FINNISH FOOD AUTHORITY
Ruokavirasto • Livsmedelsverket

Finnish Food Authority
publications
8/2019

Animal diseases in Finland 2018

Finnish Food Authority publications 8/2019

Animal Diseases in Finland 2018

FINNISH FOOD AUTHORITY
Ruokavirasto • Livsmedelsverket

Description

Publisher	Finnish Food Authority
Authors	Finnish Food Authority
Title of publication	Animal Diseases in Finland 2018
Series and publication number	Finnish Food Authority publications 8/2019
Publications date	December 2019
ISBN PDF	978-952-358-011-4
ISSN PDF	2669-8307
Pages	59
Language	English
Keywords	Contagious animal diseases, year statistics
Publisher	Finnish Food Authority
Layout	Finnish Food Authority, In-house Services Unit
Distributed by	Online version: foodauthority.fi

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 2018. The publication also describes the measures taken to prevent and combat animal diseases.

The animal disease situation remained overall good. However, the IHN epidemic that started in 2017, continued during 2018. The first case of TSE in cervids in Finland was found in February 2018. Outbreaks of highly pathogenic avian influenza H5N6 amongst wild birds occurred during springtime. New cases of salmonella were found on 36 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. The preparedness was especially targeted at combating African swine fever, IHN and CWD.

Kuvailulehti

Julkaisija	Ruokavirasto
Tekijät	Ruokavirasto
Julkaisun nimi	Eläintaudit Suomessa 2018
Julkaisusarjan nimi ja numero	Ruokaviraston julkaisuja 8/2019
Julkaisuaika	Joulukuu 2019
ISBN PDF	978-952-358-011-4
ISSN PDF	2669-8307
Sivuja	59
Kieli	Englanti
Asiasanat	Tarttuvat eläintaudit, vuositilastot
Kustantaja	Ruokavirasto
Taitto	Ruokavirasto, käyttäjäpalvelujen yksikkö
Julkaisun jakaja	Sähköinen versio: ruokavirasto.fi

Tiivistelmä

Tämä julkaisu sisältää tietoa Suomen eläintautitilanteesta vuonna 2018. 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. Edellisenä vuonna alkanut kalojen IHN-taudin epidemia kuitenkin jatkui vuonna 2018. Uutena tautina Suomessa todettiin ensimmäisen kerran hirvieläinten TSE-tautia helmikuussa. Korkeapatogeenista H5N6-tyypin lintuinfluenssaa todettiin keväällä luonnonvaraisissa linnuissa. Uusia salmonellatapauksia todettiin 36 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. Eläintautivarautumista kohdistettiin erityisesti afrikkalaisen sikaruton, IHN -taudin ja CWD:n torjuntaan.

Beskrivning

Utgivare	Livsmedelsverket
Författare	Livsmedelsverket
Publikationens titel	Djursjukdomen i Finland 2018
Publikationsseriens namn och nummer	Livsmedelsverkets publikationer 8/2019
Utgivningsdatum	December 2019
ISBN PDF	978-952-358-011-4
ISSN PDF	2669-8307
Sidantal	59
Språk	Engelska
Nyckelord	Smittosamma sjukdomar, årstatistik
Förläggare	Livsmedelsverket
Layout	Livsmedelsverket, enheten för interna stödtjänster
Distribution	Elektronisk version: livsmedelsverket.fi

Referat

Denna publikation innehåller information om djursjukdomsläget i Finland år 2017. Publikationen innehåller aktuell information om förekomsten av djursjukdomar som ska bekämpas samt information om 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 men också nya djursjukdomar konstaterades. Sjukdomsfall hos vilda fåglar som orsakats av högpatogen fågelinfluensa av typen H5N8 fortsatte under vårtiden. I slutet av året konstaterades fisksjukdomen IHN på fyra djurhållningsplatser som har regnbågslax. Ett fall av fladdermusrabies som orsakades av en ny typ av lyssavirus konstaterades hos en taigafladdermus. Nya fall av salmonella påvisades på 18 produktionsenheter och *Mycoplasma bovis* infektioner hittades igen på mjölkproduktionsgårdar.

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*-infektionen. Beredskapen var särskilt inriktad på bekämpning av afrikansk svinpest, fågelinfluensa och rabies. En beredskapsövning hölls i samverkan med de Nordiska och Baltiska länderna.

Table of contents

Disease abbreviation key....2
Animal disease situation in Finland in 2018....4
1 Cattle diseases....6
2 Pig diseases....12
3 Poultry diseases....16
4 Sheep and goat diseases....21
5 Fish and crayfish diseases....24
6 Horse diseases....27
7 Reindeer diseases....30
8 Fur animal diseases....32
9 Honey bee diseases....33
10 Companion animal diseases....34
11 Wildlife diseases....37
Appendix A: Incidence of selected animal diseases in Finland....46
Appendix B: Data on animal disease surveillance programmes and other examinations conducted....50
Cattle....50
Brucellosis surveillance in different species....51
Transmissible spongiform encephalopathies (TSEs)....52
Pigs....53
Poultry....54
Sheep and goats....54
Fish and crustaceans....55
Wildlife....57
Appendix C: Numbers of animal holdings and animals in Finland in 2018....58
Appendix D: Disease-free statuses and additional guarantees granted to Finland....57

Disease abbreviation key

Cattle

BSE, bovine spongiform encephalopathy, mad cow disease
BT, bluetongue disease
BVD, bovine viral diarrhoea
IBR, infectious bovine rhinotracheitis
SBV, Schmallenberg virus
TSE, transmissible spongiform encephalopathy

Pigs

AD, Aujeszky's disease, pseudorabies
ASF, African swine fever
CSF, classical swine fever
PRRS, porcine reproductive and respiratory syndrome
SVD, swine vesicular disease
TGE, transmissible gastroenteritis

Poultry

AAvV-1, avian avulavirus-1
AI, avian influenza
AE, avian encephalomyelitis
APV, avian pneumovirus
CAV, chicken anemia virus, blue wing disease
IBD, infectious bursal disease, Gumboro disease
IBV, IB, infectious bronchitis
ILT, infectious laryngotracheitis
PMV-1, paramyxovirus-1
PMV-3, paramyxovirus-3

Sheep and goats

CAE, caprine arthritis/encephalitis
SBV, Schmallenberg virus

Fish and crayfish

BKD, bacterial kidney disease
IHN, infectious haematopoietic necrosis
IPN, infectious pancreatic necrosis
ISA, infectious salmon anemia
KHV, koi herpesvirus
SAV, salmonid alphavirus
SVC, spring viremia of carp
VHS, viral haemorrhagic septicaemia
WSD, white spot disease

Horses
CEM, contagious equine metritis
EHV-1, equine herpesvirus 1
EHV-4, equine herpesvirus 4

Reindeer
CWD, chronic wasting disease
TSE, transmissible spongiform encephalopathy

Fur animals
TME, transmissible mink encephalopathy

Companion animals
RHD, rabbit haemorrhagic disease

Wildlife
CWD, chronic wasting disease
RHD, rabbit haemorrhagic disease
TSE, transmissible spongiform encephalopathy

Animal disease situation in Finland in 2018

The infectious haematopoietic necrosis (IHN) epidemic in fish that began in 2017 continued in 2018. In addition to the four cases identified the year before, in 2018 the disease was also detected in two fishing ponds, which were among the contacts of a fish farm on which the disease was detected. Highly pathogenic H5N6 avian influenza (HPAI) was detected in three wild birds. All three birds were white-tailed eagles found in Southwest Finland, and one of the birds was being taken care of at an animal shelter located in Southwest Finland when the disease was diagnosed. The avian influenza did not spread to poultry holdings or other domestic birds. Otherwise, the disease situation remained good, and apart from the IHN infections and avian influenza, Finland remained free from animal diseases that spread easily, such as foot-and-mouth disease, swine fevers and Newcastle disease.

The surveillance programme for chronic wasting disease (CWD) launched in Finland at the start of 2018. In February 2018, an elk found dead in Kuhmo was confirmed as the first case of TSE in cervids to be recorded in Finland. A prion disease, chronic wasting disease is a type of transmissible spongiform encelopathy (TSE), a group of brain diseases that also includes mad cow disease (BSE) and scrapie in sheep. However, based on tests conducted by an EU reference laboratory, the TSE detected in the elk in Finland was not a typical strain of CWD, but an atypical form of the disease that has also been detected in old elk in Norway.

The threat posed by African swine fever (ASF) to Finnish pork production persisted due to the disease continuing to spread across Europe and occurring in Russia near St. Petersburg, causing pressure to improve control measures. In 2018, resources were allocated particularly to communications about the threat of the disease and food souvenir regulations targeted at tourists. Furthermore, as a control measure against ASF, the keeping of pigs outdoors was prohibited as of 1 June 2018 with a decree issued by the Ministry of Agriculture and Forestry. From now on, the keeping of pigs outdoors is permitted only in enclosures that comply with the requirements laid out in the decree, with a few exceptions. The sampling of wild boars living in the wild carried out for the early detection of ASF 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.

Finland 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*. During the year, Evira received a total of 179 reports of suspected animal disease cases. In 2017, the number of reports was 246, while in 2016 the number was 180. The majority of the reports concerned wild animals, on the basis of which bats, in particular, were examined in large numbers for rabies.

The incidence of salmonella in cattle, pigs, broilers, chickens and turkeys remained below the target level of 1 per cent. New cases of salmonella were found on a total of 36 production holdings: 28 cattle holdings, six pig holdings and two poultry holdings. The number of new cases decreased on pig and poultry holdings, but was higher than usual on cattle holdings. In 2017, the total number of new salmonella cases was 19, while in 2016 the total number of new cases was 16.

New *Mycoplasma bovis* infections were detected on eight new dairy farms in 2018, which was less than half the number of infections detected in the previous year. All in all, infections have been confirmed on just over two hundred farms since 2012.

In 2018, Evira intensified the veterinary border control of dogs imported into Finland from Russia. Blood samples were collected from a total of 95 imported dogs in spot checks as part of veterinary border control and analysed for rabies vaccine antibodies. An alarmingly high proportion of the dogs, 24%, were found to have no rabies vaccine antibodies, even though their travel documents indicated that the dogs had been appropriately vaccinated. All in all, 40% of the dogs sampled did not have a sufficiently high level of rabies vaccine antibodies. Many rescue dogs imported into Finland from Russia are from areas where rabies is prevalent. Insufficient vaccination is therefore a serious matter and a potential threat to both dogs and national health. Rabies that has progressed to the symptomatic stage is always fatal in mammals, including humans. The number of dogs imported into Finland from Russia was 717 in 2018. The majority of these were rescue dogs. Additionally, approximately 16,000 dogs travelled from Russia to Finland in the company of their owners. In 2018, Evira also conducted a risk assessment project to more comprehensively determine whether the importation of dogs causes disease risks to people or animals in Finland. The project involved testing samples collected from dogs imported into Finland for rabies vaccine antibody levels, *Brucella canis* antibodies, *Echinococcus multilocularis* and multidrug-resistant ESBL and MRSA bacteria. Furthermore, the samples were analysed for the following parasites: *Dirofilaria immitis,* D*irofilaria repens* and *Leishmania infantum*. The results of the project are presented in the report ”Zoonoottiset taudinaiheuttajat tuontikoirissa” (”Zoonotic pathogens in imported dogs”).

As of the start of 2019, the Finnish Food Safety Authority Evira, the Agency for Rural Affairs and part of the IT services of the National Land Survey of Finland were merged into one single Authority, called the Finnish Food Authority. Since the Finnish Food Safety Authority Evira still served as the central authority in 2018, the Finnish Food Authority is not mentioned in this report.

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. The disease-free statuses and additional guarantees granted to Finland are presented in Appendix D.

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

1 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 28 holdings. The most common reasons for conducting tests on cattle were disease surveillance for 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 diseases, such as respiratory infections, calf diarrhoea or abortions; meat inspections; and the import and export of cattle.

Number of new *Mycoplasma bovis* infections in dairy cattle decreased

New *Mycoplasma bovis* infections were detected on eight new dairy farms in 2018, which was less than half the number of infections detected in the previous year. All in all, infections have been detected on just over 200 holdings since 2012. In nearly all the cases diagnosed in dairy cows, the infection manifested as mastitis and was first detected in a milk sample. The *M. bovis* infections detected on beef cattle holdings were identified from respiratory infection samples.

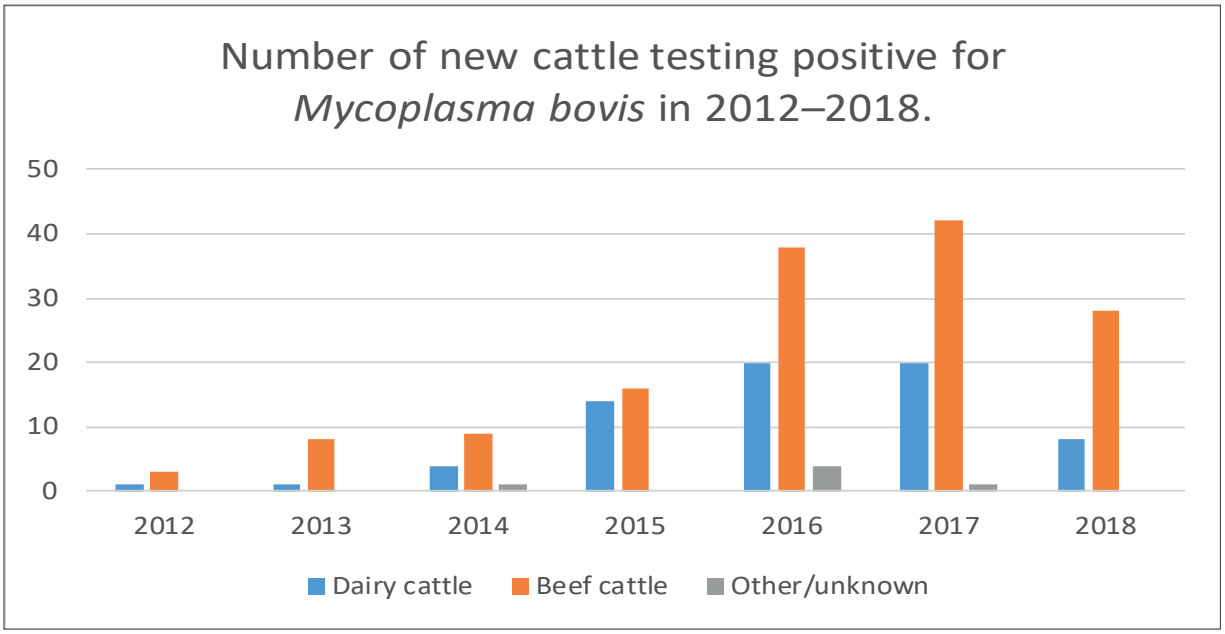


Figure 1. *Number of new cattle testing positive for Mycoplasma bovis in 2012–2018*

Diagnostics

In 2018, Evira examined a total of 389 whole carcasses or organ samples of cows submitted for pathological testing (Table 1). The number of samples decreased compared to 2017, when 454 samples were examined. A fifth of the samples consisted of foetuses, full-term stillborn calves and calves that died within a day of birth, which were submitted for abortion diagnosis. The number of samples tested in the context of meat inspections was 70.

As in previous years, the most common cause of abortion was bacterial infections. The most common isolates were the same as in previous years: *Trueperella pyogenes*, *Ureaplasma diversum* and *Listeria monocytogenes*. No *Neospora caninum* protozoan parasite infections were diagnosed in aborted foetuses. In previous years, Neospora has been detected on a few new holdings each year. A total of 198 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 93 bovine blood samples from 13 holdings were tested for Q fever using ELISA. The majority of these samples were tested in the context of abortion diagnosis, with all tests being negative. No new cases of abortion caused by Schmallenberg virus have been detected in 2014–2018.

Table 1. Numbers of pathological samples of cattle tested in 2009–2018, sorted by reason for testing.

Reason for testing	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Disease diagnosis	243	239	255	257	362	253	250	306	270	237
Abortion diagnosis	88	89	78	257	368	98	106	120	113	82
Meat inspection	128	91	79	61	108	109	72	66	71	70
Total	**459**	**419**	**412**	**575**	**838**	**460**	**428**	**492**	**454**	**389**

A large proportion of samples submitted for determining the cause of a disease consisted of calves under the age of six months (approximately 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 four holdings were tested for malignant catarrhal fever (MCF), with all samples being negative.

A total of 137 deep pharyngeal swab kits collected from calves (one kit contains four samples) as well as paired serum kits collected from seven holdings (one kit contains paired sera of five animals) and nasal mucus samples collected from four holdings (one kit contains nasal mucus samples of five animals) were tested for respiratory tract infections (Table 2).

Table 2. Results of tests performed on deep pharyngeal swab samples collected from cattle in 2009–2018. Numbers of positive submissions.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total number of submissions	**23**	**21**	**26**	**39**	**93**	**66**	**108**	**154**	**156**	**137**
Respiratory Syncytial Virus	5	9	8	8	24	13	33	28	32	26
Coronavirus	7	12	9	15	59	32	58	75	80	70
Parainfluenza-3 virus	0	0	0	0	0	0	0	0	6	28
Mycoplasma bovis	0	0	0	3	7	8	18	43	52	45
Pasteurella multocida	11	15	18	30	74	52	96	120	131	112
Histophilus somni	3	2	3	2	16	9	18	17	24	16
Mannheimia haemolytica	3	2	4	3	33	12	36	57	40	39
Ureaplasma diversum	13	13	19	24	46	40	62	99	105	88

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.

A total of 258 sets of samples were submitted in the context of the calf diarrhoea test package (one package includes testing of five faecal samples). The results 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 97 holdings, either in pathological tests or diarrhoea samples. The number of holdings with *C. parvum* infections increased again from the previous year. People working with calves were also infected with cryptosporidiosis.

Additionally, 10 bovine faecal sample submissions were tested for coronavirus, with five submissions testing positive.

Table 3. Results of calf diarrhoea diagnostic test packages from calves under six months old in 2009–2018. Total numbers of sample submissions and numbers of positive submissions.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total number of submissions	**179**	**153**	**203**	**191**	**229**	**178**	**211**	**246**	**218**	**258**
Salmonella	0	0	1	0	1	0	1	1	0	0
Rotavirus (ELISA)	73	61	83	78	83	76	74	98	75	92
Corona (ELISA)	2	2	0	3	6	4	1	1	1	0
E.coli F5	2	0	0	0	0	0	0	0	0	0
Eimeria, over 10,000 OPG	39	27	35	29	38	32	40	34	33	24
Cryptosporidium spp. (staining)	23	22	30	23	26	31	36	76	72	110
Cryptosporidium parvum	6	5	7	13	20	24	30	41	58	88
Strongylida	3	2	4	3	6	3	2	3	4	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%. However, in 2018 new salmonella infections were detected in the faecal samples of a total of 28 cattle holdings, whereas in 2017 salmonella was detected on only six holdings: of the 28, 12 were dairy farms, 4 were mixed holdings, 4 were suckler cow holdings and the remaining 8 were other beef cattle holdings.

A total of eight serotypes of salmonella were identified in cattle. *Salmonella* Typhimurium was identified on 14 holdings, *S.* Enteritidis on five and *S.* Konstanz on two holdings. The cattle of two holdings with *S.* Typhimurium were also found to be infected with *S.* Tennessee or *S.* Senftenberg. Multidrug-resistant *S.* Kentucky was identified in the cattle of four holdings; this multidrug-resistant serotype has not been previously recorded in Finland. Three of the holdings with *S.* Kentucky cattle were found to have received calves from the same infected holding. Additionally, *S.* Chester, *S.* Newport and *S.* Senftenberg were identified in the cattle of one holding each; none of these serotypes have been previously recorded in Finnish cattle. Salmonella was diagnosed on one holding from faecal samples submitted due to clinical symptoms (fever, bloody diarrhoea). On another holding the disease was diagnosed based on a positive lymph node sample (*S.* Typhimurium) collected at a slaughterhouse. There were no other lymph node sample findings in 2018. On five holdings, the disease was diagnosed based on some other suspicion of salmonella (contact holdings), while on one holding it was diagnosed in an inspection of the original holding of a bull used in artificial insemination. On one holding, salmonella was diagnosed in an examination of animals for sale, and the rest of the cases were diagnosed based on examinations commissioned by operators. No cases of salmonella were diagnosed in bulls being kept in quarantine at artificial insemination centres.

Exceptionally high number of salmonella cases in cattle in 2018

The incidence of salmonella in cattle is low in Finland, with infections identified at 6–15 holdings per year. In 2018, however, new salmonella infections were detected in the faecal samples of a total of 28 cattle holdings: 12 dairy farms, 4 mixed holdings, 4 suckler cow holdings and 8 other beef cattle holdings.

A total of eight serotypes of salmonella were detected in cattle. *Salmonella* Typhimurium was detected on 14 holdings, *S.* Enteritidis on five and *S.* Konstanz on two holdings. The cattle of two holdings with *S.* Typhimurium were also found to be infected with *S.* Tennessee or *S.* Senftenberg. Multidrug-resistant *S.* Kentucky was identified in the cattle of four holdings, three of which were found to have received calves from the same positive holding. This multidrug-resistant serotype has not been previously detected in Finland. Other serotypes identified that had not been previously recorded in cattle in Finland were *S.* Chester, *S.* Newport and *S.* Senftenberg.

No specific cause for the high incidence of salmonella in cattle in 2018 could be determined based on the range of serotypes and phage types identified. Possible causes could include the prohibition on the formaldehyde treatment of fodder that entered into effect at the start of 2018, infections transmitted by birds and other animals (including insects), the vicinity of fur farms, changes in production structure, food importing and increase in tourism.

In 2008–2018, over 20 different serotypes of salmonella were identified in imported fodder (primarily soy, turnip rape and rapeseed). Of these, only four of the same sero and phage types were occasionally found in cattle in the same period.

Since 2003, approximately 80 different serotypes of salmonella have been isolated in approximately 60 different species of wild animals and birds in Finland. For example, the five most common phage types of serotype *S.* Typhimurium are the same in both cattle and wild animals, due to which infections can be thought to occur both ways. However, these types were not exceptionally common among the infections identified in 2018. In 2018, *S.* Typhimurium bacteria were also found in project samples of flies, and there were a few articles published around the world about salmonellosis diagnosed in flies.

It has also been speculated from time to time whether fur farms might play a role in the salmonella infections of other farmed animals. However, the salmonella serotypes and phage types that have occurred on fur farms in 2003–2018 have rarely been found in other farmed animals. In 2018, S. Enteritidis PT 33, one of the types typically found on fur farms over the years, was found on four cattle holdings, but more precise typing based on WGS (whole genome sequencing) revealed that the strains affecting fur animals and cattle differed from one another.

Changes in the production structure of cattle farming, meaning larger units, the transfer of animals to different holdings based on growth stages, disease prevention challenges (outdoor runs, open walls, brushes), foreign employees, shared machines, contractors, etc. may increase the risk of infections and the spreading thereof.

The increase of tourism (including study trips) also increases the risk of transmission of salmonella infections. Salmonella infections in humans are primarily asymptomatic. Undercooked meat and eggs are often recognised as risks, but epidemics around the world have increasingly originated from vegetables and fruit as a result of contaminated irrigation water, for example.

Cattle disease surveillance

The disease situation amongst cattle was surveyed with surveillance programmes organised by the authorities for bluetongue disease, leukosis, infectious bovine rhinotracheitis (IBR), bovine viral diarrhoea (BVD), bovine spongiform encephalopathy (BSE) and brucellosis in dairy cattle and suckler cows. Dairy cattle bulk milk samples were collected primarily during late winter/early spring, with the collection and submission of samples being carried out in cooperation with dairies. Suckler cow blood samples were collected at slaughterhouses during slaughter throughout the year.

Dairy cows that had experienced an exceptionally high number of abortions over the last year were tested for BVD, IBR, leukosis and brucellosis. Additionally, dairy cows were also tested for the aforementioned diseases based on random sampling. In addition to bluetongue disease, samples collected from slaughtered suckler cows for surveillance purposes were also tested for BVD, IBR and brucellosis. Samples were also tested in the context of artificial insemination operations, imports and exports and disease diagnosis.

In 2018, surveillance samples were also tested for *Coxiella burnetii* (Q fever) and Schmallenberg virus (SBV) antibodies. Tests for Q fever antibodies were last conducted in 2009, when antibodies were found in the bulk milk samples of four holdings. Incidence remains low and Q fever antibodies were detected in ten bulk milk samples (<1%). Suckler cow samples from seven holdings – a total of eight animals – tested positive or suspicious.

The midge-borne Schmallenberg virus was first recorded in Finland in 2012. The incidence of SBV was surveyed via the testing of bulk milk samples for antibodies in 2013 and 2014. No cases of abortions caused by SBV have been identified in Finland since 2013. In 2018, 19% of bulk milk samples collected in the context of surveillance tested positive, with some samples displaying high levels of antibodies, which may indicate a recent infection. As part of suckler cow surveillance, sera collected from young cows born in 2016–2018 were tested for antibodies, with 93 samples (20%) testing positive. The majority of the positive samples had been collected late in the year, indicating that SBV circulated in Finland during the 2018 midge season. SBV antibodies were also detected in a few samples collected early in the year; these animals were from the same areas as the bulk milk samples that contained high levels of antibodies. Based on these results, it is likely that SBV infections also occurred in some areas of Finland in 2017, before becoming more widespread during the 2018 midge season.

Table 4. Numbers of viral and bacterial infection samples collected from cattle in 2018, sorted by reason for testing and test (serology, virus detection). No new infections were detected. Number of positive samples in parentheses.

	BVD		IBR		Leukosis	Bluetongue disease		Brucellosis	Schmallenberg virus infection	
	Anti-bodies	Virus detection	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies	Virus detection	Antibodies	Anti-bodies (positive)	Virus detection
Dairy cattle surveillance/ bulk milk sample	1 255	0	1 255	0	1 255	0	0	1 255	1 149 (218)	0
Suckler cow surveillance/ individual blood sample	1 832	0	1 832	0	0	1 832 (1)[4]	0	0	472 (93)	0
Artificial insemination operations	229[1]	126	229[1]	0	229[1]	0	0	229[1]	0	0
Disease diagnosis	114	89	112	83	44	1	3	236	72 (2)[3]	3
Import (cattle, semen, embryos)	61[2]	30	15	13	0	0	0	0	0	0
Other reasons (animal trade, export)	153	8	3	0	0	8	0	0	19	242
Total	**3 644**	**253**	**3 217**	**96**	**1 299**	**1 841**	**3**	**1 720**	**1 712**	**245**

[1] includes both milk and serum samples

[2] 59 samples from cows implanted with imported embryos

[3] Schmallenberg virus antibodies were detected in cows that most likely contracted the infection in 2012–2013 based on their date of birth

[4] cow born in Sweden in 2008, imported in 2011, already positive in import examination

BSE tests performed in 2018 are presented in Table 5, sorted by reason for testing. The number of BSE tests performed was of the same order as in 2017. The majority of the cattle tested had died spontaneously or been put down. The testing age limit for emergency slaughtered, animals that died spontaneously or those that were put down is still 48 months. However, animals of all ages are tested if the animal is suspected of having BSE.

Table 5. BSE tests in 2018. 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	0	15	11 295	2	**11 316**

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 cattle BSE surveillance (Table B4) between 2009 and 2018 is presented in the summary tables in Appendix B.

2 Pig diseases

The disease situation amongst rearing pigs remained good: no animal diseases that spread easily or dangerous animal diseases were detected in productive pigs. Salmonella was detected in faecal and/or environmental samples from a total of seven pig holdings, one of which had already tested positive for salmonella in 2017. The most common reasons for testing pig samples were surveillance for 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 Europe and Asia. The testing of wild boars living in the wild is 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%. In 2018, salmonella was detected in faecal and/or environmental samples on a total of seven pig holdings. Of these, one farrowing house had already tested positive (*S.* Derby) in 2017. Of the new infections identified in 2018, one consisted of *S.* Typhimurium diagnosed at a farrowing house based on sampling conducted following a lymph node finding in a sow at a slaughterhouse (*S.* Typhimurium), two consisted of *S.* Typhimurium diagnosed at the contact holdings of the aforementioned farrowing house, one consisted of *S.* Typhimurium diagnosed at an unrelated pig fattening house, one consisted of *S.* Derby diagnosed on a combination pig holding and one consisted of. Enteritidis diagnosed in the environmental samples of one central unit of a sow pool herd. In addition to the aforementioned lymph node finding, one other lymph node sample collected from a sow at a slaughterhouse was also found to contain *S.* Montevideo, but the strain was not detected on the relevant holding.

Trichinellosis not found in rearing pigs

Trichinellosis, which is classified as an animal disease to be reported, was not identified in rearing pigs, so the situation remained the same as in 2016 and 2017. No trichinellosis infections were diagnosed in farmed wild boars either. The incidence of trichinellosis in pigs and wild boars is monitored by way of sampling and testing conducted in connection with meat inspections.

Diagnostics

In 2018, Evira conducted pathologic-anatomical examinations of a total of 254 pig samples, a similar number as in the previous year. The majority of the samples consisted of whole carcasses (214 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, the *Actinobacillus pleuropneumoniae* bacterium was the major cause of pneumonia in growing pigs, as in previous years. Influenza A virus was detected in the samples of two holdings. In total, lung and nasal mucus samples received from 21 holdings were tested for the influenza virus. The most recent case of swine influenza occurred in 2017, when influenza A was detected in the samples of four 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 2018, Evira tested a total of 553 samples from 27 holdings for porcine enzootic pneumonia antibodies, with all results being negative. In 2017, porcine enzootic pneumonia was detected on two new holdings.

Table 6. Results of gastrointestinal infection diagnostic test packages (faecal samples) of weaned piglets and fattening pigs in 2018. Numbers of sample submissions and positive submissions. A submission was recorded as positive if a bacterium was detected in at least one sample. The total number of sample submissions was 57.

Pathogen	Number of sample submissions tested	Number of positive sample submissions (percentage of those tested)	Number of submissions in which the bacterium was the only pathogen detected (percentage of examined)
Toxigenic *Escherichia coli*	36	18 (50 %)	5 (14 %)
Lawsonia intracellularis	36	17 (47 %)	4 (11 %)[1)]
Brachyspira pilosicoli	37	9 (24 %)	0
Brachyspira intermedia	37	22 (59 %)	3 (8 %)
Brachyspira hyodysenteriae	56	1 (2 %)[2)]	1 (2 %)[2)]
Salmonella sp.	37	0	0

[1)] *Lawsonia intracellularis* bacteria were detected in 11 submissions that also tested positive for *B. pilosicoli* and/or *B. intermedia*.

[2)] *B. hyodysenteriae* infection was only identified in one pig examined in the context of import of pigs.

Faecal samples and samples submitted for pathological testing were tested for the causes of gastrointestinal infections. A total of 813 faecal samples from 53 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. The number of faecal samples tested was comparable to 2017. The number of samples was significantly lower than in years when cases of swine dysentery were recorded; the investigations conducted in response to detected cases also increase the total number of samples tested.

All samples from pig holdings tested were negative for swine dysentery. A swine dysentery infection was only identified in one pig examined in the context of import of pigs. A *Clostridium perfringens* type C infection was detected on one holding.

As in previous years, pathogens that cause gastroenteritis identified in the faecal samples of weaned pigs and samples submitted for pathological testing included *Brachyspira pilosicoli*, toxigenic *Escherichia coli* and *Lawsonia intracellularis* bacteria.

Surveillance

The disease situation amongst pigs was surveyed with surveillance programmes organised by the authorities for Aujeszky's disease, TGE, PRRS and classical swine fever. Blood samples for the surveillance were collected from sows in slaughterhouses so that approximately 700 samples were collected from slaughterhouses that slaughter sows 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.

Table 7. Tests performed on pig blood samples for significant viral diseases in 2018, sorted by reason for testing. None of the diseases tested for were detected.

Pigs	Aujeszky's disease		TGE	PRRS		Swine fever		ASF
	"Sero-logy"	Virus detection	"Sero-logy"	"Sero-logy"	Virus detection	"Sero-logy"	Virus detection	Virus detection
Surveillance	717	0	717	736	21	717	0	0
Artificial insemination operations*	1 013	0	850	1 034	25	777	0	0
Holdings with special level health classification	0	0	249	309	21	0	0	0
Disease diagnosis**	16	45	25	39	48	16	53	55
Imports	219	0	219	346	0	219	0	0
Farmed wild boars (surveillance)	38	1	36	40	1	38	1	54
Wild boars living in the wild	325	712	0	0	0	319	715	715
Total	**2 328**	**758**	**2 096**	**2 504**	**116**	**2 086**	**769**	**824**

* including holdings of origin

** rearing pigs, pigs kept for non-commercial purposes and farmed wild boars

Samples collected from wild boars living in the wild were also tested for pig diseases. Hunters continued to contribute actively to African swine fever surveillance in 2018 by submitting blood and tissue samples from wild boars living in the wild to Evira. The disease has never been recorded in Finland. The testing of wild boars living in the wild is 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 in 2009–2018 are presented in Appendix B.

African swine fever is a persistent threat

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

African swine fever is endemic in Africa, and the disease was first described in Kenya in 1921. In 1957, ASF (genotype 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 (genotype I).

In 2007, the disease (genotype II) spread to Georgia, most likely in the food waste of a ship arriving from Africa. Since then, ASF has also spread to Russia, Ukraine and Belarus, among other countries. In 2014, the disease spread to Lithuania, Latvia, Poland and Estonia. After this, cases of ASF have also been confirmed in Moldova, the Czech Republic, Romania, Hungary, Bulgaria and Belgium. In 2018, ASF also spread to China, and continues to spread in the Far East.

African swine fever has never been diagnosed in Finland. If the disease were to spread to Finland, it would inevitably cause major losses for the domestic pork production industry due to subsequent export restrictions, the euthanasation of animals, disruptions in the logistics chain and the renovation of holdings, among other consequences.

The 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 products that contain pork or pork products contaminated with the virus. The virus infects pigs and wild boars when they are fed with food waste containing contaminated food products. 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.

Prevention in brief

Since African swine fever has spread in several countries via food products transported by humans, in 2018 ASF prevention efforts in Finland were heightened and focused particularly on communications targeted at tourists. Information boards detailing restrictions were set up in cooperation with Finnish Customs at border stations between Finland and Russia (Nuijamaa, Vaalimaa), in addition to which the number of information boards at Helsinki's passenger harbours were increased. Furthermore, eastern border stations were supplied with food waste bins, which travellers can use to dispose of any illegal food products. Flyers detailing food import restrictions were also produced and distributed to companies that operate across the eastern border (such as bus companies, VR) and Finnish Customs. Information was also provided via Evira's website and in the form of six informative animation videos about the risk of ASF aimed at different target groups, produced in collaboration with Suomen Sikayrittäjät ry.

Collaboration with the Finnish Wildlife Agency and hunting organisations was also continued, with Evira e.g. participating in information events aimed at hunters and the Ministry of Agriculture and Forestry's wild boar working group, as well as updating guidelines and communications aimed at hunters. Evira also provided hunting organisations and game districts with supplies for sampling and sample submission, as a result of which the number of samples of dead and hunted wild boars received was higher than the year before, with a total of 715 samples (527 in 2017, 366 in 2016 and 171 in 2015). Evira continued to offer rewards for the submission of wild boar samples and reports about dead wild boars.

3 Poultry diseases

The incidence of contagious animal diseases in poultry is low in Finland compared to many other European countries, due to which Finnish poultry is only vaccinated against a few contagious diseases, whereas in many other countries poultry vaccination programmes encompass a wide range of different vaccines. The volume of antibiotics used in Finnish poultry production is also very low, as broiler chickens are not given any antibiotics and laying hens are only rarely medicated. However, Finland imports large numbers of both parent and production stock chickens, which increases the risk of diseases spreading to the country. The Finnish poultry industry monitors the health of flocks of origin and the health situation of poultry in countries of origin closely in cooperation with Animal Health ETT, in addition to which imported flocks are kept in quarantine for approximately 12 weeks after arriving in Finland. During the quarantine period, imported flocks are actively monitored for infectious diseases to ensure that no serious infectious animal diseases enter Finland in imported birds. The samples collected from imported chickens are examined by Evira. No cases of serious infectious diseases, such as avian influenza or Newcastle disease, were detected in poultry.

Highly pathogenic avian influenza

Highly pathogenic avian influenza was once again detected in wild birds in early 2018. 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 an official veterinarian. The testing of wild birds is detailed in Chapter 13.

Diagnostics

In 2018, Evira conducted pathologic-anatomical examinations on poultry samples collected from a total of 330 holdings in the context of health monitoring and import operations. The number of holdings that submitted samples was higher than in the previous year, when samples from 338 holdings were examined. Pathologic-anatomical examinations were conducted on a total of 2,586 poultry samples from 166 holdings, which was slightly less than in the previous year (2,709 samples). The majority of the samples submitted for necropsy were broilers (1,963), in addition to which a total of 395 turkeys and 226 laying hens were also necropsied.

No cases of *Mycoplasma synoviae*, *M. gallisepticum* or *M. meleagridis* infections were detected in productive poultry. *M. gallisepticum* antibody and *M. gallisepticum*/*M. synoviae* PCR tests on non-commercial poultry are 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. *M. gallisepticum* infections were detected on three non-commercial poultry holdings and *M. synoviae* infections were detected on seven non-commercial holdings.

Outbreaks of colibacillosis, which have plagued the Finnish broiler industry in recent years, decreased considerably in 2018, but did not die down completely. The reason why the situation

improved is the launch of a comprehensive vaccination programme, which also includes an autogenous vaccine and covers both grandparent and parent stock. The colibacillosis problems have been caused by strains of *E. coli*, most of which consist of APEC (Avian Pathogenic *Escherichia coli*) bacteria. The same *E. coli* strains have also been found in Denmark, Norway and Sweden, which all have hens produced from the same grandparent stock. The infection has most likely spread forth from the upstream parts of the production chain, due to which it is crucial to extend the vaccination programme to them as well. Evira continued the typification of *E. coli* strains that have caused problems to make sure that the autogenous vaccine used contains the right strains.

Problems caused by *Enterococcus cecorum* bacteria were detected in 22 broiler batches during late summer and autumn. Half of the cases were detected in meat inspection samples. The bacterium is typically detected in connection with spinal abscesses and femoral and tibial head necrosis. In addition to these symptoms, it may also cause pericarditis and hepatitis. The pathological changes caused by the bacterium can hinder the mobility of affected birds. An intestinal bacterium that is also found in healthy birds, *E. cecorum* has become a notable pathogen in recent years.

Swine erysipelas was detected on four laying hen holdings and one pheasant holding. The numbers of roundworms have increased on poultry farms producing barn eggs and are sometimes transmitted to commercial eggs as well. Evira has established a roundworm surveillance programme in collaboration with the poultry industry for the purpose of preventing major outbreaks of the parasite, which have a negative impact on poultry health and production. Roundworms occurring in poultry cannot be transmitted to humans.

Infectious bronchitis virus (IBV) infections were detected on 33 holdings. Of these, nine were broiler breeding holdings, two were production broiler rearing holdings, two were laying hen breeding holdings, 14 were laying hen holdings and six were non-commercial poultry holdings. The IB virus strains identified in production poultry have been similar to vaccine viruses, which have also been previously identified in various numbers over the years. Some of the IBV infections diagnosed in 2018 were associated with slight reductions in egg laying, but otherwise symptoms were very mild and in most cases no symptoms were observed. 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 productive 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 (Gumboro disease) were detected in 2018. Eight cases 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. Two cases of blue wing disease were detected in 2018. Parent flock birds are vaccinated against blue wing disease since infected mother hens pass the virus on to their eggs, causing hatching chicks to develop blue wing disease. Blue wing disease weakens chicks' immune systems, making them susceptible to secondary bacterial infections. The disease's mortality rate can be as high as 30%. In adult birds, blue wing disease is asymptomatic. Blue wing disease is common in Finland, due to which parent flocks' immune response to the vaccine is checked before the flocks are transferred to egg laying facilities. No cases of infectious avian encephalomyelitis (AE) were diagnosed in 2018. Parent stock is vaccinated against AE due to the fact that contracting the virus during egg-laying 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%.

Surveillance

The disease situation amongst poultry is surveyed with surveillance programmes maintained by the authorities for avian influenza (AI), Newcastle disease (Avian avulavirus-1, AAvV-1, PMV-1) and salmonella. A summary of serological tests for avian influenza, Newcastle disease and avian pneumovirus (APV) in poultry in 2009–2018 is presented in Appendix B (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. Approved poultry export facilities 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 2018. No avian influenza viruses or avian influenza antibodies were identified on any poultry holdings.

Number	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	340	540	484	20	80	40	380	108	7	**1 999**
Holdings	34	55	47	2	4	2	38	10	1	**193**

[1)] Includes parent flocks of both laying hens and broilers
[2)] Includes both parent and productive poultry

No avian influenza antibodies or avian avulavirus-1 antibodies were identified in EU surveillance.

Table 9. Viral disease test results in poultry1) in 2018, sorted by reason for testing.

Reason for testing	Avian influenza		Newcastle disease		APV[3)]
	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	1 999 (0/0)	0	6 280 (0/0)	0	0
Import	2 377 (0/0)	0	2 417 (1/3[2)])	0	2457 (x/x[4)])
Disease diagnosis	207 (0/0)	733 (0/0)	202 (0/0)	721 (0/0)	243 (x/x[4)])
Total	**4 583 (0/0)**	**733 (0/0)**	**8 899 (1/3[2)])**	**721 (0/0)**	**2 700 (x/x[4)])**

[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 bird
[3)] Virus detection not used at Evira
[4)] Testing still in progress: serologically positive results, no disease symptoms. More information in the tex.

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 two poultry holdings in 2018 (four holdings in 2017). Both cases of salmonella were detected in the laying hen flocks of small-scale egg production facilities. The serotypes isolated were *S.* Typhimurium and *S.* Hvittingfoss. No cases of salmonella in turkeys or broilers were identified in 2018.

Voluntary health monitoring programme for productive poultry and non-commercial poultry farmers

As of the start of 2016, Evira has maintained 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 fairly common in the samples tested in the context of the programme, whereas *Mycoplasma gallisepticum* antibodies were detected on two holdings. ILT antibodies were detected on one holding in 2018.

Information on the disease situation amongst poultry is also collected through voluntary health monitoring. The programme is used to survey parent flocks of both broilers and laying hens by testing blood samples for the antibodies of IB, ILT and 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). A total of 99 batches of samples were submitted in the context of the health monitoring programme, which was considerably less than in previous years. The majority of the batches (80) were from the parents of broilers and the rest (19) were from the grandparents and parents of laying hens.

In the APV tests performed by Evira in 2018, the samples of several flocks of both broilers and laying hens tested positive for APV antibodies (Table 9 and Appendix B, Table 8). However, the flocks in question did not display any of the typical symptoms of APV. Evira is investigating the causes of the positive test results with an international reference laboratory (Anses, France). The investigation is still ongoing and the results will be announced as soon as they are ready.

Table 10. Health monitoring samples of chickens and broilers in 2009–2018.

Year	AE	CAV	IB	IBD	APV	ILT	*M. gallisepticum*	*M. synoviae*
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)]
2017	1 300	1 900	1 018	1 900	770	838	795	795
2018	1 370	1 509	979	1 340	880	819	995	995

[1)] Positive samples from one chicken breeder holding

In the health monitoring programme for turkeys, blood samples are tested for the antibodies of PMV-3 infection and APV, as well as *M. gallisepticum*, *M. synoviae* and *M. meleagridis* infections. PMV-3 antibodies were detected on two separate occasions. Antibodies of this disease have been occasionally identified in some turkey parent flocks and have in some cases been found to cause a decrease in egg production, but the infection has not been observed to cause symptoms on pullet holdings. All parent flocks imported into Finland are examined in accordance with the programme, and samples were submitted on a total of ten 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 universally vaccinated against any infectious diseases. Only in some individual cases have turkey flocks been vaccinated against swine erysipelas.

Table 11. Health monitoring samples of turkeys in 2009–2018.

Year	APV	PMV-3	*M. gallisepticum*	*M. synoviae*	*M. meleagridis*
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
2017	180	280[8)]	180	180	180
2018	140	240[9)]	160	160	160

[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
[8)] A total of 54 positive samples on two holdings
[9)] A total of 9 positive samples on one holding

4 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 in 2018. The most common reasons for conducting tests on sheep and goats were disease surveillance (maedi-visna in sheep and CAE in goats, as well as scrapie), disease or abortion diagnosis, meat inspections and parasite surveying.

Diagnostics

In 2018, Evira performed pathologic-anatomical examinations on a total of 125 sheep samples and 20 goat samples. The number of samples received was slightly lower than in the previous year (161 samples). The number of samples tested in the context of meat inspection was 21.

A total of 23 samples collected from 13 sheep holdings were tested to diagnose abortions. Infectious causes of abortions were *Listeria monocytogenes* in the samples of one holding and *Escherichia coli* in the samples of two holdings.

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 ten holdings. Cysts caused by *Cysticercus tenuicollis* were found in samples collected from the sheep of three holdings in the context of meat inspection, as well as one necropsy sample. Lancet liver flukes (*Dicrocoelium dendriticum*) were found in two sheep liver samples collected in the context of meat inspection.

Listeriosis of the central nervous system caused by *Listeria monocytogenes* bacteria was detected in two sheep. In addition to this, a systemic infection caused by listeriosis was diagnosed in one lamb. *Mannheimia haemolytica* bacteria were diagnosed as the cause of pneumonia in five sheep, two of which were also diagnosed with *Mycoplasma ovipneumoniae* infections. *Bibersteinia trehalosi* bacteria were isolated from three pneumonia and one systemic infection sample. *Clostridium perfringens* type D enterotoxemia was detected in the samples of seven sheep holdings and four goat holdings. One kid was found to be suffering from infection-induced changes to the intestines and intestinal lymph nodes caused by a *Mycobacterium avium* infection.

No cases of salmonella were identified in 2018.

Orf virus was identified on 12 out of a total of 22 sheep holdings that submitted samples for testing. Additionally, goats from three holdings were tested for the orf virus, on the basis of which the orf virus was identified on one holding.

During the year, Evira tested a total of 63 submissions of faecal samples from sheep and goats from a total of 38 holdings. Samples from 11 of the holdings were tested in order to determine the cause of diarrhoea or a disease, while the samples of the other 27 holdings were tested for parasite survey purposes. The most common findings were eggs of intestinal roundworms (*Strongylida* and *Strongyloides* sp.) and *Eimeria* sp.coccidia. A *Nematodirus battus* roundworm infection was detected for the first time in Finland.

Nematodirus battus roundworms found for the first time in Finland

The suspicion of *Nematodirus battus* was raised during the routine examination of sheep faecal samples submitted to a private laboratory. The samples were forwarded to Evira's laboratory for species identification, with the laboratory confirming the first recorded case of *N. battus* in Finland.

Nematodirus battus is a roundworm of the suborder Strongylida, the eggs of which can be differentiated from those of other Strongylida and Nematodirus species by their size and shape. *N. battus* is primarily a parasite of sheep and goats, but it can also occasionally infect calves. In the UK, *N. battus* is a feared cause of spring diarrhoea in lambs. The parasite has also been found at least in Sweden, Norway, the Netherlands and Canada, although it has not caused outbreaks on a scale similar to the UK in these countries.

N. battus causes diarrhoea in young animals in early spring after the animals are put out to pasture. The eggs are laid in the summer and overwinter in pastures, with the warm period after winter causing them all to incubate at the same time, potentially leading to the presence of large amounts of infectious eggs in pastures. Sometimes a second outbreak of diarrhoea can occur in lambs in the autumn, if eggs excreted during the spring diarrhoea outbreak manage to incubate before winter. If the eggs happen to incubate by the time when lambs are put out to pasture, lambs may end up ingesting large amounts of infectious eggs and developing severe diarrhoea, which causes dehydration and potentially death if left untreated. It should be noted that symptoms can already manifest in the parasite's larval stage, due to which eggs produced by mature roundworms are not always present in the faeces of affected animals in the early stages of the disease.

Since lambs typically contract the disease from pastures used in the previous summer, the most effective method for preventing the disease is pasture rotation, i.e. making sure that lambs are not put out to the same pastures as in the previous summer. Affected ewes are usually asymptomatic, but may excrete small numbers of eggs, which are enough to maintain the disease in pastures without causing major outbreaks.

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 surveyed with a voluntary health control programme. Scrapies surveillance is conducted by testing all sheep and goats over 18 months of age that have died in the carcass collection area for scrapie; sampling is carried out at a processing facility located in Honkajoki. Furthermore, 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 older that show signs of emaciation or neurological symptoms and ones that have been emergency slaughtered. In 2018, atypical scrapie was detected on two sheep holdings, while classical scrapie was not detected.

The results of scrapie surveillance in 2009–2018 are presented in Appendix B (Table B5).

A total of 3,085 samples collected from 71 holdings were tested for maedi-visna and CAE in sheep and goats (Table 12). No maedi-visna/CAE infections were detected in the tests. Brucellosis (*Brucella melitensis*) surveillance was conducted by testing samples collected in the voluntary health control programme for small ruminants and blood samples collected at slaughterhouses in connection with slaughtering. All samples were negative.

In 2018, Evira tested 871 sheep blood samples (from 96 holdings) collected during slaughter and bulk milk samples collected from seven goat holdings for Q fever antibodies. All goat milk samples were negative. However, Q fever antibodies were detected in two animals of one sheep holding.

A total of 871 samples collected during slaughter were tested for Schmallenberg virus antibodies. Several of the samples collected in the autumn tested positive. The positive samples were from sheep in Western, Southern and Central Finland. Some sheep from Western Finland that were slaughtered in the spring also tested positive. Based on these results, SBV seems to have spread in Finland especially during the 2018 midge season.

Table 12. Results of sheep and goat health monitoring and scrapie surveillance programmes in 2018. No cases of maedi-visna/CAE or classical scrapie were detected. Atypical scrapie was detected on two sheep holdings.

Species	Maedi-visna/CAE		Scrapie	
	Antibodies		Prion detection	
	Samples	Holdings	Samples	Holdings
Sheep	3 079	70	1 593	537
Goat	6	1	282	57
Total	**3 085**	**71**	**1 875**	**594**

Summaries of brucellosis surveillance in cattle, sheep, goats and pigs (Table B3) and maedi-visna/CAE health monitoring and scrapie surveillance in sheep and goats (Table B9) conducted in 2009–2018 are presented in Appendix B.

5 Fish and crayfish diseases

The investigation of the easily spreading infectious haematopoietic necrosis (IHN) in fish that was detected in Finland for the first time in 2017 continued in 2018. All of the six affected holdings were emptied, renovated and kept empty of fish and partly empty of water for several months. All contact holdings were also examined at least once. No new affected holdings were found after January 2018, so the epidemic seems to have been successfully contained.

Although the warm summer caused problems on some holdings, the number of new infections remained reasonable and the use of antibiotics remained moderate. The number of crayfish samples tested was low.

Diagnostics

In 2018, Evira tested approximately 2,500 fish submitted for disease diagnosis. Despite the exceptionally warm summer, bacterial infections were not detected on any more fish holdings than usual. However, the incidence of flavobacteria infections was higher than in the previous year, manifesting particularly in the form of columnaris outbreaks during the warm water period. The disease is difficult to control due to being caused by bacteria that are common in nature and having no known vaccine. The outbreaks did not, however, result in any notable increases in the consumption of medicated feeds.

The discovery of bacterial kidney disease (BKD) on several holdings in northern river areas resulted in the BKD-free requirement of planted fish being revoked in the Kemijoki, Oulujoki and Iijoki river basins. The BKD-free requirement was also revoked in the Karvianjoki river basin due to the problematic BKD situation.

The growing popularity of recirculating aquaculture results in the need for holdings utilising this technique to pay particular attention to the prevention of infections, as conditions optimised for fish are also ideal for many pathogens. Treatment options are often limited.

At the initiative of the Finnish Fish Farmers' Association, Evira also investigated the impact of water mould in collaboration with Åbo Akademi and the Natural Resources Institute Finland (Luke). In addition to this, Evira conducted research on the impact of recirculating aquaculture on fish health and the pathogenicity of the genotype 2 infectious pancreatic necrosis (IPN) virus, which has become increasingly common in Finland. This genotype of the virus rarely causes an acute infection, but is often found in asymptomatic carrier fish or in addition to some other pathogen.

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* 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*). Contrary to previous assumptions, 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 2018, acute crayfish plague was detected in the noble crayfish of only one water body, and in one noble crayfish caught live for testing purposes. Both infections were caused by the type of crayfish plague that naturally occurs in signal crayfish. The number of signal crayfish samples examined was two, of which one tested positive for crayfish plague. The signal crayfish in question had been found in a lake that was to be planted with noble crayfish. 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. The EU's list of invasive alien species and renewed crayfish strategy set major limitations on the utilisation of signal crayfish, allowing the catching of signal crayfish but prohibiting their planting and farming.

Surveillance

Regular inspections and sampling of aquaculture animals by Finnish authorities are targeted based on risk at finding potential incidences of VHS, IHN, ISA, SAV and IPN. In addition to this, KHV, SVC and WSD are monitored through spot checks. BKD prevention is carried out 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 2018, risk-based surveillance programme inspections were conducted at 251 fish farms and 57 enterprises with natural food pond farmers. BKD health monitoring inspections were conducted on 93 holdings. The majority of these inspections overlapped with the risk-based surveillance programme inspections.

IHN epidemic at rainbow trout farms

In late 2017, a case of IHN, which is classified as an animal disease that spreads easily, was confirmed at a food fish farm located by the Bay of Bothnia based on the testing of a risk-based virus surveillance sample. IHN occurs in North America, Europe and Asia. The Nordic countries had, however, remained free of the disease until the cases confirmed in Finland. During the investigation into the contacts of the affected fish farm, located by the Bay of Bothnia in the municipality of Ii, infections were also found in the fish of another company in the same area, at a broodfish farm in Tervo and in fishing ponds in Tervo, Nurmes and Kaavi. The fish of all of the affected fish farms were destroyed and the farms were renovated to eradicate the disease in 2018. The origin of the infection remains undetermined. Based on a decision made by Evira, restriction zones were set up in the river basins surrounding the affected areas. IHN surveillance areas were also established in the same areas based on a decree issued by the Ministry of Agriculture and Forestry. In Nurmes, the surveillance area covers a larger area than the restriction zone. Elsewhere in the country, Finland's IHN-free status was upheld. The Nurmes restriction zone was dissolved in 2018. The aim is for the other restriction zones to be dissolved in 2019. A two-year surveillance programme will be carried out in the surveillance areas with the aim of restoring IHN-free status. Risk-based virus surveillance has also been enhanced due to the IHN infections.

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 addition to this, fish are tested for diseases in the context of exports and imports, in connection with transporting fish upstream and when they are found to exhibit symptoms of infectious diseases.

Apart from IHN, the disease-free statuses granted to Finland regarding fish remained unchanged. The restricted area established in Åland in the early 2000s to prevent the spread of VHS is still in force. The remaining three unrenovated facilities are to be renovated in 2020, after which a surveillance programme aiming for the restoration of VHS-free status can be launched. No new cases of VHS have been detected in Finland since the summer of 2012.

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 in 2009–2018 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 3,091 wild fish for VHSV, IHNV and IPNV infections in the context of IHN surveys and broodfish capturing. Furthermore, 1,043 broodfish were tested for BKD and 633 broodfish were tested for SAV.

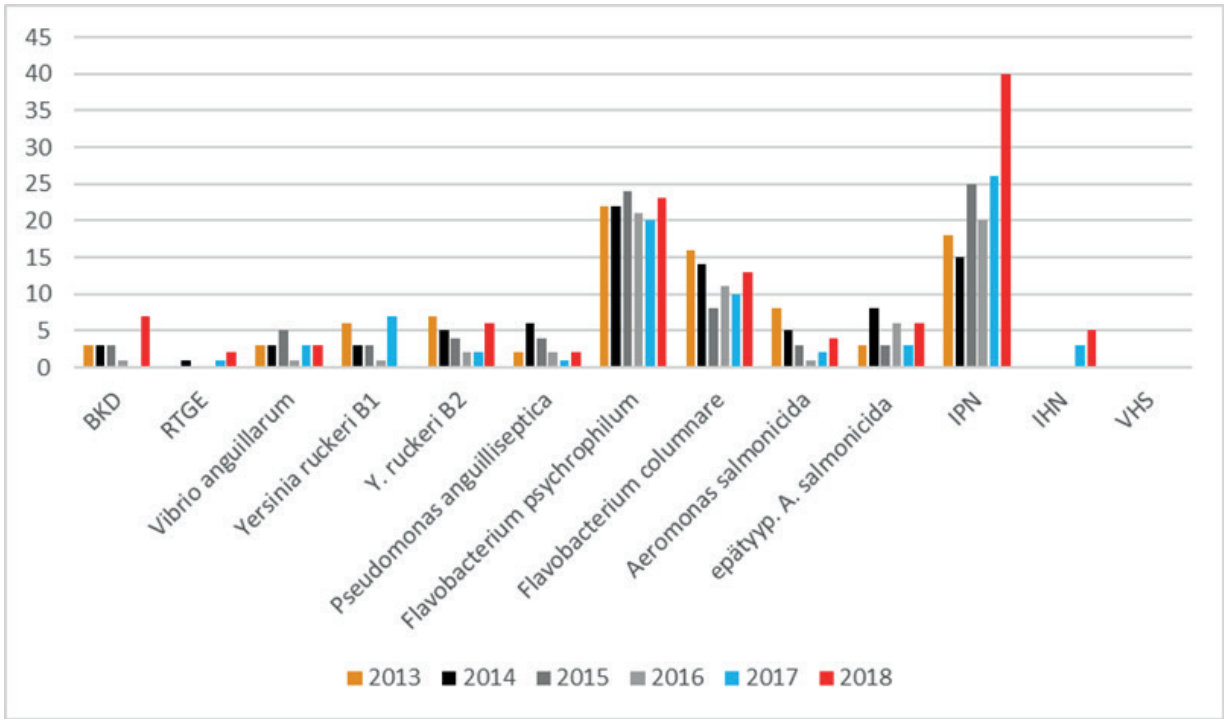


Figure 2. *Incidence of the most common fish infections in Finland in 2013–2018, number of fish farms. The most common findings are flavobacteria, which affect young fish, and IPN virus, both of which are common in the rest of the world as well. The sharp increase in the number of IPN findings is largely the result of the increase in virus tests caused by IHN virus surveys.*

6 Horse diseases

The most common reasons for conducting pathological tests on horses were disease and abortion diagnosis, determining cause of death, determining the suitability of studs for breeding and determining the suitability of horses and sperm for import and export. 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 annual number of virological tests conducted for the diagnosis of horse diseases is low, which affects estimates on the prevalence of many infectious horse diseases in Finland. No cases of abortion caused by arteritis virus were diagnosed in 2018. In contrast, there were several cases of equine herpesvirus EHV-1, which manifests as equine viral abortion, respiratory infections (equine rhinopneumonitis) and neonatal death, diagnosed in 2018. Several equine herpesvirus EHV-4 infections were also diagnosed. An EHV-4 infection usually manifests as a respiratory infection, or equine rhinopneumonitis.

Equine infectious anaemia (EIA) is classified as a dangerous animal disease to be combated in Finnish legislation. The disease has not been identified in Finland since 1943. In Europe, EIA is endemic in Romania and Italy, and individual outbreaks are confirmed annually in other European countries as well. Cases of EIA are reported annually outside of Europe as well, including in the US and Canada. Although EIA is nowadays often diagnosed in asymptomatic horses, cases of the disease causing clinical symptoms are also fairly frequent. EIA has a major impact on the equine industry, due to which the threat of the disease spreading to Finland needs to be taken into account, particularly in the context of imported horses.

Cases of West Nile fever in horses have been reported further and further north in Europe in recent years, and in 2018 the disease was found as far north as Germany. A particularly large number of new cases were reported in different parts of Hungary. While the disease has not been found in Northern Europe as of yet, there have been confirmed reports of insects in the area that could potentially spread it. A viral disease spread by insects, West Nile fever has been spreading in Southern Europe for several years now, with outbreaks typically occurring in the late summer and autumn. In horses, th disease usually manifests as a mild fever, but in some rare cases it can also cause neurological symptoms, in which case the disease is often fatal. Evira has the capability to conduct diagnostic tests for West Nile fever.

Strangles

Samples from a total of three horses submitted to Evira tested positive for *Streptococcus equi* sp. *equi*, which causes strangles. 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, and in 2018 laboratories submitted samples collected from a total of 38 horses to Evira.

Various manifestations of equine herpesvirus EHV-1 and EHV-4 identified

There is no exact data available on the actual incidence of equine herpesvirus infections in Finland. However, testing has revealed that diseases caused by both EHV-1 and EHV-4 viruses occur annually in Finland. Evira tests diagnostic samples from horses for EHV-1 and EHV-4 viruses for the purpose of disease diagnosis in response to respiratory and neurological symptoms and abortion diagnosis. Equine viral abortion is nearly always caused by the EHV-1 virus, while equine rhinopneumonitis, which is a respiratory disease, can be caused by both EHV-1 and EHV-4. Based on the tests performed in 2018, Evira confirmed cases of both equine viral abortion and equine rhinopneumonitis caused by EHV-1. Additionally, the EHV-1 virus was diagnosed as the cause of one neonatal death. Cases of equine rhinopneumonitis caused by the EHV-4 virus were also diagnosed during the year. All in all, Evira tested samples from 69 horses for equine herpesvirus. Laboratories that study animal diseases to be reported must send isolates or positive DNA samples of any EHV-1 and EHV-4 strains that they isolate to Evira, and in 2018 Evira received one positive EHV-1 DNA sample and five positive EHV-4 DNA samples.

No cases of equine influenza

No cases of equine influenza were identified in 2018, based on tests performed on paired serum and/or nasal mucus samples from 18 horses. Equine influenza antibodies are commonly detected in racehorses in particular, which are generally vaccinated against equine influenza. In tests performed by Evira in 2013–2018, equine influenza antibodies were detected in 60–80% of the horses tested.

No cases of EVA detected

In 2017, Evira tested a total of 26 horses for equine viral arteritis (EVA) or to rule out the disease in connection with examinations related to some other suspected disease. All tests were negative.

Stud testing

In Finland, all studs used in artificial insemination must be tested annually before the start of the breeding period for *Taylorella equigenitalis* bacteria and EVA. If a stud's sperm is to be sold on the internal market of the EU, the stud must also be tested for EIA.

Studs used for breeding and five mares, or a total of 328 horses, were tested for *Taylorella equigenitalis*, a bacterium that causes contagious equine metritis (CEM), as required by Decree No 780/2014 on requirements for equine animals used for breeding. All of the samples were negative.

In 2018, Evira tested a total of 194 breeding studs for EVA, with negative results. EVA antibodies were detected in a total of four studs, with further tests conducted on sperm samples coming back negative. As regards EVA, the disease situation has remained unchanged in recent years. 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 autumn 2014, the testing of studs for EVA was expanded to cover all studs used on stud farms, and the testing of studs has since become a major part of EVA surveillance in Finland.

A total of 28 studs were tested for EIA, with all the samples coming back negative.

No dangerous equine diseases detected in Finland

In addition to the testing of studs, EIA tests were also conducted in the context of import and export of horses and gametes. A total of 26 horses were tested due to non-compliance with import requirements. In 2018, a total of 67 horses were tested for EIA, with all tests coming back negative.

Evira also tested a total of 20 horses for dourine and malleus antibodies due to incomplete fulfilment of import requirements, with all tests coming back negative. Dourine has never been detected in Finland. The last confirmed case of malleus in Finland occurred in 1942.

Pathologic examinations of horses

In 2018, Evira performed pathologic examinations on 53 horses (48 horses in 2017). Of these examinations, 36 were conducted to diagnose abortions or diseases in young foals, while the rest were performed to determine the cause of a disease or death in adult horses and ponies. In addition to this, Evira performed examinations on four separate organ samples. In the majority of the examinations performed to diagnose abortions, no specific cause could be isolated. In one case, the cause was determined to be a bacterial infection of the placenta, and the isolates were found to be part of the normal bacterial flora found on horses' skins and environment. In recent years, only a few abortions caused by equine herpesvirus have occurred each year. Arteritis virus was last diagnosed as a cause of abortion in 2011. A forensic examination was performed on one horse. Furthermore, one adult horse was diagnosed with chronic enteritis caused by environmental *Mycobacterium avium* bacteria.

7 Reindeer diseases

The disease situation amongst reindeer has remained good: no cases of dangerous animal disease or diseases that spread easily were identified in reindeer in 2018. The number of reindeer samples annually tested for disease diagnosis has remained at around 50 for the past few years. In 2018, Evira received a total of 46 reindeer samples for testing, of which 24 were organ samples. The number of whole reindeer carcasses examined was 22. Reindeer samples submitted for disease diagnosis 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.

Surveillance for chronic wasting disease (CWD) started

In 2018, Finland started a three-year surveillance programme for chronic wasting disease (CWD). As part of surveillance, herding cooperatives were asked to send in samples, primarily reindeer heads, collected from reindeer that died spontaneously, were put down due to illness or reindeer older than one year of age that were rejected during slaughter or meat inspection. Samples collected from reindeer older than one year of age that were submitted for pathological examination were also tested for CWD insofar as possible. All samples tested were negative for CWD (Table B6).

The TSE situation amongst reindeer and other cervids has been monitored for several years now.

Table 13. TSE testing of cervids in 2009–2018, sorted by species. One TSE-positive elk in 2018.

Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Mountain reindeer (*Rangifer tarandus tarandus*)	0	5	2	1	4	13	3	6	16	294	**344**
Finnish forest reindeer (*Rangifer tarandus fennicus*)	0	0	0	0	0	0	0	4	13	14	**31**
Elk (*Alces alces*)	7	5	4	9	3	3	6	26	48	242	**353**
White-tailed deer (*Odocoileus virginianus*)	150	3	1	2	5	3	4	12	23	50	**253**
Roe deer (*Capreolus capreolus*)	0	2	1	2	2	2	0	7	13	63	**92**
Fallow deer (*Dama dama*)	1	0	1	0	0	1	1	0	1	0	**5**
All	**158**	**15**	**9**	**14**	**14**	**22**	**14**	**55**	**114**	**663**	**1 078**

Meat inspection samples serve as indicators of reindeer health

A large proportion of reindeer samples are submitted by veterinarians inspecting reindeer meat in slaughterhouses. *Echinococcus canadensis* G10 was detected in the lungs of two reindeer – in 2017, lesions caused by the parasite were found in seven reindeer. As in previous years, the infections occurred in the eastern parts of the reindeer management area. Other findings in the meat inspection samples included lesions caused by dog tapeworm *Taenia hydatigena* larvae (*Cysticercus tenuicollis*) and liver bile duct cysts, which are considered abnormalities or neoplasms. Because of their appearance, these types of cysts can easily be confused with cysts caused by echinococcosis. Because of this, all suspicious cyst findings must be submitted to Evira for testing. Additionally, lesions caused by wandering parasites were detected in several samples received from slaughterhouses. Tissue cysts caused by the protozoan parasite *Besnoita tarandi* were found in one sample. Skeletal muscle tumours were found in one sample, and lymphocyte tumours were found in another sample.

Bacterial infections and orf virus

In early 2018, some cases of necrobacillosis (*Fusobacterium necrophorum* infection) and related aphthous stomatitis (mouth ulcers) were identified in reindeer placed in farms that were examined for the purpose of determining the cause of a disease or death. Orf virus infections were identified in two calves examined due to mouth infections in 2018. There were also some cases of eye infections in reindeer caused by *Moraxella* bacteria in early 2018. Other isolates from pulmonary and systemic infections included bacteria that cause purulent infections, such as *Trueperella pyogenes* and *Clostridium* bacteria. One reindeer was diagnosed with purulent meningitis. All samples that included intestines were tested for salmonella, with negative results. A few individual cases of enteritis and peritonitis were identified. Cases of emaciation were often the result of other diseases, such as aphthous stomatitis. In 2018, Evira also received some samples collected from old reindeer whose teeth had worn down to the extent of causing the deterioration of general health and starvation. Other diagnosed causes of death in reindeer included injuries from car accidents and wounds caused by predators.

Parasites are common findings

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. Tissue cysts caused by parasites of the *Sarcocystis* genus were a common incidental finding in microscopic tissue examinations of cardiac and skeletal muscles. For the first time in several years, reindeer nose botfly (*Cephenemyia trompe*) larvae were found in one reindeer.

8 Fur animal diseases

Diagnostics

In 2018, Evira conducted pathologic-anatomical examinations on a total of 486 fur animal samples. The number of samples was nearly the same as the previous year, when 491 samples were examined. Of the samples tested, 146 were minks, 311 were farmed foxes, most of which were blue foxes, and 29 were raccoon dogs. Compared to the previous year, the number of mink samples was considerably lower (237 samples in 2017), whereas the number of fox samples was higher (221 samples in 2017). The number of faecal samples tested to determine the cause of diarrhoea was 187, with the number being considerably lower than in the previous year (228 samples in 2017).

The most common finding in the fox samples examined at Evira was a systemic infection. The second most common finding was enteritis. In the previous year, salmonella outbreaks caused infections in fox pups, but no such outbreaks occurred in 2018. In previous years, metritis has also been a common finding in foxes, but in 2018, only a few cases were identified.

The most common finding in the mink samples examined was a systemic infection. The number of enteritis cases identified was low compared to the previous year. One of the major diseases 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 2018, plasmacytosis was diagnosed in the minks of five 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. Less common findings included systemic infections and metritis.

Major viral pathogens in fur animals include parvovirus and canine distemper virus. Diarrhoea caused by parvovirus was diagnosed in the farmed foxes and raccoon dogs of a total of 42 fur farms (49% of those examined) between May and October. No canine distemper virus infections were diagnosed during the year.

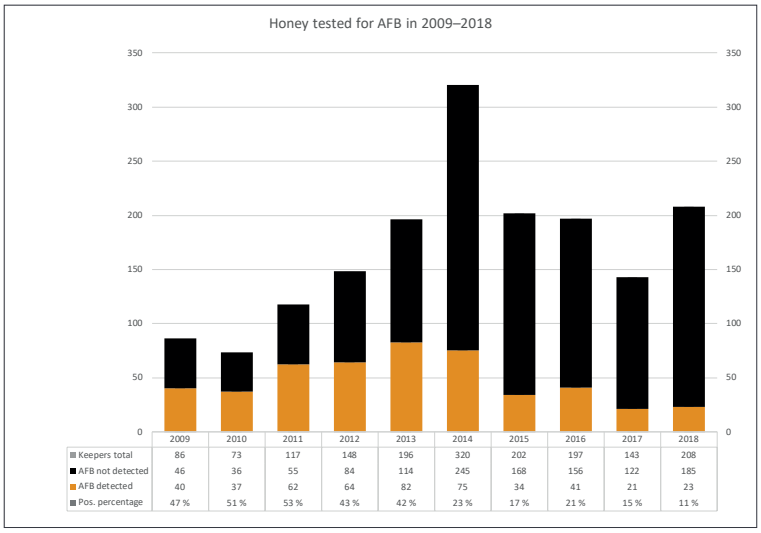
Salmonella infections were diagnosed in pathologic-anatomically examined animals and faecal samples tested to determine the cause of diarrhoea collected from a total of eight fur farms in 2018, five less than in the previous year.

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).

9 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 2018, a total of 1,624 honey samples submitted by 208 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 level prior to the change. In 2018, P. larvae was detected in 5% of the samples submitted to Evira (11% of beekeepers). Cases of clinical American foulbrood were diagnosed at two apiaries in Southwest Finland. Compared to previous years, the proportion of positive samples has remained low. Of the samples tested between 2006 and 2017, 8–31% have been positive.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Keepers total	86	73	117	148	196	320	202	197	143	208
AFB not detected	46	36	55	84	114	245	168	156	122	185
AFB detected	40	37	62	64	82	75	34	41	21	23
Pos. percentage	47 %	51 %	53 %	43 %	42 %	23 %	17 %	21 %	15 %	11 %

Figure 3. *Beekeepers who submitted honey samples for testing for American foulbrood in 2009–2018.*

In 2018, 183 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. However, no honey bee tracheal mites were found in 2018.

European foulbrood infections are usually diagnosed in a few apiaries each year. In 2018, however, *Melissococcus plutonius*, the bacterium that causes European foulbrood, was not found in any of the samples tested.

In 2018, a total of six samples were tested for nosema disease, of which none 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*). No small hive beetles were found in Finland in 2018.

10 Companion animal diseases

Diagnostics

Companion animals are most commonly examined at Evira to determine the cause of a disease or death, to diagnose infectious and hereditary diseases, to investigate animal welfare issues and to determine the cause of death of newborn young. In 2018, Evira conducted pathological examinations on nearly 1,000 animals, of which 631 were dogs, 244 were cats and approximately 90 were other animal species. A large proportion of these examinations consists of forensic necropsies, some of which are conducted in connection with investigations of suspected animal welfare crimes. In addition to performing necropsies, Evira also tested a total of 139 faecal samples for parasites.

Infectious diseases more common in imported dogs

Infectious diseases affecting dogs are dangerous for young puppies in particular due to their underdeveloped immune systems. At present, the most common infectious diseases affecting dogs in Finland are respiratory tract and gastrointestinal infections. There are no effective vaccines against many of these infections, with the exception of diarrhoea caused by parvovirus. Diarrhoea caused by parvovirus is commonly diagnosed particularly in insufficiently vaccinated young dogs. Dogs cannot develop a so-called herd immunity against parvovirus, and the persistence of the virus in the environment poses a constant risk of infection.

Cases of vomiting and diarrhoea caused by various microbes occur every year in dogs, as do cases of bacterial pneumonia and viral and bacterial infections that cause 'kennel cough.' Canine herpesvirus is a relatively rare cause of mortality in newborn puppies. Herpesvirus infections are diagnosed in a few litters each year, and the number of cases has not increased in the past few years. Problems caused by herpesvirus mostly occur when a bitch is infected for the first time while pregnant and transmits the virus to the puppies when they pass through the birth canal. Thanks to regular vaccinations, dangerous viral diseases, such as rabies, distemper and infectious canine hepatitis, rarely occur in Finnish dogs nowadays.

Parasitic diseases are rarely diagnosed in companion animals in Finland, with the exception of imported dogs. Infections caused by *Toxoplasma gondii* and *Neospora caninum* protozoans are rare in dogs. In contrast, intestinal infections caused by *Giardia* sp. or *Cryptosporidium* sp. protozoans are diagnosed regularly from faecal samples. Dogs are susceptible to these infections if they roam freely in nature or outside enclosures. The infections are usually asymptomatic, but in young puppies and dogs with an immune deficiency, they may cause long-term diarrhoea.

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

Infectious diseases are far more common in imported dogs than in Finnish ones. One dog imported from Romania was diagnosed with tuberculosis caused by *Mycobacterium*

tuberculosis, the bacterium that also causes tuberculosis in humans. The dog had been imported approximately two years prior, and had long been displaying various intestinal symptoms. The finding was rare – *M. tuberculosis* was last isolated from a dog in Finland in 1996.

A total of 12 dogs were tested for distemper, with two dogs testing positive. Both had been imported from Russia. One of the two was a rescue dog that had been imported in early 2018 and developed the disease soon after arriving in Finland. The case raised suspicions of insufficient vaccination, as the dog's import documentation indicated that it had been appropriately vaccinated against both distemper and rabies. While distemper vaccination is not a requirement for dogs imported into the EU, all dogs imported into Finland must be vaccinated against rabies. The dog's blood samples were found to contain no rabies vaccine antibodies, despite its import documents indicating that it had been vaccinated. Following this incident, Evira increased random sampling conducted in connection with veterinary border control. In 2018, a total of 95 blood samples were collected from dogs imported from Russia and tested for rabies vaccine antibodies. An alarmingly high proportion of the dogs, 24%, were found to have no rabies vaccine antibodies. All in all, 40% of the dogs sampled had an insufficient level of rabies vaccine antibodies (≥ 0.5 ky/ml). Many rescue dogs imported into Finland are from areas where rabies is prevalent. Insufficient vaccination is therefore a serious matter and a potential threat to both dogs and national health. Symptomatic rabies is always fatal in mammals, including humans. The total number of dogs imported into Finland from Russia was 717 in 2018. The majority of these were rescue dogs. Additionally, approximately 16,000 dogs travelled from Russia to Finland in the company of their owners.

In 2018, Evira also conducted a risk assessment project to more comprehensively determine whether the importation of dogs causes disease risks to people or animals in Finland. The project involved examining samples collected from dogs imported into Finland for rabies vaccine antibody levels, *Brucella canis* antibodies, *Echinococcus multilocularis* and multi-drug resistant ESBL and MRSA bacteria. Furthermore, the samples were analysed for the following parasites: *Dirofilaria immitis*, *Dirofilaria repens* and *Leishmania infantum*. The results of the project are presented in the report "Zoonoottiset taudinaiheuttajat tuontikoirissa" ("Zoonotic pathogens in imported dogs").

Bacterial infections caused by *Brucella canis* occur every now and then in imported dogs and Finnish dogs taken abroad for breeding purposes. In 2018, samples collected from a total of 24 dogs were tested in the context of export, suspected disease or abortion diagnosis. No *Brucella* infections were detected.

Based on monthly reports from veterinarians, a total of 60 cases of canine leishmaniasis were diagnosed. The infection is typically contracted during travel in countries in which the sandflies that act as intermediary hosts for the parasite occur.

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 in Finland is feline infectious peritonitis (FIP) caused by coronavirus. Feline panleukopenia virus (FPV), also known as cat plague, occurs in insufficiently vaccinated young cats. Outbreaks of viral respiratory tract infections also occur regularly in cats. There is no detailed data available on the prevalence of feline leukaemia virus (FeLV) and FIV infections in Finland. Systemic infections caused by the protozoan *Toxoplasma gondii* occur in young cats each year,

and the infection is significantly more common in cats than in dogs due to the fact that cats are the primary hosts of the parasite and more commonly roam freely and hunt in the wild.

A total of 22 cats were tested for rabies. No cases of rabies were diagnosed in cats (Table 14).

Rabbit haemorrhagic disease diagnosed in pet rabbits

A few cases of rabbit haemorrhagic disease (RHD), which was first diagnosed in wild and pet rabbits in Finland in 2016, are still diagnosed nearly every year. Caused by rabbit calicivirus, RHD is a highly infectious and often fatal disease. There is no treatment for RHD, but a vaccine does exist, and it is recommended that all pet rabbits be vaccinated due to the persistence and high transmissibility of the virus. Other common findings in pet rabbits include bacterial respiratory infections, in addition to which a few cases of *Encephalitozoon cuniculi* fungal infections are diagnosed each year.

11 Wildlife diseases

Wildlife disease surveillance 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 by testing animal samples submitted by members of the public. For the disease situation of wild fish and crustacean populations, please refer to Chapter 7 Fish and crustacean diseases.

In 2018, there was a confirmed case of a new animal disease in Finland: cervid TSE, which is related to the North American CWD. Highly pathogenic avian influenza was diagnosed in three white-tailed eagles in the spring. The isolate was a subtype that had not been previously recorded in Finland, H5N6. Salmonellosis is a common disease in wild birds, but in winter 2018 it was unusually prevalent in small birds. Cases of the disease were also confirmed in birds of prey and mammals during the same period.

Cervid TSE diagnosed for the first time in Finland

A case of cervid TSE (transmissible spongiform encephalopathy) was confirmed in Finland for the first time in 2018. The presence of TSE prions was confirmed in a brain tissue sample collected from an approximately 15-year-old female elk found dead in Kuhmo in late January. Further examinations confirmed that the prion was similar to the one found in elk in Norway. These prions found in elk are not the same as the ones found in North American cervids and Norwegian wild mountain reindeer, which cause CWD (chronic wasting disease), an environmentally transmitted disease. Following the case in Kuhmo, sampling was intensified in Kainuu and the northern part of North Karelia. In addition to animals found dead and diseased animals, samples (heads) were also collected in autumn 2018 from old hunted elk. However, no further cases of cervid TSE have been confirmed so far.

In accordance with EU instructions, Finland launched a surveillance programme to determine the incidence of CWD in 2018, which is set to continue until the end of 2020. The aim is to examine a total of 3,000 cervids over a period of three years. The target species are reindeer, Finnish forest reindeer, elk, white-tailed deer and roe deer. The animals to be examined will consist of animals found dead, put down due to illness, determined to be ill during slaughter and animals that died in car crashes. The number of animals examined during the first year of the programme was 644. In 2018, the surveillance programme only applied to reindeer herding cooperatives and certain randomly selected game associations. From 2019 onwards, samples will be collected throughout Finland.

Atypical form of CWD found in an old elk in Kainuu

A case of cervid TSE, an atypical form of CWD, was identified for the first time in Finland in early March 2018. The disease was diagnosed in an old elk found dead in the municipality of Kuhmo.

Chronic wasting disease (CWD) is a slowly progressing prion disease affecting cervids. Infected animals may seem healthy for up to several years, until they start to lose weight, waste away, withdraw from other animals and become agitated in the final stage of the disease. CWD is always fatal for cervids. CWD is a type of transmissible spongiform encephalopathy (TSE) and related to bovine spongiform encephalopathy (BSE), which affects cattle, and scrapie, which affects sheep and goats. The prion that causes infectious CWD is highly persistent in the environment and is transmitted via the bodily fluids of infected animals, such as urine, faeces and saliva.

CWD was first diagnosed in Europe in Norwegian wild mountain reindeer in March 2016. The finding was unexpected, as prior to this the disease had only been found in North America, where it has spread widely among the local cervid population since the 1960s. The original source of the disease in Norway has not been determined. The discovery of the disease in Norway led to enhanced disease surveillance as of the start of 2018 in Finland and five other EU countries. The aim of the three-year (2018–2020) surveillance programme is to examine 3,000 cervids in Finland. The atypical form of the disease has since been found in old elk in Norway, Finland and Sweden. In Norway, the atypical form of the disease has also been found in red deer. The atypical form of the disease found in elk and red deer may be a sporadic, spontaneously created prion mutation, which is not transmitted from animal to animal. There are no recorded cases of CWD affecting humans. Because of this, the meat of affected cervids is still safe for consumption, and no restrictions have been imposed on the sale or export of meat. Since the CWD case discovered in Finland was a form of the disease occurring in elk, there is no need to launch special disease eradication efforts in Finland in light of current knowledge.

New subtype of avian influenza spread to Finland as well

In March-April 2018, three cases of avian influenza were identified in white-tailed eagles found within a relatively small area in Southwest Finland. Found in Parainen, Sauvo and Turku, the white-tailed eagles were diagnosed with highly pathogenic H5N6 avian influenza, which was also found in Sweden and elsewhere in Europe in 2018. Two of the affected white-tailed eagles were found dead, while the third was found sick and was taken to an animal shelter for treatment. The white-tailed eagle had to be put down at the animal shelter along with five other wild birds being treated there to prevent the virus from spreading. After this, the animal shelter's facilities were also cleaned and disinfected. The H5N6 virus has not been found to cause mass deaths of birds in Finland. The H5N8 virus that occurred in Finland and other countries in 2016–2017 was no longer found in Finland in 2018.

In addition to the highly pathogenic viruses mentioned above, one long-tailed duck that was found dead and starved was diagnosed with low pathogenic avian influenza (subtype other than H5 or H7) that does not cause a disease. The bird was found in Central Finland.

Figure 4. *Map of avian influenza cases confirmed in wild birds in 2018.*

In addition to investigating suspected cases of avian influenza, Evira also tested birds found dead in the wild as part of avian influenza surveillance. Over the course of the year, a total of 195 wild birds were tested. More detailed information on avian influenza tests performed on wild birds in 2009–2018 is presented in Table B13 of Appendix B.

Salmonella infections in redpolls and birds of prey

The number of salmonella infections identified in small birds at feeding sites was unusually high in January-February 2018 and later in the spring as well. The epidemic impacted redpolls the worst, with Evira receiving 37 redpolls for examination (4 in 2017) from different parts of the country. Salmonella infections were also identified in bullfinches and in one great tit and one waxwing in the winter. In small birds, salmonella typically causes an infection of the crop, which hinders feeding and eventually develops into blood poisoning. Birds of prey can also contract salmonella by feeding on small birds that carry the disease. In 2018, salmonella infections were identified in three goshawks, two Ural owls and one sparrowhawk. Salmonella is rarely diagnosed in bats, but in summer 2018 the disease was diagnosed in one Daubenton's bat. Individual cases were also diagnosed in lynxes, squirrels, blue hares and brown hares in the winter and spring. In addition to these, salmonella was also diagnosed in hedgehogs and gulls, as is the case every year, in the summer and autumn. The majority of salmonella strains carried by wild animals and all salmonella strains affecting birds are of the species *Salmonella enterica* ssp. *enterica* and its serotype Typhimurium. In hedgehogs, the most common serotype (77%) was Enteritidis, as has been the case in previous years as well. One hedgehog was also diagnosed with the serotype Konstanz, which is rarer in wild animals. In all other mammals examined, the serotype was Typhimurium, but the salmonella affecting the Daubenton's bat could not be serotyped.

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 2018, 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 rabies surveillance. Samples for rabies testing are mostly collected in Southeast Finland and North Karelia, where the baits are distributed. In 2018, the collection campaign failed to reach its target. Evira's goal was to receive a total of 360 animal samples from the distribution area of the baits, and a total of 271 foxes and raccoon dogs were ultimately submitted, yielding 256 brain samples for rabies testing and 240 blood samples for vaccine success monitoring.

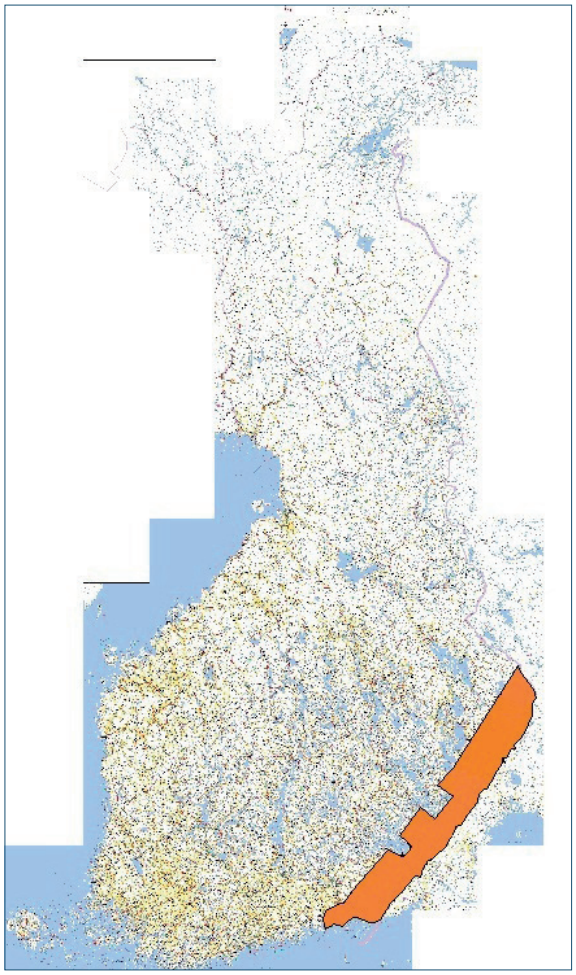


Figure 5. *Drop zone of rabies vaccine baits.*

In total, 406 wild animals from all over Finland were submitted to the rabies surveillance programme. The majority of these were raccoon dogs (201) and foxes (67). No cases of rabies were identified. A total of 58 bats were also tested for rabies.

Table 14. Animals tested for rabies for different reasons in 2018. **No cases of rabies were detected.**

	Traffic accident	Put down due to aggressiveness	Put down due to illegal import	Put down due to injury	Put down due to illness	Put down healthy	Found dead	Indicator animals tested	Total number of animals tested
Ferret	0	0	2/ 0	0	0	0	**0**	2/ 0	**2/ 0**
Cat	0	9/ 0	3/ 0	0	3/ 0	0	**1/ 0**	22/ 0	**22/ 0**
Dog	0	4/ 0	9/ 0	0	2/ 0	0	**1/ 0**	19/ 0	**19/ 0**
Sheep	0	0	0	0	0	0	**0**	2/ 0	**2/ 0**
Musk ox	0	0	0	0	0	0	**0**	1/ 0	**1/ 0**
Cow	0	0	0	0	0	0	**0**	1/ 0	**1/ 0**
Wolverine	1/ 0	0	0	0	0	0	**1/ 0**	2/ 0	**2/ 0**
Polecat	0	0	0	0	0	0	**0**	0	**1/ 0**
Lynx	15/ 0	0	0	6/ 0	0	0	**4/ 0**	25/ 0	**35/ 0**
Bear	0	0	0	3/ 0	0	0	**1/ 0**	4/ 0	**7/ 0**
Fox	0	0	0	0	0	0	**6/ 0**	6/ 0	**67/ 0**
Bat	0	1/ 0	0	3/ 0	2/ 0	1/ 0	**36/ 0**	43/ 0	**58/ 0**
Badger	1/ 0	0	0	0	0	0	**0**	1/ 0	**4/ 0**
Pine marten	0	0	0	0	0	0	**0**	0	**4/ 0**
Otter	3/ 0	0	0	0	1/ 0	0	**13/ 0**	17/ 0	**20/ 0**
Raccoon dog	1/ 0	0	0	0	3/ 0	0	**11/ 0**	15/ 0	**201/ 0**
Wolf	2/ 0	0	0	1/ 0	0	0	**2/ 0**	5/ 0	**7/ 0**
Total	**23/ 0**	**14/ 0**	**14/ 0**	**13/ 0**	**11/ 0**	**1/ 0**	**76/ 0**	**165/ 0**	**453/ 0**

Examinations of wild boars living in the wild

The threat of African swine fever did not decrease in 2018, as the disease continued to spread in Europe and occur in the Baltic countries. In Finland, hunters have participated actively in the surveillance for 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. In 2018, Evira received samples from 715 wild boars. 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.

Table 15. Numbers of samples collected from wild boars living in the wild and submitted for African swine fever testing by municipality in 2018. All samples tested negative for African swine fever.

Municipality	ELY Centre	Number of boars	Municipality	ELY Centre	Number of boars
Finström	Åland	1	Parkano	Pirkanmaa	1
Karijoki	South Ostrobothnia	1	Punkalaidun	Pirkanmaa	1
Kauhava	South Ostrobothnia	1	Pälkäne	Pirkanmaa	6
Kuortane	South Ostrobothnia	1	Tampere	Pirkanmaa	5
Seinäjoki	South Ostrobothnia	1	Urjala	Pirkanmaa	1
Joroinen	South Savo	3	Kokkola	Ostrobothnia	1
Juva	South Savo	1	Kristiinankaupunki	Ostrobothnia	6
Mikkeli	South Savo	4	Toholampi	Ostrobothnia	1
Mäntyharju	South Savo	1	Ilomantsi	North Karelia	4
Pieksämäki	South Savo	1	Joensuu	North Karelia	2
Rantasalmi	South Savo	1	Juuka	North Karelia	1
Savonlinna	South Savo	1	Kitee	North Karelia	11
Sulkava	South Savo	2	Lieksa	North Karelia	1
Asikkala	Häme	1	Polvijärvi	North Karelia	1
Hausjärvi	Häme	1	Tohmajärvi	North Karelia	9
Hollola	Häme	2	Kaavi	North Savo	1
Janakkala	Häme	1	Kiuruvesi	North Savo	1
Lahti	Häme	7	Pielavesi	North Savo	1
Sysmä	Häme	4	Vesanto	North Savo	2
Hamina	Southeast Finland	7	Oulainen	North Ostrobothnia	1
Iitti	Southeast Finland	5	Pyhäjärvi	North Ostrobothnia	1
Imatra	Southeast Finland	27	Siikajoki	North Ostrobothnia	1
Kotka	Southeast Finland	15	Eura	Satakunta	1
Kouvola	Southeast Finland	35	Eurajoki	Satakunta	5
Lappeenranta	Southeast Finland	149	Kankaanpää	Satakunta	1
Luumäki	Southeast Finland	22	Pori	Satakunta	1
Miehikkälä	Southeast Finland	29	Ulvila	Satakunta	1
Parikkala	Southeast Finland	60	Lapinjärvi	Uusimaa	36
Pyhtää	Southeast Finland	31	Loviisa	Uusimaa	33
Rautjärvi	Southeast Finland	56	Myrskylä	Uusimaa	1
Ruokolahti	Southeast Finland	19	Mäntsälä	Uusimaa	1
Virolahti	Southeast Finland	21	Porvoo	Uusimaa	18
Hyrynsalmi	Kainuu	1	Pukkila	Uusimaa	2
Kajaani	Kainuu	2	Sipoo	Uusimaa	9
Kuhmo	Kainuu	1	Laitila	Southwest Finland	1
Kuhmoinen	Central Finland	1	Mynämäki	Southwest Finland	6
Ikaalinen	Pirkanmaa	2	Salo	Southwest Finland	2
Juupajoki	Pirkanmaa	5	Uusikaupunki	Southwest Finland	2
Kangasala	Pirkanmaa	2	Vehmaa	Southwest Finland	6
Orivesi	Pirkanmaa	5	**Total**		**715**

Echinococcus multilocularis-free status maintained, *Echinococcus canadensis* spreading

Of the small predator samples submitted to Evira, foxes and raccoon dogs are tested for *Echinococcus multilocularis*. *Echinococcus multilocularis* infections have never been detected in Finland, and Finland is considered a country free of *E. multilocularis* in the EU. In 2018, a total of 529 animals (203 foxes and 326 raccoon dogs) were tested for the parasite. *E. multilocularis* surveillance in Southern and Southwest Finland is conducted in cooperation with the regional offices of the Finnish Wildlife Agency. Small predators submitted to Evira in the context of rabies surveillance are also tested for *E. multilocularis*.

Echinococcus canadensis, whose intermediate hosts are cervids and definitive hosts are wolves and dogs, occurs primarily in Eastern Finland (Eastern Lapland, Kuusamo, Kainuu, North Karelia), but seems to have spread westward in recent years. In 2018, the parasite was found in 29% of examined wolves (5 positive samples out of 17 examined). Of the positive samples, four were collected in the parasite's typical area of distribution in Eastern Finland, and one was found in southern Häme, where *E. canadensis* has not been previously found. Two cases of *E. canadensis* were also identified in reindeer (see also Section 9 Reindeer diseases). Four cases were also identified in elk, of which three were identified in an area south of Oulu, which lies west of the parasite's typical area of distribution, and one was identified in North Karelia. The gradual growth of the distribution range of *E. canadensis* towards western and southern Finland emphasises the importance of the appropriate processing of elk slaughterhouse waste throughout Finland. Elk lungs and livers that may contain cysts caused by *E. canadensis* larvae must not be given to dogs or left in the wild to be eaten by wild canines.

Carnivorous mammals and birds are tested for the parasitic roundworms (*Trichinella* spp.) living in the muscle tissue. Trichinella worms are fairly common in the wild in Finland (Table B14). Trichinella findings in bears and wild boars made by different laboratories are submitted to Evira for confirmation.

A total of 43 cases of scabies (*Sarcoptes scabiei* mite) were confirmed in wild animals. As in previous years, scabies infections were most commonly identified in raccoon dogs (25 cases) and foxes (13 cases). In addition to these, scabies infections were diagnosed in five lynxes. Geographically, the cases are centred around southern Finland: 77% of the animals diagnosed with scabies were from the regions of Southwest Finland, Häme, Uusimaa, Kymenlaakso and South Karelia. Scabies does, however, occur in the north as well, with two cases confirmed in foxes in Utsjoki, for example. Cases of scabies continued to be identified all year round.

Only a few cases of tularemia identified

In 2018, Evira received 13 blue hares and 58 brown hares for testing. A total of four cases of tularemia were identified, of which three were in brown hares and one was in a blue hare. Three of the cases were identified during the typical tularemia season (July–September), during which tularemia bacteria are transmitted by insects. The fourth case was identified in January and consisted of an infection contracted via the respiratory tract, as is typical in the winter season. The cases occurred in different parts of the country: in Kymenlaakso, the Oulu region and North Karelia. Other infectious pathogens identified in hares included *Toxoplasma gondii* parasites (3 cases) as well as the bacteria *Yersinia pseudotuberculosis* (5 cases) and *Pasteurella multocida* (4 cases). All of these pathogens cause severe systemic infections in blue and brown hares,

and infections occur annually in Finland. Cases of salmonellosis (systemic infections caused by salmonella bacteria) were identified in late winter and early spring in both brown hares and blue hares. The hares most likely contracted the disease during visits to bird feeding sites, at which salmonella is common.

Cause of death surveillance in large predators

In 2018, the whole or partial carcasses of two wolverines, 42 lynxes, nine wolves and ten bears were submitted to Evira in the context of death and disease surveillance in large predators. Of these, one wolverine, 29 lynxes, three wolves and five bears were determined to have died or been injured in traffic accidents. Five lynxes were diagnosed with scabies. Salmonella was found in the intestines of one lynx that had been run over by a car. Four lynxes were determined to have starved to death. One lynx was diagnosed with a systemic infection, which had most likely developed as a result of bite wounds. One lynx that had a broken leg was shot with police permission. The number of bears shot with police permission was four, of which three had been repeatedly spotted wandering near inhabited areas (with one visiting honey bee nests) and one was put down due to leg problems. The number of wolves shot with police permission due to wandering near inhabited areas was four. None of these wolves showed any signs of notable injuries or illnesses. In 2018, examinations revealed illegal killings of all large predator species (one wolverine, one lynx, one bear and two wolves). Furthermore, the body of one lynx that had been run over by a car was found to contain encapsulated shotgun pellets.

Avian chlamydiosis and trichomonosis in small birds

In 2018, avian chlamydiosis (*Chlamydophila psittaci*), a zoonotic, i.e. capable of infecting humans, bacterial disease, was diagnosed in one bullfinch, one great tit and two yellowhammers. All of the cases occurred in different locations around the country. Avian chlamydiosis can be transmitted to humans as a result of prolonged, close contact with an infected bird. However, the risk of infection posed by birds visiting feeding sites is practically zero.

Cases of trichomonosis, an infection of the crop affecting small birds caused by *Trichomonas gallinae* parasites, were identified in redpolls and yellowhammers in different parts of Finland. A rarer case of trichomonosis in a brambling was identified in February in Southern Finland. In the summer and autumn, cases were also identified in bullfinches, greenfinches and spruce siskins. All in all, nine outbreaks of the disease were confirmed. Trichomonosis seems to have spread everywhere in Finland, including Lapland.

Cases of lead poisoning in eagles and swans

The number of white-tailed eagles found dead due to lead poisoning was seven in 2018, the same as in the previous year. In addition to this, lead poisoning was also diagnosed in three whooper swans and one golden eagle. Cases of lead poisoning are identified in birds every year. Swans may inadvertently swallow lead shotgun pellets to use as gastroliths, after which the shots start slowly melting in the bird's stomach. Eagles can end up ingesting a toxic amount of lead by eating the carrion of shot animals that contain lead shotgun pellets or bullet splinters, for example. The lead then dissolves fairly rapidly in the raptor's stomach.

Online reports submitted about birds in particular

Wild animals that are found sick or dead can be reported on Evira's website, which is encouraged especially in cases where sending a sample of the animal is not possible. In 2018, the number of reports submitted via the website was 240, slightly higher than in the previous year (214 reports). Reports were submitted from nearly everywhere in Finland. The most common species reported were whooper and mute swans, with 62 reports. Swan observations were received from different parts of the country, particularly during the birds' migration period in May, but also in the summer and autumn. Many of the reports were submitted due to a bird being suspected of hitting a nearby power line. The number of reports submitted about small birds (most commonly redpolls) was 21, the majority of which (15) were submitted during the salmonella epidemics in January-February. Birds of prey (hawks, owls, eagles) were also frequently reported, with the total number of reports being 37. Over half of the bird of prey findings were made during the cold period of the year, in January-April. The number of reports about hares (blue and brown hares) was 23, with the majority of reports (16) submitted in the summer and autumn. The number of reports about cervids (white-tailed deer, roe deer, elk) was 17. Individual cervid sightings were made fairly evenly throughout the year, primarily in the distribution area of white-tailed deer in Southern Finland. The number of reports about hedgehogs and otters were seven and six, respectively.

Appendix A: Incidence of selected animal diseases in Finland

Table A1. Incidence of selected multiple species diseases in Finland in 2018

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		x	
• *E. multilocularis*	Fox, raccoon dog, rodents		Never
• *E. canadensis*	Cervids, dog, wolf		2018
Heartwater	Ruminants		Never
Tularemia	Blue and brown hare, rodents, birds	x	2018
Rinderpest (cattle plague)	Ruminants		1877
Leptospirosis	Cattle, pig, horse, dog	x	2017 [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	2018[4)]
Rabies	Mammals	x	
• Rabies			1989
• Bat rabies			2017
Rift Valley fever	Ruminants	x	Never
Salmonella infections	Numerous different species	x	2018
Foot-and-mouth disease	Cloven-hoofed animals		1959
Trichinellosis		x	
• Production animals	Pig, farmed wild boar, horse		2017[5)]
• Other mammals	Predators, wild boar		2018
TSEs (Transmissible Spongiform Encephalopathies)			
• BSE	Cattle	x	2001
• Classical scrapie	Sheep, goat		2005[6)]
• Atypical scrapie	Sheep, goat		2018
• 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)] Clinical symptoms in two dogs

[3)] In a zoo animal

[4)] Antibodies

[5)] In a farmed wild boar

[6)] 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	2018
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	2018
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 type A	2018
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 and other bird 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 • Other birds in captivity • Wild birds	 Never 2016 2018
Marek's disease	2018[1)]
Low pathogenic avian influenza (in poultry)	Never
Mycoplasma gallisepticum infection (avian mycoplasmosis)	2018[1)]
Mycoplasma meleagridis infection	Never
Mycoplasma synoviae infection (avian mycoplasmosis)	2018[1)]
Newcastle disease • Poultry • Other birds in captivity • PMV-1 infection in wild birds	 2004 2013 2018
Psittacosis, also known as parrot fever, and ornithosis (avian chlamydiosis)	2015[1)]
Avian infectious laryngotracheitis (ILT)	2018[1)]
Avian infectious bronchitis (IB)	2018
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
Ram epididymitis (*Brucella ovis*)	Never
Maedi-visna (MV)	2006
Nairobi sheep disease	Never
Peste des petits ruminants (PPR)	Never
Salmonella Abortusovis	Never
Scrapie • Classical scrapie • Atypical scrapie	 2005[1)] 2018
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)	2018
Viral haemorrhagic septicaemia (VHS)	2012[1)]
Koi herpesvirus (KHV)	Never
Bacterial kidney disease (BKD) in inland water area	2018
Salmon fluke infection (*Gyrodactulus salaris*) in the conservation area of Upper Lapland	1996
Infectious pancreatic necrosis (IPN) in inland water area	2018[2)]
Salmonid alphaviruses (SAV)	Never
Spring viraemia of carp (SVC)	Never
White spot disease in crustaceans (WSD)	Never
Crayfish plague	2018[3)]
Marteiliosis in molluscs	Never
Bonamiosis in molluscs	Never

[1)] In the VHS restriction area of Åland
[2)] Genogroup 2 infection
[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)	2017
Equine influenza	2012
Equine infectious anaemia (EIA)	1943
Equine piroplasmosis (EP)	2017[1)]
Equine rhinopneumonitis/equine viral abortion	2018
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	2018
European foulbrood	2017
Varroatosis	2018
Nosemosis	2017
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 in 2009–2018, 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. Schmallenberg virus antibody surveillance began 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. Bluetongue disease surveillance began in 2007–2008. The testing of bulk 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 in 2009–2018. No antibodies other than Schmallenberg were detected.

Year	BVD		IBR	Leukosis	Bluetongue disease	Schmallenberg	
	Samples (number)"	Positive (%)	Samples (number)	Samples (number)	Samples (number)"	Samples (number)	Positive (number)
2009	11 763	0,06	3 440	3 440	7 527	0	0
2010	11 112	0,04	3 277	3 277	2 708	0	0
2011	3 302	0,09[1)]	1 449	1 449	860	0	0
2012	2 963	0,10[1)]	1 312	1 312	0[2)]	0	0
2013	1 800	0,05[1)]	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
2017	715	0	715	715	0	0	0
2018	1 255	0	1 255	1 255	0	1 149	218

[1)] BVD seropositive sample, old infection

[2)] 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 in 2009–2018.

Year	BVD		IBR	Bluetongue disease		Schmallenberg virus	
	Samples (number)	Positive (number)	Samples (number)	Samples (number)	Positive (number)	Samples (number)	Positive (number)
2009	3 524	0	3 524	2 337	0	0	0
2010	4 108	0	4 108	2 626	0	0	0
2011	4 661	1[1)]	4 661	4 661	0	0	0
2012	5 096	1[1)]	5 096	5 096	0	1 093	93
2013	2 485	1[1)]	2 485	2 485	1[2)]	97	8
2014	7 915	1[3)]	7 915	7 915	1[4)]	0	0
2015	8 141	0	8 141	8 141	1[4)]	0	0
2016	7 901	0	7 901	7 901	0	0	0
2017	6 885	0	6 885	6 885	0	0	0
2018	1 832	0	1 832	1 832	1[5)]	472	93

[1)] BVD seropositive sample, old infection
[2)] BTV-14 seropositive Finnish suckler cow
[3)] BVD seropositive suckler cow imported from Denmark (seropositive already in the import tests in 1999)
[4)] BTV seropositive suckler cow imported from Sweden (seropositive already in the import tests in 2011)
[5)] BTV seropositive cow born in Sweden in 2008, positive already in the import tests in 2011

Brucellosis surveillance in different species

Table B3. Surveillance and health monitoring tests for brucellosis in 2009–2018. All test results were negative.

Year	Sheep	Goat	Cattle		Pig
	Number of samples	Number of samples	Number of bulk milk samples	Number of blood samples	Number of samples
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[2)]	1 245	2 126
2013	2 709	534	130	1 072	2 079
2014	4 156	160	869[3)]	715	2 076
2015	4 501	6	929	681	1 297
2016	4 295	52	908	681	2 055
2017	3 856	16	91[2)]	439	1 711
2018	3 931	0	1 336	391	1 484

[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 brucellosis cases.
[2)] Dairy cattle bulk milk samples were tested in the context of artificial insemination operations
[3)] In 2014, the surveillance testing of bulk milk samples was 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 surveillance of a cattle group at risk. As a result, BSE 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 BSE testing of healthy cows ended entirely on 1 March 2013.

Table B4. BSE surveillance in cattle in 2009–2018.
BSE was not detected in any of the samples.

Year	Number of samples tested*
2009[1)]	72 145
2010	73 715
2011[2)]	56 187
2012	38 718
2013[3)]	15 911
2014	10 778
2015	11 576
2016	11 234
2017	11 596
2018	11 316

* The numbers also include animals not covered by the mandatory testing programme
[1)] The age limit of slaughtered cows to be tested was raised to 48 months on 1 January 2009
[2)] The age limit of slaughtered cows to be tested was raised to 72 months on 1 July 2011
[3)] BSE testing of healthy cows ended on 1 March 2014

Table B5. Surveillance of scrapie in sheep and goats in 2009–2018.

Year	Sheep		Goat	
	Number of samples	Number of pos. holdings/ samples	Number of samples	Number of pos. holdings/ samples
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
2017	1 673	0/0	205	0/0
2018	1 593	2/2[1)]	282	0/0

[1)] Atypical scrapie (Nor98)

Table B6. TSE testing of other animals in 2018. TSE was diagnosed in one elk.

Species	Number of animals
Cat	73
Reindeer	294
Fur animals	
Mink	53
Fox	33
Raccoon dog	13
Wild animals	
Elk (*Alces alces*)	242
White-tailed deer (*Odocoileus virginianus*)	50
Roe deer (*Capreolus capreolus*)	63
Finnish forest reindeer (*Rangifer tarandus fennicus*)	14
Total	**835**

Pigs

Table B7 contains the results of surveillance and health monitoring programmes, disease diagnosis and import tests. All test results were negative in 2018. Clinical leptospirosis has never been diagnosed in rearing pigs 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 in 2009–2018.

Year	Aujeszky's disease	TGE	Swine fever	Leptospirosis (pos. results in parentheses)	Swine influenza (pos. results in parentheses)	SVD	PRRS	ASF
2009	3 040	4 124	3 035	281 (0)	3,086 (484)	1549	4 672	0
2010	3 171	3 899	3 172	35 (0)	0	1 738	4 150	14
2011	2 599	2 883	2 818	100 (0)	0	1 264	3 754	128
2012	2 769	3 361	2 678	97 (0)	0	699	3 815	1 137
2013	2 649	2 986	2 429	39 (0)	0	26	4 058	1 178
2014	2 725	2 740	2 437	2 (0)	0	0	3 515	1 227
2015	2 320	2 332	2 050	0	0	0	2 909	180
2016	2 140	1 867	1 929	0	0	0	2 455	24*
2017	2 387	1 917	2 029	0	0	0	2 661	0
2018	2 328	2 096	2 086	0	0	0	2 504	0

* Surveillance emphasises virological surveillance instead of serological surveillance

Poultry

Table B8. Serological tests for viral diseases in poultry[1] in 2009–2018. Includes results of EU surveillance programmes, disease diagnosis 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
2009	3 204	0/0	8 117	2/43[3]	8 393	3/55[4]
2010	3 175	0/0	8 325	3/61[3][5]	8 416	4/21[5]
2011	3 011	1/11[2]	9 289	2/48[3][5]	9 521	1/63[5]
2012	3 223	2/8	10 423	3/423)5)	10 078	1/60[5]
2013	2 712	1/3[2]	10 686	4/910[3][5][6][7]	9 921	1/53[5]
2014	4 318	2/12[2]	11 606	6/249[3][5]	5 933	3/17[5]
2015	5 245	1/1[2]	10 613	2/14[3][5]	2 592[8]	2/41[5]
2016	3 902	0/0	9 177	4/10[3][5]	1 728	3/43[5]
2017	4 369	0/0	9 591	3/6[3][5]	2 244	4/50[5]
2018	4 583	0/0	8 899	1/3[5]	2 700	x/x[9]

[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] H5 antibodies, virus detection negative, no symptoms
[3] Serology positive, virus detection negative, no symptoms
[4] Serology positive in preliminary tests. Confirmation tests did not provide further clarification.
[5] Maternal (transferred from mother to offspring) antibodies in imported birds
[6] Vaccination antibodies in imported birds
[7] Serology positive, low pathogenic PMV-1 virus detected, no symptoms
[8] The EU surveillance programme for APV ended in 2015
[9] Testing still in progress: serologically positive results, no disease symptoms. More information in the text.

Sheep and goats

Table B9. Samples collected in the health control programme for maedi-visna in sheep and CAE in goats in 2009–2018. Maedi-visna or CAE were not detected.

Year	Sheep	Goat	Total number of samples
	Number of holdings tested	Number of holdings tested	
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
2017	75	2*	3 077
2018	70	1	3 085

* Includes holdings that keep sheep in addition to goats

Fish and crustaceans

Table B10. Surveillance of viral fish diseases in 2009–2018.

Year	IHN, IPN, VHS		ISA		SAV	KHV	SVC	Number of fish farms where the virus was isolated						
	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
2009	73/318	51/177	0	0	0	0	3/5	0	3[2)]	6[4)]	0	0	0	0
2010	65/3 726	53/2 890	0	0	0	0	2/33	0	9[2)]	1[3)]	0	0	0	0
2011	44/2 588	38/1 256	0	0	0	0	1/12	0	6[2)]	2[3)]	0	0	0	0
2012	68/5 406	49/1 332	2/320	4/95	0	0	0	0	10[4)]	1[3)]	0	0	0	0
2013	55/3 740	46/1 870	0	1/20	35/1 050	0	0	0	18[5)]	0	0	0	0	0
2014	54/2 480	41/1 347	9/603	0	25/750	0	0	0	16[6)]	0	0	0	0	0
2015	62/2 570	45/1 382	1/60	0	45/1 179	0	0	0	23[7)]	0	0	0	0	0
2016	53/2 753	38/1 164	1/10	0	32/1 476	0	0	0	23[8)]	0	0	0	0	0
2017	55/2 591	18/991	7/240	0	30/1 500	0	2/25	4	29[9)]	0	0	0	0	0
2018	64/2 544	30/1 038	6/125	0	35/1 700	0	0	3	37[10)]	0	0	0	0	0

[1)] Number of pools in 2000–2009. 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 restricted area of Åland

[4)] IPN was found on a total of ten farms, of which 6 (gr 2) were in inland water areas

[5)] IPN was found on a total of 18 farms, of which 6 (gr 2) were in inland water areas

[6)] IPN was found on a total of 16 farms, of which 6 (gr 2) were in inland water areas

[7)] IPN was found on a total of 23 farms, of which 4 (gr 2) were in inland water areas

[8)] IPN was found on a total of 23 farms, of which 11 (gr 2) were in inland water areas

[9)] IPN was found on a total of 29 farms, of which 13 (gr 2) were in inland water areas

[10)] IPN was found on a total of 37 farms, of which 13 (gr 2) were in inland water areas

Table B11. Surveillance of bacterial kidney disease (BKD) in fish in 2009–2018.

Year	Tests inland water area	BKD cases
	Farms/fish	Inland water area
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
2017	59/3 946	0
2018	48/3 525	7

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

Table B12. Surveillance of *Gyrodactylus salaris* in 2009–2018. All test results were negative.

Year	Teno River[1)]	Näätämö River[1)]	Paatsjoki River[1)]	Paatsjoki River, farmed fish		Tuuloma River[1)]
	Salmon	Salmon	Grayling	Others	The Salvelinus genus	Grayling
2009	100	122	15	150 (salmon)	60	53
2010	102	173	15	0	120	30
2011	65	156	15	0	120	30
2012	100	120	15	0	100	0
2013	100	120	15	0	120	30
2014	100	120	15	0	120	30
2015	100	120	15	0	120	0
2016	101	120	15	0	120	10
2017	30	120	15	0	60	0
2018	99	120	15	60 (brown trout)	0	22

[1)] Samples collected from wild-caught fish

Wildlife

Table B13. Surveillance of avian influenza in wild birds in 2009–2018. All viruses found before 2016 were low pathogenic.

Year	Number of birds tested	Positive birds (pcr/virus isolation)
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)]
2017	316	7/0[5)]
2018	195	4/3

[1)] Collection of samples from healthy birds ended in 2011
[2)] Includes 70 healthy birds tested
[3)] Of the positive results, 8 were healthy birds and one was a bird that was found dead
[4)] Includes 2 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 2018

Species	Number of Trichinella positive animals	Number of animals tested	Proportion of positive animals	Incidence in 2005–2015
Raccoon dog	91	229	39,7 %	33,0 %
Fox	77	180	42,8 %	23,5 %
Badger	1	11	9,1 %	8,7 %
Pine marten	6	11	54,5 %	11,3 %
Otter	1	34	2,9 %	5,0 %
Bear	16	914	1,8 %	6,1 %
Lynx	24	42	57,1 %	44,9 %
Wolf	4	9	44,4 %	33,9 %
Wolverine	1	2	50,0 %	56,3 %
Goshawk	1	18	5,6 %	2,3 %
Wild boar	2	268	0,7 %	5,1 %

Appendix C: Numbers of animal holdings and animals in Finland in 2018

Terrestrial animals

Terrestrial animals	Animals	Holdings	Reindeer owners	Beehives	Apiaries
Cattle	863 127	10 617			
Pigs (commercial production)	1 076 301	1 156			
Non-commercial pigs	664				
Bison	152	12			
Sheep	135 480	3 958			
Goats	8 201	975			
Cervids (reindeer)	184 958		4 494		
Honey bees				72 000	7 845
Laying hens	3 663 349	975			
Broilers	8 146 724	135			
Turkeys	284 284	52			
Other commercial poultry	43 809	400			
Camelids		107			
Horses	74 400	16 000			
Dogs	700 000				

Aquatic animals

Aquatic animals	Production[1]		Establishments
	Farmed[2]	Wild[3]	
Fish	14 600 T	190 600 T	402
Crayfish		157,2 T	

[1] Tonnes
[2] Farmed = from aquaculture
[3] Wild = wild-caught

Appendix D: Disease-free statuses and additional guarantees granted to Finland

Animal disease	Status	EU/ OIE*	Valid decision
African horse sickness	Disease-free	OIE	
Aujeszky's disease (pseudorabies)	Disease-free, resulting in additional EU guarantee	EU	2008/185/EC
Brucellosis (*Brucella abortus*)	Disease-free	EU	2003/467/EC
Brucellosis (*Brucella melitensis*)	Disease-free	EU	2001/292/EC
BSE	Negligible risk	OIE	
Echinococcus multilocularis	Disease-free	EU	(EU) 2018/878
Gyrodactylus salaris	Disease-free in the Teno and Näätämö river basins. The Paatsjoki, Tuulomajoki and Uutuanjoki river basins are part of the buffer zone	EU	2010/221/EC
Rinderpest (cattle plague)	Disease-free	OIE	
Spring viraemia of carp (SVC)	Disease-free	EU	2010/221/EC
Classical scrapie	Negligible risk	EU	2016/1396/EC
Classical swine fever (CSF)	Disease-free	OIE	
Infectious salmon anaemia (ISA)	Disease-free	EU	2009/177/EC
Salmonid alphaviruses (SAV)	Disease-free in the inland water area	EU	2010/221/EC
Enzootic bovine leukosis (EBL)	Disease-free	EU	2003/467/EC
Bovine tuberculosis	Disease-free	EU	2003/467/EC
Newcastle disease	A country in which vaccination against Newcastle disease is not conducted	EU	94/963/EC
Peste des petits ruminants (PPR)	Disease-free	OIE	
Salmonella infections	Additional guarantee	EU	2003/644/EC (breeding poultry and day-old chicks for introduction into flocks of breeding poultry or flocks of productive poultry) 2004/235/EC (laying hens) 95/410/EC (poultry for slaughter) (EC) 1688/2005 (meat and eggs)
Foot-and-mouth disease	Disease-free	OIE	
Infectious bovine rhinotracheitis (IBR/IBV)	Disease-free, resulting in additional EU guarantee	EU	2004/558/EC
Infectious pancreatic necrosis (IPN gr 5)	Disease-free in the inland water area	EU	2010/221/EC
Infectious haematopoietic necrosis (IHN)	Disease-free except for surveillance zones	EU	2009/177/EC
Transmissible gastroenteritis (TGE)	Disease-free, resulting in additional EU guarantee	EU	48/94/COL
Varroa	Disease-free in the Åland Islands	EU	2013/503/EC
Viral haemorrhagic septicaemia (VHS)	Disease-free except in Åland Islands	EU	2009/177/EC

OIE = World Organisation for Animal Health

FINNISH FOOD AUTHORITY

Ruokavirasto • Livsmedelsverket

Finnish Food Authority publications 8/2019
ISSN 2669-8307
ISBN 978-952-358-011-4 (pdf)

Cover picture: Petri Timonen