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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 2019. The publication also describes the measures taken to prevent and combat animal diseases.

The animal disease situation in Finland remained good in 2019. No easily spreading animal diseases were detected in production animals. A hunted wild boar was found to be seropositive for Aujeszky's disease on September 2019.

Finland has Aujeszky´s disease free status and the disease has never been detected in domestic pigs in Finland. 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 rabies.

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Tiivistelmä

Tämä julkaisu sisältää tietoa Suomen eläintautitilanteesta vuonna 2019. 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 hyvänä Suomessa vuonna 2019. Helposti leviäviä eläintauteja ei todettu tuotantoeläimillä. Aujeszkyn taudin vasta-aineita todettiin metsästetyssä luonnonvaraisessa villisiassa syyskuussa 2019. Suomi on virallisesti vapaa Aujeszkyn taudista eikä tautia ole Suomessa koskaan todettu tuotantosioilla.

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 rabieksen torjuntaan.

Beskrivning

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Referat

Denna publikation innehåller information om djursjukdomsläget i Finland år 2019. 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.

Djursjukdomssituationen i Finland har varit god under 2019. Djursjukdomar som sprider sig med lätthet konstaterades inte hos produktionsdjur. Antikroppar mot Aujeszkys sjukdom konstaterades hos ett vilt vildsvin i september år 2019. Finland är officiellt fritt från Aujeszkys sjukdom och sjukdomen har aldrig konstaterats hos produktionssvin i Finland.

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, IHN och rabies.

Contents

Disease abbreviation key

Cattle

BSE, bovine spongiform encephalopathy
BT, bluetongue
BVD, bovine viral diarrhea
BCV, bovine coronavirus
EBL, enzootic bovine leucosis
IBR, infectious bovine rhinotracheitis
PIV-3, parainfluenza virus type 3
RSV, respiratory syncytical virus
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
IBD, infectious bursal disease, Gumboro disease
IB (IBV), infectious bronchitis (virus)
ILT, infectious laryngotracheitis
PMV-1, paramyxovirus-1
PMV-3, paramyxovirus-3

Sheep and goats

CAE, caprine arthritis/encephalitis
MV, Maedi-Visna virus
SBV, Schmallenberg virus

Fish and crayfish

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

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

Pets

RHD, rabbit hemorrhagic disease

Wild animals

CWD, chronic wasting disease
RHD, rabbit hemorrhagic disease
TSE, transmissible spongiform encephalopathy

Animal diseases in Finland in 2019

The health of Finnish domestic animals and livestock remained at a high level in 2019. No cases of easily spreading and dangerous animal diseases in domestic animals were detected; in addition, no cases of strategically important diseases such as enzootic bovine leucosis (EBL), infectious bovine rhinotracheitis (IBR), bovine viral diarrhoea (BVD) in cattle or PRRS and the *Echinococcus multilocularis* parasite in pigs were found.

The intensified monitoring of the easily spreading IHN (*Infectious Haematopoietic Necrosis*) that was found in winter 2017–2018 was continued at contact holdings and in the waterways of the infected sites. No new infections were found and it would appear that the virus has been eradicated in Finland. Fish farming was started again in summer 2019 at farming sites on three renovated fish farms, and fishing ponds have also continued to operate. In 2019, a two-year monitoring programme to restore the IHN free status was launched in monitoring areas established by a decree of the Ministry of Agriculture and Forestry in accordance with EU legislation.

A wild boar killed in North Karelia near the eastern border was found to have antibodies to Aujeszky's disease (AD). Aujeszky's disease is classified as an easily spreading animal disease. In Finland, AD antibodies were last found in wild boar in 1980. AD is mainly a pig disease but it can also be transmitted to other animal species, although not to humans. Aujeszky's disease has officially been eradicated in Finland, and the disease has never been found in livestock in Finland. The case found in wild boars living in the wild does not affect Finland's official disease-free status. Wild boars will be monitored for AD with samples collected as a part of the monitoring of African swine fever. Aujeszky's disease is relatively common in wild boars in Europe.

The incidence of salmonella in cattle, pigs, broilers, chickens and turkeys remained at the target level of less than 1%. However, new cases of salmonella were found more than usual in a total of 46 farms. In 2018, a total of 36 new salmonella cases were found on farms; in 2017 the number was 19 and in 2016, 16. The number of new cases of salmonella has increased over the last two years especially on cattle farms, and in 2019, salmonella was found on a total of 24 cattle farms (28 cattle farms in 2018). In 2019, more cases of salmonella were also detected in other livestock than in the previous year: on 13 pig farms (in 2018, cases were found on six pig farms) and on 9 poultry farms (in 2018, on two farms).

New *Mycoplasma bovis* infections were diagnosed on 17 dairy cattle farms during 2019, which is more than in the previous year. In total, more than 280 farms have had infections since 2012.

The spread of *African Swine Fever* (ASF) around the world poses a threat of the disease to domestic pork production and calls for continuous methods to intensify disease control and prevention measures. The intensified prevention of ASF continued in 2019 and resources were directed, among other things, to inform tourists on the threat of the disease and the regulations on importing food as a souvenir.

The Finnish Food Authority received 163 notifications on suspected animal diseases, compared with 179 in 2018 and 246 in 2017. Most of the reports concerned wild animals, and especially bats were extensively examined for rabies.

At the beginning of 2019, the Finnish Food Safety Authority Evira, the Agency for Rural Affairs and a part of the IT services of the National Land Survey of Finland were merged into one single authority named the Finnish Food Authority.

The tables in Appendix A show the latest incidence of several serious animal diseases in Finland. The tables containing monitoring data from multiple years are summarised in Appendix B. Animal and farm numbers are presented in Appendix C. The official disease-free statuses and additional guarantees granted to Finland are presented in Appendix D.

More information on the incidence of zoonoses in Finland and the monitoring programmes for zoonoses in animals and food can be found on the website of the joint expert network of the Finnish Food Authority and the National Institute for Health and Welfare, the Zoonosis Centre (www.zoonoosikeskus.fi).

1 Cattle diseases

Disease numbers in cattle remained almost unchanged in 2019 and no dangerous or easily spreading diseases were detected. New salmonella infections were diagnosed on 24 farms which was less than in the previous year but more than in most previous years. The number of infections caused by *bovine coronavirus* (BCV) was higher than in previous years which was detected in samples taken in connection with respiratory tract infections, calf and adult bovine diarrhoea and pathological samples. Cryptosporidium and *Mycoplasma bovis* infections also increased from the previous year. The main reasons for examining cattle were the monitoring programme for cattle diseases that focuses on bovine viral diarrhoea (BVD), infectious rhinotracheitis (IBR), bluetongue disease (BT), enzootic bovine leucosis (EBL) and bovine spongiform encephalopathy (BSE); other reasons included artificial insemination operations; disease diagnostics for respiratory tract infections, calf diarrhoea or brucellosis; investigating changes found in meat inspections; and the import and export of cattle.

New *Mycoplasma bovis* infections were diagnosed in dairy cattle more than the previous year

New *Mycoplasma bovis* infections were diagnosed on 17 dairy cattle farms in 2019 which is more than the previous year. In total, more than 280 farms have had infections since 2012. In almost all dairy cattle, the infection showed as a uterus infection and was therefore first detected in a milk sample. *M. bovis* infections on beef cattle holdings were diagnosed from respiratory infection samples.

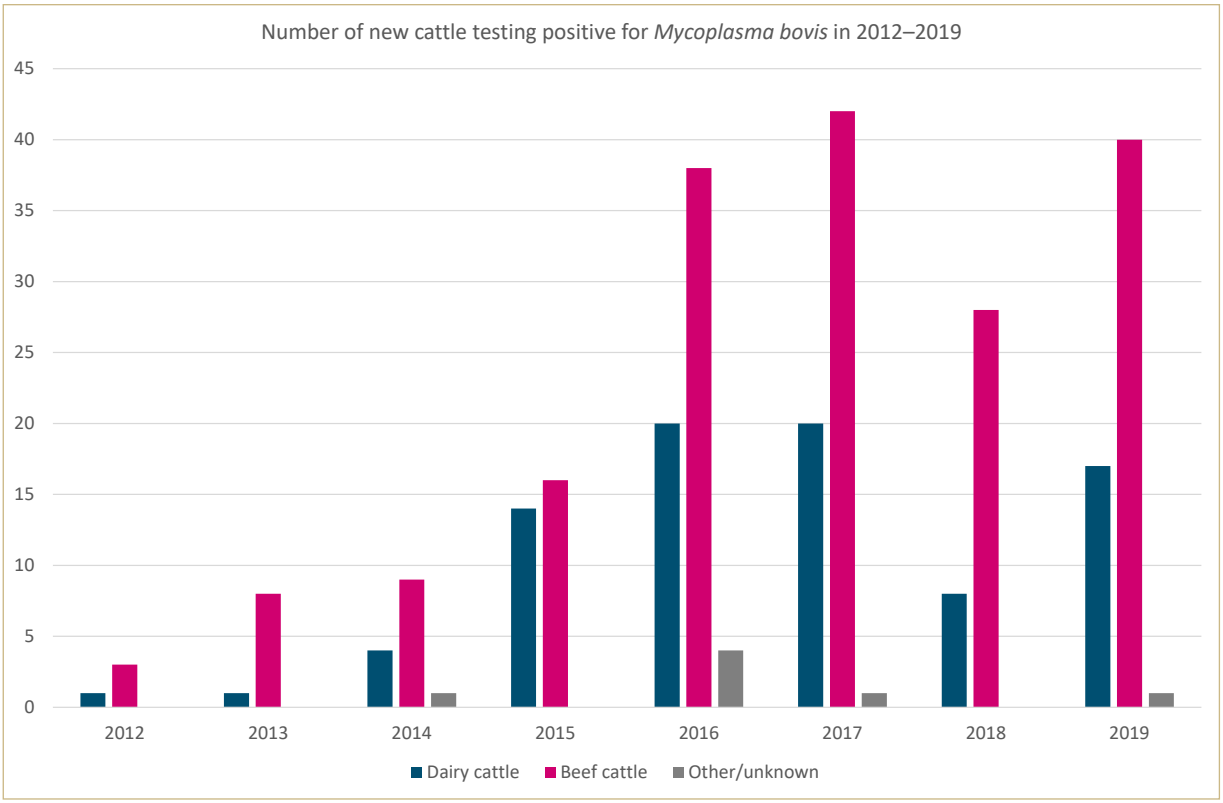


Figure 1. *Number of new cattle tested positive for Mycoplasma bovis in 2012–2019.*

Disease diagnostics

The Finnish Food Authority examined a total of 449 samples of whole cow carcasses or organ samples submitted for pathological testing (Table 1). The number of samples increased from the previous year as 389 samples were examined in 2018. The number of samples submitted for the examination of disease diagnostics and the cause of brucellosis increased, while the number of meat inspection samples decreased from the previous year. 53 samples related to meat inspections were examined.

Similarly to previous years, bacterial infections were the most commonly detected cause of abortion. The most commonly isolated bacteria were the same one as those found in previous years: *Trueperella pyogenes, Ureaplasma diversum* and *Listeria monocytogenes*. One *Neospora caninum* infection was diagnosed in an aborted foetus. Previously, neospora has been found on a few new farms every year. Schmallenberg virus was detected in one foetus. Schmallenberg virus was not found to have caused any abortion in 2014–2018.

A total of 285 blood or milk samples from 22 different farms were tested for neospora with ELISA. Out of these samples, 109 samples from 19 farms were examined to find the cause of abortion, and four farms were found have Neospora antibody positive samples. In addition, 176 samples from three farms were examined to determine the incidence of Neospora infection per animal. 108 blood samples from cattle from 18 different farms were examined for Q fever using the ELISA test. The samples were examined in connection with examinations to determine the cause of abortion, all with negative results.

Table 1. Numbers of pathological samples of cattle tested in 2010–2019, sorted by reason for testing.

Reason for testing	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cause for disease	239	255	257	362	253	250	306	270	237	297
Reason for abortion	89	78	257	368	98	106	120	113	82	99
Meat inspection	91	79	61	108	109	72	66	71	70	53
Total	**419**	**412**	**575**	**838**	**460**	**428**	**492**	**454**	**389**	**449**

A large proportion of samples submitted for determining the cause of a disease consisted of calves under the age of six months. The most common findings were calf diarrhoea, respiratory tract infections and other systemic bacterial infections and gastrointestinal diseases in young calves. In 2019, a significantly larger number of cases of diarrhoea caused by bovine coronavirus was diagnosed in calves than in previous years. The number of *Cryptosporidium parvum* findings has been increasing for several years. Samples from three farms were tested for malignant catarrhal fever (MCF) with one farm having a positive sample.

A total of 150 farms were examined for respiratory tract infections using deep pharyngeal swab kits (one kit contains four samples), and paired serum kits were collected from six farms (one kit contains paired sera of five animals). The results of the deep pharyngeal swab samples are given in Table 2. Nasal mucus samples were examined from samples submitted from 15 farms (one package includes nasal mucus samples from five animals), and out of them, nine farms tested positive for respiratory syncytial virus (RSV) and four farms tested positive for bovine coronavirus. Parainfluenza 3 virus (PIV-3) was not detected.

Table 2. Results of deep pharyngeal swab samples collected from cattle in 2010–2019. Number of positive submissions or number of holdings.

	2010	2011	2012	2013	2014	2015	2016	2017	2018*	2019*
Tested holdings/ submissions*	**21**	**26**	**39**	**93**	**66**	**108**	**154**	**156**	**121**	**150**
RS virus	9	8	8	24	13	33	28	32	25	32
Coronavirus	12	9	15	59	32	58	75	80	63	100
Parainfluenza-3 virus	0	0	0	0	0	0	0	6	29	15
Mycoplasma bovis	0	0	3	7	8	18	43	52	42	63
Pasteurella multocida	15	18	30	74	52	96	120	131	100	133
Histophilus somni	2	3	2	16	9	18	17	24	16	20
Mannheimia haemolytica	2	4	3	33	12	36	57	40	37	52
Ureaplasma diversum	13	19	24	46	40	62	99	105	81	102

*years 2010–2017 the number of submissions is stated and 2018–2019 the number of holdings.

In respiratory tract infection samples (pathological and clinical samples), the most common virus detected was bovine coronavirus. In addition, generally samples were found to contain cattle RS virus, *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 *P. multocida* and *M. haemolytica* strains on several holdings.

A total of 277 farms were examined with calf diarrhoea test packages (one package includes testing of five faecal samples). The results are presented in Table 3. The incidence of bovine coronavirus (BCV) increased significantly; this was partly influenced by the PCR study introduced but the ELISA test has also detected significantly more positive samples than in other years. The most common cause of calf diarrhoea was *Cryptosporidium parvum* but the rotavirus was also still a common finding. The number of holdings with *C. parvum* infections increased again from the previous year. Zoonotic *C. parvum* protozoans that cause calf diarrhoea were found on a total of 150 farms through pathological examinations or diarrhoea samples. Some people working with the calves were also infected with cryptosporidiosis.

In addition, the Finnish Food Authority examined faecal samples of cattle (other than calves) from 22 farms for coronavirus. Out of these, the bovine coronavirus was found to be the cause of diarrhoea on ten farms. Both the number of samples and the number of positive samples were higher than in the previous year.

Table 3. Results of calf diarrhoea diagnostic test packages from calves under six months old in 2010–2019. Number of positive submissions or number of holdings.

	2010	2011	2012	2013	2014	2015	2016	2017	2018*	2019*
Tested holdings/submissions*	**153**	**203**	**191**	**229**	**178**	**211**	**246**	**218**	**258**	**277**
Salmonella	0	1	0	1	0	1	1	0	0	0
Rotavirus (ELISA)	61	83	78	83	76	74	98	75	92	88
Corona (ELISA)	2	0	3	6	4	1	1	1	0	33
E.coli F5	0	0	0	0	0	0	0	0	0	0
Eimeria, over 10,000 OPG	27	35	29	38	32	40	34	33	24	45
Cryptosporidium (staining)	22	30	23	26	31	36	76	72	110	140
Cryptosporidium parvum	5	7	13	20	24	30	41	58	88	123
Strongylida	2	4	3	6	3	2	3	4	3	3

*years 2010–2017 the number of submissions is stated and 2018–2019 the number of holdings.

Salmonella

The salmonella monitoring of cattle is a part of the national salmonella monitoring programme in Finland. The incidence of salmonella in cattle is low and has remained below the target of 1%. However, a clear increase in salmonella cases in cattle (28 cattle farms) observed in 2018 continued in 2019, when new salmonella infections were detected on a total of 24 cattle farms: on 15 dairy cattle farms, on two suckler cow holdings and on seven calf or beef cattle holdings.

A total of six serotypes of salmonella were identified on cattle farms. *Salmonella Typhimurium* was diagnosed on seven farms, out of which three had a monophase strain that has not previously been diagnosed in livestock in Finland. *S. Enteritidis* was found on five farms and *S. Infantis* on two farms, in addition to two cattle farms where both serotypes were found . *S. Altona* was found on five farms, out of which one farm was found to have had it twice in one year, i.e. the infection was found again after the renovation and the dismantling of the restrictions imposed by the authority. *S. Umbilo* was detected on one farm. This serotype has not previously been diagnosed in animals in Finland. In addition, two farms were found to have *Salmonella enterica* ssp. *diarizonae* (*S.* ssp. IIIb) that has previously been found very occasionally in cattle. Salmonella infections in cattle were mainly diagnosed in self-monitoring studies commissioned by animal keepers, for example in samples taken for the sale of animals. On two farms, infections were detected in faeces samples submitted due to clinical symptoms (strong diarrhoea, decrease in milk production in one of the cases). On six farms, the infection was detected because of suspected salmonella (contact holdings), and on two farms, infections were detected in bacteriological cultivation of a calf sent for obduction; however, no salmonella (*S. Typhimurium*) was found in the samples taken from the holding. There were no lymph node findings at slaughterhouses in 2019.

Salmonella's increased incidence continued in 2019

The incidence of salmonella in Finnish livestock has been very low for a long time, and salmonella infections related to animal diseases to be combated have typically been diagnosed annually on approximately 10-20 farms in the 2010s. However, in 2019, more salmonella infections were diagnosed than usual, on a total of 46 cattle, pig or poultry holdings. The previous year, salmonella was also found on an exceptionally large number of livestock farms, and the incidence of salmonella has increased over the last two years especially on cattle farms. The range of salmonella serotypes detected in livestock is broad and the sources of infection or reasons for their reproduction cannot be deducted based on it.

The most common serotype of salmonella in both cattle, pigs and poultry in 2019 was Typhimurium. S. Typhimurium strains had different phage types by animal species: in poultry, the most common phage type was FT 41, in pigs FT 120 and in cattle FT NST, i.e. the strains from cattle farms were not generally categorised into specific types in the phage typing. The Finnish Institute for Health and Welfare has traditionally typed S. Typhimurium and S. Enteritidis strains of livestock but at the beginning of 2020, the phage typing ended as more detailed typing methods developed.

As a new finding on cattle and pig farms, the S. Typhimurium serotype was found to be a so-called monophase form that has not previously been found in our livestock. Monophase S. Typhimurium strains do not express all surface structures normally present on the strains of the Typhimurium serotype on their surface. Over the last two decades, S. Typhimurium - which is monophase worldwide - has been an ever more common finding in livestock, animal products and human diseases. S. Typhimurium is currently common particularly in pigs in European countries but it is also found in poultry, especially broilers, and in cattle. Monophase strains of S. Typhimurium found in Europe have typically been resistant to many different antibiotics (multi-resistant), such as ampicillin, sulphonamides and tetracyclines (ASSuT). Out of the three findings of monophase strains of S. Typhimurium on Finnish cattle farms, on one holding the strain was susceptible to the antibiotics studied; on one holding it was multi-resistant (ASSuT); and on one holding, both susceptible and resistant strains were found. In addition, a non-monophase strain of S. Typhimurium was found on that holding, phage type 135. The monophase S. Typhimurium strains found on pig farms were all of the multi-resistant type (ASSuT) and of the phage type 120; the cases were connected due to the transportation of animals, and the infection had likely spread from one suckler pig holding to four pig fattening house with transported piglets. Monophase S. Typhimurium strains in Finland have been regularly isolated from imported food at least since 2012, and their most common resistance profile has been the aforementioned ASSuT.

In addition to the S. Typhimurium serotype, S. Enteritidis was a general finding on cattle farms, and all strains were of phage type FT33. On pig farms, the serotype Enteritidis was less common; the only finding was the same phage type as the one found on cattle farms. This serotype was not found on poultry farms. In Europe, S. Enteritidis is most commonly found in laying hen and broiler holdings but it is less common in cattle and pigs. Strains of salmonella Enteritidis FT33 have previously been found in fur animals but the similarity of strains of S. Enteritidis FT 33 found in different animal species should, however, be examined using genomic methods that are more specific than phage typing before it can be deducted if the strains are similar to each other.

Salmonella serotype Alona was also a fairly common finding on cattle farms in 2019 as it caused a small-scale clustering in Ostrobothnia where four closely located farms were found to be positive at the end of the summer. The infection was suspected to have spread to and between farms through wild animals in the area, perhaps through a particularly large number of jackdaws whose faeces could have contaminated feed and bedding stocks. One S. Alona isolation was also done from jackdaw faeces but the sample was taken from faeces found on surfaces, which makes it difficult to assess the significance of the finding. S. Alona strains have previously been isolated a few times on cattle farms and in rapeseed imported from Germany.

In addition to S. Typhimurium strains, a large number of the salmonella serotype Derby was found on pig farms. It has been detected on pig farms to an increasing extent since 2015, and previously before that in 2007. In Europe, S. Derby is commonly found in pigs and pork products, also to some extent in the poultry chain, and it is also rather commonly isolated from human infections. In Finland, this serotype has previously been isolated from imported food such as sausages and pork, pet treats, fur animal feed and once in a fur fox and one cattle farm.

Salmonella enterica ssp. diarizonae was also found on two cattle farms. This strain of salmonella has been considered to be a salmonella subspecies in predominantly cold-blooded animals but it has also been reported in domestic animals such as sheep and cattle. The specific serotype of that subspecies (61:(k):1, 5, (7)) appears to have adapted to sheep and has been detected in relatively high numbers in sheep in e.g. Sweden and Norway. In Finland, the incidence of this serotype in sheep has not been systematically mapped but strains of the diarizonae subspecies are sometimes found in both faecal samples of sheep and sheep sent for obduction. Strains have not always been serotyped but strains isolated from sheep have been varied serotypes, i.e. a type other than those adapted to sheep has also been found. Those isolations from cattle that have been serotyped have not been a typical serotype for sheep. Strains of salmonella enterica ssp. diarizonae have previously been isolated in Finland from cold-blooded animals such as snakes and lizards, pet hedgehogs and frogs, various environmental samples and, as individual findings, wild boar and imported pork.

Cattle disease monitoring

Dairy and suckler cow holdings were monitored for BT, EBL, IBR, BVD and BSE through monitoring programmes run by the authorities. Dairy cattle bulk milk samples were mainly collected in late winter and early spring. The collection and submission of samples was 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 and EBL. In addition, dairy cattle was also examined for these diseases through random sampling. In addition to BT, samples taken for monitoring from slaughtered suckler cows were examined for BVD and IBR. In addition, cattle samples were examined for the aforementioned diseases and brucellosis in connection with artificial insemination operations, imports and exports and disease diagnostics.

In addition, the presence of *Fasciola hepatica* antibodies in blood samples from bulk milk and suckler cattle were determined. The prevalence of antibodies was low: only three bulk milk samples (<1%) showed antibodies. 18 suckler cow samples from four holdings tested positive or suspicious.

Table 4. Numbers of viral and bacterial infection samples collected from cattle in 2019, sorted by reason for testing and test (serology, virus detection). The number of positive samples is indicated in brackets.

	BVD		IBR		Leucosis	Bluetongue		Liverfluke	Brucellosis	Schmallenberg-virus	
	Anti-bodies	Virus detection	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies	Anti-bodies (Positive)	Virus detection
Dairy cattle monitoring/ bulk milk sample	1,344	0	1,344	0	1,214	0	0	660 (3)	0	0	0
Suckler cow monitoring/ individual blood sample	1,970	0	1,970	0	0	1,970	0	1,980 (18)	210	0	0
Artificial insemination operations	157[1)]	106	157[1)]	0	157[1)]	0	0	0	157[1)]	0	0
Disease diagnosis	126	99	126	98	133	0	0	0	128	54 (7)[4)]	47 (1)
Import (cattle, semen, embryos)	108[2)]	45	62[3)]	21	3	3	3	0	8	0	0
Other reasons (animal trade, export)	85	0	4	0	1	4	0	0	0	21	159
Total	**3,790**	**250**	**3,663**	**119**	**1,508**	**1,977**	**3**	**1,640 (21)**	**503**	**84**	**206 (1)**

[1)] includes both milk and serum samples
[2)] 87 samples from cows implanted with imported embryos
[3)] 41 samples from cows implanted with imported embryos
[4)] no embryos with antibodies were found

BSE tests are presented in Table 5, sorted by reason for testing. The number of BSE tests performed in 2019 was around the same level as in 2018. The majority of the cattle tested had died spontaneously or been put down. The testing age limit for emergency slaughters, 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 2019. All test results were negative.

Slaughtered healthy	Clinical suspicions at farms	Emergency slaughters	Spontaneously died or put down at farms	Disease symptoms in ante-mortem inspections	Total
3	0	14	11,272	0	**11,289**

Data on dairy cattle disease surveillance (Table B1), suckler cow disease surveillance (Table B2), tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and cattle BSE surveillance (Table B4) between 2010–2019 are presented in the summary tables in Appendix B.

2 Pig diseases

Disease numbers in productive pigs remained at a good level and no dangerous or easily spreading diseases were detected. Salmonella infections were diagnosed in faecal and/or environmental samples on a total of 14 pig farms, one of which had already been diagnosed in 2018. Virus A, which causes swine influenza, was detected in samples from 19 holdings. The main reasons for the examination of samples from pigs were follow-up studies on swine diseases (Aujeszky's disease (AD), transmissible gastroenteritis (TGE), PRRS, classical swine fever (CSF) and African swine fever (ASF) as well as *Brucella suis* infections), insemination operations and disease diagnostics particularly to detect pathogens of intestinal and respiratory tract infections. The spread of African swine fever around the world poses a persistent threat of the disease to domestic pork production and calls for continuous prevention measures. Examinations of wild boar living in the wild are described more in Chapter 11 (Wild animal diseases.)

Disease diagnostics

In 2019, 254 samples from pigs were examined in pathologic anatomy tests, a similar number as in the previous year. The majority of the samples were whole, dead carcasses (198 pcs) and the other samples were mainly organ samples. More than 80% of the samples were examined to determine the cause of a disease; usually this meant examining the cause of intestinal or respiratory inflammatory symptoms in a specific age group on the farm. Most of the examinations were related to determining the cause of a disease in piglets and young pigs. A number of samples were also sent in for testing in connection with meat inspections, determining the cause for brucellosis and for determining the cause of death of individual pigs.

As in previous years, the *Actinobacillus pleuropneumoniae* bacteria was a major cause of lung infections in growing pigs. In 2019, virus A, which causes swine influenza, was detected in samples from a total 19 holdings. Samples were tested from a total of 49 farms. The number of cases detected and samples received was significantly higher than in usual years; for example, in 2018 influenza A virus was detected in samples from only two farms. Influenza viruses found in pigs are usually type H1N1 in Finland. Some of the A viruses diagnosed in 2019 were typed in more detail, and the virus strains were found to be so-called classical types that only pigs have. The majority of typed swine influenza viruses were a subtype of H1N1 in pigs which was first diagnosed in Finland in a sample submitted for examination at the end of 2018. This slightly different virus strain may help explain the number of cases detected.

As things currently are, annual and regular 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, samples are examined, if necessary, from holdings where porcine enzootic pneumonia infections are suspected. 899 samples from 37 different farms were examined for antibodies of porcine enzootic pneumonia. No porcine enzootic pneumonia infections were diagnosed in 2019. The last case of porcine enzootic pneumonia in Finland was detected on two farms in 2017.

Table 6. Results of gastrointestinal infection diagnostic test packages (faecal samples) of weaned piglets and fattening pigs in 2019. Numbers of sample submissions and positive submissions. A submission was recorded as positive if bacteria was detected in at least one sample. A total of 59 samples were submitted and 23 of them were examined for dysentery only.

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)
Toksigenic *Escherichia coli*	35	14 (40%)	8 (23%)
Lawsonia intracellularis	35	24 (69%)	2 (6%)[1]
Brachyspira pilosicoli	35	12 (34%)	0
Brachyspira intermedia	35	20 (57%)	2 (6%)
Brachyspira hyodysenteriae	58	4 (7%)	3 (5%)[2]
Salmonella sp.	35	1 (3%)	0

[1)] Lawsonia intracellularis bacteria were detected in 20 submissions that also tested positive for B. pilosicoli and/or B. intermedia.
[2)] These Brachyspira hyodysenteriaepositive samples were found in sample submissions that were only examined for dysenteria.

Faecal samples and samples submitted for pathological testing were examined to determine the causes of gastrointestinal infections. A total of 1,146 faecal samples from 63 holdings were bacteriologically tested for the *Brachyspira hyodysenteriae* bacterium that causes dysentry in pigs and for 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 examined was higher than in 2018 since an investigation related to detected cases of dysentry increased the number of samples. In 2019, dysentry infections were diagnosed in samples from four pig holdings and in one of the pigs examined in connection with its import. No *Clostridium perfringens* type C infections were detected.

As in previous years, samples from weaned pigs' faeces and from pathological studies found *Brachyspira pilosicoli* bacteria, toxigenic *Escherichia coli* bacteria and *Lawsonia intracellularis* bacteria as pathogens for intestinal infection. In particular, there were differences in antimicrobial susceptibility among the toxic *E. coli* strains found in the samples, some of which were found to be resistant to one or more commonly used antimicrobials.

Salmonella

The salmonella monitoring of pigs is a part of the national salmonella monitoring programme in Finland, and salmonella infections in pigs are included in animal diseases that are being combated against by legislation. The incidence of salmonella is low and has remained below the target of 1%. However, more new salmonella infections were diagnosed on pig farms during 2019 (13 cases) than in the previous year (6 cases), and the infections represented four different serotypes of salmonella. *Salmonella Derby*and a monophase *S. Typhimurium* were both found on five pig farms; serotype Typhimurium (non-monophase), *S. Hessarek* and *S. Enteritidis* were detected on one pig farm each. Out of the *S. Derby* infected farms, two were farrowing pig holdings, two pig fattening houses and one combination pig holding. Two of the *S. Derby* infections were detected in samples taken due to a suspected case (contact with the *S. Derby* farm), and three infections were found in samples taken at a slaughterhouse following a finding in a lymph node sample. In addition to these lymph node findings at the slaughterhouse, *S. Derby* was found in a single lymph node sample although the strain was not found in the samples taken on the holding. A monophase *S. Typhimurium* strain was found at one farrowing house, in a lymph

node finding in a sow at a slaughterhouse, and on four pig fattening holdings to which piglets from the farrowing house in question had been taken. Salmonella serotype Typhimurium (non-monophase) was also found on one pig fattening holding in a sample taken in connection to a suspected case (contact with the *S. Derby* farm). *S. Hessarek* was found at one farrowing house in samples taken from piglets sent to obduction but it was not found in the samples taken at the farm. The serotype in question has been diagnosed in Finland once before in pigs, in a surface swab sample on a carcass in 2018. In addition, *S. Enteritidis* was detected on one farrowing pig farm in a self-monitoring examination. For more information on cases of salmonella in pigs, see the salmonella information box in chapter 1, Cattle diseases.

Trichinellosis not found in rearing pigs

Trichinellosis, which is classified as an animal disease to be reported, was not identified in rearing pigs, which means that the disease numbers remained the same as in 2017 and 2018. No trichinellosis infections were diagnosed in farmed wild boars either. The incidence of trichinellosis in pigs and wild boars is monitored by sampling and testing conducted in connection with meat inspections.

Monitoring studies

The monitoring of disease numbers for Aujeszky's disease, TGE, PRRS and CSF in pigs was continued through monitoring programmes organised by authorities. Approximately 700 blood samples were collected from four large slaughterhouses that slaughter sows in proportion with the number of animals slaughtered so that the maximum number of samples collected per holding was eight. Samples from farmed wild boars were also collected during slaughter. In addition to the above-mentioned diseases, the samples were tested for African swine fever and brucellosis. All test results were negative. Tests for significant swine diseases were also conducted in connection with artificial insemination operations, disease diagnosis, import and the health classification of special level pig farms.

Table 7. Tests performed on samples from pigs for significant viral diseases in 2019, sorted by reason for testing. None of the diseases that were subject to testing 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
Monitoring studies	701	0	704	723	0	702	0	0
Artificial insemination operations*	1,088	0	796	1,160	89	778	0	0
Holdings with special level health classification	0	0	365	412	47	0	0	0
Disease diagnosis **	2	68	1	2	53	32	97	83
Import	143	0	155	280	0	143	0	0
Export	225	0	0	225	0	225	0	0
Farmed wild boars (monitoring)	30	3	29	30	0	30	1	29
Wild boars living in the wild	284	683	0	0	0	285	683	683
Total	**2,473**	**754**	**2,050**	**2,832**	**189**	**2,195**	**781**	**795**

* 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 contributed actively to African swine fever monitoring by submitting blood and tissue samples from wild boars living in the wild to the Finnish Food Authority. Examinations of wild boar living in the wild are described more in Chapter 11 (Wild animal diseases.)

Summaries of tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and tests for viral diseases and leptospirosis in pigs (Table B7) conducted in 2010–2019 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. 23 genotypes of the virus are known. There is no known treatment for or vaccine against the ASF virus which makes ASF prevention extremely challenging.

African swine fever is common in Africa. The disease was first recorded in 1921 in Kenya. In 1957, ASF (genotype I) spread out of Africa for the first time when it was recorded in Portugal. ASF was detected in Portugal again in 1960, at which point the virus also spread to Spain. The countries were declared disease-free only in 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 spread to countries such as Russia, Ukraine and Belarus. In 2014, the disease spread to Lithuania, Latvia, Poland and Estonia. After this, cases of ASF have also been detected in Moldova, the Czech Republic, Romania, Hungary, Bulgaria, Belgium, Serbia, Slovakia and Greece. The Czech Republic is the only one of these countries where the disease is officially eradicated. In 2018, ASF also spread to China, and it 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 cause major losses for the domestic pork production industry due to 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 or when food waste has been left out for wild boars living in the wild. The virus can also spread to new areas in live pigs and sperm as well as through transport vehicles, humans and wild boars.

Prevention in brief

Since African swine fever has spread in several countries through food products transported by humans, ASF prevention efforts in Finland have been heightened and focused particularly on information targeted at tourists since 2018. Information boards detailing restrictions were set up in cooperation with

Finnish Customs at border stations between Finland and Russia (Nuijamaa, Vaalimaa and other border stations), and more information boards have been added at different passenger harbours in Helsinki and at the cargo harbour in Vuosaari. Eastern border stations were also 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. The Finnish Food Authority's website also shares information on ASF. Six informative animation videos about the risk of ASF aimed at different target groups were also produced in collaboration with Suomen Sikayrittäjät ry; the videos were used in a targeted paid social media campaign for six weeks. The Matka Nordic Travel Fair in Helsinki had a stall related to ASF where information on the restrictions and risks of passenger imports was shared. Guidelines on restrictions on the import of food to the domestic market were prepared for supervising authorities, companies and citizens.

Collaboration with the Finnish Wildlife Agency and hunting organisations was also continued, with the Finnish Food Authority participating in information events aimed at hunters, attending the wild boar working group of the Ministry of Agriculture and Forestry and updating guidelines and communications aimed at hunters. The Finnish Food Authority also provided hunting organisations and game districts with supplies for taking and submitting samples. As a result, the number of samples from dead and hunted wild boars was again high, with a total of 683 samples in 2019 (715 samples in 2018, 527 samples in 2017, 366 samples in 2016 and 171 samples in 2015). The Finnish Food Authority continued to offer rewards for the submission of wild boar samples and reports about dead wild boars. Articles on the risk of African swine fever and on the ban on keeping pigs outdoors were written for magazines targeted at different national target groups. News on the spread of African swine fever worldwide and in Finland's neighbouring areas were also highlighted on The Finnish Food Authority's website.

3 Poultry diseases

The incidence of contagious animal diseases in poultry is low in Finland compared to many other European countries. 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. Chicken reared for meat production are not given any antibiotics and laying hens are only rarely medicated. However, Finland imports large numbers of both parent and production stock poultry from abroad which increases the risk of diseases spreading to the country. The poultry industry monitors the health level of flocks and countries of origin in cooperation with Animal Health ETT. In addition, 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 the Finnish Food Authority. No cases of serious infectious diseases, such as avian influenza or Newcastle disease, were detected in poultry in 2019.

Disease diagnostics

The diagnostics of poultry samples are based on pathologic-anatomical tests and their parasitological, bacteriological and virological follow-up examinations. The presence of diseases is also examined through health monitoring studies by examining blood samples from birds for antibodies to certain diseases. In addition, poultry diseases are tested in connection with import operations and through test packages developed for poultry. Pathologic-anatomical examinations were conducted on a total of 1,451 poultry samples from 167 holdings which was less than in the previous year (2,586 samples). The majority of samples submitted for necropsy were broilers (1,080). 168 turkeys and 198 laying hens were inspected. Packages for decreased egg-laying and respiratory tracts in poultry were examined on a total of five farms which is less than the previous year (a total of 8 farms in 2018).

Mycoplasma synoviae, *M. gallisepticum* and *M. meleagridis* antibody tests are conducted for productive poultry in the context of health monitoring, respiratory tract packages and import operations. Mycoplasma tests on native breeds of chicken and other non-commercial poultry are also conducted as a part of health monitoring programmes or at the request of owners. All bird species in both productive and non-commercial poultry are also subject to *M. gallisepticum/M. Synoviae* PCR examinations. *M. gallisepticum* infections were detected on two non-commercial poultry holdings, and *M. synoviae* infections were detected on eight non-commercial holdings through antibody or PCR testing. No *M. synoviae*, *M. gallisepticum* or *M. meleagridis* infections were detected in production poultry.

Outbreaks of colibacillosis, which have plagued the Finnish broiler industry in the past years, decreased considerably in 2019 and the disease numbers returned to almost normal levels. The launch of a comprehensive vaccination programme is the reason why the situation improved. The programme 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 that infect mainly poultry. 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 from the start of the production chain which is why it has been crucial to extend the vaccination programme to the start of the production chain as well. At the beginning of 2019, the Finnish Food Authority launched a research project to monitor the problems caused by APEC bacteria. The project focuses on taking samples from specific mother flocks and their descendants as well as examining *E. coli* strains that have caused issues. Typing ensures that the autogenous vaccine used contains the right strains. The three-year research project is carried out in cooperation with the broiler industry.

Swine erysipelas (*Erysipelothrix rhusiopathiae*) was detected on three laying hen holdings and one turkey holding. Systemic infections caused by *Pasteurella multocida* were detected seven times in production poultry (one turkey farm and four laying hen holdings). *Pasteurella multocida* can either cause a chronic disease or very high sudden mortality, in which case the disease in question is chicken cholera. Goslings on one farm were diagnosed with a systemic infection caused by *Riemerella anatipestifer* whose symptoms include balance issues and a slightly increased mortality. *Riemerella anatipestifer* typically causes polyserositis, such as encephalomyelitis, airsacculitis, peritonitis, and pericarditis as well as arthritis and eye infections in farmed ducks, geese and turkeys and wild waterbirds. In Finland, this bacteria was previously known to only have been diagnosed in wild waterbirds in 2015.

The number of roundworms has increased on poultry farms producing barn eggs, and worms are sometimes transmitted to commercial eggs as well. The Finnish Food Authority has established a roundworm monitoring programme in collaboration with the poultry industry to prevent 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 in particularly large numbers in 2019. In 2019, cases continued to occur both in laying hens and in the broiler production chain. Infections were determined through virus detection and antibodies. In the previous year, slightly decreased egg-laying was observed in connection with these infections but in 2019, respiratory tract symptoms typical to the disease were reported in addition to decreased egg-laying. This change in the symptoms of the disease was also observed in pathologic-anatomical and histological studies conducted at the Finnish Food Authority. IBV is a common virus in non-commercial poultry; non-commercial poultry has also had incidences of a highly pathogenic virus strain QX which has not been detected in production poultry since 2011. The vaccination programme launched in the spring of 2012 to vaccinate parent flocks of laying hens against IB with an inactivated vaccine was continued.

Marek's disease was detected on 14 non-commercial poultry holdings but no cases of the disease were detected in commercial poultry. Laying hens and parent stock are vaccinated against Marek's disease. Infectious laryngotracheitis (ILT) or its antibodies were detected on seven non-commercial poultry holdings. Clinical (symptomatic) Gumboro disease (IBD), chicken anemia virus (CAV) and avian encephalomyelitis (AE) were not detected in 2019. Birds in mother flocks are vaccinated against Gumboro disease, chicken anemia virus and AE in order to protect the broods from the diseases. Laying hens contracting the AE virus can also result in a 5–10% decrease in egg production which lasts for a couple of weeks.

Monitoring studies

The disease numbers for avian influenza (AI), Newcastle disease (Avian avulavirus-1, AAvV-1, PMV-1) and salmonella in poultry are monitored with surveillance programmes maintained by authorities. A summary of tests for avian influenza, Newcastle disease and avian pneumovirus (APV) in poultry in 2010–2019 is presented in Appendix B (Tables 8 and 9).

The collection of avian influenza samples was directed at different species of poultry in accordance with the EU Commission Decision 2010/367/EC. Samples for Newcastle disease were taken from all holdings with parent and grandparent flocks. No avian influenza antibodies or avian avulavirus-1 antibodies were detected in EU monitoring. Approved poultry export facilities follow the monitoring programme defined in the Ministry of Agriculture and Forestry Decree No 1036/2013 for the following pathogens: *Salmonella* Gallinarum/*Pullorum*, *Salmonella arizonae*, *Mycoplasma gallisepticum* and *Mycoplasma meleagridis*. In 2019, export facilities conducted monitoring studies on 5,677 broiler and 1,860 laying hen blood samples for *M. gallisepticum* antibodies and 1,600 broiler and 240 laying hen blood samples for *Salmonella Gallinarum/Pullorum* antibodies. In addition, 140 broiler and 540 laying hen blood samples were examined for *M. synoviae* antibodies in connection with export operations.

Table 8. Test results of the EU surveillance programme for avian influenza in poultry in 2019. No avian influenza viruses or avian influenza antibodies were detected on any poultry holdings.

	Chicken breeder holdings[1)]	Conventional laying hen holdings	Organic and free range hen holdings	Organic broilers	Geese and ucks[2)]	Turkey breeder holdings	Fattening turkey holdings	Farmed game birds	Ostriches	Total
Samples	360	543	434	30	40	40	400	112	18	**1,977**
Farms	33	52	42	3	2	3	40	8	2	**185**

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

Table 9. Viral disease test results in poultry[1)] in 2019, sorted by reason for testing.

Reason for testing	Avian influenza		Newcastle disease		APV[2)]
	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 monitoring	1,977 (0/0)	0	6,198 (0/0)	16 (0/0)	0
Import	2,290 (0/0)	0	2,290 (0/0)	0	2,010 (x/x[3)])
Disease diagnosis	55 (0/0)	504 (0/0)	35 (0/0)	496 (0/0)	11 (x/x[3)])
Total	**4,322 (0/0)**	**504 (0/0)**	**8,523 (0/0)**	**512 (0/0)**	**2,021 (x/x[3)])**

1) Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or the breeding programmes of the previously mentioned birds.
2) Virus detection not used at the Finnish Food Authority.
3) Testing still in progress: serologically positive results, no disease symptoms.

Salmonella

Finland's statutory salmonella monitoring programme covers all generations of broilers, turkeys and laying hens. The incidence of salmonella is low and has remained below the target of 1%. Salmonella was detected on nine poultry holdings (two holdings in 2018). Cases of salmonella were detected in a laying hen flock on one holding (*S. Abony*), in breeding flocks on four holdings (*S. Typhimurium*), in one parent flock of laying hens (*S. Typhimurium*), in one hatchery (*S. Typhimurium*) and at one small-scale egg production facility(*S. Adelaide*). Salmonella was found on one holding in production poultry (*S. Bredeney*). No cases of salmonella in turkeys were detected in 2019.

New health monitoring package for productive poultry and non-commercial poultry farmers

The contract-based health monitoring programme for poultry keepers was replaced in autumn 2019 with a new poultry health monitoring package. The new health monitoring package has the same content as the health monitoring programme but it is not contract-based, and the customer can determine which diseases are examined and when. The service is aimed at both farmers of productive poultry and farmers of native breeds of chicken and non-commercial poultry farmers. One poultry health monitoring package includes 20 bird blood samples from the flocks to be examined, out of which the farmer can choose 1-3 diseases included in the package to be examined. The previous health monitoring programme and the new health monitoring package help provide information on the disease numbers in poultry and show if vaccinating production poultry has been successful. In 2019, a total of 128 batches of samples were submitted from 72 farms which is slightly more than in 2018 but less than in previous years.

The majority of sample batches were examined using the parent generations of production poultry, i.e. 62 were from broilers' parents and 18 were from the grandparents and parents of laying hens. 26 broiler sample batches and 10 sample batches from non-commercial chicken were also examined. The disease numbers in chickens and broilers are monitored by examining antibodies in blood samples, especially for IBV, ILT, APV, *M. gallisepticum* and *M. synoviae* infections. Samples from parent generations are mainly examined for Gumboro disease (IBD), avian encephalomyelitis (AE), chicken anemia virus (CAV) and in some flocks for immune responses to the IB vaccine.

Table 10. Health monitoring samples of chickens and broilers in 2010–2019.

Year	AE	CAV	IB	IBD	APV	ILT	*M. gallisepticum*	*M. synoviae*
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
2019	1,840	1,928	1,277	1,908	351	469	439	439

[1)] Positive samples from one chicken breeder holding

In regards to turkeys, in the previous health monitoring programme and in the new health monitoring package blood samples are tested for antibodies of PMV-3 infection and APV, as well as *M. gallisepticum*, *M. synoviae* and *M. meleagridis* infections. In 2019, PMV-3 antibodies were found twice during health monitoring. Antibodies of this disease have been occasionally detected 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 to Finland are examined in accordance with the programme, and samples for health monitoring were submitted a total of eleven times. The disease numbers in turkeys are currently at such a good level in Finland that in general, turkeys do not need to be 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 2010–2019.

Year	APV	PMV-3	*M. gallisepticum*	*M. synoviae*	*M. meleagridis*
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
2019	242	302[10)]	120	120	120

[1)] A total of 114 positive samples on five holdings.
[2)] A total of 25 positive samples on two holdings.
[3)] A total of 81 positive samples on three holdings.
[4)] A total of 38 positive samples on three holdings.
[5)] A total of 55 positive samples on two holdings.
[6)] A total of 11 positive samples on one holding.
[7)] A total of 44 positive samples on four holdings.
[8)] A total of 54 positive samples on two holdings.
[9)] A total of 9 positive samples on one holding.
[10)] A total of 22 positive samples on two holdings.

4 Sheep and goat diseases

Disease numbers in sheep and goats have remained at a good level and no dangerous or easily spreading diseases were detected in 2019. The most common reasons for examinations 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.

Disease diagnostics

In 2019, pathologic-anatomical examinations were performed on a total of 104 sheep samples and 11 goat samples. The number of samples was lower than in the previous year (145 samples). 5 samples related to meat inspections were examined.

Pathologic-anatomical examinations were performed on 12 samples from two goat farms and four sheep farms to determine the cause for abortion. No infectious causes for abortion were found.

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 eight holdings, out of which two were goat farms. Cysts caused by *Cysticercus tenuicollis* were found in a sheep from one holding in samples collected in the context of meat inspection, and lancet liver flukes (*Dicrocoelium dendriticum*) and lungworms (*Protostrongylus* sp.) were detected in sheep on another holding.

Listeriosis of the central nervous system caused by *Listeria monocytogenes* bacteria was detected in sheep from four holdings. *Mannheimia haemolytica* bacteria were diagnosed as the cause of pneumonia in sheep on four holdings, and *Mycoplasma ovipneumoniae* was isolated from two respiratory tract infection samples. *Bibersteinia trehalosi* bacteria were isolated from three pneumonia and one systemic infection sample. *Clostridium perfringens* type D -enterotoxemia was detected in samples from three sheep holdings and three goat holdings.

Salmonella enterica ssp. *diarizonae* was found in one sheep sample and, in addition, in a faecal sample from one holding taken in connection with self-monitoring.

Orf virus was detected on 6 sheep holdings during the year. In total, samples from 22 sheep farms were examined for the Orf virus.

A total of 50 submissions of faecal samples from sheep and goats from a total of 36 holdings were examined. Samples from 4 of the holdings were tested in order to determine the cause of diarrhoea, while the samples from the other 33 holdings were tested for parasite survey purposes. The most common findings were eggs of intestinal roundworms (*Strongylida* and *Strongyloides* sp.) and *Eimeria* sp. coccidia.

Monitoring studies

Scrapies monitoring is conducted by testing all sheep and goats over 18 months of age that have died in the carcass collection area for scrapie; samples are taken 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 send at least one sheep or goat over 18 months of age that died or was put down during the year for testing. In 2019, samples were submitted from 25 holdings located outside of the carcass collection area. Slaughterhouses also collect samples from all sheep and goats aged 18 months and older that show signs of emaciation or neurological symptoms or that have been emergency slaughtered. In 2019, atypical scrapie was detected on three sheep holdings while classical scrapie was not detected.

The results of scrapie monitoring in 2010–2019 are presented in Appendix B (Table B5).

The lentivirus infections (maedi-visna and CAE) in small ruminants are monitored with voluntary health control. A total of 3,685 samples collected from 74 different holdings were tested for maedi-visna and CAE in sheep and goats in 2019 (Table 12). No maedi-visna/CAE infections were detected in the tests. Brucellosis (*Brucella melitensis*) monitoring was conducted by testing blood samples collected in the voluntary health control programme for maedi-visna and CAE in small ruminants and blood samples collected at slaughterhouses during slaughter. All samples were negative.

In addition, the presence of *Fasciola hepatica* antibodies in blood samples taken at the slaughterhouse were determined. A total of 1,070 samples from 91 holdings were examined. No antibodies were found in the samples.

Table 12. Results of sheep and goat health monitoring and scrapie surveillance in 2019.
No cases of maedi-visna/CAE or classical scrapie were detected. Atypical scrapie was detected on three sheep holdings.

Animal species	Maedi-visna/CAE				Scrapie	
	Antibodies		Virus detection		Priority detection	
	Samples	Farms	Samples	Farms	Samples	Farms
Sheep	3,442	72	0	0	1,665	467
Goat	243	4*	2	1	270	43
Total	**3,685**	**74**	**2**	**1**	**1,935**	**510**

*incl. farms that also keep sheep

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 2010–2019 are presented in Appendix B.

5 Fish and crayfish diseases

Disease numbers in fish and crayfish remained at a good level and no diseases that are being combated against by legislation were detected. The intensified monitoring of the easily spreading infectious haematopoietic necrosis (IHN) in fish was continued in 2019. The disease was first detected in Finland in the winter 2017–2018. No new infections were found and it would appear that the virus has been eradicated in Finland. Fish farming at infected farms was started again in summer 2019 after renovating the farms, and fishing ponds have also continued to operate. In 2019, a two-year monitoring programme to restore the IHN free status was launched in monitoring areas established by a decree of the Ministry of Agriculture and Forestry in accordance with EU legislation.

As regards to bacteriological fish diseases, the situation remained mainly at the same level in 2019 as in the previous years. Very few crayfish samples were submitted for testing which makes it difficult to assess disease numbers in crayfish.

Disease diagnostics

Approximately 2,700 fish submitted for disease diagnosis were examined in 2019. As regards to bacteriological fish diseases, the situation remained mainly at the same level as in the previous years. An exception to the incidence of bacterial diseases was *Flavobacterium psychrophilum* which was detected more than in previous years. The disease causes rainbow trout fry syndrome and coldwater disease. The first *Flavobacterium psychrophilum* infections were diagnosed at the Finnish Food Authority in March, and the last diagnoses were made from samples taken in December. Most of the cases were detected in rainbow trout fries in inland waters. No cases of bacterial kidney disease (BKD) were found.

In summer 2019, a large number of fish with skin damage were found in the wild trout population of the Tornionjoki river. In fresh water, water moulds often stick to damaged fish skin and may ultimately cause the fish to die. So far, a single common cause for the disease has not been found. International cooperation also contributed to the investigation of this trout disease.

At the Finnish Food Authority, research related to fish diseases focused on the effects of recirculating aquaculture on fish health; the pathogenicity of the genotype 2 of infectious pancreatic necrosis (IPN) virus that has become more common in Finland; and water mould research. 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 and treatment options are often limited. A new phenomenon was detected on recirculating aquaculture farms: rainbow trout gastroenteritis (RTGE), i.e. summer enteritis.

The IPN virus genotype 2 rarely causes an acute infection but it is often found in asymptomatic carrier fish or together with another pathogen. In the infection tests, the Finnish IPN genome group 5 caused relatively high mortality rates in Finnish rainbow trout - up to 38% total mortality - but the IPN viruses from genotype 2 were also not found to be harmless on the infection tests. It is not impossible that the pathogenicity of the strains of the virus might become stronger in the future.

Water mould research also progressed to a new phase in cooperation with Åbo Akademi and the University of Jyväskylä. The goal is to improve the diagnostics of water mould diseases and better understand the origins of the disease and the role of bacteria in causing skin problems in particular.

Crayfish plague carried by signal crayfish endangering noble crayfish

The most significant crayfish disease detected in Finland is the crayfish plague caused by the *Aphanomyces astaci* water mould. In 2019, acute crayfish plague was detected in one noble crayfish in one river basin. The infection was caused by the plague type Ps1 that occurs naturally in signal crayfish. In addition, another type of crayfish plague - type As - that often occurs in a hidden form was isolated in one dead noble crayfish in a lake that had already been found to be contaminated with crayfish plague. Signal crayfish samples examined were taken only from one lake and no crayfish plague was found.

Crayfish plague

Crayfish plague originates from North America, and North American crayfish species such as signal crayfish naturally carry the disease. The acute form of the disease is usually found in susceptible species such as noble crayfish. Contrary to previous assumptions, crayfish plague may also occur in a hidden form in noble crayfish populations. This means that crayfish plague may occur without symptoms in both noble crayfish and signal crayfish in addition to being detected in dead crayfish. Signal crayfish in particular must always be treated as asymptomatic carriers of the crayfish plague. Signal crayfish are extremely harmful to noble crayfish, and in practice, if signal crayfish carrying crayfish plague are found in a water area, it prevents the reintroduction of noble crayfish. EU's list of invasive species and the renewed crayfish strategy strongly restrict the use of signal crayfish: catching crayfish is still permitted but the introduction to new areas and the farming of signal crayfish is prohibited.

Monitoring studies

About 20 different species of aquaculture animals are farmed in Finland. Species susceptible to each disease are listed in legislation and monitoring is targeted at these species. The objective of regular risk-based inspections of aquaculture animals by authorities and the samples taken in connection with them is to detect the possible presence of IHN, IPN, VHS (viral hemorrhagic septicemia), ISA (infectious salmon anemia) and SAV (salmonid alphavirus) at farms. KHV (Koi herpesvirus), SVC (spring viremia of carp) and WSD (white spot disease) are monitored through spot checks but samples are not routinely taken. BKD prevention is carried out with the help of a voluntary health control programme, and samples are regularly taken from farms within the scope of the programme. In addition, the spread of *Gyrodactylus salaris* (salmon fluke) to Upper Lapland is monitored though regular sampling. In 2019, risk-based inspections related to the monitoring programme were conducted at 340 fish farms, out of which 139 were natural food pond farmers. BKD health monitoring inspections were conducted on 91 holdings. Some of the inspections are carried out at the same time as inspections related to the risk-based monitoring programme. The number of tests can be found in the appendix (Table B10).

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 export and import operations, when transporting fish over dams from sea areas to inland waters in connection with the spawning season and always when there is a suspicion of a disease.

Eradication measures against IHN infection appear to have been successful

Cases of IHN, which is classified as an easily spreading animal disease, were detected in Finland in the winter 2017-2018. IHN occurs in North America, Europe and Asia. However, the Nordic countries had remained free from this disease before the cases found in Finland. The infection was found while taking samples in connection to the risk-based monitoring of viral diseases. In investigations of the origin and prevalence of the disease, the virus was found on a total of six holdings in the municipalities of Tervo, Nurmes and Kaavi. All the fish on the affected farms were destroyed and the farms were renovated to eradicate the disease in 2018. Based on Evira's decision, four restriction zones were set up in the river basins surrounding the affected areas. One of them was dismantled in 2018 and two in 2019. The fourth zone has no fish farming operations, and samples needed to dismantle the zone are still being collected from wild fish. The origin of the infection has not been established. IHN surveillance areas were also established around the infected areas based on a decree issued by the Ministry of Agriculture and Forestry where a two-year surveillance programme was launched to restore the IHN-free status. The IHN-free status is valid elsewhere in the country. Risk-based monitoring of viral diseases has also been enhanced due to the IHN infections. No new infections have been found.

The disease-free statuses granted to Finland regarding fish remained unchanged. In regards to IHN, a two-year monitoring programme was launched in the monitoring areas in Tervo, Kava and Nurmes in 2019 to restore the IHN-free status. The restricted area established in Åland in the early 2000s to prevent the spread of VHS is still in force. The eradication programme launched in 2014 was finished in 2019, and in 2020 a two-year monitoring programme aimed at restoring the disease-free status will be launched. The VHS virus has not been detected in Åland since summer 2012. The rest of the country is still free from VHS and IHN.

ISA, SAV, SVC, KHV or WSD infections have never been diagnosed 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 2010–2019 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 above-mentioned tests, a total of 2,965 wild fish were tested for VHSV, IHNV and IPNV infections in connection to IHN surveys and broodfish capturing. A total of 818 broodfish were also tested for BKD, and 717 broodfish were tested for SAV.

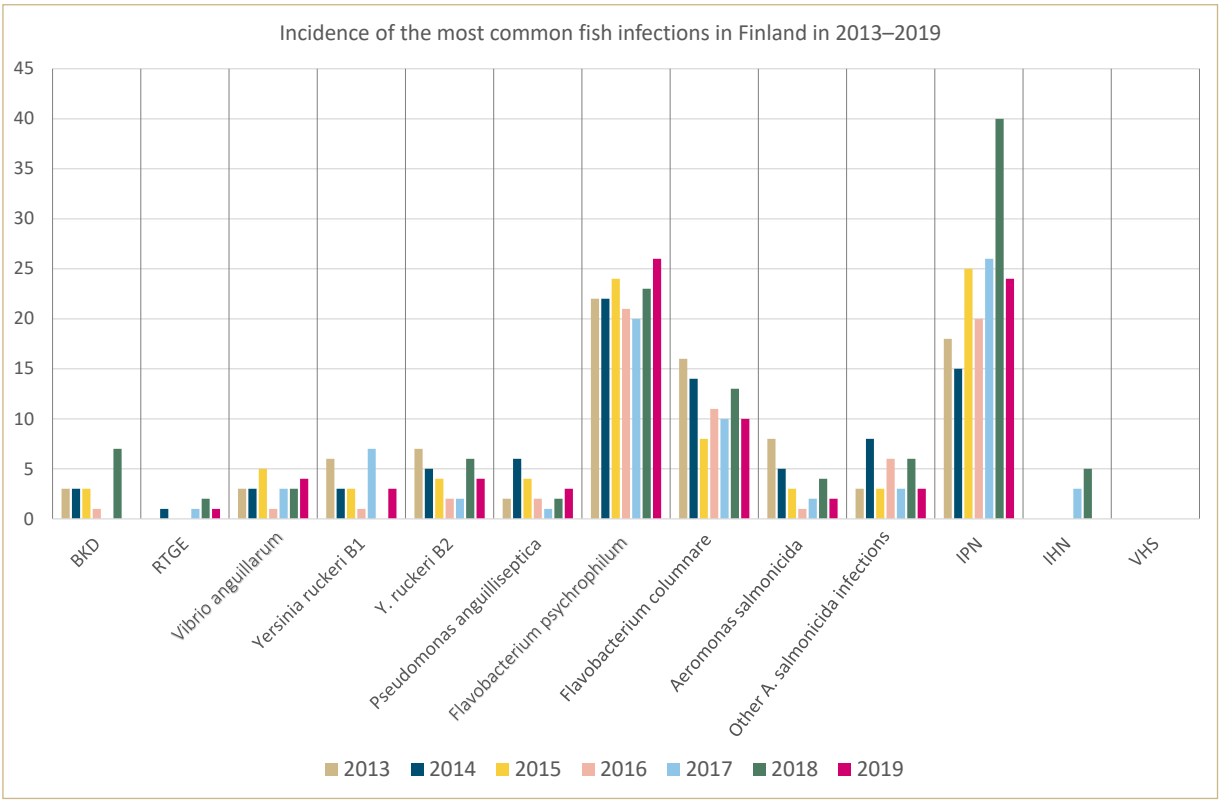


Figure 2. *Incidence of the most common fish infections in Finland in 2013–2019. The number of fish farms where the disease was diagnosed are presented on the Y-axis. The most common findings are flavobacteria, which affect young fish, and IPN virus, both of which are also common elsewhere in the world.*

6 Horse diseases

The most common reasons for testing horses were disease and abortion diagnosis, determining the cause of death, determining the suitability of studs for breeding and reasons related to the import and export of horses and their sperm. Horses imported from the EU were also tested for covering sickness (dourine), glanders (malleus) and equine infectious anaemia (EIA) in cases where the horse and its documentation did not comply with import requirements.

Disease diagnostics

In 2019, a pathological examination was conducted on 48 horses and one donkey (53 horses in 2018). Out of these, 30 were examinations to determine the cause of abortion or foal diseases while the rest were tests to diagnose the disease and cause of death in adult animals. Three horses were subject to a forensic pathology examination. In addition, three cases were investigated in which only organ samples were examined. In most of the examinations on the cause of abortion, no specific reason for the interruption of pregnancy was found, or the interruption of pregnancy was caused by a cord rotation. In two cases, the cause was determined to be the foal's bacterial infection, the cause of which is likely to have been a part of the normal microbial system of the dam's skin and environment. In recent years, herpesvirus has caused a few abortion cases per year at most, and the arteritis virus was last found to be the cause for abortion in 2011.

Strangles

Streptococcus equi sp. *equi,*, the cause of strangles, was confirmed in one horse from samples submitted to the Finnish Food Authority. Other laboratories examining strangles samples must submit the *Streptococcus equi* sp. *equi* strains that they have isolated or a positive DNA sample to the Finnish Food Authority. In 2019, samples from three horses were submitted from laboratories for confirmation.

Various forms of disease caused by equine herpesvirus EHV-1 and EHV-4 were identified

The annual number of herpesvirus samples from horses is relatively small which affects the assessment of its prevalence but forms of the disease caused by both viruses occur in Finland every year. Diagnostic samples for EHV-1 and EHV-4 viruses have been examined to determine the cause of a disease and the cause of respiratory tract symptoms, neurological symptoms or abortion. Abortion caused by a herpesvirus (equine viral abortion) is nearly always caused by EHV-1 while equine rhinopneumonitis which causes respiratory symptoms can be caused by both EHV-1 and EHV-4. One case of equine viral abortion caused by EHV-1 was detected in the examinations at the Finnish Food Authority in 2019. Rhinopneumonitis caused by EHV-4 also occurred during the year. In addition to the foals sent to be examined to determine the cause for abortion, samples from 39 horses were examined either by examining samples for the virus and/or examining paired serum samples for an increase in antibodies. Laboratories independent from the Finnish Food Authority must send isolates of any EHV-1 and EHV-4 strains or positive DNA samples to the Finnish Food Authority. Annually, a few EHV-1 and EHV-4 samples are received from these laboratories.

No cases of equine influenza or viral arteritis found

Equine influenza or viral arteritis infections were not diagnosed in the samples examined in 2019. 33 horses were examined for horse influenza either by examining nasal mucus samples and/or paired serum samples to look for an increased amount of antibodies. Samples were examined for viral arteritis to determine the cause of a disease or brucellosis. In 2019, in addition to foals sent for disease diagnostics, samples from 33 horses were examined to determine the cause of abortion either by examining samples for the virus and/or paired serum samples to find an increased amount of antibodies.

Stud testing

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

In accordance with the legislation, studs used for breeding and a few mares - a total of 428 horses - were tested for *Taylorella equigenitalis* , a bacterium that causes contagious equine metritis (CEM) The number of horses examined increased by 100 from the previous year. One fjord horse stud was found to have a *T. equigenitalis* infection.

In 2019, 220 breeding studs were examined for viral arteritis with negative results. Antibodies to viral arteritis were detected in a total of seven breeding studs but the results of further tests on sperm samples were all negative. There have been no changes in the disease numbers of viral arteritis in recent years. Studs infected with the virus and excreting it have not been detected in Finland since 2010, and there have only been individual cases of other horses infected with the virus, most recently in late 2013/early 2014. In autumn 2014, the testing of studs was expanded to cover all studs used on stud farms. Testing studs for viral arteritis has become a major part of EVA monitoring in Finland.

A total of 32 studs were tested for EIA with all the samples coming back negative.

Dangerous equine diseases were not diagnosed in Finland

Dourine, malleus and EIA are all classified as dangerous animal diseases to be combated against according to animal disease legislation. Dourine has never been detected in Finland, and the last confirmed cases of malleus and EIA occurred in 1942 and 1943 respectively. In Europe, EIA occurs endemic in Romania and Italy, and individual outbreaks are also recorded in other parts of Europe every year. Outside of Europe, EIA is also reported annually. The spread of EIA through imported horses is therefore a persistent threat, especially as the disease may be completely asymptomatic in the horse.

In addition to breeding stud tests, EIA examinations were conducted in connection with the import of horses and their gametes, their export, and in cases with inadequate information on imported horses. In 2019, a total of 62 samples were examined for EIA, all with negative results.

Antibodies for dourine and glanders were examined at the Finnish Food Authority from 13 horses due to import or export operations and in cases with inadequate information on imported horses, all with negative results.

West Nile Fever

West Nile Fever is a vector-borne disease caused by a flavivirus called West Nile virus with wild birds acting as a reservoir for the disease. Although the range of hosts for the WN virus is very wide, clinical infections occur mainly in humans and horses as well as in some bird species, such as crow birds and birds of prey. However, the WN virus does not spread from horses or other mammals as the infection does not cause adequate viremia for the vector insects in these animals. The majority of WN virus infections in horses are asymptomatic or cause a flu type fever with very mild symptoms but a small proportion of the infected horses may also get a severe neurosymptomatic disease which often leads to death. West Nile Fever occurs mainly from midsummer to late autumn, depending on the variation in the prevalence of the Culex genus insects that acts as a vector for the virus. West Nile Fever has been occurring in southern Europe for years but in recent years it has started spreading north in Europe. In 2018, an outbreak of West Nile Fever occurred in Europe, and the disease was reported in humans about seven times more than usually. The disease was also diagnosed for the first time in Germany in two horses and several birds such as a blackbird and a northern goshawk. In 2019, 31 cases in horses were detected in Germany, all in East and North-East Germany. Germany also reported the first infection in humans with domestic origins in 2019. In Northern Europe, the disease has not yet occurred but suitable vector insects are found in the area. On their website, ECDC has continuously updating information on the presence of West Nile Fever in Europe and in humans, wild birds and horses. If necessary, the Finnish Food Authority is prepared to carry out diagnostic examinations to detect West Nile Fever.

7 Reindeer diseases

In 2019, disease numbers in reindeer remained at a good level and no dangerous or easily spreading diseases were detected. Approximately 50–60 samples from reindeer are examined every year to determine the cause of a disease. In 2019, 70 samples from reindeer were submitted for pathological testing, out of which 57 were organ samples. In addition, 13 reindeer carcasses were examined. Reindeer samples submitted for disease diagnostics are mostly submitted in the autumn and winter when reindeer are slaughtered and captured. Possible cases of diseases may not be detected in reindeer that roam free in nature. Especially in the summer, reindeer that die in the wild rot rapidly because of the warm weather, and scavengers might eat them before they are found.

Monitoring of chronic wasting disease (CWD) continued

In 2018, a three-year monitoring programme was launched to detect the presence of CWD in Finland. As a part of monitoring, herding cooperatives were asked to send in samples - primarily reindeer heads - taken from reindeer that died spontaneously, were put down due to an 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 testing were also tested for CWD insofar as possible. CWD was not detected in any of the samples. (Table B6). The TSE numbers in reindeer and other cervids has been monitored for several years now.

Table 13. TSE testing of cervids in 2010–2019 sorted by species. One TSE-positive elk was found in 2018.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Reindeer *(Rangifer tarandus tarandus)*	5	2	1	4	13	3	6	16	294	616	**960**
Finnish forest reindeer *(Rangifer tarandus fennicus)*	0	0	0	0	0	0	4	13	14	12	**43**
Elk *(Alces alces)*	5	4	9	3	3	6	26	48	242	162	**508**
White-tailed deer *(Odocoileus virginianus)*	3	1	2	5	3	4	12	23	50	131	**234**
Roe deer *(Capreolus capreolus)*	2	1	2	2	2	0	7	13	63	208	**300**
Fallow deer *(Dama dama)*	0	1	0	0	1	1	0	1	0	0	**4**
All	**15**	**9**	**14**	**14**	**22**	**14**	**55**	**114**	**663**	**1,129**	**2,049**

Meat inspection samples important for disease monitoring

A large proportion of reindeer samples are submitted by veterinarians who inspect reindeer meat at slaughterhouses. Of all reindeer samples in 2019, 47 were related to meat inspections. *Echinococcus canadensis* G10 was detected in the lungs of six reindeer; in 2018, Echinococcus cysts were only found in two reindeer. As in previous years, the infections mainly occurred in the eastern parts of the reindeer management area. The meat inspection samples also indicated liver bile duct cysts which are considered abnormalities or neoplasms as well as air-filled cysts in the lungs that were caused by bronchectasia. Because of their appearance, these types of cysts can easily

be confused with cysts caused by echinococcus. Because of this, all suspicious cyst findings must be submitted to the Finnish Food Authority for testing.

Bacterial infections and starvation

Several cases of necrobacillosis (*Fusobacterium necrophorum* infection) were diagnosed in reindeer that were examined to determine the cause of a disease or death and related aphthous stomatitis (mouth ulcers) were detected mainly in farmed reindeer. Orf virus was not diagnosed in reindeer in 2019. As in the previous year, some cases of easily-spread eye infections caused by *Moraxella* bacteria were detected in reindeer. In one case, the eye infection was caused by *Helcococcus ovis* bacterium. *Helcococcus ovis* was also isolated from purulent infections in several reindeer. The samples also showed other bacteria causing purulent infections, including *Trueperella pyogenes* and streptococci bacteria. One reindeer was diagnosed with purulent meningitis. One reindeer's liver was found to be infected with a focal purulent infection caused by the swine erysipelas bacteria (*Erysipelothrix rhusiopathiae*). A few cases of enteritis and peritonitis were identified. All samples that included intestines were tested for salmonella with negative results. Various reindeer examined were found to have a poor nutrition status and a few were determined to have starved to death. Starvation was often related to other diseases such as mouth ulcers. In addition, the environmental conditions at the end of 2019 exposed reindeer to starvation as in a large part of the reindeer herding area it snowed onto bare ground and there was a lot of snow. Some heads of reindeer that were slaughtered in poor condition were also submitted as samples. Their teeth were heavily and unevenly worn, indicating difficulties in finding food.

Parasites are a part of a reindeer's life

Reindeer living in the wild are susceptible to parasitic infections. Although parasites are rarely the main cause of a disease in reindeer, they can expose reindeer to other diseases, and abnormalities caused by parasites often result in rejection in meat inspections. Several samples from slaughterhouses showed scarring from migrating parasites in organs. Some reindeer had *Setaria tundra* roundworms in the abdominal cavity and infection-induced changes caused by the worms in the peritoneum. One reindeer was infected with *Elaphostrongylus rangiferi* brain worm infection. Tissue cysts caused by parasites of the *Sarcocystis* genus were a common incidental finding in microscopic tissue examinations of cardiac and skeletal muscles. Most living reindeer are treated annually for parasites in connection with round-ups. Similarly to previous years, the number of parasites was low in faeces and blood samples that were examined for parasites. In farm conditions, feeding plays an important role in reindeer health and welfare, and parasites can play a greater role in reindeer health. Some reindeer are farmed throughout the year outside the reindeer herding area. In 2019, the Finnish Food Authority examined a few calves that had lived on such farms. They were in poor general condition and were found to have an intestinal infection due to intestinal parasites.

8 Fur animal diseases

Disease diagnostics

In 2019, pathologic-anatomical examinations were performed on a total of 431 fur animal samples. The number of samples decreased slightly from the previous year when 486 samples were examined. Out of the samples examined, 177 were minks; 238 were farmed foxes, most of which were blue foxes; and 16 were raccoon dogs. 219 stool samples were examined for diarrhoea. The number of faecal samples increased from the previous year when 187 samples were examined.

Like the year before, the most common finding in farmed foxes examined at the Finnish Food Authority was systemic infection. The second most common findings were metritis and enteritis. The number of metritis infections rose considerably from the previous year when very few of them were diagnosed.

The most common finding in the mink samples examined was also systemic infection. The second most common finding in minks was enteritis which was diagnosed very little the year before. 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 the Finnish Food Authority each year. In 2018, plasmacytosis was diagnosed in minks from two fur farms.

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

Major viral pathogens in fur animals include parvovirus and canine distemper virus. Parvovirus was diagnosed in 92 samples during the year. No cases of canine distemper virus were found in tests during the year.

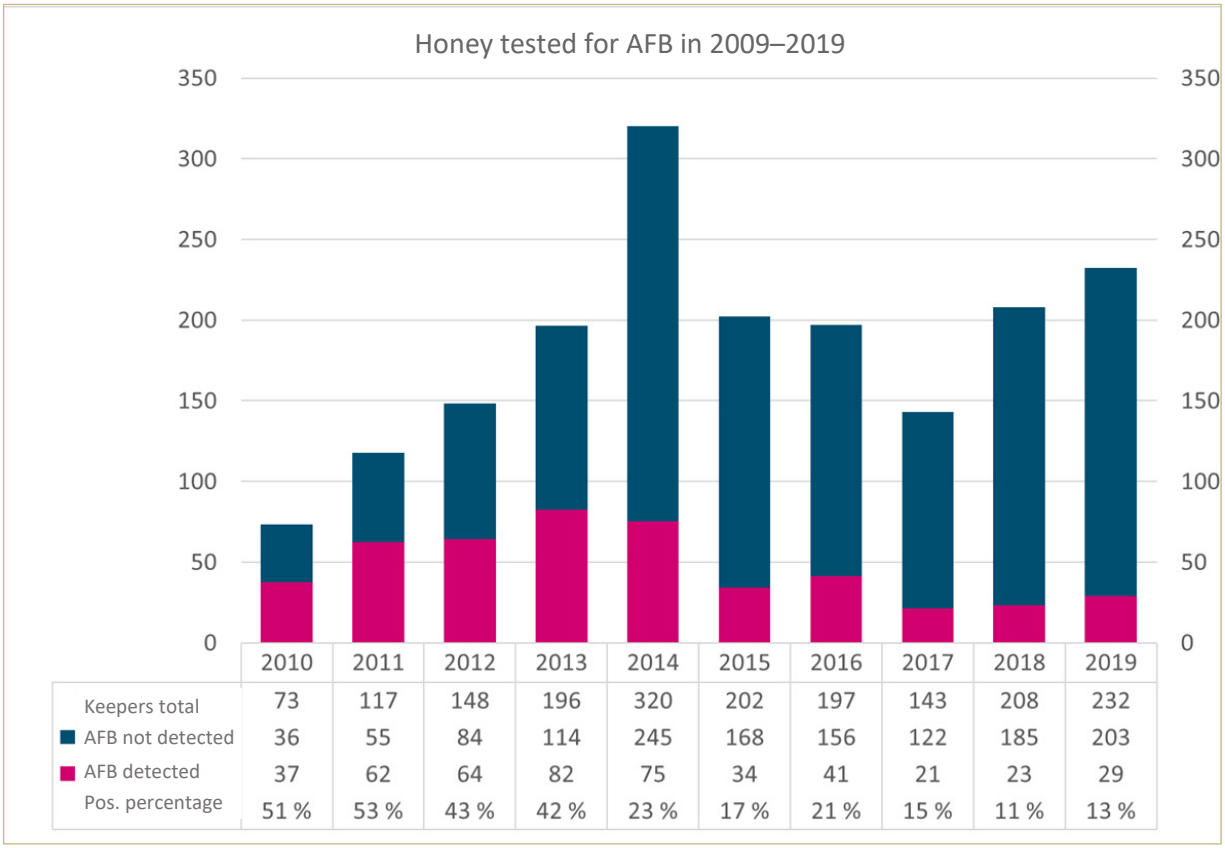
Salmonella infections were diagnosed in pathologic-anatomically examined animals and faecal samples tested to determine the cause of diarrhoea from a total of eleven fur farms in 2019. All found strains were serotypes *S. Enteritidis* FT 33. The number of farms increased by three compared to the previous year.

Monitoring studies

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

9 Honeybee 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 samples sent to the laboratory are submitted for testing for American foulbrood. In 2019, a total of 2,171 honey samples submitted by 232 beekeepers were tested for American foulbrood. Testing for American foulbrood became subject to a fee in 2015 which is why the number of samples submitted was unusually high in 2014. Since then, the number of beekeepers submitting samples has returned to the same level as before the change. In 2019, *P. larvae* was detected on 13% of the farms that submitted samples. In total, 5% of the samples in 2019 were found to be infected. No cases of clinical American foulbrood were found. Compared to previous years, the proportion of positive samples has remained low. In 2006–2018, 5–31% of the samples have been positive.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Keepers total	73	117	148	196	320	202	197	143	208	232
AFB not detected	36	55	84	114	245	168	156	122	185	203
AFB detected	37	62	64	82	75	34	41	21	23	29
Pos. percentage	51 %	53 %	43 %	42 %	23 %	17 %	21 %	15 %	11 %	13 %

Figure 3. *Beekeepers who submitted honey samples for testing for American foulbrood in 2010–2019.*

In 2019, 216 honey bee hives on the Åland Islands were examined for *Varroa destructor* mites. The Åland Islands were declared to still be free from Varroa. The mites are common in mainland Finland but samples are usually not tested for them in laboratories.

Thanks to the efforts to combat Varroa destructor mites, honey bee tracheal mites (*Acarapis woodi*) have also become less common throughout Europe, though they are still occasionally found in Finland. In 2019, no honey bee tracheal mites were found.

European foulbrood infections are usually diagnosed in a few apiaries each year. In 2019, *Melissococcus plutonius*, the bacterium that causes European foulbrood, was found on one apiary in Pirkanmaa and on one apiary in Southwest Finland.

Nosema apis and *N. ceranae* parasites are common in Finland but they rarely cause a serious disease. No nosema was detected in 2019.

Beekeepers can also submit small beetles or larvae found in apiaries to the Finnish Food Authority to identify small hive beetles (*Aethina tumida*). Small hive beetle has not been found in Finland.

10 Pet diseases

Disease diagnostics

The most common reasons for examinations on pets were determining the cause of a disease or death, infectious diseases, to investigate animal welfare issues, to identify hereditary diseases and to determine the cause of death of newborn animals. In 2019, pathological examinations were conducted on nearly 900 animals of which 596 were dogs, 213 were cats and approximately 85 were other animal species. A large proportion of these examinations (approx. 10%) consists of forensic necropsies, some of which are conducted in connection with investigations of suspected animal welfare crimes. In addition to necropsies, 217 faecal samples were also tested for parasites, out of which 157 were dog samples, 38 were cat samples and the rest were from other animals.

Infectious diseases more common in imported dogs

Currently, commonly occurring infectious diseases in young and adult dogs are mainly respiratory tract infections or gastrointestinal infections. Cases of vomiting and diarrhoea caused by various microbes occur every year. There are no effective vaccines against these infections with the exception of diarrhoea caused by parvovirus. Diarrhoea caused by parvovirus is diagnosed particularly in young dogs and illegally imported puppies that often have poor immunity against parvovirus due to insufficient vaccinations of the mother dog. The parvovirus is resistant and continues to occur in the environment. Every year, dogs also have bacterial pneumonia and viral and bacterial infections that cause so-called 'kennel cough'. A vaccine is available against kennel cough, and although it does not fully protect against infection, it may alleviate symptoms.

In the autumn of 2019, an outbreak of sudden bloody diarrhoea occurred in dogs in Norway which also caused many people to contact the Finnish Food Authority. In Finland, the haemorrhagic intestinal disease in dogs occurs fairly regularly throughout the year as individual cases. The disease is now known as AHDS (acute haemorrhagic diarrhoea syndrome). The triggering causes of the disease are not well known but it is most likely not infectious between dogs.

Infectious diseases are especially dangerous for young puppies due to their underdeveloped immune systems. Small puppies are mainly diagnosed with different bacterial infections. 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. Issues caused by herpesvirus mostly occur if a bitch is infected for the first time while pregnant and transmits the virus to the puppies when they pass through the birth canal.

Parasitic diseases are rarely diagnosed in pathological studies although imported dogs are overrepresented. Infections caused by T*oxoplasma gondii* and *Neospora caninum* are rare in dogs. Intestinal infections caused by *Giardia* sp. or *Cryptosporidium* sp. protozoans are diagnosed regularly from faecal samples since their pathogens are common in the environment. The infections are usually asymptomatic in dogs but they can cause long-term diarrhoea in puppies and dogs with a weakened immune system.

Thanks to regular vaccinations, dangerous viral diseases such as rabies, distemper and infectious canine hepatitis, never occur in Finnish dogs nowadays. 73 dogs were examined for rabies, 55 of which were illegally imported. Dogs are also tested for rabies when, based on the symptoms, the possibility of rabies cannot be ruled out. No cases of rabies were diagnosed in dogs (Table 14).

In 2018–19, the Finnish Food Authority carried out a risk assessment project that examined whether importing dogs into Finland poses disease risks to humans or animals. In the project, samples from dogs imported to Finland were examined for the levels of rabies vaccine antibodies, *Brucella canis* antibodies, *Echinococcus multilocularis* and multi-drug resistant bacteria ESBL and MRSA. In addition, samples from dogs were examined for the following parasites: *Dirofilaria immitis*, *Dirofilaria repens* and *Leishmania infantum*. The results of the project are presented in Finnish in the report "Zoonoottiset taudinaiheuttajat tuontikoirissa" ("Zoonotic pathogens in imported dogs") (https://www.ruokavirasto.fi/globalassets/tietoa-meista/julkaisut/julkaisusarjat/tutkimukset/riskiraportit/2019_2_zoonoottiset-taudinaiheuttajat-tuontikoirissa.pdf).

Bacterial infections caused by *Brucella canis* occur every now and then in imported dogs and Finnish dogs taken abroad for breeding purposes. In 2019, 12 dog samples were serologically tested and 18 samples were bacteriologically tested either in connection with the export tests, suspected disease or brucellosis. No confirmed *Brucella* infections were diagnosed.

Based on monthly reports from veterinarians, three dogs were diagnosed with clinical leptospirosis in 2019. All these dogs had been on a dog show or hunting trip to the Baltic countries.

Based on monthly reports from veterinarians, a total of 86 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 affect cats of all ages

Viral diseases are more common in cats than in dogs. Currently the most common infectious cause of death in cats in Finland is feline infectious peritonitis (FIP) caused by feline coronavirus. Cat plague caused by feline parvovirus also occurs often in insufficiently vaccinated young cats. Viral infections that cause viral respiratory tract infections also occur regularly in cats. There is no 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. 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. Freely roaming cats also often have roundworm and tapeworm infections.

12 cats were tested for rabies. No cases of rabies were diagnosed in cats (Table 14).

One poisoning caused by a rodenticide diagnosed in a cat

In 2019, the Finnish Food Authority found one alphachloralose poisoning in a cat. Veterinarians also reported several similar cases of suspected poisonings in late 2018 and early 2019 to the Finnish Safety and Chemicals Agency. Alphachloralose is the active substance in rodenticides and affects the function of the central nervous system. The cat is exposed to the substance when eating a poisoned mouse. No antidote is available for poisoning but most cats recover if they receive supportive care that corresponds to their symptoms.

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. In spring 2019, the Finnish Food Authority found individual infections in pet rabbits around Finland. 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 since the virus is persistent and highly contagious. Other common findings in pet rabbits include bacterial respiratory infections, and a few cases of *Encephalitozoon cuniculi* fungal infections are diagnosed each year.

Salmonella in pets

In 2019, eight salmonella strains were found in samples isolated from pets that were submitted to the Finnish Food Authority for confirmation and typing. The majority of salmonella infections in pets are asymptomatic and will therefore likely not be detected. Five infections were diagnosed in cats, one of which was the serotype *S. Infantis* and four were the serotype *S. Typhimurium* FT U277. Infantis was isolated from a cat that lives on an Infantis positive cattle farm. Typhimurium FT U277, on the other hand, is the serotype and phage type that is most typically isolated from small wild birds. *S. Typhimurium* FT 8 was isolated from one dog, and *S. Kottbus* was isolated from another one. Both are rare in Finland. In addition, one snake was found to have a strain belonging to the *Salmonella enterica* ssp. *diarizonae* subtype. Reptiles (snakes, lizards, turtles) typically carry strains from subspecies *arizonae*, *diarizonae* and *houtenae* in their intestines.

11 Wild animal diseases

Wildlife disease surveillance in Finland focuses primarily on diseases that can be spread between animals and humans i.e. zoonotic diseases (zoonoses). The incidence of other animal diseases and outbreaks of new epidemics are also monitored by testing animal samples submitted by members of the public. In addition to the wild animal tests presented in this chapter, tests on wild fish and crustaceans are detailed in chapter 5, Fish and crayfish diseases.

Antibodies to Aujeszky's disease (AD) caused by herpesvirus were detected in a blood sample from a wild boar killed by hunting. The finding is very rare and it is the first time its antibodies were found during the current monitoring programme of wild boar living in the wild. An exceptionally large number of salmonellosis cases were diagnosed in hedgehogs in late summer and autumn 2019. Most infected hedgehogs were young and in bad condition. Serotypes Enteritidis and Typhimurium were found in hedgehogs. Rabbit haemorrhagic fever (RHD) caused a new, broader epidemic in the wild rabbits in the Helsinki Metropolitan Area for the first time in a few years. This year, the first RHD cases in brown hare were also diagnosed in Helsinki.

Antibodies to Aujeszky's disease in one wild boar

A wild boar killed in North Karelia near the eastern border was found to have antibodies to Aujeszky's disease (AD). However, in a PCR study the organs of the boar tested negative for the virus that causes AD (suid herpesvirus 1, SuHV1) which means that the animal was unlikely to be secreting the virus at the time of killing. The wild boar was killed on a pasture where sheep were grazed at the time of the killing, and later one of the sheep had strong neurological symptoms that led to death. Since the AD virus is very persistent in the environment and may also infect ruminants causing neurological symptoms, the sheep in question was examined for Aujeszky's disease with negative results.

Aujeszky's disease common in European wild boar

Aujeszky's disease or pseudorabies is mainly a swine disease caused by a herpesvirus called the suid herpesvirus 1 (SuHV1). The symptoms of the disease include fever, apathy, lack of appetite, respiratory tract symptoms and central nervous system symptoms such as convulsions and coordination issues, and sometimes also excessive saliva production. The severity of the disease depends on age, and in piglets mortality can be very high, up to 100%. For pregnant sows, it causes brucellosis, mummified piglets, piglets born weak and other reproductive problems. The AD virus causes a life-long, latent infection in pigs which means that the virus remains permanently hidden in the nerve ganglia of the body. However, the secretion of the virus may start again later e.g. as a result of some form of stress like during farrowing.

Although Aujeszky's disease has been eradicated from farmed pigs in several European countries, antibody studies indicate that it is endemic in wild boar in Europe, and in some areas up to half of the wild boar population has AD antibodies. The prevalence of the secretion of the virus in wildlife populations has been studied relatively little and the studies seem to indicate that the differentiation varies fairly widely:

in PCR testing on secretion samples, approximately 1–19% of the AD antibody positive wild boars tested were detected to have the AD virus, and virus secretion through genital secretion seems more common than other secretions. AD appears to be very rare in the wild boar population in Finland as the previous antibody finding dates back to 1980 and the AD virus has never been detected. Organ samples from wild boar that are submitted for testing in connection to the monitoring of African swine fever are always also tested for the AD virus, and AD antibodies are determined for all animals that can produce a blood sample that is eligible for testing. The number of samples that has been tested for AD antibodies has been slightly more than half of the number of wild boar examined each year. For example, in 2018, 712 wild boar living in the wild were examined for AD virus, out of which 325 were also tested for AD antibodies. The wild boar from which the AD antibody finding originated in 2019 had been killed in North Karelia. Between 2015–2019, 15-41 wild boar were sent for testing from this region.

In addition to pigs, AD can infect many other species of animals; e.g. hunting dogs could be infected when eating meat from a wild boar that is secreting the virus. In fact, infections in hunting dogs as a result of feeding them raw wild boar meat have been reported in research although compared to the prevalence of AD antibodies in the wild boar population, it is rare for dogs to fall ill. In animals other than pigs, AD leads to an acute neurological disease and typically to rapid death. These infections are not relevant to the spread of the disease. The AD virus is very persistent in the environment and it can stay in soil or slurry for several weeks or even months.

Rabbit haemorrhagic disease RHD back in the Helsinki Metropolitan Area

In May 2019, the Finnish Food Authority started receiving notifications about dead wild rabbits in Helsinki, and in late May, the first RHD diagnosis of the year was confirmed in a rabbit found in Helsinki. Shortly before the rabbit case, the first RHD case in Finland had already been diagnosed in a brown hare leveret that had been put down in Helsinki at the beginning of May because of the disease. The virus in the brown hare was of the same RHDV2 type as in the wild rabbits. Another brown hare case was found at the end of June, also in Helsinki. In other parts of the world, cases have already been diagnosed in brown and blue hares. Cases in wild rabbits were detected and reported throughout the summer, and the last case was confirmed in November. RHD cases were found especially in Helsinki but also in Espoo and Vantaa, and one case in Kirkkonummi. The previous (and first) RHD epidemic in wild rabbits occurred in the Helsinki Metropolitan Area in 2016. Individual RHD cases occurred in pet rabbits in early 2019 (see chapter 10 Pet diseases).

Salmonella in hedgehogs

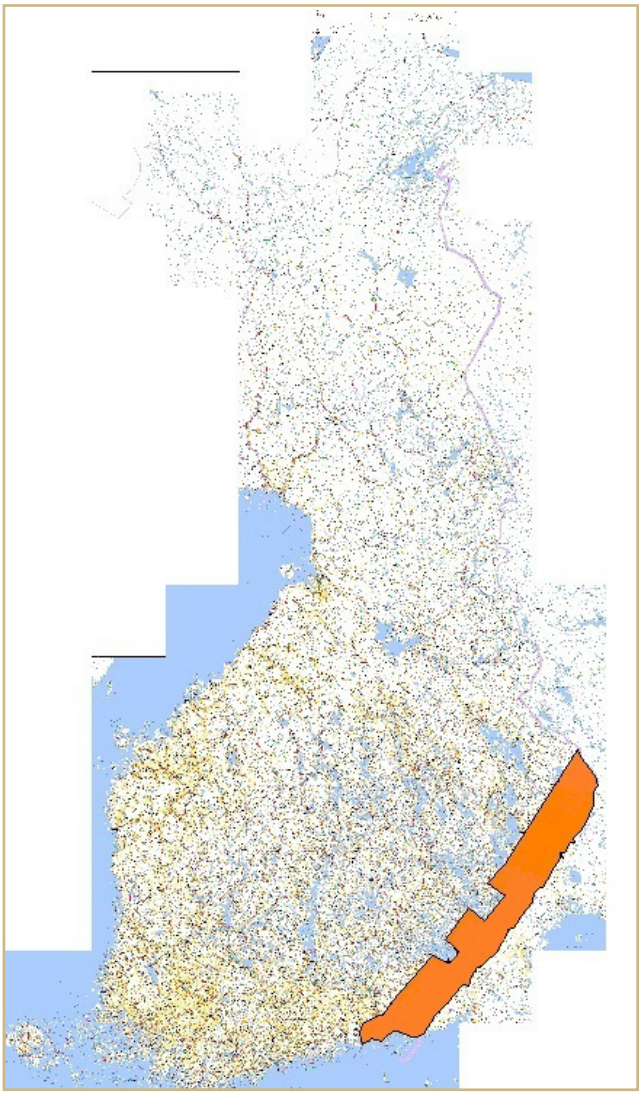
A large number of hedgehogs were sent in for tests in late summer and autumn 2019, often by people who had taken care of the hedgehogs. A total of 86 hedgehogs were examined, out of which 61 (71%) were that summer's hoglets. As many as 47% of the hedgehogs (40/85 bacteriologically studied) were found to be carrying salmonella. The most common type of salmonella serotype in hedgehogs was Enteritidis (83% of the strains). A less common strain found was the Typhimurium serotype that is common in small birds. The majority (87.5%) of the salmonella positive hedgehogs were that summer's hoglets. Almost two out of five infections (37.5%) were asymptomatic, i.e. they were only detected in the culture enrichment in the intestine while other infections had spread from the intestine to the rest of the body. Increasing numbers of salmonella were often found in young and very thin hedgehogs that were in poor condition. Other disease-causing bacteria were also found in hedgehogs, including *Yersinia pseudotuberculosis* (3 cases), *Pasteurella multocida* (3), *Klebsiella pneumoniae* (2) and *Listeria monocytogenes* (1).

Monitoring of chronic wasting disease (CWD) continued

In accordance with EU instructions, Finland launched a monitoring 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 these three years. By the end of 2019, samples from 1,792 cervids had been examined. Out of these, 1,129 cervids were examined in 2019 without detecting any diseases (Table B6). CWD has not been detected in Finland but in 2018, an old elk in Kuhmo was found to have TSE deviating from the actual wasting disease. The monitoring covers reindeer, Finnish forest reindeer, elk, white-tailed deer and roe deer. The animals needed for testing are animals that were found dead - including animals that were involved in traffic accidents or that were killed by a predator -, animals that were put down due to a disease or that were over one year old and determined to be ill during slaughter. Samples are collected everywhere in the country. The up-to-date accumulation of sample numbers by species and region can be seen on the Finnish Food Authority's open information portal.

Finland remained rabies-free

Efforts to combat rabies continued from previous years. In Finland, vaccine baits intended for wild animals are spread in the environment in order to stop rabies from spreading to the country via small wild predators. In 2019, the vaccine baits (a total of 180,000 vaccines) were dropped from an aircraft in September and October. The incidence of rabies and consumption of the baits are constantly monitored by testing hunted animals and animals that are found dead. It is crucial for the monitoring of diseases that hunters help collect animal samples. Samples are mainly collected from Southeast Finland and North Karelia where bait vaccines are spread. In 2019, the collection campaign failed to reach its target. The aim of the Finnish Food Authority was to obtain 360 animal samples from the rabies bait vaccination area. A total of 321 foxes and raccoon dogs were sent in, out of which 289 animals provided brain samples for rabies testing and 251 blood samples for vaccine success monitoring. 45% of the animals examined were diagnosed with antibodies at the time of vaccination. The tracer used in the vaccines, tetracycline, was found from 72% of jaw bone samples.



492 wild animals were collected in the whole country in connection to rabies monitoring. The majority of these were raccoon dogs (261) and foxes (68). No cases of rabies were detected. 40 bats were tested for rabies.

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

Table 14. Animals tested for rabies for different reasons in 2019. **No cases of rabies were detected.**

	Neurological symptoms	Traffic accident	Put down - aggressive	Put down - illegally imported	Put down due to injury	Put down - other neurological symptoms	Put down sick	Put down healthy	Found dead	Preliminary data results/ positive	Samples examined/ pos.
Ferret	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Horse	0	0	0	0	0	1/0	0	0	0	1/0	1/0
European polecat	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Cat	2/0	0	4/0	3/0	0	1/0	0	0	2/0	12/0	12/0
Dog	3/0	0	6/0	55/0	0	2/0	2/0	3/0	2/0	73/0	73/0
Sheep	1/0	0	0	0	0	0	0	0	0	1/0	1/0
Cow	1/0	0	0	0	0	0	0	0	0	1/0	1/0
Reindeer	0	0	1/0	0	0	0	0	0	0	1/0	1/0
Wolverine	0	2/0	0	0	0	0	0	0	2/0	4/0	5/0
Lynx	0	19/0	0	0	2/0	0	3/0	0	13/0	37/0	46/0
Bear	0	3/0	0	0	0	0	0	1/0	2/0	6/0	7/0
Fox	0	1/0	0	0	0	0	1/0	0	3/0	5/0	68/0
Bat	0	0	0	0	0	0	0	0	40/0	40/0	40/0
Badger	0	0	0	0	0	0	0	0	0	0/0	4/0
Marten	0	0	0	0	0	0	0	0	0	0/0	8/0
Otter	0	13/0	0	0	0	0	0	0	14/0	27/0	37/0
Raccoon dog	0	1/0	0	0	0	0	0	0	3/0	4/0	261/0
Wolf	0	3/0	0	0	0	0	1/0	0	2/0	6/0	14/0
Wild mink	0	0	0	0	0	1/0	0	0	0	1/0	1/0
Total	**7/0**	**42/0**	**11/0**	**58/0**	**2/0**	**5/0**	**7/0**	**4/0**	**85/0**	**221/0**	**582/0**

Examinations on wild boar living in the wild

The threat of African swine fever persisted in 2019 as the disease spread in Europe and Asia and continues to occur in the Baltic countries. In Finland, hunters have actively contributed to swine disease testing by sending blood and tissue samples from wild boar living in the wild to the Finnish Food Authority. Wild boar living in the wild have been tested for African swine fever in our country since 2010. In 2019, a total of 683 samples from dead or killed wild boar were received which is slightly fewer than in the previous year. The samples consisted of 15 wild boar that were found dead or that were killed in car accidents and 668 that were killed by hunters. The most likely reason for the decrease in the number of samples is the decrease in the population numbers of wild boar in Finland. According to an estimate by the Natural Resources Institute Finland (Luke), the average population size in January 2020 was about 1,400 boars. In January 2019, the corresponding estimate was 1,500 to 2,650 boars. In 2019, the Finnish Wildlife Agency received reports on 863 wild boar killed in hunting; in 2018, the corresponding number was 913. Overall, a very high proportion of the samples that the Finnish Food Authority receives are obtained from hunted wild boar (77% in 2019). The Finnish Food Authority continued to offer rewards for the submission of wild boar samples and reports about dead wild boars. In addition to African swine fever, samples from wild boar living in the wild were examined for classical swine fever and Aujeszky's disease. African swine fever or classical swine fever were not detected. Antibodies to Aujeszky's disease were diagnosed in one wild boar.

Blood samples from wild boar that were killed by hunters in other parts of the country than Southeast Finland were serologically examined for antibodies to *Brucella suis*. Out of a total of 146 samples examined, 12 were serologically positive and one sample was suspicious. All serologically positive animals were killed in Southern and Southwest Finland. Bacteria culture tests are still ongoing. In a 2015 report, *Brucella suis* antibodies and bacteria were only found in a wild boar that was killed by hunters in the Southeast Finland region which is why wild boar hunted in this area were not tested in 2019. Table B13 in Appendix B provides more detailed information on examinations on wild boar living in the wild in 2010–2019.

Table 15. Number of samples collected from wild boars by region in 2019.

Region	Tested animals
South Karelia	320
Kymenlaakso	121
Uusimaa	99
North Karelia	41
Pirkanmaa	17
Southwest Finland	17
Kanta-Häme	15
North Savo	15
Päijät-Häme	9
South Savo	9

Region	Tested animals
Satakunta	7
Ostrobothnia	4
Kainuu	3
North Ostrobothnia	2
Åland	1
Central Ostrobothnia	1
South Ostrobothnia	1
Central Finland	1
Lapland	0
TOTAL	**683**

Highly pathogenic avian influenza was not detected in wild bird monitoring

The incidence of avian influenza is monitored by examining wild birds that were found dead. A total of 174 wild birds were examined throughout the year. Highly pathogenic avian influenza was not detected. One sample combined from intestinal samples of three herring gulls was found to contain influenza A virus but it was not a type that causes any serious diseases (not a H5 or H7 virus type). Table B14 in Appendix B provides more detailed data on tests on avian influenza in wild birds in 2010–2019.

Echinococcus multilocularis-free status maintained, numbers of Echinococcus canadensis on the same level

Out of small predator samples, foxes and raccoon dogs are tested for *Echinococcus multilocularis*. Echinococcus multilocularis has never been detected in Finland which means that in the EU, Finland is considered a country free of E. multilocularis. In 2019, 523 animals were tested for the parasite (198 foxes and 325 raccoon dogs). E. multilocularis surveillance in Southern and Southwest Finland is conducted in cooperation with the regional offices of the Finnish Wildlife Agency. Small predators examined in the context of rabies monitoring are also tested for E. multilocularis.

Echinococcus canadensis, whose intermediate hosts are cervids and definitive hosts are wolves or dogs, occurs primarily in Eastern Finland (Eastern Lapland, Kuusamo, Kainuu, North Karelia) but it has been spreading westward in recent years. In 2019, the parasite was detected in 24% of wolves (9 positive out of 38 tested) which is only slightly less than in the previous year (29%). Seven of the positive cases were found in Kainuu, Lapland and North Karelia, and the other two cases were found in the western part of Northern Ostrobothnia. Six cases of E. canadensis were also identified in reindeer (see also chapter 7, Reindeer diseases). One infection was detected in North Karelia in a female elk that had been killed by hunters. The gradual spread of the range of E. canadensis towards western and southern Finland showcases the importance of the appropriate processing of elk slaughterhouse waste throughout Finland. Elk lungs and livers may contain cysts caused by E. canadensis larvae so they 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 roundworm (*Trichinella* spp.) that live in the muscle tissue. Trichinella worms are fairly common in the wild in Finland (Table B15). Positive Trichinella findings in bears and wild boars made by different laboratories are confirmed at the Finnish Food Authority.

Scabies (*Sarcoptes scabiei* mite) was confirmed in a total of 57 wild animals which is more than in the previous year (43 cases). As in previous years, the most cases of scabies were found in raccoon dogs (30 cases) and the second most in foxes (15 cases). A scabies infection was also diagnosed in 11 lynx and in one wolf. Geographically, the cases were centred around southwestern and southern Finland: 65% of the cases were found in Southwest Karelia, Kymenlaakso and Uusimaa. A large number of samples from small carnivores also come from the area for rabies monitoring. Ten cases were found in North Karelia and four in Western Lapland. Some scabies cases were also detected in Southwest Finland, Satakunta and Central Finland. Scabies cases occur at all times of the year although half of the cases were diagnosed in winter (January-March).

Tularemia mainly found in Northern Ostrobothnia

In 2019, 13 blue hares and 90 brown hares were examined. The proportion of blue hares in the tested hare animals has fallen over the years and was lower than usual in 2019 (11.5%). A total of seven cases of tularemia were confirmed at the Finnish Food Authority, all in brown hare. The cases occurred during the warm season from May to September. Most of the cases (5 cases) were found in Northern Ostrobothnia (in the Oulu region), and one case was also found in Central Finland and one in Kymenlaakso. Tularemia has already been found in these regions in the past several years. Other infectious pathogens in rabbits were the *Toxoplasma gondii* parasite (2 cases) and the bacteria *Yersinia pseudotuberculosis* (9 cases), *Pasteurella multocida* (2 cases) and *Listeria monocytgenes* (1 case) bacteria. All of them cause severe systemic infections in blue and brown hares, and infections occur every year in Finland. Salmonella infection was diagnosed in two brown hares: one in May and one in September. In both cases, the salmonella serotype was *Salmonella Typhimurium*.

Cause of death and disease monitoring of large predators

The Finnish Food Authority examines large predators that have been found dead (including those killed in traffic) and that have been put down due to illness, injury or police orders. The Natural Resources Institute Finland (Luke) handles large predators that were hunted with a permit granted on the basis of damage or population management. The Finnish Food Authority and The Natural Resources Institute Finland cooperate closely to collect and record samples from large predators.

The monitoring of the cause of a disease or death included whole or partial carcasses from 7 wolverines, 56 lynx, 16 wolves and 10 bears from different parts of the country. The largest number (20) of predators were received from North Karelia from where more than one sample of each of the four species were submitted. The second largest number of samples (11) came from the operating area of the Finland Wildlife Agency in Southeast Finland.

All the wolverines had been injured in car crashes. The wolverines were found in the North Karelia and Kainuu regions with the exception of one that died in Satakunta. Traffic accidents were the most common cause of death for all other large predators as well. 33 lynx, 7 wolves and 5 bears were killed or injured in traffic accidents. Traffic collisions with large predators took place throughout the country, with the exception of South Ostrobothnia and Lapland. The largest number of accidents happened in North Karelia (9 accidents).

Scabies was diagnosed in 11 lynx, all of which were found in Southern Finland (South Karelia, Uusimaa, Southwest Finland and Satakunta). Four lynx were shot with the permission of the police. Two of them were considered disturbances (roamed in yards or in pastures); one had been trapped in a trap for small predators and become injured; and one was found in poor condition with a foot injury. Two lynx had starved to death. In addition, pyothorax, lymphatic tissue cancer and fatal bite injuries (two cases) were found in the lynx. One lynx with an old shooting injury in the pelvis area was found immobile in the wild. One lynx carcass had been mummified and the cause of its death could not be determined.

Two bears were shot with the permission of the police. One of them had repeatedly roamed close to urban areas, and the other one had injured its foot in a trap. One bear was examined in connection with suspected hunting crimes. One young bear was killed by a predator, apparently a bigger bear. One small bear cub was found dead but the cause of its death could not be determined due to decomposition.

Seven wolves were shot with the permission of the police. Of these, four had been roaming near urban areas, two had attacked domestic animals and one was suffering from old fractures in its jaws and ribs and had been killed due to its poor condition. One of the wolves that had been shot near yards was found to have scabies but the three others had no diseases or injuries. This was the only scabies case in wolves in 2019. One collared wolf was found dead and it was diagnosed with a pulmonary infection. One wolf was diagnosed with purulent dermatitis. Three wolves were found to have old injuries from shooting (encapsulated shotgun pellets) which were not immediately lethal. The pellets were found in the above-mentioned collared wolf, in one that had died in a car crash and in the wolf with scabies.

Avian chlamydiosis, trichomonosis and salmonella in small birds

In 2018, avian chlamydiosis (caused by *Chlamydia psittaci*), a zoonotic, i.e. capable of infecting humans, bacterial disease, was diagnosed in one great tit that was found in Southwest Finland. In previous years, avian chlamydiosis has also been found in other small bird species in different parts of Finland but the great tit appears to be the most common carrier species of the bacteria. 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 in March and April. In addition, in the autumn (October/November), trichomonosis was diagnosed in domestic pigeons (pigeons), goshawks and greenfinches. There were no significant changes in the prevalence of trichomonosis compared to the previous year.

Salmonella was relatively rare in small birds. At the beginning of the year, salmonella was detected in three redpolls found in the Helsinki Metropolitan Area in February, March and April. In addition, at the end of December salmonella was found in two bullfinches, one from the Oulu region and the other from Southwest Finland.

Brucella found in a Baltic Sea seal

The health of seal populations in the Baltic Sea is monitored on the basis of samples obtained from seals killed by hunters. The uteri of female seals are used to monitor reproductive health, and liver samples help monitor parasites and environmental toxins. Bacteriological studies are also carried out on the samples if necessary. Liver fluke infections sometimes cause centralised infections in the liver in seals. In 2019, *Brucella pinnipedialis* bacteria was found in a centralised liver infection in a seal that was caught in the Bay of Bothnia. The seal was killed in May and was a one-year-old male. The same bacteria have previously been diagnosed in a few grey seals hunted on the Finnish coast. *B. pinnipedialis* is a species of brucellosis occurring in seals that could, in principle, also be transmitted to humans. However, infections in humans are very rare.

Cases of lead poisoning in eagles and a swan

Eight white-tailed eagles were found dead in 2018 due to lead poisoning which was one more than the year before. In addition, 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 pellets 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. Lead dissolves quite quickly in a raptor's stomach.

Many online reports on swans and rabbits

Wild animals that are found sick or dead can be reported on the Finnish Food Authority's website which is encouraged especially if sending a sample of the animal is not possible. Online reporting has become more and more popular every year. In 2019, 302 reports were made on the website which is more than in any previous year. Reports were submitted from everywhere in Finland. The regional distribution of the number of reports seemed to be in line with the population density as the highest number of reports (117) came from Uusimaa and many were also received from Häme, Southwest Finland and Northern Ostrobothnia. A large number of reports were about whooper and mute swans (75 reports). The largest number of swan reports came from Uusimaa and Northern Ostrobothnia, 12 from each. The highest number of swan deaths were reported during the spring migration in April (24 reports), and reports were received throughout summer and autumn. No swan reports were submitted from December to February. In 20 cases, swans were suspected to have hit a power line. Many reports - a total of 78 - also concerned hare animals (brown and blue hare, wild rabbit). The RHD epidemic in the Helsinki Metropolitan Area showed as a notable increase in reports about wild rabbits. In 2018, no wild rabbits were reported dead, but in 2019, there were 25 reports. With the exception of one report made in Hyvinkää, all came from the Helsinki Metropolitan Area. The highest number of rabbit reports were received in July (10 reports). Reports on brown and blue hares were made mainly during June-October (81% of the reports). Nearly half (47%) of the hare reports came from Uusimaa.

There were also a lot of reports on cervids (17), otters (16) and hedgehogs (11). This year there were no reports on deaths of small birds at winter feeding sites even though they were common in 2018. Different types of birds of prey (hawks, owls, eagles) were reported 24 times in different seasons.

Appendix A: Incidence of selected animal diseases in Finland

Table A1. Incidence of selected multiple species diseases in Finland in 2019.

Animal disease	Primary target animals	Zoonosis*	Last detected
Aujeszky's disease (pseudorabies)	Pig, ruminants, dog, cat Wild boar		Never 2019[1), 4)]
Bluetongue	Ruminants		Never
Brucellosis		x	
▪ *B. abortus*	Ruminants		1960
▪ *B. melitensis*	Small ruminants		Never
▪ *B. suis*	Pig		Never
▪ *B. suis* bv.2	Wild boar		2019[1)]
Echinococcosis		x	
▪ *E. multilocularis*	Fox, raccoon dog, rodents		Never
▪ *E. canadensis*	Cervids, dog, wolf		2019
Heartwater	Ruminants		Never
Tularemia	Blue and brown hare, rodents, birds	x	2019
Rinderpest (cattle plague)	Ruminants		1877
Leptospirosis	Cattle, pig, horse, dog	x	2019 [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
▪ Rabies in bats			2017
Rift Valley fever	Ruminants	x	Never
Salmonella infections	Numerous different species	x	2019
Foot-and-mouth disease	Cloven-hoofed animals		1959
Trichinellosis		x	
▪ Livestock	Pig, farmed wild boar, horse		2017[5)]
▪ Other mammals	Predators, wild boar		2019
TSEs (Transmissible Spongiform Encephalopathies)			
▪ BSE	Cattle	x	2001
▪ Classical scrapie	Sheep, goat		2005[6)]
▪ Atypical scrapie	Sheep, goat		2019
▪ 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 disease in four dogs

3) in a zoo animal

4) antibodies

5) in a farmed wild boar

6) has only been found in goats in Finland

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	2019
Bovine anaplasmosis	Never
Bovine genital campylobacteriosis (vibriosis)	Never
Bovine spongiform encephalopathy (BSE)	2001
Bovine viral diarrhoea (BVD)	2010
EBL, enzootic bovine leucosis	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	2019
Swine fever	1917
Swine vesicular disease (SVD)	Never
PMWS (postweaning multisystemic wasting syndrome)	2008[1)]
PRRS (porcine reproductive and respiratory syndrome)	Never
TGE (transmissible gastroenteritis)	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)	2014
Fowl cholera (*Pasteurella multocida*)	1993
Fowl tyhpoid (*S. Gallinarum*)	Never
Highly pathogenic avian influenza ▪ Poultry ▪ Other birds in captivity ▪ Wild birds	 Never 2016 2018
Marek's disease	2019[1)]
Low pathogenic avian influenza (in poultry)	Never
Mycoplasma gallisepticum infection (avian mycoplasmosis)	2019[1)]
Mycoplasma meleagridis infection	Never
Mycoplasma synoviae infection (avian mycoplasmosis)	2019[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)	2019[1)]
Avian infectious bronchitis (IB)	2019
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 virus	2006
Nairobi sheep disease	Never
Peste des petits ruminants (PPR)	Never
Salmonella Abortusovis	Never
Scrapie ▪ Classical scrapie ▪ Atypical scrapie	 2005[1)] 2019
Contagious agalactia	Never
Enzootic abortion in ewes (EAE), ovine chlamydiosis	Never
Caprine arthritis encephalitis (CAE)	Never
Contagious caprine pleuropneumonia	Never

[1)] has only been found in goats in Finland

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	2019[2)]
Salmonid alphaviruses (SAV)	Never
Spring viraemia of carp (SVC)	Never
White spot disease in crustaceans (WSD)	Never
Crayfish plague	2019[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)	2019
Equine influenza	2012
Equine infectious anaemia (EIA)	1943
Equine piroplasmosis (EP)	2017[1)]
Equine rhinopneumonitis/equine viral abortion	2019
Glanders (malleus)	1942
Surra (*Trypanosoma evansi*)	Never
Viral arteritis	2014[2)]

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

Table A8. IIncidence of selected honey bee diseases in Finland.

Name of disease	Last detected
American foulbrood	2019
European foulbrood	2019
Varroatosis	2019
Nosemosis	2017
Acarapis woodi (honey bee tracheal mite, acarapisosis)	2016
Small hive beetle (*Aethina tumida*)	Never
Tropilaelaps mites	Never

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

This appendix collects data on animal disease surveillance conducted in 2009–2019, grouped by species.

Cattle

Cattle examinations include the results of monitoring programmes for viral diseases based on antibody studies in both dairy and suckler cow farms. All dairy herds in Finland were examined for IBR and leucosis until 2006 and for BVD until 2010. Monitoring of Schmallenberg virus antibodies began in 2012 with the testing of blood samples collected from suckler cows and expanded in 2013–2014 to testing bulk milk samples to provide information on the spread of the virus in Finland. The monitoring of bluetongue was started in 2007–2008. Testing bulk milk samples from dairy cows for bluetongue disease was discontinued in 2015 but the testing of suckler cow samples continued.

Table B1. Health monitoring of dairy cattle in 2010–2019.

Year	BVD		IBR	Leukosis	Bluetongue	Schmallenberg	
	Samples (pcs)	Positive (%)	Samples (pcs)	Samples (pcs)	Samples (pcs)	Samples (pcs)	Positive (pcs)
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
2019	1,344	0	1,344	1,214	0	0	0

[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 monitoring of suckler cows between 2010–2019.

Year	BVD		IBR	Bluetongue		Schmallenberg	
	Samples (pcs)	Positive (%)	Samples (pcs)	Samples (pcs)	Positive (pcs)	Samples (pcs)	Positive (pcs)
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
2019	1,970	0	1,970	1,970	0	0	0

[a)] BVD seropositive sample, old infection
[b)] BTV-14 seropositive Finnish suckler cow
[c)] BVD seropositive suckler cow imported from Denmark (seropositive already in the import tests in 1999)
[d)] BTV seropositive suckler cow imported from Sweden (seropositive already in the import tests in 2011)
[e)] 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 2010–2019. All test results were negative.

Year	Sheep	Goat	Cow		Pig
	Samples (pcs)	Samples (pcs)	Bulk milk samples (pcs)	Blood samples (pcs)	Samples (pcs)
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
2019	4,512	243	45[2)]	459	1,986

[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)

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

Table B4. BSE surveillance in cattle in 2010–2019. BSE was not detected in any of the samples.

Year	Number of tested samples*
2010	73,715
2011[1)]	56,187
2012	38,718
2013[2)]	15,911
2014	10,778
2015	11,576
2016	11,234
2017	11,596
2018	11,316
2019	11,289

* 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 72 months on 1 July 2011.
[2)] BSE testing of healthy cows ended on 1 March 2014.

Table B5. Surveillance of scrapie in sheep and goats in 2010–2019.

Year	Sheep		Goat	
	Samples (pcs)	Number of pos. holdings/ samples	Samples (pcs)	Number of pos. holdings/ samples
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
2019	1,665	3/3[1)]	270	0/0

[1)] atypical scrapie (Nor98)

Table B6. TSE testing of other animals in 2019. TSE was not diagnosed in any of the samples examined.

Species	Number of animals
Fur animals	
Mink	60
Fox	42
Raccoon dog	12
Wild animals	
Elk (*Alces alces*)	162
White-tailed deer (*Odocoileus virginianus*)	131
Roe deer (*Capreolus capreolus*)	208
Finnish forest reindeer (*Rangifer tarandus fennicus*)	12
Free ranging	
Reindeer (*Rangifer tarandus tarandus*)	616
Total	**1,243**

Pigs

The table B7 includes results of surveillance and health monitoring programmes, disease diagnoses and import and export tests on production pigs. All test results were negative in 2019. Clinical leptospirosis has never been diagnosed in livestock in Finland. The results of the monitoring of brucellosis have been reported separately (Table B3).

Table B7. Serological tests for viral diseases and leptospirosis in pigs in 2010–2019.

Year	Aujeszky's disease	TGE	Swine fever	Leptospirosis (pos. results in parentheses)	SVD	PRRS	ASF
2010	3,171	3,899	3,172	35 (0)	1,738	4,150	14
2011	2,599	2,883	2,818	100 (0)	1,264	3,754	128
2012	2,769	3,361	2,678	97 (0)	699	3,815	1,137
2013	2,649	2,986	2,429	39 (0)	26	4,058	1,178
2014	2,725	2,740	2,437	2 (0)	0	3,515	1,227
2015	2,320	2,332	2,050	0	0	2,909	180
2016	2,140	1,867	1,929	0	0	2,455	24*
2017	2,387	1,917	2,029	0	0	2,661	0
2018	2,328	2,096	2,086	0	0	2,504	0
2019	2,473	2,050	2,195	0	0	2,832	0*

* surveillance emphasises virological surveillance instead of serological surveillance

Poultry

Table B8. Results of serological tests for viral diseases in poultry[1] in 2010–2019. The table includes results of surveillance and health monitoring programmes, disease diagnoses and import tests.

Year	Avian influenza		Newcastle disease		APV	
	Samples (pcs)	Number of pos. holdings/samples	Samples (pcs)	Number of pos. holdings/samples	Samples (pcs)	Number of pos. holdings/samples
2010	3,175	0/0	8,325	3/61[3)4)]	8,416	4/21[4)]
2011	3,011	1/11[2)]	9,289	2/48[3)4)]	9,521	1/63[4)]
2012	3,223	2/8	10,423	3/42[3)4)]	10,078	1/60[4)]
2013	2,712	1/3[2)]	10,686	4/910[3)4)5)6)]	9921	1/53[4)]
2014	4,318	2/12[2)]	11,606	6/249[3)4)]	5,933	3/17[4)]
2015	5,245	1/1[2)]	10,613	2/14[3)4)]	2,592[7)]	2/41[4)]
2016	3,902	0/0	9,177	4/10[3)4)]	1,728	3/43[4)]
2017	4,369	0/0	9,591	3/6[3)4)]	2,244	4/50[4)]
2018	4,583	0/0	8,899	1/3[4)]	2,700	x/x[8)]
2019	4,322	0/0	8,523	0/0	2,021	x/x[8)]

[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)] Maternal (transferred from mother to offspring) antibodies in imported birds.
[5)] Vaccination antibodies in imported birds.
[6)] Serology positive, low pathogenic PMV-1 virus detected, no symptoms.
[7)] The EU surveillance programme for APV ended in 2015.
[8)] Testing still in progress: serologically positive results, no disease symptoms. More information in the text.

Sheep and goat examinations

Table B9. Samples collected in the health control programme for maedi-visna in sheep and CAE in goats in 2010–2019. Maedi-visna or CAE were not detected.

Year	Sheep	Goat	Total samples (pcs)
	Number of holdings tested	Number of holdings tested	
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
2019	72	4*	3,685

* includes holdings that keep sheep in addition to goats

Fish and crayfish examinations

Table B10. Surveillance of viral fish diseases in 2010–2019.

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 marine area	IPN inland area[1)]	VHS[2)]	ISA	SAV	KHV	SVC
2010	65/3,726	53/2,890	0	0	0	0	2/33	0	9	0	1	0	0	0	0
2011	44/2,588	38/1,256	0	0	0	0	1/12	0	6	0	2	0	0	0	0
2012	68/5,406	49/1,332	2/320	4/95	0	0	0	0	4	6	1	0	0	0	0
2013	55/3,740	46/1,870	0	1/20	35/1,050	0	0	0	12	6	0	0	0	0	0
2014	54/2,480	41/1,347	9/603	0	25/750	0	0	0	10	6	0	0	0	0	0
2015	62/2,570	45/1,382	1/60	0	45/1,179	0	0	0	19	4	0	0	0	0	0
2016	53/2,753	38/1,164	1/10	0	32/1,476	0	0	0	12	11	0	0	0	0	0
2017	55/2,591	18/991	7/240	0	30/1,500	0	2/25	4	16	13	0	0	0	0	0
2018	64/2,544	30/1,038	6/125	0	35/1,700	0	0	3	24	13	0	0	0	0	0
2019	65/2,966	52/2,082	1/30	0	11/330	0	0	0	12	12	0	0	0	0	0

[1)] Only infections of IPN genome group 2 were detected in the inland water areas.
[2)] VHS was found on marine area farms in the restricted area of Åland.

Table B11. Surveillance of bacterial kidney disease (BKD) in fish in 2010–2019.

Year	Tests inland water area	BKD cases
	Farms/fish	Inland water area
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
2019	44/3,285	0

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

Table B12. Surveillance of *Gyrodactylus salaris* between 2010–2019.

Year	Tenojoki River[1)]	Näätämöjoki River[1)]	Paatsjoki River[1)]	Paatsjoki River, farmed fish		Tuulomajoki River[1)]
	Salmon	Salmon	Grayling	Others	Arctic chars	Grayling
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
2019	101	118	15	0	60	31

[1)] Samples collected from wild-caught fish

Wild animal examinations

Table B13. Examinations on wild boars living in the wild in 2012–2019. Number of positive samples in parentheses.

Year	Aujeszky's disease		Swine fever		ASF		Brucellosis
	Sero-logy	Virus detection	Sero-logy	Virus detection	Sero-logy	Virus detection	Serology and/or bacteria culture
2012	8	0	8	0	8	0	0
2013	9	9	9	9	9	9	0
2014	82	134	81	138	37	138	70
2015	107	166	109	171	31	171	171 (7)
2016	234	362	230	366	0	366	116 (6)
2017	292	525	293	527	0	527	0
2018	325	712	319	715	0	715	0
2019	284 (1)	683	285	683	0	683	146 (12)*

* only samples from regions other than South-East Finland examined

Table B14. Results of surveillance of avian influenza in wild birds in 2010–2019. All viruses found before 2016 and the virus in 2019 were low pathogenic.

Year	Number of birds examined	Positive birds (PCR/virus isolation)
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
2019	174	3[6)]/0

[1)] collection of samples from healthy birds ended in 2011
[2)] includes 70 healthy birds that were tested
[3)] of the positive results, 8 birds were healthy and one was found dead
[4)] includes 2 healthy birds that were tested
[5)] virus isolation has not been conducted for all PCR positive birds
[6)] combined sample from three birds

Table B15. Incidence of *Trichinella* spp. in wild animals in Finland in 2019.

Species	Number of Trichinella positive animals	Number of animals tested	Proportion of positive animals	Incidence in 2010–2019
raccoon dog	135	323	41.8%	37.5%
fox	61	198	30.8%	32.5%
badger	0	6	0.0%	12.0%
marten	0	9	0.0%	15.1%
otter	1	50	2.0%	4.1%
bear	6	267	2.2%	5.0%
lynx	27	55	49.1%	45.4%
wolf	28	50	56.0%	36.7%
wolverine	3	7	42.9%	56.0%
goshawk	0	15	0.0%	4.1%
wild boar	5	1,074	0.5%	0.6%

Appendix C: Numbers of animal holdings and animals in Finland in 2019

Terrestrial animals

Terrestrial animals	Animals	Farms	Reindeer owners	Bee hives	Bee farms
Cattle	849,120	10,042			
Pigs (commercial production)	1,073,396	997			
Non-commercial pigs					
Bisons	166	12			
Sheep	147,662	3,738			
Goats	8,691	979			
Reindeer	184,934		4,354		
Bees				83,900	8,872
Laying hens	3,730,812	937			
Broilers	8,547,914	141			
Turkeys	235,314	49			
Other commercial poultry	43,713	400			
Camelids		118			
Horses	74,400	16,000			
Dogs	700,000				

Aquatic animals

Aquatic animals	Production[1]		Farms
	Farmed[2]	Wild[3]	
Fish	14,3600 T	175,070 T	382
Crayfish		129 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/EY
Brucellosis (*Brucella abortus*)	Disease-free	EU	2003/467/EY
Brucellosis (*Brucella melitensis*)	Disease-free	EU	2001/292/EY
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/EY
Rinderpest (cattle plague)	Disease-free	OIE	
Spring viraemia of carp (SVC)	Disease-free	EU	2010/221/EY
Classical scrapie	Negligible risk	EU	2016/1396/EY
Classical swine fever (CSF)	Disease-free	OIE	
Infectious salmon anaemia (ISA)	Disease-free	EU	2009/177/EY
Salmonid alphaviruses (SAV)	Disease-free in the inland water area	EU	2010/221/EY
EBL, enzootic bovine leucosis	Disease-free	EU	2003/467/EY
Bovine tuberculosis	Disease-free	EU	2003/467/EY
Newcastle disease	A country in which vaccination against Newcastle disease is not conducted	EU	94/963/EY
Peste des petits ruminants (PPR)	Disease-free	OIE	
Salmonella infections	Additional guarantee	EU	2003/644/EY (breeding poultry flocks and day-old chicks of breeding and productive poultry) 2004/235/EY (laying hens of productive poultry) 95/410/EY (poultry for slaughter) (EY) 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/EY
Infectious pancreatic necrosis (IPN gr 5)	Disease-free in the inland water area	EU	2010/221/EY
Infectious haematopoietic necrosis (IHN)	Disease-free except for surveillance zones	EU	2009/177/EY
TGE (transmissible gastroenteritis)	Disease-free, resulting in additional EU guarantee	EU	48/94/COL
Varroa	Disease-free in the Åland Islands	EU	2013/503/EY
Viral haemorrhagic septicaemia (VHS)	Disease-free except in Åland Islands	EU	2009/177/EY

OIE = World Organisation for Animal Health

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