kola Peninsula. However, recently it has been reported in Russia in the Tuloma River basin, the ends of which are on the Finnish side of the border (rivers Lutto, Jauru and Nuortti). The river drains into Kola Bay in Murmansk. The finding highlights the importance of both Finnish and international efforts to prevent the spread of the parasite and suggests that prohibitions on transferring fish to water bodies draining into the Arctic Ocean and regulations concerning the drying and disinfection of fishing equipment should still be followed. Along with chemical disinfectants, fishing equipment can also be disinfected by heat; for example, submerging equipment in +45 °C water for approximately one minute is enough to kill the parasite. Using dry heat – such as a drying cabinet – takes more time. Evira recommends that equipment should be dried for at least half an hour so that the temperature of the pieces of equipment and potential parasites on their surfaces has time to rise high enough.

Gulf of Finland based on random sampling. The preliminary prevalence of flukes that can be transmitted to humans through the consumption of raw fish was quite high, approximately 30–50%. The research is still ongoing, but so far *Pseudamphistomum truncatum* and *Metorchis bilis* liver fluke metacercariae have been identified in the muscles of cyprinids. The precise prevalence of the parasites in Finnish cyprinid fish is as yet unknown.

Crayfish plague carried by signal crayfish endangering noble crayfish

The most significant crayfish disease observed in Finland is crayfish plague, which is caused by the *Aphanomyces astaci*, a fungal-like water mould. Crayfish plague originates from North America, where endemic species of crayfish, such as signal crayfish, are natural carriers of the disease. The acute type of crayfish plague is usually observed in species susceptible to it, such as noble crayfish (*Astacus astacus*). Recent studies have shown that populations of noble crayfish may also harbour asymptomatic crayfish plague infections. As such, in addition to causing crayfish deaths, crayfish plague may also occur asymptomatically in bodies of water inhabited by either noble or signal crayfish. In 2016, acute cases of crayfish plague were observed in noble crayfish in two bodies of water. In addition to this, crayfish plague was detected in three river areas in tests conducted before the reintroduction of noble crayfish. All of the identified cases of crayfish plague in noble crayfish were caused by the type of crayfish plague that naturally occurs in signal crayfish. The number of signal

crayfish samples tested was three, of which two tested positive for crayfish plague. One of the two positive samples came from a noble crayfish area in Pyhäjoki. Signal crayfish are extremely harmful to noble crayfish, and in practice the presence of signal crayfish in a water body completely prevents the reintroduction of noble crayfish.

Surveillance

Regular inspections and sampling of aquaculture animals by the authorities are targeted at finding potential incidences of viral haemorrhagic septicaemia (VHS), infectious hematopoietic necrosis (IHN), infectious salmon anaemia (ISA), salmonid alphavirus (SAV) and infectious pancreatic necrosis (IPN). In addition to this, koi herpesvirus (KHV), spring viremia of carp (SVC) and white spot disease (WSD) in crustaceans are monitored through spot checks. The spread of bacterial kidney disease (BKD) is prevented with the help of a voluntary health control programme. Furthermore, the spread of *Gyrodactylus salaris* (salmon fluke) in Upper Lapland is monitored though regular sampling. There are approximately 20 aquaculture species being farmed in Finland. The species susceptible to each disease are listed in legislation and surveillance is targeted at these species. In 2016, inspections based on monitoring programmes were conducted at 222 fish farms or enterprises with natural food pond farmers.

Wild fish are tested for fish diseases when they or their gametes are introduced to fish farms for broodstock or for the purpose of producing juveniles, in connection with transporting fish upstream or if they are found to exhibit symptoms of infectious diseases.

Fish diseases to be combated were not identified in 2016 and the disease free statuses granted to Finland remained unchanged.

The restricted area established in Åland in the early 2000s to prevent the spread of viral haemorrhagic septicaemia (VHS) is still in force. While operations to eradicate VHS have proceeded in recent years and no cases of the disease have been detected since the summer of 2012, the monitoring programme to prove that Finland is free of the disease has not been started yet.

In 2013, only the infections caused by infectious pancreatic necrosis (IPN) in genogroup 5 in inland water areas were included in the diseases to be combated. While Finland's inland water areas have remained free of infections caused by genogroup 5, genotype 2 infections have spread to several water body areas. As in the previous year, IPN genotype 2 was isolated at 23 fish farms, though this year a larger proportion of the fish farms were located inland.

The programme to eradicate bacterial kidney disease (BKD) was discontinued and BKD was added to the list of animal diseases to be reported in late 2014. Efforts to combat BKD are based on a voluntary health control programme launched in 2012. At the end of 2016, there were 134 fish farms or operators covered by the programme. BKD was not detected on any of the fish farms participating in the programme in 2016.

IHN, ISA, SAV, SVC, KHV and WSD infections have never been detected in Finland. *Gyrodactylus salaris* (salmon fluke) has not been found in the protected zone in Upper Lapland since 1995, when an infection was detected in a now defunct rainbow trout farm located in the buffer zone.

Summaries of the tests performed between 2007 and 2016 for the diagnosis of viral diseases in fish (Table B10), BKD (Table B11) and *Gyrodactylus salaris* (Table B12) are presented in Appendix B. In addition to the tests mentioned above, Evira tested a total of 845 wild fish for VHSV, IHNV and IPNV infections, 137 for BKD and 179 for SAV, mostly in the context of capturing broodfish. The scope of the sampling has remained relatively consistent.

7 Horse diseases

The most common reasons for conducting test on horses were disease and abortion diagnosis, determining cause of death, determining the suitability of studs for breeding and import and export of horses and sperm. Horses imported from the EU were also tested for covering sickness (dourine), glanders (malleus) and equine infectious anaemia (EIA) in cases where the horse and its documentation did not comply with import requirements. Testing for contagious equine metritis (CEM) in the context of stud farm and artificial insemination operations as well as regulatory testing for equine viral arteritis (EVA) and equine infectious anaemia (EIA) are based on legislation.

With the exception of the testing of studs, the number of virological tests conducted for the diagnosis of horse diseases was low in 2016, which in part affects estimates on the prevalence of certain infectious horse diseases observed in Finland. Despite the small number of samples, a number of infectious diseases that have a major impact on the equine industry were identified in the tests. These included equine viral abortion caused by equine herpesvirus EHV-1 as well as equine rhinopneumonitis caused by EHV-1 and EHV-4. Cases of these diseases are continuously being reported from different parts of Europe and America. In the US, outbreaks of neurologic EHV-1, often resulting in death, were reported in 11 states. The neurologic form of the disease has also become fairly common Europe. West Nile virus, which in 2016 caused severe outbreaks in 24 states in the US, has not been reported in northern Europe so far. The disease is, however, reported annually in horses elsewhere in Europe; in 2016, cases were reported in Spain, Italy, Austria, Portugal and Hungary.

In bacterial disease, strangles was detected at several stables in Finland, while a salmonella infection was identified at one stable.

Diagnostics

In 2016, Evira conducted pathologic-anatomical examinations on a total of 33 horses (57 in 2015). Of these, 19 were tested to diagnose abortions or diseases in young foals. Equine herpesvirus 1 (EHV-1) was identified in two aborted foals. In recent years, only a few abortions caused by herpesvirus have occurred each year. Arteritis virus was last determined as a cause of abortion in 2011.

Equine viral abortion and rhinopneumonitis found in Finnish horses

Tests performed in Finland in 2016 revealed cases of equine viral abortion caused by equine herpesvirus EHV-1 as well as equine rhinopneumonitis caused by EHV-1 and EHV-4. The infections were detected in the areas of northern Finland and southern Finland. However, information on the actual incidence of equine herpesvirus infections in Finland is not available due to the small number of samples submitted for testing in 2016. In total, 15 serum samples from 10 horses were tested for EHV-1 and EHV-4 antibodies. In addition to this, a total of 61 nasal mucus and tissue samples (from 43 horses or foetuses) were tested for herpes viruses. These samples were submitted for testing due to symptoms indicating respiratory tract infections or for the purpose of determining the cause of abortions.

Tests revealed no cases of equine influenza

No cases of equine influenza were identified in 2016, based on tests performed on paired serum and/or nasal mucus samples from five horses. In tests performed by Evira in 2013–2015, equine influenza antibodies were detected in 70–80% of the horses tested. Antibodies are commonly detected in racehorses in particular, which are generally vaccinated against equine influenza.

Strangles

Samples from a total of five stables submitted to Evira tested positive for *Streptococcus equi*, which causes strangles. According to the Ministry of Agriculture and Forestry's Decree No 605/2016, laboratories that study animal diseases to be reported must send isolates or positive DNA samples of any *Streptococcus equi* sp. *equi* strains that they isolate to Evira. Based on the Decree, Evira received isolates or positive DNA samples from 11 horses. The number of positive stables could not be confirmed from the isolate samples.

Salmonella

Salmonella Typhimurium was detected in the horses of one stable.

Dangerous equine diseases – equine infectious anaemia not found in Finland

Equine infectious anaemia (EIA) is an equine disease classified as a dangerous animal disease to be combated under the Finnish Animal Diseases Act (441/2013). The disease has been observed in several European countries in the past few years; in 2016, it was reported in Greece, Slovakia and Hungary. In Romania the disease is endemic, with cases being continuously reported from different parts of the country. The majority of EIA tests performed in Finland were conducted in the context of import and export of horses and gametes. A total of 41 horses or ponies, as well as one donkey, were tested due to incomplete fulfilment of import requirements. Of these, four horses that had been in Finland for less than three months were tested twice. In addition to this, two horses were examined for disease diagnosis. Based on symptoms, one of these horses was suspected of having EIA. The other horse was examined in connection with another disease for the purpose of ruling out EIA. A total of 74 samples collected from 69 equines were tested for EIA, all of which came back negative.

Studs tested for equine viral arteritis – no cases found in Finland

A total of 212 serum samples collected from 206 horses were tested for equine viral arteritis (EVA) antibodies, in addition to which 74 foetal, nasal mucus and sperm samples from a total of 58 horses were tested for the virus. The total number of horses tested for EVA was 240, of which 196 were studs. No cases of EVA were detected. The expansion of the testing of studs for the disease to also cover all studs used on stud farms in the autumn of 2014 has provided important new information about the incidence of the disease in Finland. Based on the results, it can be said that the disease situation has remained stable in Finland. Studs infected with the virus and excreting it have not been detected in Finland since 2010, and there have only been sporadic cases of other horses infected with the virus, most recently in late 2013/early 2014. In 2016, EVA antibodies were detected in a total of 11 studs. Further tests were conducted on sperm samples collected from nine of these studs, with all the samples coming back negative. The last time EVA was identified as a cause of abortion in Finland was in 2011.

CEM

Studs used for breeding and a few mares, a total of 304 horses, were tested for *Taylorella equigenitalis*, a bacterium that causes contagious equine metritis (CEM), as required by the decree. All tests came back negative.

8 Reindeer diseases

The number of reindeer samples annually tested at Evira has remained around 50 for the past few years. In 2016, Evira analysed a total of 45 samples, of which 11 consisted of carcases and 34 were organ samples or parts of reindeer. Based on the number of samples and findings, the health situation amongst reindeer has remained fairly good, as in previous years. Samples were received from nearly all parts of the reindeer management area, with the southern parts of the area yielding the most samples, as in previous years. The samples submitted from the northern parts of the area consisted primarily of organ samples. Reindeer samples are primarily received in the autumn and winter, when reindeer are slaughtered and placed in farms. In the summer, diseases are not always detected, as the reindeer roam freely in the wild.

Chronic wasting disease detected in wild mountain reindeer and elk in Norway

Chronic wasting disease (CWD) belongs to a group of diseases known as transmissible spongiform encephalopathies (TSEs), which also includes BSE (bovine spongiform encephalopathy, also known as mad cow disease), and scrapie in small ruminants. CWD causes a chronic illness in cervids, ultimately resulting in death. There is currently no evidence of CWD infecting humans.

CWD is a contagious disease caused by a misfolded prion protein, which damages the brains of cervids. The disease progresses slowly, with affected cervids exhibiting loss of body condition, weight loss and altered behaviour. Death is inevitable once symptoms start to manifest.

CWD is an endemic disease in North America, where it affects mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), wapiti (*Cervus elaphus nelsoni*) and elk (*Alces alces shirasi*). The cases of CWD identified in three wild mountain reindeer and two elks in Norway in 2016 are the first recorded cases of CWD in Europe. The origin of the infections is unknown. Based on preliminary studies, it seems that the disease affecting elk is caused by a different type of prion than the one affecting reindeer, which resembles the type found in North America.

CWD is transmitted from infected animals to healthy ones through direct contact, from infected mothers to their offspring and indirectly in the secretions of infected animals (saliva, urine, faeces). The prions have high environmental persistence, as a result of which areas in which infected animals have grazed may remain infectious for several years. The prions persist for particularly long periods in clay-rich soil. Transporting infected cervids from one place or country to another poses the greatest risk of spreading the disease.

CWD is diagnosed by determining the presence of the prion in brain or lymph node samples.

Samples collected from full-grown reindeer and tested for TSE diseases (chronic wasting disease, CWD) where possible, were negative (Table B6).

Meat inspection samples serve as indicators of reindeer health

The majority of reindeer samples are submitted by veterinarians inspecting reindeer meat in slaughterhouses. Of the organ samples submitted to Evira, 26 were meat inspection samples. *Echinococcus canadensis* G10 was detected in the lungs of six reindeer – in 2015, lesions caused by the parasite were found in three reindeer. As in previous years, the infections occurred in the eastern parts of the reindeer management area, though this year one of the cases occurred in northern Lapland. The liver of one reindeer was found to contain bile duct cysts considered growth disorders or neoplasms, while the lungs of one reindeer contained an air-filled vesicle, or bronchiectasis, caused by growth disorders. Because of their appearance, these types of cysts can be confused with cysts caused by echinococcosis. As such, all suspicious cyst findings must be submitted to Evira for testing. One reindeer had several hemangiosarcoma tumours in its lungs, while another was found to be suffering from a hematoma of the spleen. Furthermore, aphthous stomatitis (mouth ulcers), mainly affecting the tongue, were detected in some samples received from a slaughterhouse. Scars caused by migrating parasites were detected in some samples.

Reindeer plagued by mouth infections

In early 2016, several cases of necrobacillosis (*Fusobacterium necrophorum* infection) and related aphthous stomatitis (mouth ulcers) were detected reindeer placed in farms that were examined for the purpose of determining the cause of a disease or death. Orf virus was detected in three reindeer. Infections caused by *Trueperella pyogenes*, *Bibersteinia trehalosi*, *Clostridium sordellii* and *Streptococcus suis* bacteria were also identified. All samples that included intestines were tested for salmonella, with negative results. One aged reindeer was found to be suffering from a generalised lymphocyte tumour, or lymphoma. A few individual cases of enteritis and peritonitis were also identified. Cases of emaciation were often the result of other diseases, such as aphthous stomatitis.

While living in the wild, reindeer are exposed to a range of parasites that can cause infections. Although parasites are rarely the cause of diseases in reindeer, abnormalities caused by them often result in rejection in meat inspections. The majority of reindeer not slaughtered in the autumn are medicated against parasites each year when the reindeer are gathered in an enclosure for selection for slaughtering. The numbers of parasites in faecal and blood samples that were tested for parasites were low, as in previous years. Deer ked were found in the coats of two reindeer; one of the cases was from the southern part of the reindeer management area, while the other was from south of the reindeer management area. Reindeer sinus worms (*Linguatula arctica*) were found in the sinuses of one reindeer, while one sample contained reindeer warble flies (*Hypoderma tarandi*). Tissue cysts caused by parasites of the Sarcocystis genus were a common incidental finding in microscopic tissue examinations of cardiac and skeletal muscles.

9 Fur animal diseases

Diagnostics

In 2016, Evira conducted pathologic-anatomical examinations on a total of 409 fur animal samples. The number of samples rose compared to the previous year, when 285 samples were tested. Of the samples tested, 251 were minks, 137 were farmed foxes, most of which were blue foxes, and 21 were raccoon dogs. The increase in the number of samples was primarily caused by the increase in the number of mink samples. In addition to this, a total of 213 faecal samples were tested to determine the cause of diarrhoea, with the number being slightly lower than in the previous year.

The most common finding in the fox samples examined at Evira was enteritis. The number of systemic infections diagnosed was lower than the year before, and similar numbers of metritis and eye infections were also diagnosed. *Lawsonia intracellularis* bacteria were an unusually common finding in cases of enteritis identified in foxes on the basis of pathologic-anatomical examinations as well as fox faecal samples tested to determine the cause of diarrhoea.

In minks, the most common findings were enteritis and pneumonitis. The number of systemic infections diagnosed was lower than the year before, and cases of fatty liver diseases were slightly more common than systemic infections. One major disease affecting minks is plasmacytosis, which is serologically diagnosed by a private laboratory. Pathological and anatomical changes indicative of plasmacytosis are identified in the minks examined at Evira each year. In 2016, plasmacytosis was diagnosed in the minks of four fur farms.

In farmed raccoon dogs, the most common finding was enteritis, as has been the case in previous years. The most common cause identified was parvovirus.

Major viral pathogens in fur animals include parvovirus and canine distemper virus. Parvovirus infections were diagnosed in the farmed foxes and raccoon dogs of 33 fur farms between July and December. No canine distemper virus infections were diagnosed during the year.

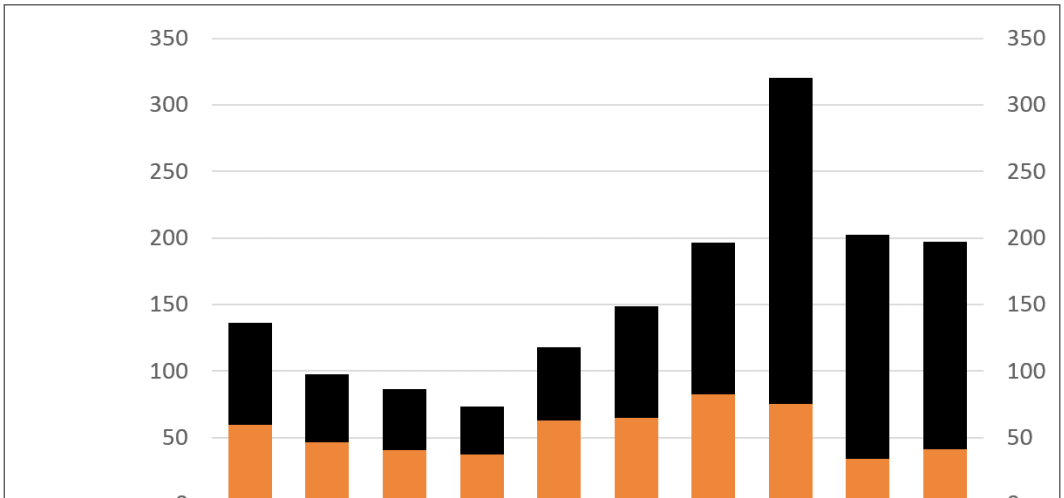
Salmonella infections were diagnosed in pathologic-anatomically examined animals and faecal samples tested to determine the cause of diarrhoea collected from a total of 11 fur farms.

Surveillance

Transmissible mink encephalopathy (TME) is an extremely rare, slowly progressing central nervous system disorder that affects farmed minks. Evira has been examining brain samples from fur animals for TME annually since 2006. No cases of the disease have been diagnosed. (Appendix B, Table B6).

10 Honey bee diseases

The most notable diseases affecting honey bees in Finland are Varroa destructor mites and the viral diseases spread by them, as well as American foulbrood, caused by the *Paenibacillus larvae* bacterium. The majority of the bee samples submitted to Evira are sent in for the purpose of testing for American foulbrood. In 2016, a total of 1,731 honey samples submitted by 197 beekeepers were tested for American foulbrood. Testing for American foulbrood became subject to a charge in 2015, due to which the number of samples submitted was unusually high in 2014. Since then the numbers of beekeepers submitting samples have returned to the 2013 level. *P. larvae* was detected in 8% of the samples submitted to Evira in 2016 (21% of beekeepers). Cases of clinical American foulbrood were diagnosed at one apiary in Uusimaa and one apiary in Pirkanmaa. Compared to previous years, the proportion of positive samples was low. Of the samples tested between 2006 and 2016, 10–30% were positive.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total beekeepers	136	97	86	73	117	148	196	320	202	197
Not dectected	77	51	46	36	55	84	114	245	168	156
Detected	59	46	40	37	62	64	82	75	34	41
% of positive	43 %	47 %	47 %	51 %	53 %	43 %	42 %	23 %	17 %	21 %

Figure 2. Beekeepers who submitted honey samples for testing for American foulbrood in 2007–2016.

71 honey bee hives on the Åland Islands were examined for *Varroa destructor* mites. Based on the tests, the Åland Islands were declared to be still free from Varroa. The mites are common in mainland Finland, but samples are usually not tested for them in laboratories.

Thanks to the efforts to combat Varroa destructor mites, honey bee tracheal mites (*Acarapis woodi*) have also become less common throughout Europe, though they are still occasionally found in Finland. In 2016, honey bee tracheal mites were found in one apiary in Eastern Finland.

European foulbrood infections are usually diagnosed in a few apiaries each year. However, the *Melissococcus plutonius* bacterium that causes European foulbrood was not found in any of the samples tested in 2016.

In 2016, a total of 16 samples were tested for nosema disease, of which eight tested positive for nosema spores. *Nosema apis* and *N. ceranae* parasites are common in Finland, but cause symptomatic diseases only rarely.

Beekeepers can also submit small beetles or larvae found in apiaries to Evira to identify small hive beetles (*Aethina tumida*). In 2016, the number of beetles submitted for identification was three. No small hive beetles were found in Finland.

11 Diseases in companion animals

Parvoviral enteritis is the most severe infectious disease in dogs

The most common reasons to send a dog for necropsy in Evira are to obtain a specific diagnosis for a hereditary disease, to determine the cause of death during the neonatal period, to diagnose new infectious diseases and to investigate an animal welfare case. Forensic necropsies constitute a significant portion of the necropsies performed and some of them involve investigations of suspected animal welfare crimes. Infectious diseases are important cause of death during the neonatal period. Due to the regular vaccination against canine distemper and infectious canine hepatitis these disease are rarely seen in Finland. However, the increased movement of dogs from country to country increases the risk of new infectious diseases spreading to Finland.

Importation of dogs has increased

Infectious diseases spread by dogs brought to Finland from abroad pose a major risk to the diseases situation amongst Finland's dog population. There are many diseases that do not occur in Finland that pose a threat to the health of both animals and people, but which are fairly common outside our borders. The most dangerous of these include rabies and echinococcosis, which are the only diseases classified in Finnish legislation as diseases to be combated in imported dogs. In raids conducted at Helsinki's harbours in recent years by the Regional State Administrative Agency for Southern Finland, approximately 30% of dogs examined have been found not to meet currently valid import regulations.

Dogs are actively imported into Finland. In recent years, Finnish Customs has annually inspected over 16,000 dogs entering Finland from outside of the EU. Evira is only notified of imported dogs that undergo veterinary border inspections (so-called commercial imports, Figure 3). Dogs entering Finland from other EU countries are not required to undergo veterinary border inspections. Evira is informed of commercial dog imports entering Finland from other EU countries by way of the EU's TRACES system (Figure 4).

In 2012, a study was conducted in Norway in which blood and faecal samples from rescue dogs imported from eastern Europe were examined for pathogens. Over half of the dogs were found to have insufficient levels of neutralising antibodies against rabies. In some of the dogs, the levels were so low that there was cause to question whether the dogs had been vaccinated at all. The samples were also found to contain a number of pathogens that are not usually seen in Norway. While similar studies have not been conducted in Finland, Finnish veterinarians have reported an increase in the occurrence of exotic pathogens in dogs in recent years. In spite of this, the diseases situation amongst dogs is currently good.

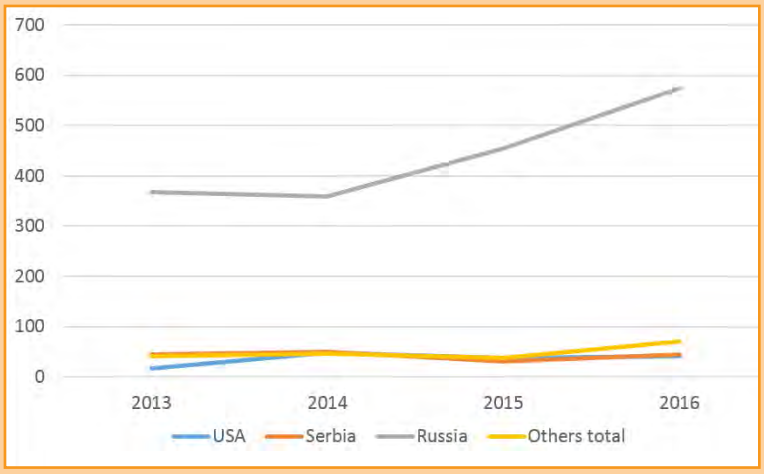


Figure 3. Commercial dog imports from outside the EU to Finland in 2013–2016. The total number of countries from which dogs were imported during this period is 37, of which only countries that imported 140 dogs or more are mentioned in the figure.

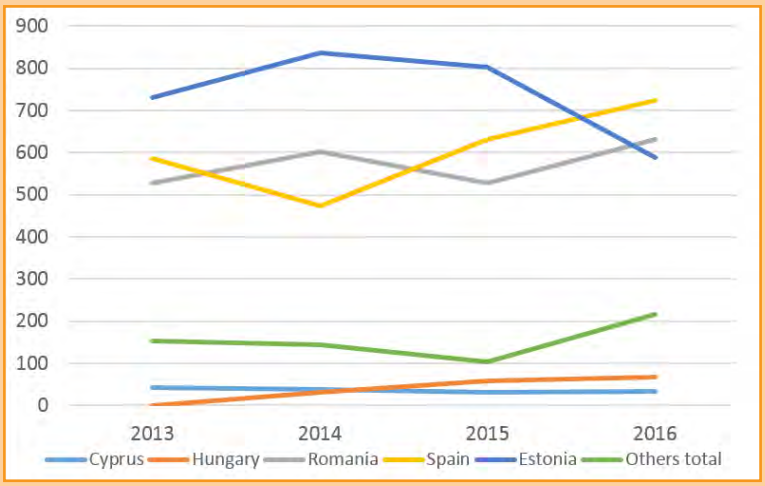


Figure 4. Commercial dog imports from other EU countries to Finland in 2013–2016. The total number of countries from which dogs were imported during this period is 20, of which only countries that imported 140 dogs or more are mentioned in the figure.

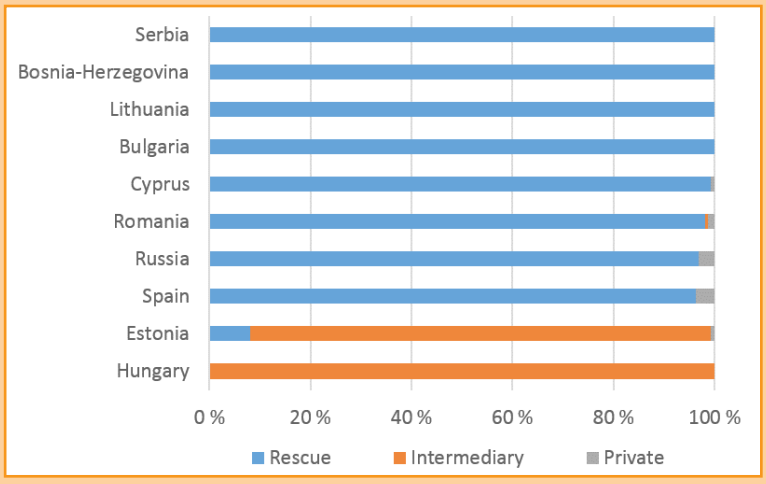


Figure 5. Distribution of commercial dog imports between rescue dogs, dog broker imports and private imports in 2013–2016. The figure does not include countries from which only individual private import dogs were imported.

Infectious diseases commonly occurring in dogs in Finland are respiratory tract infections and viral gastroenteritis. There are no efficient vaccines against many of these infections, with the exception of diarrhoea caused by parvovirus. Parvoviral diarrhoea is regularly diagnosed in young dogs with insufficient immunisation against the virus. A herd-immunity against parvovirus does not develop to protect the young, and there is constant risk of infection due to the persistence of the parvovirus in the environment. A parvovirus infection either reinforces the protection provided by the vaccine or causes disease when there is not sufficient protection from maternal antibodies or from vaccination.

Vomiting and diarrhoea caused by coronavirus, bacterial pneumonia and viral and bacterial infections causing 'kennel cough' occur every year. Canine herpesvirus is a relatively rare cause of mortality in puppies, and infections are diagnosed in a few litters each year. The number of cases has not increased significantly in the past few years. Problems caused by herpesvirus mostly occur when the bitch is infected for the first time while pregnant and then transmits the virus to the puppies when they pass through the birth canal.

Fatal infections caused byprotozoan *Toxoplasma gondii* are diagnosed every year. Infections caused by *Neospora caninum*, on the other hand, are rare. Intestinal infections of *Giardia* sp. or *Cryptosporidium* sp. are diagnosed regularly. Dogs often contract these parasites in nature or their outside enclosures may become contaminated. The infection is usually asymptomatic, but in young puppies and dogs with an immune deficiency, it may cause diarrhoea.

A total of 31 dogs, of which 19 had been illegally imported, were examined for rabies. Dogs were also tested for rabies in situations where, based on the symptoms, the possibility of rabies could not be ruled out. No cases of rabies were diagnosed in dogs (Table 14).

A total of nine dogs were serologically tested for *Brucella canis* antibodies. Of these dogs, seven were tested before export and two were tested to diagnose a disease. Antibodies were detected in one dog, while the samples from the other eight dogs were negative. Bacterial infections caused by *Brucella canis* occur every now and then in imported dogs and Finnish dogs taken abroad for breeding purposes.

Viral diseases occur in cats of all ages

Viral diseases are more common in cats than dogs. Currently the most common infectious cause of death in cats is feline infectious peritonitis (FIP) caused by coronavirus, and coronavirus infection is probably the most common viral infection in cats in Finland. Feline panleukopenia virus (FPV), also known as cat plague, occurs in young cats with insufficient immune protection. Viral respiratory tract infections are fairly common in cats. The prevalence data of feline leukaemia virus (FeLV) and FIV infections in Finland is not readily available. Systemic infections caused by protozoan *Toxoplasma gondii* occur in young cats each year, and the infection is more common in cats than dogs.

A total of six cats were tested for rabies in connection with illegal importation or due to clinical symptoms. No cases of rabies were diagnosed in cats (Table 14).

In addition to the infectious diseases, common causes for necropsy in cats are to obtain a specific diagnosis of a hereditary disease and to determine the cause of neonatal mortality.

12 Wildlife diseases

The surveillance of wildlife diseases in Finland focuses primarily on diseases that can be spread between animals and humans, or zoonotic diseases (zoonoses). In addition to this, Evira also monitors the incidence of other animal diseases and outbreaks of new epidemics through animal samples submitted by members of the public. In addition to the information presented in this chapter on tests conducted on wildlife, information on tests conducted on wild fish and crustaceans is presented in Chapter 6 (Fish and crustacean diseases).

In 2016, two new infectious diseases were detected in Finnish wildlife, namely H5N8 highly pathogenic avian influenza and rabbit haemorrhagic disease (RHD).

Avian influenza detected in wild birds

An outbreak of avian influenza was detected in November in the Åland Islands, where dozens of tufted ducks died over a short period of time. The tufted ducks were diagnosed with an acute generalised infection, and a viral examinations of their organs confirmed the presence highly pathogenic influenza A virus, subtype H5N8. After this, tufted ducks killed by the virus were also discovered on islands off the coast of Nagu. Soon after the discovery of the tufted ducks, the virus was also detected in white-tailed eagles, first in the Åland Islands (4 cases) and later on the mainland, in Satakunta (2 cases). In addition to this, the virus was detected in one Eurasian eagle-owl in the Åland Islands in December. All in all, a total nine cases of avian influenza in wild birds were identified. New cases continued to be confirmed in early 2017. Only one case of the virus infecting tame birds was confirmed soon after the start of the outbreak in November, at a bird park in Mariehamn (see Chapter 4).

In addition to investigating suspected cases of avian influenza, Evira also tested hunted birds and birds found dead in the wild as part of avian influenza monitoring. Over the course of the year, a total of 208 wild birds were tested. More detailed information on avian influenza tests performed on wild birds in 2007–2016 is presented in Table B13 of Appendix B.

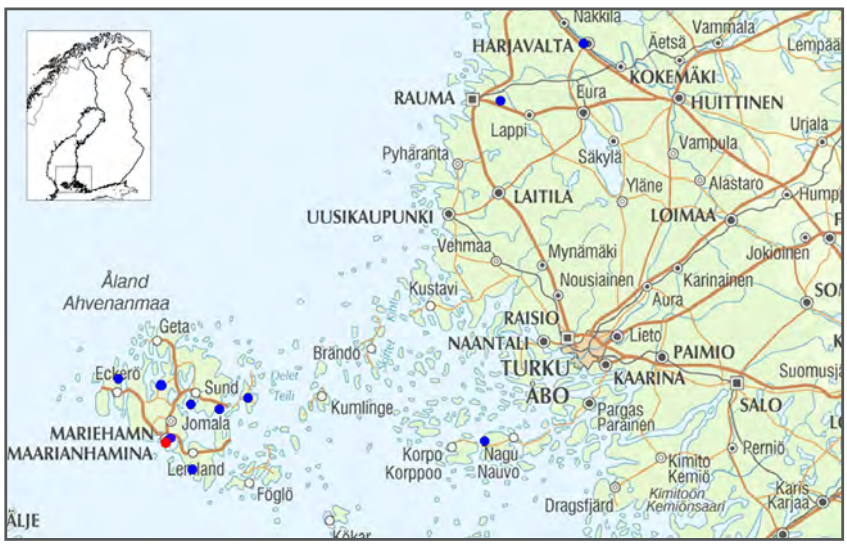


Figure 6. Map of avian influenza cases confirmed in wild birds and the Mariehamn bird park in 2016.

Rabbit haemorrhagic disease (RHD) killed wild rabbits in and around Helsinki

An outbreak of rabbit haemorrhagic disease (RHD) occurred in the area in and around Helsinki, starting in April and continuing throughout the summer. The virus was determined to be type RHDV2. The epidemic was fairly devastating and spread widely in the area in and around the capital, almost completely eradicating the local wild rabbit population. During the epidemic, Evira also diagnosed one fatal case of the disease in a pet rabbit. The disease does not infect people or other pets. While the virus has been confirmed to infect brown hares in Australia and blue hares in Sweden, it does not seem to cause epidemics in these species, unlike in rabbits.

RHD kills rabbits quickly

Rabbit haemorrhagic disease (RHD) is a highly infectious disease affecting rabbits, caused by the rabbit calicivirus (*Oryctolagus cuniculus*). RHD is a rapidly progressing disease that damages rabbits' internal organs, particularly the liver. RHD causes high morbidity and high mortality in rabbits. There are two known variants of the virus, the classical RHD virus and the more recent RHD2 virus. The virus that has been killing rabbits in the area in and around Helsinki since April 2016 has been identified as RHDV2. The disease has not been previously detected in Finland. The wild rabbit population of the Helsinki area first appeared in the 1980s, and experienced rapid growth in the early 2000s. Finland's wild rabbit population consists of the offspring of pet rabbits that escaped into the wild. As such, the rabbit is classified as an invasive species in Finland.

RHDV causes symptoms particularly in adult rabbits, whereas baby rabbits remain asymptomatic until approximately 4–6 weeks of age. However, the new RHDV2 variant can also cause symptoms in baby rabbits as young as 15–20 days old. These symptoms include neurological symptoms, respiratory tract symptoms, apathy and loss of appetite. The liver damage caused by the virus can also result in haemorrhaging and jaundice. Cases of sudden death without observable symptoms also occur during epidemics. The RHD virus usually kills up to 80–90% of infected rabbits, whereas the mortality rate of RHDV2 varies, ranging from 5 to 70%. Mortality rates can be especially high in populations that have not previously been exposed to the virus.

The virus is transmitted between rabbits by direct contact with secretions as well as indirectly in dens, in food and water and carried by insects. The virus is shed in all of the infected rabbit's bodily secretions. Predators that feed on infected rabbits may also carry the virus. The new RHDV2 variant of the virus has also infected blue hares and brown hares (*Lepus timidus and L. europaeus*). The virus does not infect people, dogs, cats or rodents. Examinations conducted by Evira have confirmed one case in which a pet rabbit died as a result of an RHDV2 infection.

There is a RHDV vaccine available in Finland by special permit. The vaccine is inactivated and contains both the classical RHVD strain and the new RHDV2 strain. Evira recommends vaccinating rabbits in areas where wild rabbits are found. We also recommend vaccinating any pet rabbits that are taken to shows or other similar events and competitions. Based on a veterinary risk assessment, we also recommend vaccinating other rabbits that are at heightened risk of being infected with RHD. Rabbits are vaccinated in accordance with the instructions provided by the manufacturer of the vaccine.

Chronic wasting disease (CWD) not detected in Finland

A wildlife disease completely new to Europe was detected in 2016 when a mountain reindeer in Norway was diagnosed with chronic wasting disease (CWD), a disease endemic to North America. Later in the year the disease was also detected in two elks and a further two mountain reindeer. The first cases of the disease were detected as part of the wildlife disease surveillance conducted in Norway, which is similar to the surveillance conducted in Finland. In Finland, small numbers of animals that have died spontaneously and wild animals that exhibit symptoms are tested for CWD every year. In 2016, Evira aimed to increase the number of samples collected due to the cases in Norway, as a result of which the number of samples tested during the year rose to 50 (26 elks, 12 white-tailed deer, 7 roe deer and 5 Finnish forest reindeer). All of the samples were negative.

Finland remained free of rabies

Efforts to combat rabies continued from previous years. In Finland, vaccine baits intended for wild animals are spread on the south-eastern border in order to stop rabies from spreading to the country via small predators. In 2016, the vaccine baits (a total of 180,000 vaccines) were dropped from aircraft in September and October. The incidence of rabies and consumption of the baits are constantly monitored through examinations of hunted animals and animals that are found dead. As such, hunters who collect samples play a key role in the success of the disease monitoring programme. Samples for rabies testing are mostly collected in south-east Finland and North Karelia, where the baits are distributed. The collection campaign in 2016 went well. Evira's goal was to receive a total of 360 animal samples from the distribution area of the baits, and a total of 389 foxes and raccoon dogs and 322 blood samples were ultimately submitted.

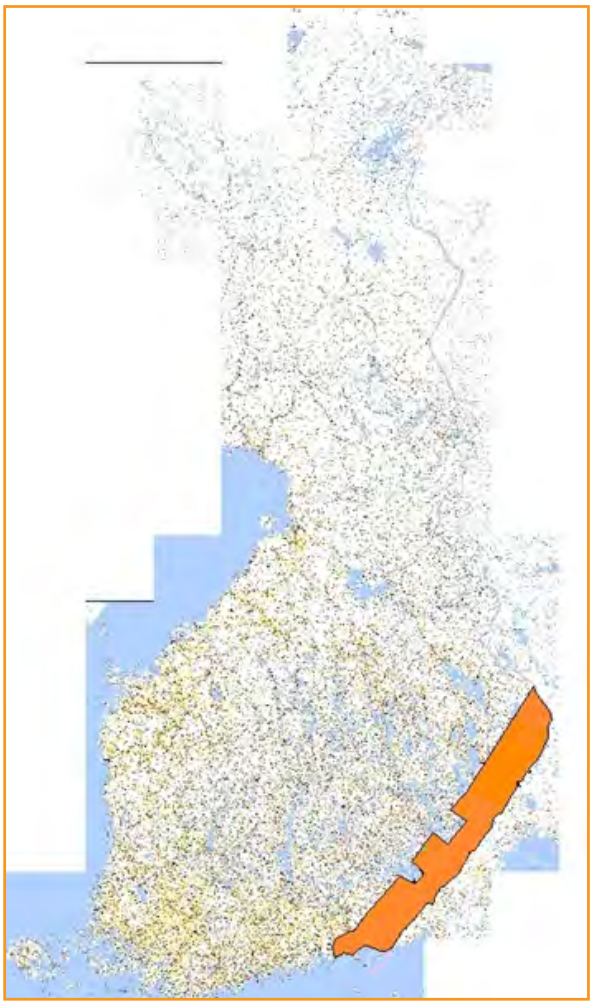


Figure 7. Drop zone of rabies vaccine baits.

In total, 562 wild animals from all over Finland were submitted to the rabies monitoring programme. The majority of these were raccoon dogs (308) and foxes (104). Additionally, Evira also examined a number of mustelids, namely ten European pine martens, one mink, seven badgers and 34 Eurasian otters. Furthermore, 76 large predators and 19 bats were also tested for rabies. No rabies cases were identified in wild predators. However, one Daubenton's bat found in Ingå was diagnosed with bat rabies. The bat had exhibited abnormal behaviour: it had been moving around during the day in late autumn, and its movements had been unsteady and its flight unbalanced. The virus was determined to be European bat lyssavirus type 2 (EBLV-2), which had been previously detected in 2009 in a Daubenton's bat in Turku. European bat lyssavirus antibodies have also been found in Daubenton's bats in the Turku region in an active surveillance project, so it seems that EBLV-2 is endemic in Daubenton's bats in the region. The risk of contracting bat rabies is considered extremely unlikely in Finland for people who have no contact with bats as part of their work or hobbies.

Table 14. Animals tested for rabies for different reasons in 2016.

	Traffic accident	Put down due to aggressiveness	Put down due to illegal import	Put down due to injury	Put down due to neurological symptoms	Put down due to illness	Found dead	Suspected animals/positives	Samples tested/ positives
wolverine	0	0	0	0	0	0	1/0	1/0	1/0
horse	0	0	0	0	0	1/0	0	1/0	1/0
lynx	22/0	0	0	4/0	0	2/0	13/0	41/0	43/0
bear	1/0	0	0	5/0	0	1/0	0	7/0	12/0
fox	2/0	0	0	0	0	3/0	7/0	12/0	104/0
cat	0	2/0	2/0	0	0	1/0	1/0	6/0	6/0
dog	0	6/0	19/0	0	3/0	3/0	0	31/0	31/0
sheep	0	0	0	0	0	0	1/0	1/0	1/0
bat	0	1/0	0	1/0	0	1/0	9/1	12/1*	19/1*
badger	0	0	0	0	0	0	0	0	7/ 0
bovine	0	0	0	0	1/0	0	0	1/0	1/0
pine marten	0	0	0	0	0	0	0	0	10/0
hare	0	0	0	0	1/0	0	0	1/0	1/0
otter	11/0	0	0	3/0	0	1/0	18/0	33/0	34/0
hedgehog	0		0	0	0	0	0	1/0	1/0
arctic fox	0	0	0	0	0	0	1/0	1/0	1/0
raccoon dog	2/0	1/0	0	0	0	7/0	11/0	21/0	308/0
wolf	5/0	0	0	2/0	0	3/0	3/0	13/0	20/0
wild mink	0	0	0	0	0	0	0	0	1/0
Total	**43**	**11**	**21**	**15**	**5**	**23**	**65**	**183/1***	**602/1***

* European bat lyssavirus type 2 (EBLV-2)

Examinations of wild boars living in the wild

The threat of African swine fever did not decrease in 2016, as the disease continued to occur in the Baltic countries. Hunters have participated actively in the surveillance of swine diseases by sending blood and tissue samples collected from wild boars living in the wild to Evira. Wild boars living in the wild have been tested for African swine fever in Finland since 2010, and between 2010 and 2013, Evira examined an average of ten samples each year. In 2014, samples collected from 138 wild boars were submitted to Evira, and in 2015, active hunters submitted samples from 171 wild boars. The number of samples submitted continued to increase in 2016, with Evira receiving samples collected from a total of 366 wild boars. More than half of the samples (251) were submitted from Southeast Finland. The municipality with the most samples was Lappeenranta, from where samples from 70 animals were submitted.

In addition to African swine fever, samples from wild boars living in the wild were tested for classical swine fever and Aujeszky's disease. None of the viral diseases tested for were found in the samples. Additionally, 116 blood and/or organ samples collected from hunted wild boars living in the wild were examined for brucellosis. Bacteria of the *Brucella* genus

were isolated from the samples of five animals. The bacterium is most likely the same type as the strain isolated in 2015 (*B. suis* bv. 2). In addition to this, brucella antibodies were found in the blood sample of one wild boar. All the wild boars that tested positive were hunted in South-East Finland, in the area surrounding Lappeenranta.

Table 15. Numbers of samples collected from wild boars living in the wild by municipality in 2016.

Municipality	ELY Centre	Number of boars examined
Mikkeli	South Savo	4
Puumala	South Savo	1
Savonlinna	South Savo	1
Heinola	Häme	10
Hollola	Häme	1
Hämeenlinna	Häme	1
Janakkala	Häme	1
Orimattila	Häme	2
Sysmä	Häme	1
Hamina	Southeast Finland	5
Iitti	Southeast Finland	10
Imatra	Southeast Finland	1
Kotka	Southeast Finland	1
Kouvola	Southeast Finland	41
Lappeenranta	Southeast Finland	70
Luumäki	Southeast Finland	23
Miehikkälä	Southeast Finland	13
Parikkala	Southeast Finland	11
Pyhtää	Southeast Finland	27
Rautjärvi	Southeast Finland	7
Ruokolahti	Southeast Finland	12
Savitaipale	Southeast Finland	2
Virolahti	Southeast Finland	28
Ristijärvi	Kainuu	1
Sotkamo	Kainuu	1
Hankasalmi	Central Finland	15
Joutsa	Central Finland	2
Jyväskylä	Central Finland	1
Kangasala	Pirkanmaa	4
Orivesi	Pirkanmaa	1
Pälkäne	Pirkanmaa	1
Kitee	North Karelia	1
Lieksa	North Karelia	1
Tohmajärvi	North Karelia	13

Table 15. Numbers of samples collected from wild boars living in the wild by municipality in 2016.		
Municipality	**ELY Centre**	**Number of boars examined**
Pudasjärvi	North Ostrobothnia	1
Pyhäjärvi	North Ostrobothnia	3
Ylivieska	North Ostrobothnia	1
Kiuruvesi	North Savo	6
Lapinlahti	North Savo	2
Eura	Satakunta	1
unknown	Uusimaa	1
Järvenpää	Uusimaa	1
Lapinjärvi	Uusimaa	18
Loviisa	Uusimaa	2
Myrskylä	Uusimaa	2
Mäntsälä	Uusimaa	2
Pukkila	Uusimaa	1
Sipoo	Uusimaa	7
Vantaa	Uusimaa	1
Laitila	Southwest Finland	1
Mynämäki	Southwest Finland	1
Vehmaa	Southwest Finland	1
Total		**366**

Some cases of Trichinella found, no cases of *Echinococcus multilocularis*

Canine samples, meaning foxes and raccoon dogs, submitted to Evira are tested for *Echinococcus multilocularis*. *Echinococcus multilocularis* infections have never been detected in Finland, and Finland is considered a country free from *Echinococcus multilocularis* in the EU. In 2016, a total of 230 foxes and 466 raccoon dogs were tested for the parasite. The monitoring of *Echinococcus multilocularis* infections in southern and southwest Finland is conducted in cooperation with the regional offices of the Finnish Wildlife Agency. *Echinococcus canadensis*, whose intermediate hosts are cervids and definitive hosts are wolves, occurs in eastern Finland (eastern Lapland, Kuusamo, Kainuu, North Karelia). In 2016, the parasite was found in 20% of wolves (15 positive samples out of 74 examined). The positive samples were found in the parasite's typical area of distribution in eastern Finland. Additionally, six *Echinococcus canadensis* infections were identified in reindeer (see also Chapter 8 Reindeer diseases and infections). No infections were identified in elk.

Carnivorous mammals and birds are tested for the parasitic roundworms (*Trichinella* spp.) living in the muscle tissue. Trichinella worms are fairly common in Finland, and no drastic changes in their prevalence were observed in 2016 (Table B14). Bear samples are also tested for Trichinella in other approved laboratories, but any positive findings are confirmed at Evira.

The incidence of scabies (*Sarcoptes scabiei* mite) remained largely the same as in the previous year. Scabies infections were most commonly identified in raccoon dogs (26 cases) and foxes (15 cases). The cases diagnosed in raccoon dogs were centred around southern Finland, with the number of cases being the highest in Satakunta (7 cases) and Uusimaa (6 cases). The northernmost and only case found in North Karelia was found in Rääkkylä.

Conversely, foxes with scabies were found more widely, with the northernmost cases found in Utsjoki and the southernmost in the area of Kotka and Pyhtää. Scabies infections were also detected in two lynxes and even in one hedgehog, which was found in Porvoo. Skin changes indicative of scabies were observed in one wolf, but in this cases no scabies mites were found.

Number of tularemia cases higher than in recent years

A total of 45 blue hares and 107 brown hares were submitted to Evira for testing, and tularemia infections were identified in 11 blue hares, 24 brown hares and one squirrel. The majority of the cases (92%) were detected during the typical tularemia season in July–September. The epidemics affecting hares seemed to be restricted to three areas, namely western North Ostrobothnia, South Ostrobothnia and Kymenlaakso, in all of which tularemia is known to be endemic. Other infectious pathogens identified in hares included *Toxoplasma gondii* parasites (9 cases) as well as the bacteria *Yersinia pseudotuberculosis* (9 cases), *Pasteurella multocida* (9 cases) and *Listeria monocytogenes* (1 case). All of these pathogens cause severe generalised infections in blue and brown hares, and infections occur annually in Finland.

Cause of death monitoring of large predators

The carcasses of two wolverines, 44 lynx, 22 wolves and 12 bears were submitted to the cause of death and disease monitoring programme for large predators. In addition to this, Evira examined the skin of one lynx due to suspected scabies and organ samples from one bear that was hit by a car. The most common cause of death for large predators was traffic accidents. A total of one wolverine, five bears, six wolves and 35 lynx were determined to have been hit by a car. Additionally, one lynx, one wolf and two bears had been hit by trains. Two cases of scabies were detected in lynx. In November, four lynx cubs that had starved to death were found in eastern Finland, in the Savo and North Karelia area. One lynx cub had to be put down due to limb fractures. A total of 12 wolves were shot with police permission. Of these wolves, four had leg injuries of some sort, while the rest had no severe injuries or diseases. The majority of the wolves shot with police permission (8) were from North Karelia. One wolf was diagnosed with scabies. Two wolves had signs of old shooting-related injuries (shotgun shots). One wolf carcass submitted to Evira was found to have a severe skull fracture. The carcass in question had been found near a train track. Two of the bears submitted to Evira had been shot with police permission. One bear cub had starved to death and was diagnosed with enteritis. One bear that had been put down had a leg-hold trap embedded deep in its front paw. Two of the bear carcasses submitted to Evira were connected to suspected hunting offences.

Causes of death of small birds garnered interest

Cases of avian chlamydiosis (*Chlamydophila psittaci*), a bacterial disease that also infects humans, were identified in two great tits, which were found in two localities in North Karelia. Cases of fowlpox, caused by avipoxvirus, were identified in three great tits during the winter and two European goldfinches and one chaffinch during the summer. The cases identified during the summer were all chicks. Outbreaks of trichomonosis, an infection of the crop affecting greenfinches and caused by *Trichomonas gallinae* parasites, occurred once again in the autumn. Evira received bird samples from five outbreaks of the disease, which occurred in the Oulu region, Ostrobothnia, Southwest Finland and Uusimaa. Salmonellosis was a very rare find in small birds in 2016, with only one confirmed case. The bird in question was a bullfinch from Kymenlaakso.

Salmonella infections were identified in several species of wildlife known as natural carriers of salmonella. Infections were identified in five hedgehogs, four of which were infected with serotype Enteritidis and one with serotype Typhimurium. In birds, in addition to the bullfinch mentioned above, salmonella was identified in three herring gulls, one mew gull and one unidentified species of gull. Slightly more unusual were infections identified in a barn swallow and a goshawk. All salmonella infections in birds were serotype Typhimurium, with the exception of the one affecting the barn swallow, which was serotype Enteritidis.

Number of electronic reports of wild animals found dead doubled

Wild animals that are found sick or dead can be reported on the Evira website in cases where sending a sample of the animal is not possible. In 2016, a total of 205 reports were submitted through the website, which was nearly double the number from the previous year (115 reports). The main reason for the increase in reports was the RHD epidemic affecting wild rabbits in the Helsinki area, with a total of 76 of the reports submitted concerning rabbits. The first of these reports were submitted in the latter half of April from Käpylä, Helsinki. The first reports from Vantaa started coming in in early May, and reports from Espoo started coming in in the latter half of May. The number of reports submitted concerning rabbits was highest in May (43 reports), while in July and August only 4 reports were submitted. A total of 54 reports were submitted concerning hares (blue hares or brown hares). The majority of the reports (32) were submitted in July–August during the tularemia season. Conversely, the avian influenza epidemic did not seem to cause any significant changes in the number of reports submitted concerning birds. For example, the number of reports submitted concerning swans was exactly the same as in the previous year (10 reports). Other fairly commonly reported species included otters (9 reports) and hedgehogs (7 reports).

Appendix A: Incidence of selected animal diseases in Finland in 2016

Table A1. Incidence of selected multiple species diseases in Finland

Animal disease	Primary target animals	Zoonosis*	Last detected
Aujeszky's disease (pseudorabies)	Pig, ruminants, dog, cat		Never
Bluetongue disease	Ruminants		Never
Brucellosis		x	
• *B. abortus*	Ruminants		1960
• *B. melitensis*	Small ruminants		Never
• *B. suis*	Pig		Never
• *B. suis* bv.2	Wild boar		2016[1)]
Echinococcosis			
• *E. multilocularis*	Fox, raccoon dog, rodents	x	Never
• *E. canadensis*	cervids, dog, wolf	x	2016
Heartwater	Ruminants		Never
Tularemia	Blue and brown hare, rodents, birds	x	2016
Rinderpest (cattle plague)	Ruminants		1877
Leptospirosis	Cattle, pig, horse, dog	x	2014[2)]
New world screwworm	Mammals	x	Never
Old world screwworm	Mammals	x	Never
Paratuberculosis	Ruminants		2008[3)]
Anthrax	Ruminants, pig, horse	x	2008
Q fever	Ruminants	x	2016[4)]
Rabies	Mammals	x	
• Rabies			1989
• Bat rabies			2016
Rift Valley fever	Ruminants	x	Never
Salmonella infections	Numerous different species	x	2016
Foot-and-mouth disease	Cloven-hoofed animals		1959
Trichinellosis		x	

Table A1. Incidence of selected multiple species diseases in Finland			
Animal disease	**Primary target animals**	**Zoonosis***	**Last detected**
• Farmed animals	Pig, farmed wild boar, horse		2012
• Other mammals	Predators, wild boar		2016
TSEs (Transmissible Spongiform Encephalopathies)			
• BSE	Cattle	x	2001
• Classical scrapie	Sheep, goat		2005[5)]
• Atypical scrapie	Sheep, goat		2016
• CWD	Cervids		Never
Vesicular stomatitis	Ruminants, horse, pig	x	Never
West Nile fever	Birds, horse	x	Never

*Zoonosis = disease that can be transmitted from animals to humans
[1)] In wild boars living in the wild
[2)] No clinical disease
[3)] In a zoo animal
[4)] Antibodies on the same holding as in previous years
[5)] Has only occurred in Finland in goats

Table A2. Incidence of selected cattle diseases in Finland.	
Name of disease	**Last detected**
Haemorrhagic septicaemia	Never
Lumpy skin disease	Never
Malignant catarrhal fever (wildebeest)	Never
Mycoplasma bovis	2016
Bovine anaplasmosis	Never
Bovine genital campylobacteriosis (vibriosis)	Never
Bovine spongiform encephalopathy (BSE)	2001
Bovine viral diarrhoea (BVD)	2010
Enzootic bovine leukosis (EBL)	2008[1)]
Bovine tuberculosis	1982
Bovine babesiosis	2016
Theileriosis	Never
Contagious bovine pleuropneumonia (CBPP)	1920
Infectious bovine rhinotracheitis (IBR/IBV)	1994
Trichomonosis	1952
Trypanosomiasis (transmitted by the tsetse fly)	Never

[1)] Antibodies found in one artificial insemination bull in 2008 but no confirmed viral infection.

Table A3. Incidence of selected pig diseases in Finland.	
Name of disease	**Last detected**
African swine fever	Never
Atrophic rhinitis	2001
Nipah virus encephalitis	Never
Porcine cysticercosis	Never
Swine influenza (H1N1)	2016
Pandemic (H1N1) 2009 influenza	2014
Swine fever	1917
Swine vesicular disease (SVD)	Never
Postweaning multisystemic wasting syndrome (PMWS)	2008[1)]
Porcine reproductive and respiratory syndrome (PRRS)	Never
Transmissible gastroenteritis (TGE)	1980

[1)] Clinical symptoms diagnosed on one holding.

Table A4. Incidence of selected poultry diseases in Finland.	
Name of disease	**Last detected**
Duck virus hepatitis	Never
Avian pneumovirus (APV) infection (previously known as avian/turkey rhinotracheitis/swollen head syndrome (ART/TRT/SHS))	1999
Infectious bursal disease (IBD, also called Gumboro disease)	2014
Fowl cholera (*Pasteurella multocida*)	1993
Fowl typhoid (*S.* Gallinarum)	Never
Highly pathogenic avian influenza	
• Poultry	Never
• Other birds in captivity	2016
• Wild birds	2016
Marek's disease	2016[1)]
Low pathogenic avian influenza	Never
Mycoplasma gallisepticum infection (avian mycoplasmosis)	2016[1)]
Mycoplasma meleagridis infection	Never
Mycoplasma synoviae infection (avian mycoplasmosis)	2016
Newcastle disease	
• Poultry	2004
• Other birds in captivity	2013
• PMV-1 infection in wild birds	2014
Psittacosis, also known as parrot fever and ornithosis (avian chlamydiosis)	2015[1)]
Avian infectious laryngotracheitis (ILT)	2016[1)]
Avian infectious bronchitis (IB)	2016
Pullorum disease (*S.* Pullorum)	1961

[1)] only in non-commercial poultry

Table A5. Incidence of selected sheep and goat diseases in Finland.	
Name of disease	**Last detected**
Sheep and goat pox	Never
Ovine epididymitis (*Brucella ovis*)	Never
Maedi Visna (MV)	2006
Nairobi sheep disease	Never
Peste des petits ruminants (PPR)	Never
Salmonella abortus ovis	Never
Scrapie	
• Classical scrapie	2005[1)]
• Atypical scrapie	2016
Contagious agalactia	Never
Enzootic abortion in ewes (EAE), ovine chlamydiosis	Never
Caprine arthritis encephalitis (CAE)	Never
Contagious caprine pleuropneumonia	Never

[1)] Has only occurred in Finland in goats.

Table A6. Incidence of selected aquatic animal diseases in Finland.	
Name of disease	**Last detected**
Epizootic haematopoietic necrosis (EHN)	Never
Infectious salmon anaemia (ISA)	Never
Infectious haematopoietic necrosis (IHN)	Never
Viral haemorrhagic septicaemia (VHS)	2012[1)]
Koi herpesvirus (KHV)	Never
Bacterial kidney disease (BKD) in inland water area	2016
Salmon fluke infection (*Gyrodactulus salaris*) in the conservation area of Upper Lapland	1996
Infectious pancreatic necrosis (IPN) in inland water area	2016[2)]
Salmonid alphaviruses (SAV)	Never
Spring viraemia of carp (SVC)	Never
White spot disease in crustaceans (WSD)	Never
Crayfish plague	2016[3)]
Marteiliosis in molluscs	Never
Bonamiosis in molluscs	Never

[1)] VHS restriction area of Åland
[2)] genogroup 2
[3)] in wild crayfish

Table A7. Incidence of selected horse diseases in Finland.	
Name of disease	**Last detected**
African horse sickness	Never
Dourine	Never
Equine encephalitis virus (WEE, EEE, VEE)	Never
Contagious equine metritis (CEM)	2014
Equine influenza (type A)	2012
Equine infectious anaemia (EIA)	1943
Equine piroplasmosis (EP)	1998[1)]
Equine rhinopneumonitis/equine viral abortion	2016
Glanders (malleus)	1942
Surra (*Trypanosoma evansi*)	Never
Equine viral arteritis (EVA)	2014[2)]

[1)] Imported horse
[2)] Increased antibody load in a clinically ill horse; not used for breeding

Table A8. Incidence of selected honey bee diseases in Finland.	
Name of disease	**Last detected**
American foulbrood	2016
European foulbrood	2014
Varroatosis	2016
Nosemosis	2016
Acarapis woodi (honey bee tracheal mite, acarapisosis)	2016
Small hive beetle (*Aethina tumida*)	Never
Tropilaelaps mites	Never

Appendix B: Data on animal disease surveillance programmes and other examinations conducted

This appendix collects data on animal disease surveillance conducted between 2007 and 2016, grouped by species.

Cattle

The results of cattle surveillance consist of the results of surveillance programmes based on the detection of antibodies, covering both dairy and suckler herds. All dairy cows in Finland were tested for IBR and leukosis until 2006 and for BVD until 2010. The programme to monitor Schmallenberg virus antibodies was launched in 2012 with the testing of blood samples collected from suckler cows, and expanded in 2013 and 2014 with the testing of bulk milk samples to provide information on the spread of the virus in Finland. The programme to monitor bluetongue disease was launched in 2007 and 2008. The testing of tank milk samples for bluetongue disease was discontinued in 2015, but the testing of suckler cow samples continued.

Table B1. Dairy cattle disease surveillance based on the detection of bulk tank milk antibodies between 2007 and 2016. No antibodies were detected in 2016.

	BVD		IBR	Leukosis	Bluetongue disease	Schmallenberg	
Year	Number of samples	Positive (%)	Number of samples	Number of samples	Number of samples	Number of samples	Number of pos. results
2007	13,483	0.11	13,483	1,887			
2008	12,637	0.06	2,885	2,885	748		
2009	11,763	0.06	3,440	3,440	7,527		
2010	11,112	0.04	3,277	3,277	2,708		
2011	3,302	0.09[a)]	1,449	1,449	860		
2012	2,963	0.10[a)]	1,312	1,312	0[b)]		
2013	1,800	0.05[a)]	1,292	1,292	795	991	374
2014	1,277	0	1,277	1,277	849	615	108
2015	989	0	989	989	0	0	0
2016	920	0	920	920	0	0	0

[a)] BVD seropositive sample, old infection.
[b)] The surveillance of bluetongue disease in dairy cattle was rescheduled to be conducted using samples collected in spring 2013.

Table B2. Serological testing of suckler cow herds between 2007 and 2016.

Year	BVD		IBR	Leukosis	Bluetongue disease		Schmallenberg virus	
	Number of samples	Number of pos. results	Number of samples	Number of samples	Number of samples	Number of pos. results	Number of samples	Number of pos. results
2007	2,432	2	2,432	2,432	1,677	0		
2008	3,507	1	3,507	0	2,624	0		
2009	3,524	0	3,524	0	2,337	0		
2010	4,108	0	4,108	0	2,626	0		
2011	4,661	1 [a)]	4,661	0	4,661	0		
2012	5,096	1 [a)]	5,096	0	5,096	0	1,093	93
2013	2,485	1 [a)]	2,485	0	2,485	1[b)]	97	8
2014	7,915	1 [c)]	7,915	0	7,915	1[d)]	0	0
2015	8,141	0	8,141	0	8,141	1[d)]	0	0
2016	7,901	0	7,901	0	7,901	0	0	0

[a)] BVD seropositive sample, old infection.
[b)] BTV-14 seropositive Finnish suckler cow.
[c)] BVD seropositive suckler cow imported from Denmark (seropositive already in the import tests in 1999).
[c)] BTV seropositive suckler cow imported from Sweden (seropositive already in the import tests in 2011).

Surveillance of brucellosis in different species

Table B3. Surveillance and health monitoring tests for brucellosis between 2007 and 2016. All test results were negative.

Year	Sheep	Goat	Cattle		Swine
	Number of samples	Number of samples	Number of bulk milk samples	Number of blood samples	Number of samples
2007	3,069	1,508	2,044	3,200	3,428[2)]
2008	3,474	1,459	0[1)]	1,294	2,578
2009	1,961	1,541	0[1)]	1,411	2,395
2010	1,443	967	0[1)]	1,307	2,816
2011	3,036	1,868	0[1)]	823	2,079
2012	3,183	1,853	88[3)]	1,245	2,126
2013	2,709	534	130	1,072	2,079
2014	4,156	160	869[4)]	715	2,076
2015	4,501	6	929	681	1,297
2016	4,295	52	908	681	2,055

[1)] After several years of surveillance, it was decided to discontinue the testing of bulk milk samples to substantiate freedom from disease and to concentrate on the testing of clinical abortion cases.
[2)] The number of samples tested for brucellosis in swine was reduced in 2008 when a shift was made to risk-based monitoring by focusing primarily on breeding animals instead of production animals in the collection of samples.
[3)] Dairy cattle bulk milk samples were tested in the context of artificial insemination operations.
[4)] In 2014, the monitoring tests of bulk milk samples were re-implemented in addition to the testing of bulk milk samples in the context of artificial insemination operations.

Transmissible spongiform encephalopathies (TSEs)

The only BSE case to occur in Finland was diagnosed in December 2001. The case was found in the monitoring of a cattle group at risk. As a result, the testing was expanded to also cover healthy cows. In accordance with the expanded testing programme, all cows over 24 months of age that were emergency slaughtered, spontaneously died or were killed and all slaughtered healthy cows over 30 months of age were tested until 31 December 2008. The age limit for the animals to be tested was raised in 2009 and 2011 after the risk of BSE had decreased. The testing of healthy cows ended entirely on 1 March 2013.

Table B4. Surveillance of BSE in cattle between 2007 and 2016.

Year	Number of samples tested*	Number of positive samples
2007	119,338	0
2008	110,094	0
2009[a)]	72,145	0
2010	73,715	0
2011[b)]	56,187	0
2012	38,718	0
2013[c)]	15,911	0
2014	10,778	0
2014	10,778	0
2015	11,576	0
2016	11,234	0

* The numbers also include animals not covered by the mandatory testing programme.
[a)] The age limit of cows to be tested was raised to 48 months at the beginning of the year.
[b)] The age limit of slaughtered cows to be tested was raised to 72 months on 1 July 2011.
[c)] BSE testing of healthy cows ended on 1 March 2014.

Table B5. Surveillance of scrapie in sheep and goats between 2007 and 2016.

	Sheep		Goat	
Year	Number of samples	Number of pos. holdings/ samples	Number of samples	Number of pos. holdings/ samples
2007	3,030	1/1[1)]	431	0/0
2008	1,164	0/0	274	0/0
2009	1,143	0/0	350	1/1[1)]
2010	949	3/3[1)]	270	0/0
2011	1,251	0/0	217	0/0
2012	1,387	1/1[1)]	200	0/0
2013	1,431	1/1[1)]	276	0/0
2014	1,305	1/1[1)]	156	0/0
2015	1,325	0/0	149	0/0
2016	1,398	2/2[1)]	137	0/0

[1)] Atypical scrapie (Nor98)

Table B6. TSE testing of other animals in 2016. TSE diseases were not found in any of the samples tested.	
Animal	**Number of animals**
Companion animals	
Cat	59
Fur animals	
Mink	54
Fox	35
Raccoon dog	10
Captive animals	
Farmed reindeer	6
Zoo animals	0
Wild animals	
Elk (*Alces alces*)	26
White-tailed deer *(Odocoileus virginianus)*	12
Roe deer (*Capreolus capreolus*)	7
Finnish forest reindeer (*Rangifer tarandus fennicus*)	5
Total	**214**

Pigs

Table B7 contains the results of surveillance and health monitoring programmes, disease diagnosis and import tests. All samples were negative in 2016. Clinical leptospirosis has never been diagnosed in production animals in Finland. The results of brucellosis surveillance are presented separately (Table B3).

Table B7. Results of serological tests for viral diseases and leptospirosis in pigs between 2007 and 2016.

Year	Aujeszky's disease	TGE	Swine fever	Leptospirosis (pos. results in parentheses)	Swine influenza (pos. results in parentheses)	SVD	PRRS	ASF
2007	13,822	13,393	4,709	249 (1)	1,791	4,064	3,217	
2008	2,479	2,952	2,481	161 (2)	2,085	984	3,294	
2009	3,040	4,124	3,035	281 (0)	3,086 (484)	1,549	4,672	
2010	3,171	3,899	3,172	35 (0)	-	1,738	4,150	14
2011	2,599	2,883	2,818	100 (0)	-	1,264	3,754	128
2012	2,769	3,361	2,678	97 (0)	-	699	3,815	1,137
2013	2,649	2,986	2,429	39 (0)	-	26	4,058	1,178
2014	2,725	2,740	2,437	2 (0)	-	-	3,515	1,227
2015	2,320	2,332	2,050	0	-	-	2,909	180
2016	2,140	1,867	1,929	0	-	-	2,455	24*

* Surveillance emphasizes virological surveillance instead of serological surveillance.

Poultry

Table B8. Serological tests for viral diseases in poultry[1] between 2007 and 2016. The table contains results of surveillance and health monitoring programmes, determinations of disease causes and import tests.

Year	Avian influenza		Newcastle disease		APV	
	Number of samples	Number of pos. holdings/ samples	Number of samples	Number of pos. holdings/ samples	Number of samples	Number of pos. holdings/ samples
2007	1,865	1/4[4]	5,101	0/0	5,101	0/0
2008	2,035	1/2[4]	8,317	1/40[3]	8,317	0/0
2009	3,204	0/0	8,117	2/43[3]	8,393	3/55[5]
2010	3,175	0/0	8,325	3/61[2][3]	8,416	4/21[2]
2011	3,011	1/11[4]	9,289	2/48[2][3]	9,521	1/63[2]
2012	3,223	2/8	10,423	3/42[2][3]	10,078	1/60[2]
2013	2,712	1/3[4]	10,686	4/910[2][3][7][8]	9,921	1/53[2]
2014	4,318	2/12[4]	11,606	6/249[2][3]	5,933	3/17[2]
2015	5,245	1/1[4]	10,613	2/14[2][3]	2,592[6]	2/41[2]
2016	3,902	0/0	9,177	4/10[2][3]	1,728	3/43[2]

[1]) Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or the breeding programmes of the previously mentioned birds.
[2]) Maternal (transferred from mother to offspring) antibodies in imported birds. In turkeys only.
[3]) Serology positive, virus detection negative, no symptoms.
[4]) H5 antibodies, virus detection negative, no symptoms.
[5]) Serology positive in preliminary tests. Confirmation tests did not provide further clarification.
[6]) The EU surveillance programme for APV ended in 2015.
[7]) Vaccination antibodies in imported birds.
[8]) Serology positive, low pathogenic PMV-1 virus detected, no symptoms.

Sheep and goats

Table B9. Samples collected in the health control programme for Maedi Visna in sheep and CAE in goats between 2007 and 2016. All test results were negative.

Year	Sheep	Goat	Total number of samples
	Number of holdings tested	Number of holdings tested	
2007	253	32*	**16,771**
2008	274	32*	**19,904**
2009	270	34*	**18,472**
2010	266	24	**16,155**
2011	287	30*	**23,828**
2012	324	39*	**24,548**
2013	317	35*	**20,140**
2014	111	9*	**4,716**
2015	111	4*	**4,566**
2016	106	6*	**4,165**

* Includes holdings that keep sheep in addition to goats.

Fish and crustaceans

Table B10. Surveillance of viral diseases in fish between 2007 and 2016.

	IHN, IPN, VHS		ISA		SAV	KHV	SVC	Number of fish farms where the virus was isolated						
Year	Inland farm/ tests[1)]	Marine area farm/ tests[1)]	Inland farm/ tests	Marine area farm/ tests	Inland farm/ tests	Inland farm/ tests	Inland farm/ tests[1)]	IHN	IPN	VHS	ISA	SAV	KHV	SVC
2007	81/450	83/288					1/3	0	9[2)]	2[3)]	0	0	0	0
2008	69/440	43/154					2/20	0	1[2)]	4[4)]	0	0	0	0
2009	73/318	51/177					3/5	0	3[2)]	6[3)]	0	0	0	0
2010	65/3,726	53/2,890					2/33	0	9[2)]	1[3)]	0	0	0	0
2011	44/2,588	38/1,256					1/12	0	6[2)]	2[3)]	0	0	0	0
2012	68/5,406	49/1,332	2/320	4/95			0	0	10[5)]	1[3)]	0	0	0	0
2013	55/3,740	46/1,870		1/20	35/1,050		0	0	18[6)]	0	0	0	0	0
2014	54/2,480	41/1,347	9/603		25/750		0	0	16[7)]	0	0	0	0	0
2015	62/2,570	45/1,382	1/60		45/1,179	0	0	0	23[8)]	0	0	0	0	0
2016	53/2,753	38/1,164	1/10	0	32/1,476	0	0	0	23[9)]	0	0	0	0	0

[1)] Between 2007 and 2009 number of pools. Number of fish from 2010 onwards. One pool contains the samples of approximately ten fish.
[2)] IPN was only found on marine area farms.
[3)] VHS was found on marine area farms in the restriction area of Åland.
[4)] VHS was found on marine area farms in the restriction area of Åland and the restriction area of Uusikaupunki, Pyhäranta and Rauma.
[5)] IPN was found on a total of ten farms, six (genogroup 2) of which were in inland water areas.
[6)] IPN was found on a total of 18 farms, six (genogroup 2) of which were in inland water areas.
[7)] IPN was found on a total of 16 farms, six (genogroup 2) of which were in inland water areas.
[8)] IPN was found on a total of 23 farms, four (genogroup 2) of which were in inland water areas.
[9)] IPN was found on a total of 23 farms, four (genogroup 2) of which were in inland water areas.

Table B11. Surveillance of bacterial kidney disease (BKD) in fish between 2007 and 2016.		
	Laboratory sample	BKD cases
Year	Farms/fish	Inland water area
2007	84/7,299	2
2008	80/4,375	7
2009	102/9,625	6
2010	80/5,164	4
2011	84/6,748	4
2012	79/5,830	3
2013	64/5,128	3
2014[1)]	73/4,627	2
2015	60/3,617	3
2016	71/3,910	1

[1)] The programme to combat BKD switched to voluntary health monitoring on 1 December 2014.

Table B12. Surveillance of *Gyrodactylus salaris* between 2007 and 2016. All test results were negative.						
	Teno River[1)]	Näätämö River[1)]	Paatsjoki River[1)]	Paatsjoki River, farmed fish		Tuuloma River[1)]
Year	Salmon	Salmon	Grayling	Salmon	Fish of the Salvelinus genus	Grayling
2007	197	161	14	150	60	
2008	100	120	15	150	60	30
2009	100	122	15	150	60	53
2010	102	173	15		120	30
2011	65	156	15		120	30
2012	100	120	15		100	
2013	100	120	15		120	30
2014	100	120	15		120	30
2015	100	120	15		120	
2016	101	120	15		120	10

[1)] Samples collected from wild-caught fish.

Wildlife

Table B13. Surveillance of avian influenza in wild birds between 2007 and 2016.		
Year	**Number of birds tested**	**Positive samples (PCR/virus isolation)**
2007	777	14/13
2008	437	21/15
2009	384	23/18
2010	354	16/16
2011	86[1)]	0/0
2012	141	1/1
2013	133	0/0
2014	181[2)]	9/9[3)]
2015	133[4)]	1/0
2016	208	15/1[5)]

[1)] Collection of samples from healthy birds ended in 2011.
[2)] Includes 70 healthy birds tested.
[3)] Of the positive samples, eight were collected from healthy birds and one from a bird found dead.
[4)] Includes two healthy birds tested.
[5)] Virus isolation has not been conducted for all PCR positive birds.

Table B14. Occurrence of *Trichinella* spp. in Finnish wildlife in 2016.				
Species	**Number of Trichinella positive animals**	**Number of animals tested**	**Proportion of positive animals**	**Incidence between 2005 and 2016**
raccoon dog	88	227	38.8%	33.0%
fox	30	90	33.3%	23.5%
badger	1	11	9.1%	8.7%
pine marten	3	11	27.3%	11.3%
otter	1	39	2.6%	5.0%
bear	5	87	5.7%	6.1%
lynx	15	44	34.1%	44.9%
wolf	27	90	30%	33.9%
wolverine	2	2	100%	56.3%
goshawk	1	19	5.3%	2.3%
wild boar	0	38	0	5.1%

Appendix C: Numbers of animal holdings and animals in Finland in 2016

Table C1. Numbers of animal holdings and animals.

Terrestrial animals	Animals	Holdings
Cattle	908,807	12,620
Pigs (commercial production)	1,212,432	1,285
Non-commercial pigs	900	304
Sheep	143,132	3,869
Goats	7,165	953
Poultry	11,800,000	1,250
Bison	207	7
Cervids (reindeer)	196,852	4,421
Camelids		115
Horses	74,600	16,000
Dogs	800,000	
Honey bees	60,000	6,504
Laying hens	4,085,264	897
Broilers	6,839,600	323
Other commercial poultry	128,378	1,465
Non-commercial poultry		6,121

Aquatic animals	Production quantity in tonnes		Farms
	Farmed[1]	Wild [2]	
Fish	14,900	182,714	440
Crayfish	0.83	157.24	47
Molluscs	0		1

1 Farmed = from aquaculture
2 Wild = wild-caught

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