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Abstract

This publication contains information on the animal disease situation in Finland during 2021. Topical information on occurrence of the diseases to be combated under the law and certain other infections in various animal species in Finland has been compiled. The publication also describes the measures taken to prevent and combat animal diseases.

The animal disease situation of 2021 was different from the general good situation in Finland. In our country, highly pathogenic avian influenza was first diagnosed in poultry, and in Åland there were cases of IHN in salmonids and varroa mite infection in bees. Highly pathogenic avian influenza is classified as a category A animal disease under the EU Animal Health Regulation, Finland has had official freedom of disease from IHN, with the exception of the 2017—2018 continental epidemic restricted zone, and Åland has had official disease-free status from infestation with Varroa.

The COVID-19 pandemic continued to present challenges for the sector's operations. Since minks in particular are susceptible to SARS-CoV-2 infection of fur animals, the control program of fur animals started in 2020 was continued as well as to prepare for corona infestation of fur animals. Continuous monitoring of the coronal situation in fur farms important, since epidemics that persist in large numbers of animals allow new virus variants to emerge. Although the year was challenging, it also included plenty of successes and the health level of Finnish domestic and farmed animals can still be considered good. Finland remained free of strategically important animal diseases such as enzootic bovine leucosis, IBR and BVD infections, PRRS infections in swine and *Echinococcus multilocularis* infection. In 2020, Finland applied for official disease freedom status for rabies, bluetongue disease and BVD. Official disease-free country status for Rabies and bluetongue disease was obtained in 2021, and intensified surveillance sampling carried out during the year of the BVD led to the obtaining of disease freedom in early 2022.

Beskrivning

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Referat

Denna publikation innehåller information om djursjukdomsläget i Finland år 2021. 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 år 2021 skilde sig från den allmänna goda situationen i Finland. I vårt land diagnostiserades högpatogen aviär influensa först hos fjäderfä, och på Åland fanns fall av IHN i laxfiskar och upptäcktes varroa kvalster hos bin. Högpatogen aviär influensa klassificeras som en djursjukdom i kategori a enligt EU:s djurhälsoförordning, Finland har haft officiell sjukdomsfrihet från IHN, med undantag för restriktionszonen för epidemin 2017—2018, och Åland har haft officiell sjukdomsfrihet vad gäller angrepp av Varroa.

COVID-19-pandemin fortsatte att innebära utmaningar för sektorns verksamhet. Eftersom minkar i synnerhet är mottagliga för SARS-CoV-2-infektion av pälsdjur, fortsatte uppföljningsundersökningar på pälsfarmer samt att vara förberedd för koronavirusinfektion av pälsdjur. Kontinuerlig övervakning av koronasituationen på pälsfarmer är viktig, eftersom epidemier som kvarstår i ett stort antal djur tillåter nya virusvarianter att dyka upp. Även om året var utmanande, innehöll det också många framgångar och hälsonivån hos finska husdjur kan fortfarande anses vara god. Finland är fortfarande fritt från djursjukdomar som ses som strategiskt viktiga, såsom bovin leukos, IBR och BVD hos nötkreatur, PRRS hos svin samt *Echinococcus multilocularis* -infektionen. År 2020 ansökte Finland om officiell sjukdomsfrihetsstatus för rabies, blåtunga och BVD. Officiell sjukdomsfri landsstatus för rabies och blåtunga erhölls 2021, och intensifierad provtagning som genomfördes under BVD:s år resulterade i att sjukdomsfrihet uppnåddes i början av 2022.

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Tiivistelmä

Tämä julkaisu sisältää tietoa Suomen eläintautitilanteesta vuonna 2021. Julkaisuun on koottu ajankohtaista tietoa lainsäädännön nojalla vastustettavien eläintautien ja eräiden muiden tartuntojen esiintymisestä eri eläinlajeilla maassamme. Julkaisussa kuvataan myös tehtyjä toimenpiteitä eläintautien ennaltaehkäisemiseksi ja torjumiseksi.

Vuoden 2021 eläintautitilanne oli Suomen yleisestä hyvästä tilanteesta poikkeava. Maassamme todettiin ensimmäisen kerran korkeapatogeenista lintuinfluenssaa siipikarjassa, ja Ahvenanmaalla todettiin lohikalojen IHN-tautia sekä mehiläisten varroapunkkitartuntaa. Korkeapatogeeninen lintuinfluenssa on EU:n eläinterveyssäännössä luokiteltu a-luokan eläintaudiksi, Suomella on ollut virallinen tautivapaus IHN-taudista, vuoden 2017–2018 mantereen epidemian rajoitusvyöhykettä lukuun ottamatta, ja Ahvenanmaalla on ollut virallinen tautivapaus varropunkkitartunnasta.

COVID-19-pandemia aiheutti sektorin toiminnalle edelleen haasteita. Koska turkiseläimistä erityisesti minkit ovat SARS-CoV-2 - tartunnalle herkkiä, jatkettiin vuonna 2020 aloitettua turkiseläinten koronaseurantaa sekä varautumista turkiseläintilojen koronatartuntaan. Turkistarhojen koronatilanteen jatkuva seuranta on tärkeää, sillä isoissa eläinmäärissä pitkään jatkuvat epidemiat mahdollistavat uusien virusvarianttien syntymisen. Vaikka vuosi oli haastava, siihen sisältyi myös runsaasti onnistumisia ja Suomen koti- ja tuotantoeläinten terveyden tasoa voi edelleen pitää hyvänä. Suomi pysyi vapaana strategisesti tärkeistä naudan tarttuvasta leukoosista, IBR- ja BVD-tartunnoista, sikojen PRRS-taudista ja *Echinococcus multilocularis* -loisesta. Vuonna 2020 Suomi haki virallista tautivapauden statusta rabieksen, sinikielitaudin ja BVD:n osalta. Rabieksen ja sinikielitaudin virallinen tautivapaan maan asema saatiin vuonna 2021, ja BVD:n vuoden aikana toteutettu tehostettu seurantanäytteenotto johti tautivapauden saamiseen vuoden 2022 alussa.

Contents

Abbreviations of diseases used in the report

Cattle

BSE, bovine spongiform encephalopathy
BT, bluetongue
BVD, bovine viral diarrhoea
BCV, bovine coronavirus
EBL, enzootic bovine leucosis
IBR, infectious bovine rhinotracheitis
OvHV-2 ovine herpesvirus 2
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

AOAV-1, Avian orthoavulavirus 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
EIA, equine infectious anemia

Reindeer

CWD, chronic wasting disease
TSE, transmissible spongiform encephalopathy

Fur animals

TME, transmissible mink encephalopathy
SARS-CoV-2, coronavirus

Pets

FIP, feline infectious peritonitis
RHD, rabbit haemorrhagic disease

Wild animals

CWD, chronic wasting disease
HPAI, highly pathogenic avian influenza
RHD, rabbit haemorrhagic disease
TSE, transmissible spongiform encephalopathy

Animal diseases in Finland in 2021

While the situation of animal diseases in Finland is generally good, year 2021 was an exception. Highly pathogenic avian influenza was diagnosed for the first time in poultry in Finland, and in Åland there were cases of IHN in rainbow trout and a varroa mite infestation in bees. These are diseases that must be combated under the law. Highly pathogenic avian influenza is classified as a category A animal disease under the EU Animal Health Regulation, and both IHN and varroosis are category C diseases. Finland has had official IHN free status, except in the restricted zones of the 2017–2018 epidemic, and Åland has had official disease-free status from varroa mite infestations. For more information on these cases, see the sections on the relevant animal species in this report.

In 2021, more cases of highly pathogenic avian influenza in wild birds were diagnosed in Finland than ever before, or 66 cases in total. A case may mean the death of an individual bird, or even mass mortality of thousands of birds on the same site. The virus type was highly pathogenic H5N8 in early 2021, and H5N1 later in the year. Despite the high disease pressure caused by infections in wild birds, avian influenza was only detected on one poultry farm, which can be considered an indication of highly effective control of poultry diseases. Type H5N1 highly pathogenic avian influenza virus was also diagnosed in two foxes and one otter in the autumn. The infected mammals were found in areas with high levels of avian influenza in wild birds. The mammals were probably infected after eating wild birds that had contracted avian influenza.

IHN in salmonids (Infectious Haematopoietic Necrosis) spread from Denmark to two establishments in Åland in spring 2021 with transfers of fish. In the summer and autumn, IHN was further diagnosed at three other establishments, to which the infection had spread through water or by human activity. To prevent the spread of the disease, the Finnish Food Authority set up a restricted zone around the infected establishments. The IHN epidemic was eradicated by the authorities; fish susceptible to IHN at the establishments where the infection was present were slaughtered or euthanised, equipment and tools were disinfected to eradicate the virus, and fish susceptible to the disease were no longer kept at the establishments. Aquaculture could be resumed in spring 2022, and a two-year monitoring programme to restore the disease-free status was launched at the establishments within the affected zone.

The COVID-19 pandemic also continued to present many challenges for the activities in 2021. It has been found that SARS-CoV-2 also infects some animals. Mink among fur animals are particularly susceptible to the virus, and raccoon dogs may also be infected. The coronavirus monitoring of fur animals initiated in 2020 was continued, as was preparation for coronavirus infections on fur farms. Continuous coronavirus monitoring of fur farms is vital, as persistent epidemics affecting a large number of animals enable the emergence of new virus variants. So far, no SARS-CoV-2 infections have been diagnosed in fur animals in Finland.

Pets that contracted SARS-CoV-2 have typically been in close contact with a person infected with COVID-19, and it is suspected that the virus has been transmitted from humans to pets. In late 2021, a cat was diagnosed with SARS-CoV-2 infection (delta variant) in Finland. Transmission of the SARS-CoV-2 virus to pets appears to be very rare and irrelevant to the

spread of COVID-19. Vaccinating humans against the disease also protects susceptible animals, as it curbs the circulation of the virus among the human population.

While the year was challenging, it also included plenty of successes, and the health level of Finnish domestic and farmed animals can still be considered good. Finland remained free of such strategically important diseases as EBL, IBR and BVD, PRRS in pigs and the *Echinococcus multilocularis* parasite. Finland applied for official disease-free status for rabies, bluetongue disease and BVD in 2020. Official disease-free status for rabies and bluetongue disease was granted to Finland in 2021. Regarding BVD, the aim in 2021 was to demonstrate the disease-free status by means of intensified additional sampling, and this status was consequently granted at the beginning of 2022. IHN free status was also successfully restored in autumn 2021 for the areas which lost it in winter 2017–2018.

A total of 45 new cases of salmonella were diagnosed in cattle, pigs and poultry, which meant a return to the previous years' level after lower figures in 2020. Salmonella in cattle, pigs and poultry must be combated by law and, despite the higher number of cases, the prevalence of salmonella remained at the target level of less than 1%. Due to an increase in the number of salmonella cases observed over several years, efforts have been made to intensify the control of this disease.

Influenza A virus, which causes swine influenza, was detected in samples from nine farms. Seven of these were of the H1N1 virus type specific to pigs, one represented an old H1N1 strain of pigs, and one could not be typed.

The spread of African Swine Fever (ASF) around the world is a persistent threat to pork production in Finland and calls for continuous disease prevention measures. The measures have been successful, at least so far: while African swine fever occurs both in Russia and in several European countries, it has never been diagnosed in Finland. Surveillance of African swine fever has continued for some time, and wild boar living in the wild, for instance, have been tested for African swine fever in Finland since 2010. In 2021, more samples from wild boar living in the wild were received than ever before, or from a total of 1,215 wild boars. Hunters submit samples from a very high proportion of hunted wild boar (83% in 2021) to the Finnish Food Authority, and this share has even increased. Among other things, the high number of samples indicates that hunters are aware of the importance of the sampling for controlling African swine fever.

Due to the COVID-19 pandemic, few people travelled abroad, and outdoor recreation was popular in Finland. Information activities were consequently targeted at people who went out and about in nature. In addition, a six-week media campaign using animation videos to inform the public about the ASF risk was repeated in summer 2021. The campaign videos were watched by Finnish online users more than 5.5 million times, and the targeted visibility was exceeded by 40%.

See the Tables in Appendix A for the latest occurrence of many serious animal diseases in Finland. For a summary of monitoring data from multiple years, see Appendix B. For animal and farm numbers, see Appendix C, and for the official disease-free statuses granted to Finland, see Appendix D.

Up-to-date information on animal disease investigations and their results can be found in the Finnish Food Authority's open information portal.

More information on the occurrence of zoonoses in Finland and the zoonoses monitoring programmes for animals and foods can be found on the website of the Zoonosis Centre, which is a joint expert network of the Finnish Food Authority and the Finnish Institute for Health and Welfare (https://www.ruokavirasto.fi/en/themes/zoonosis-centre/).

1 Cattle diseases

As in previous years, the disease situation of cattle remained good in 2021, and no category A to C diseases or other animal diseases to be combated were diagnosed. New salmonella infections were diagnosed on 25 farms, which represents another increase compared to the previous year, and the clear increase in the number of salmonella cases observed in cattle in 2018–2019 appears to continue. Similarly to 2020, a high number of infections caused by the Bovine Coronavirus (BCV) was detected in samples taken in connection with respiratory tract infections, diarrhoea in calves and mature animals, and pathological samples. The main reasons for examining cattle were the surveillance 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 abortion; investigating changes found in meat inspections; and the import of cattle.

More new *Mycoplasma bovis* infections were diagnosed in dairy cattle than in 2020

New *Mycoplasma bovis* infections were diagnosed on 11 dairy farms in 2021, which is more than in the previous year (six infections in 2020). In total, infections have been diagnosed on more than 350 farms since 2012. In almost all dairy herds, the infection took the form of mastitis and was consequently first detected in a milk sample. *M. bovis* infections on beef cattle farms were diagnosed from respiratory tract infection samples.

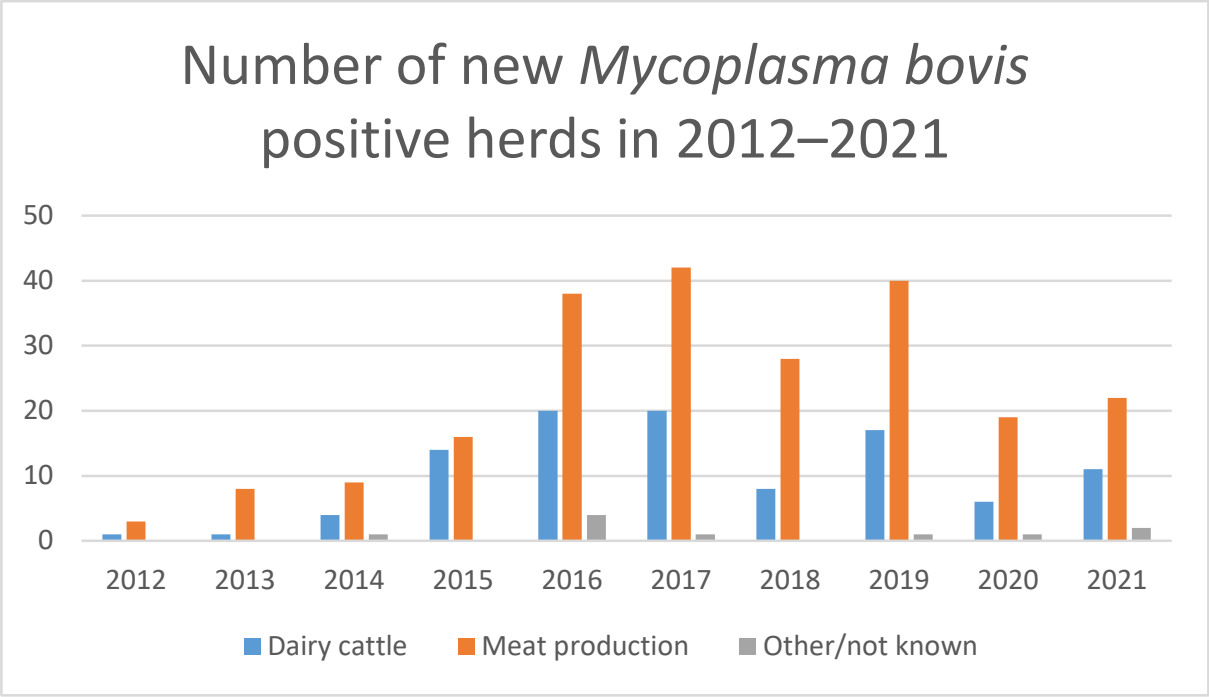

Figure 1. *Number of new herds testing positive for Mycoplasma bovis in 2012–2021.*

Disease diagnostics

The Finnish Food Authority examined a total of 367 samples consisting of whole carcasses or organ samples submitted for pathological testing (Table 1). The number of samples decreased from the previous year, as 406 samples were examined in 2020. The number of samples submitted for examination of the reason for abortion was similar to the year before, whereas the number of meat inspection samples decreased; in total, 63 samples related to meat inspection were examined. In addition, 434 samples were examined in connection with the cysticercosis project.

Similarly to previous years, bacterial infections were the most commonly detected cause of abortion. The most commonly isolated bacteria were the same as those found in previous years: *Trueperella pyogenes, Ureaplasma diversum, Bacillus licheniformis* and *E. coli.* No *Neospora caninum* protozoans were found in foetuses. Previously, neospora has been found on a few new farms every year. No cases of abortion caused by the Schmallenberg virus were found in 2021, which was also the situation in 2014–2018 and 2020. The Schmallenberg virus was detected in one foetus in 2019.

A total of 124 blood or milk samples from 21 different farms were tested for *neospora* antibodies using the enzyme-linked immunosorbent assay test (ELISA). Of these, 103 samples from 20 farms were tested to investigate the cause of abortion. In addition, 21 milk samples from two farms were examined to determine the occurrence of *neospora* infections in individual animals. No *Neospora* antibodies were found in any of the samples. In connection with investigating the cause of abortion, 96 cattle blood samples from 17 different farms were tested for Q fever and *Chlamydia abortus* antibodies using the ELISA test, all with negative results.

Table 1. *Numbers of pathological samples from cattle tested in 2012–2021 by reason for testing.*

Reason for testing	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cause of disease	257	362	253	250	306	270	237	297	228	208
Cause of abortion	257	368	98	106	120	113	82	99	93	96
Meat inspection	61	108	109	72	66	71	70	53	85	63
Total	**575**	**838**	**460**	**428**	**492**	**454**	**389**	**449**	**406**	**367**

A large proportion of samples submitted for disease diagnosis 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. The most common causes of diarrhoea were *Cryptosporidium parvum* and the bovine coronavirus (BCV). Quinofever (OvHV-2) is usually diagnosed almost annually in individual cases; however, no cases were found in 2021.

Deep pharyngeal swab kits were used to test 140 farms for respiratory tract infections (one kit contains four samples). For the results of the deep pharyngeal swab samples, see Table 2. Nasal mucus samples submitted from six farms were examined (one kit is sufficient for collecting nasal mucus samples from five animals), and two farms out of these six tested positive for *Respiratory Syncytial Virus,* (RSV) and two for BCV. Parainfluenza 3 virus (PIV-3) was not detected.

Table 2. *Results of deep pharyngeal swab samples from cattle in 2012–2021. Number of positive submissions or number of holdings.*

Test	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Tested holdings/ submissions*	**39**	**93**	**66**	**108**	**154**	**156**	**121**	**150**	**145**	**140**
Coronavirus	15	59	32	58	75	80	63	100	105	96
Parainfluenza-3 virus	0	0	0	0	0	6	29	15	15	17
RS virus	8	24	13	33	28	32	25	32	26	23
Histophilus somni	2	16	9	18	17	24	16	20	14	7
Mannheimia haemolytica	3	33	12	36	57	40	37	52	60	61
Mycoplasma bovis	3	7	8	18	43	52	42	63	53	59
Pasteurella multocida	30	74	52	96	120	131	100	133	123	129

* The figures for 2012–2017 include the number of samples sent, and the figures from 2018 on include the numbers of farms.

In respiratory tract infection samples (pathological and clinical samples), the most common virus detected was BCV. In addition, the samples were commonly found to contain cattle RS virus and *Histophilus somni, Pasteurella multocida, Mannheimia haemolytica* and *T. pyogenes* bacteria. *M. bovis* bacteria were detected in deep pharyngeal swabs and lung, joint and ear infection samples. Antibiotic resistance was detected in *P. multocida* and *M. haemolytica* strains on several farms.

A total of 178 farms were examined using calf diarrhoea test kits (one kit is sufficient to test five faecal samples). This figure is significantly lower than in 2020. See Table 3 for the results. Bovine coronavirus (BCV) was diagnosed less often than in 2020. Rotavirus in samples from calves was the most common cause of diarrhoea. In autumn 2021, a PCR test became available for rotavirus diagnostics, which may contribute to the number of findings. Numerous cases of zoonotic *Cryptosporidium parvum* protozoan, which also causes diarrhoea in calves, were diagnosed, even if the number of farms with *C. parvum* infections decreased somewhat compared to 2020. The infection was found on 88 holdings in total, either in a pathological examination or in diarrhoea samples. Some people working with the calves also contracted cryptosporidiosis.

In addition, the Finnish Food Authority examined faecal samples from cattle (other than calves) from 17 farms for coronavirus. Out of these, the bovine coronavirus was found to be the cause of diarrhoea on 12 farms. The numbers of both samples and positive findings were the highest in March.

Table 3. *Results of calf diarrhoea diagnostic test kits for calves aged under six months in 2012–2021. Number of positive submissions or number of farms.*

Test	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Tested holdings/ submissions*	**191**	**229**	**178**	**211**	**246**	**218**	**229**	**277**	**243**	**178**
Salmonella	0	1	0	1	1	0	0	0	2	1
Rotavirus (ELISA or PCR [1)])	78	83	76	74	98	75	87	88	86	84
Coronavirus (ELISA or PCR [2)])	3	6	4	1	1	1	0	33	52	24
E.coli F5	0	0	0	0	0	0	0	0	0	0
Eimeria, over 10000 OPG	29	38	32	40	34	33	24	45	43	24
Cryptosporidium (staining)	23	26	31	36	76	72	107	140	123	94
Cryptosporidium parvum	13	20	24	30	41	58	85	123	99	71
Strongylida	3	6	3	2	3	4	3	3	1	3

* For 2012–2017, the number of submissions is given, and from 2018 on, the number of farms.

[1)] From autumn 2021 on

[2)] From autumn 2019 on

Salmonella

Control of salmonella in cattle is part of Finland's National salmonella control programme, and salmonella infections in cattle have been classified as an animal disease to be controlled under animal disease legislation. While the occurrence of salmonella in cattle has traditionally been very low in Finland, since 2018, a clearly higher number of salmonella cases have been found on cattle farms. It has nevertheless remained within the target set in the Salmonella control programme, or below 1%. In 2021, a total of 27 new cases of salmonella infections were diagnosed on 25 cattle farms in total: 15 on dairy farms, nine in calf rearing facilities or on beef farms, and one in a suckler cow herd. This is more than in 2020 and similar to figures seen in the two preceding years (17 cattle farms in 2020, 24 in 2019 and 28 in 2018).

A total of eight different salmonella serotypes were identified on cattle farms during the year. A larger number of *Salmonella* Altona cases was diagnosed on nine farms in total, whereas there were no cases in the year before. Six of these farms were dairy farms and three beef farms. As in previous years, *S* Typhimurium was also a common serotype that was diagnosed on eight farms. One half of these were dairy farms and the rest beef cattle farms, mostly calf rearing facilities. The *S*. Typhimurium strain identified on four farms was resistant to several antibiotics(ampicillin, sulphonamide, tetracycline and trimethoprim), but none of the *S*. Typhimurium infections diagnosed during the year represented a monophase strain. *S*. Kentucky infections were found on three farms, two of which were dairy farms. The strain identified on one of these two farms was of a multiresistant type (ampicillin, enrofloxacillin, nalidixic acid, sulphonamide, tetracycline). A similar strain had been identified on the same dairy farm a few years earlier. A multiresistant Kentucky strain was also found in a calf rearing facility to which calves had been transferred from the dairy farm in question. In this facility, a multiresistant *S*. Typhimurium strain was identified later after eradication had already been completed, and this Typhimurium infection also recurred late in the year; in other words, a salmonella infection was diagnosed on this farm three times during the year. Two different salmonella strains were found on one dairy farm; first serotype *S*. Overchie, and later (in 2022),

S. Onderstepoort was also identified in the eradication samples. Neither of these serotypes has been diagnosed in Finland in production facilities, or otherwise in samples from animals. Serotype *S*. Enteritidis was identified on one dairy farm and one beef farm, whereas serotype *S*. Konstanz was found on one suckler cow farm as well as in one lymph node sample from a slaughterhouse. However, the samples taken on the farm from which the animal came were negative for salmonella. Additionally, serotype *S*. Abony was identified on one dairy farm, and serotype *S*. Infantis in one calf rearing facility. In addition to salmonella findings on livestock farms, *S*. Kedougou was detected in an environmental sample from a truck used to transport cattle, whereas all samples from contact holdings were negative. This strain has previously only been isolated once in a production livestock facility in Finland.

As before, salmonella infections in cattle were mainly diagnosed in self-monitoring studies commissioned by animal keepers, but samples collected on contact holdings by the authorities were also a common method of diagnosing the infection, as infections on nine farms were detected this way. However, the serotype diagnosed on the farm where the original case occurred was not always found on the contact farm. On two farms, the infections were diagnosed from faecal samples submitted for testing due to clinical symptoms (fever and diarrhoea, which contained blood on one farm), and on two farms, the infection was additionally detected in a bacteriological culture from calves sent to obduction.

Surveillance

The disease situation in cattle is monitored in dairy and suckler cow herds by means of official surveillance programmes for BT, BVD, EBL, IBR and brucellosis, either annually or every two years depending on the disease. As in previous years, bulk milk samples from dairy herds were collected in cooperation with dairies, mainly in late winter. Suckler cow blood samples were collected at slaughterhouses during slaughter throughout the year. Samples are also examined for these diseases in connection with artificial insemination operations, animal imports and exports and disease diagnostics. No cattle were examined in connection with export operations in 2021.

In autumn 2020, Finland applied for BVD free status under new EU legislation on animal diseases ((EU) 2020/689). To demonstrate that Finland is free from this disease in compliance with the legislative requirements, intensive surveillance of BVD was carried out in 2021 with the aim of obtaining samples from all dairy and suckler cow herds in Finland. On dairy farms not included in milk collections and on suckler cow farms from which no animals were taken to slaughterhouses, an effort was made to collect samples in connection with monitoring visits (including for contaminant sampling and on visits related to cross-compliance control). All samples obtained were tested for BVD, in addition to which approx. 20% of bulk milk samples were also tested for IBR and EBL, and approx. 27% of serum samples were also tested for BT and IBR. Extensive surveillance of bulk milk samples for brucella takes place every two years, and in 2021, only milk samples collected directly from the farm for BVD surveillance were tested for brucella.

Table 4. *Numbers of viral and bacterial disease samples collected from cattle in 2021 by reason for testing and test (antibodies, virus detection). None of the diseases that the samples were tested for were detected.*

Cattle	BVD		IBR		Leu-cosis	Bluetongue		Brucellosis	Schmallenberg virus	
	Anti-bodies	Virus detection	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies	Virus detection	Antibodies	Anti-bodies	Virus detection
Dairy cattle surveillance/ bulk milk sample	5,326	0	1,287	0	1,284	0	0	9	0	0
Suckler cow herd surveillance/ individual blood sample	9,367	0	2,622	0	0	2,562	0	0	0	0
Artificial insemination activities	124 [1)]	102	124 [1)]	0	99 [1)]	0	0	141 [1]	0	0
Disease diagnosis	98	95	96	95	27	0	3	191	5	25
Import (cattle, semen, embryos)	57 [2)]	31	15 [3)]	9	0	0	0	2	0	0
Other reasons (animal trade, export)	17	1	16	0	16	0	0	0	0	0
Total	**14,989**	**229**	**4,160**	**104**	**1,426**	**2,562**	**3**	**343**	**5**	**25**

[1)]The figure includes both milk and serum samples
[2)] 50 samples from cows implanted with imported embryos
[3)] 8 samples from cows implanted with imported embryos

Samples for the BSE surveillance programme are mainly taken at a processing facility for category 1 by-products, and to some extent also at slaughterhouses. For BSE tests examined by the reason for testing, see Table 5. Fewer BSE tests were taken than in previous years. The reason for this was that the summer was hotter than normal. Because of the heat, carcasses arriving at the rendering plant were already so far decomposed that BSE samples could no longer be taken.

Apart from three emergency slaughtered animals, all animals had died spontaneously or been put down. The testing age limit for emergency slaughters, animals that died spontaneously or those that were put down remains at 48 months. However, animals of all ages are tested if suspected of having BSE.

Table 5. BSE tests in 2021. All test results were negative.

Slaughtered healthy	Clinical suspicions at farms	Emergency slaughtered	Spontaneously died or put down at farms	Disease symptoms in ante-mortem inspections	Total
0	0	3	9,552	0	**9,555**

See the summary tables in Appendix B for 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) in 2012–2021.

2 Pig diseases

The disease situation of productive pigs remained good, and no A to C category diseases or other animal diseases to be combated were detected. New salmonella infections were found on a total of 12 pig farms during the year, which is clearly more than in the previous year (three farms). Influenza A virus, which causes swine influenza, was detected in samples from nine holdings. Seven of these were of the H1N1 virus type specific to pigs, one represented an old H1N1 strain of pigs, and one could not be typed. The main reasons for testing samples from pigs were surveillance studies on swine diseases for Aujeszky's disease (AD), TGE (Transmissible Gastroenteritis), PRRS (Porcine Reproductive and Respiratory Syndrome), Classical Swine Fever (CSF) and African Swine Fever (ASF) as well as *Brucella suis* infections, insemination operations, and disease diagnostics aimed particularly at detecting pathogens of intestinal and respiratory tract infections in growing pigs. 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. For a more detailed description of examinations of wild boar living in the wild, see Chapter 11 (Wild animal diseases.)

Disease diagnostics

In 2021, 251 samples from pigs were subjected to anatomical pathology examinations, which was a similar number as in the previous year. The majority of the samples were whole carcasses (176), while the others 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 tract infection 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 or for determining the cause of abortion, or the cause of death in individual pigs.

As in previous years, the *Actinobacillus pleuropneumoniae* bacteria were a major cause of lung infections in growing pigs. In 2021, influenza A virus, which causes swine influenza, was detected in samples from a total nine holdings. Samples from 32 holdings were tested in total. The number of diagnosed cases was the same as in 2020. Influenza viruses found in pigs are usually of the type H1N1 in Finland. All influenza A viruses found in 2021 were typed, and in seven cases, the virus strains were found to be of the classical H1N1 virus type specific to pigs; one case represented the 'old' H1N1 strain of pigs (the closest equivalents in the gene bank are Finnish and Danish isolates from 2006–2010), whereas one could not be typed.

Annual and regular antibody monitoring of porcine enzootic pneumonia is only mandatory for holdings designated as special level breeding farms in the Sikava health classification register. If necessary, samples from holdings where porcine enzootic pneumonia infections are suspected are also examined. For antibodies of porcine enzootic pneumonia, 818 samples from 31 different farms were tested. No porcine enzootic pneumonia infections were diagnosed in 2021. The most recent cases of porcine enzootic pneumonia in Finland were detected on two farms in 2017.

Table 6. *Results of gastrointestinal infection diagnostic test kits (faecal samples) for weaned piglets and older pigs in 2021. Numbers of sample submissions, samples and holdings examined. A submission was recorded as positive if bacteria were detected in at least one sample. A total of 29 samples were submitted, of which 9 were examined for dysentery only.*

Test	Number of tested sample submissions	Number of samples examined	Number of positive samples (percentage of those tested)	Number of holdings from which submissions came	Number of positive holdings (percentage of those tested)
Tested for enterotoxic *E. coli* bacteria	18	147	12 (8%)	15	5 (33%)
Tested for *Lawsonia intracellularis* bacteria	17	131	42 (32%)	14	5 (36%)
Tested for *Brachyspira hyodysenteriae* bacteria	28	489	1 (0.2%)	24	1 (4%)
Tested for *Brachyspira pilosicoli* bacteria	19	219	50 (23%)	17	7 (41 %)

Faecal samples and samples submitted for pathological testing were examined to determine the causes of gastrointestinal infections. A total of 581 faecal samples from 32 holdings were bacteriologically tested for *Brachyspira hyodysenteriae* bacteria, which cause dysentery in pigs, and for other pathogens that cause diarrhoea in pigs. The number of tested faecal samples was at the same level as in 2020. While a higher number of faecal samples from weaned pigs or older pigs was examined, faecal samples from piglets were also tested. In 2021, pig dysentery infections were diagnosed on one farm and in four pigs examined in connection with imports. No *Clostridium perfringens* type C infections were detected.

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

Salmonella

Salmonella control in pigs is part of Finland's National salmonella control programme, and salmonella infections in pigs have been classified as an animal disease to be controlled under animal disease legislation. The occurrence of salmonella in pigs has been low in Finland for a long time, and it has remained below the target of 1% set in the salmonella control programme. In 2021, new salmonella infections were diagnosed on a total of 12 pig farms, which is clearly more than in the previous year (three cases) but the same range as in 2019 (13 cases).

A total of five different salmonella serotypes were identified on pig farms. The most common identified serotype was *Salmonella* Typhimurium, a monophase type of which was detected on one farrowing pig farm and three fattening pig farms. Piglets had been transferred to all of these fattening pig farms under a derogation from the farrowing pig holding in question, and the infections on fattening pig farms were diagnosed from samples taken by the authority to repeal a decision made to prevent the spread of salmonella. The infection on the farrowing pig farm was diagnosed based on self-monitoring samples. This was a recurring infection, as the

same serotype had also been detected on the farm earlier. Serotype *S*. Derby was identified on two farrow-to-finish pig farms, and both infections were first detected in lymph node samples from fattening pigs taken at the slaughterhouse, after which the infection was found on the farms in samples taken by the authority based on a suspected case. The same serotype had previously been identified on both farrow-to-finnish pig farms. In addition, *S*. Derby was identified on one fattening pig farm in industry self-monitoring samples. Serotype *S*. Uganda was also found on three pig farms, one of which was a pig nursery, while the other two were fattening pig farms to which piglets had been transferred from the nursery. All infections were detected in industry self-monitoring samples. In addition, *S*. Uganda serotype was identified in one lymph node sample from a fattening pig, whereas no salmonella was found in samples collected by the authority on the farm. A completely new salmonella finding was also made in Finland during the year, as serotype *S*. Choleraesuis was identified on two pig farms. This serotype was first identified in a lymph node sample from an animal brought to slaughter from a farrow-to-finnish pig farm, after which the infection was also confirmed on the farm from a sample taken by the authority. The same serotype was additionally detected on a fattening pig farm to which piglets had been transferred from the farrow-to-finnish pig farm in question. *S*. Choleraesuis is a serotype adapted to pigs and may consequently cause very serious symptoms in these animals. However, no symptoms were observed on either of the farms where the infection was diagnosed. Since autumn 2020, a few *S*. Choleraesuis cases have been diagnosed in farmed pigs in Sweden, and the infection has also been diagnosed in wild boar in the same area. farrow-to-finnish pig farm where the *S*. Choleraesuis infection was diagnosed, serotype *S*. Enteritidis was also identified in production environment samples taken in the eradication phase. The same serotype was also found in the production environment samples taken in the eradication phase on another farrow-to-finnish pig farm (where *S*. Derby had been identified earlier). This sample was, however, taken in the loft area of the facility, which means that the finding was not actually associated with the production environment or production animals of the farm.

Trichinellosis

A trichinellosis infection was diagnosed on one pig farm where the pigs had had outdoor access. It was identified as *Trichinella nativa* in a PCR test. The occurrence of trichinellosis in pigs and farmed wild boar is monitored by sampling and testing conducted in connection with meat inspections. Trichinellosis, which is classified as an animal disease to be reported, has not been identified in productive pigs or farmed wild boar in 2019 and 2020.

Surveillance

The monitoring of the disease situation in pigs for Aujeszky's disease, TGE, PRRS and CSF was continued through surveillance programmes organised by the authorities. Less than 700 blood samples were collected from four large sow slaughterhouses. The samples were taken in proportion to the number of animals to be slaughtered, with no more than eight samples collected from sows of each farm. Samples from farmed wild boar were also collected at slaughter. In addition to the diseases listed above, 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, imports, exports, and the health classification of special level pig farms.

Table 7. *Tests performed on samples from pigs for significant viral diseases in 2021 by reason for testing. None of the diseases that the samples were tested for were detected.* [3)]

	Aujeszky's disease		TGE	PRRS		Swine fever		ASF
Pigs	Sero-logy	Virus detection	Sero-logy	Sero-logy	Virus detection	Sero-logy	Virus detection	Virus detection
Surveillance	691	0	671	671	0	691	0	0
Artificial insemination activities [1)]	1,032	0	448	1,057	206	647	0	0
Holdings with special level health classification	0	0	233	293	5	0	0	0
Disease diagnosis [2)]	5	71	1	6	28	1	78	80
Import	273	0	377	468	0	221	0	0
Export	262	0	0	262	0	262	0	0
Farmed wild boar (monitoring)	16	1	16	16	0	16	1	17
Wild boar living in the wild	672 [3)]	1,215	0	0	0	675 [3)]	1,215	1,215
Total	**2,279**	**1,287**	**1,746**	**2,773**	**239**	**1,838**	**1,294**	**1,312**

[1)] Includes holdings of origin

[2)] Productive pigs, pigs kept for non-commercial purposes and farmed wild boar

[3)] In serological studies, AD antibodies were found in two wild boars living in the wild, and CSF antibodies in one. None of these diseases were detected. For more information on the results, see Chapter 11 in this report.

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 organ samples from wild boars living in the wild to the Finnish Food Authority. For a more detailed description of examinations of wild boar living in the wild, see Chapter 11 (Wild animal diseases.)

African swine fever is a persistent threat

African swine fever (ASF) is a serious haemorrhagic fever caused by the ASF virus that infects domestic pigs and wild boars. It causes major financial losses but does not infect humans. The virus has 23 known genotypes. 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. ASF (genotype I) spread out of Africa for the first time in 1957, in which year it was recorded in Portugal. ASF was detected in Portugal again in 1960, at which point the virus also spread to Spain. These countries were only declared disease-free in 1995. African swine fever has also been present on the island of Sardinia in Italy since 1978 (genotype I).

In 2007, the disease (genotype II) spread to Georgia, most likely with food waste carried by a ship arriving from Africa. Since then, ASF has spread to such countries as Russia, Ukraine and Belarus. In 2014, it spread to Lithuania, Latvia, Poland and Estonia. Cases of ASF have later also been detected in Moldova, the Czech Republic, Romania, Hungary, Bulgaria, Belgium, Serbia, Slovakia, Greece, Germany, Italy (on the continent in 2022) and North Macedonia (2022). The Czech Republic became officially free of this disease in 2019, and Belgium in 2020. The disease also no longer occurs in Greece, where zone I only extends to the northern border (as a buffer on the Bulgarian border). In 2018, ASF also spread to China, and it has continued to spread in the Far East. In 2021, it spread to the Dominican Republic and Haiti.

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, among other things due to export restrictions, euthanisation of animals, disruptions in the logistics chain and the cleaning and disinfection of holdings.

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 contaminated food containing food waste 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 stepped up and focused particularly on informing tourists since 2018. In cooperation with the Customs, signs with information about the restrictions have been set up at border crossings between Finland and Russia as well as in Helsinki passenger ports, Vuosaari Harbour used by freight traffic and Helsinki-Vantaa Airport.

Due to COVID-19 restrictions, there was little tourism in 2021, which is why the focus of the information campaign was shifted to people spending time in nature in Finland. The

messages of the campaign encouraged people not to leave the remains of their picnics out for wild boars to find, and to notify the official veterinarian of the area if they find a dead or sick wild boar in the wild. The placement and procurement of information signs intended for resting areas on roads made progress, but the signs will only be put up in 2022. The Finnish Food Authority ran a media campaign based on ASF videos over a seven-week period. The data-driven campaign focused on the outdoor, hunting, agriculture and health care sectors (veterinarians). The results of the campaign were good, and the videos attracted over 5.5 million views.

Training on ASF preparedness was provided for pig producers in connection with the SiKana project of the Finnish pig farmers' association and at other events.

Collaboration with the Finnish Wildlife Agency and hunting organisations also continued. Among other things, the Finnish Food Authority participated in planning the Finnish Hunters' Associations' ASF project and complemented the guidelines and communication 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 1,215 samples in 2021 (937 samples in 2020, 638 samples in 2019, 715 in 2018, 527 in 2017, 366 in 2016 and 171 in 2015). The Finnish Food Authority continued to offer rewards for the submission of wild boar samples and reports about dead wild boars.

Efforts were made to work on the development targets identified in the final report of the Potsi 2020 preparedness exercise aimed at combating AFS in 2021, but due to the COVID-19 pandemic and other animal disease epidemics, development measures were partly postponed to 2022. On the other hand, general epidemic management practices and cooperation between different parties were developed in connection with controlling other animal disease epidemics.

See Appendix B for summaries of tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and for viral diseases in pigs (Table B7) in 2012–2021.

3 Poultry diseases

In 2021, highly pathogenic avian influenza was detected in poultry for the first time in Finland, as virus type H5N8 was identified on a pheasant farm in Janakkala in February. In addition, there was a high level of avian influenza in wild birds throughout the year, putting poultry under a constant infection pressure. In general, the occurrence of contagious animal diseases in Finnish poultry is low 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. Broilers 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 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 animals are examined by the Finnish Food Authority. No cases of serious infectious diseases, such as avian influenza or Newcastle disease, were detected in broilers, turkeys or egg-producing poultry in 2021.

Highly pathogenic avian influenza

For the first time, highly pathogenic avian influenza was detected in poultry in Finland. The first avian influenza cases were diagnosed in wild birds, or pheasants released into the wild in Janakkala, in January 2021. In February, the infection spread to a nearby pheasant farm. As the virus type was identified the highly pathogenic H5N8. The Finnish Food Authority ordered the birds on the pheasant farm to be euthanised, and the facilities of the farm were cleaned and disinfected before new birds could be brought in. The Finnish Food Authority set up a restricted zone around the infected farm, which was divided into a protection zone of 3 km and a surveillance zone of 10 km. Movements of poultry and poultry products were restricted within this zone, and the bird farms within it had to comply with specified disease protection measures. The restricted zone was discontinued on 15 March 2021. After this outbreak, Finland's status as a disease-free country according to the OIE terrestrial animal code was restored on 12 May 2021. For more information on avian influenza cases in wild birds, see Chapter 11, Wild animal diseases.

Highly pathogenic avian influenza in Europe 2020–2021

During the epidemic period extending from October 2020 to September 2021, Europe experienced the largest epidemic of highly pathogenic avian influenza (HPAI) of all times. The outbreak started in late 2020 and also appears to continue on a large scale in the epidemic period of 2021–2022. Its geographical scope was similar to that of the previous major outbreak in 2016–2017. Cases were diagnosed almost across Europe. More than 1,000 outbreaks were reported in poultry, and more than 2,000 in wild birds. The most common virus type identified in the early stages of the epidemic was the highly pathogenic H5N8, whereas H5N1, which started becoming more common in spring 2021, had emerged as the dominant virus by the autumn. In addition, smaller amounts of several other H5 virus types were detected.

Most of the cases in wild birds were diagnosed in aquatic birds, the largest numbers in swans, barnacle geese and greylag geese. Cases were additionally reported in birds of prey and several other bird species. Exceptionally, cases were also diagnosed in wild birds in Northern Europe during the summer.

In poultry, HPAI outbreaks were found in several poultry species and in most EU countries. In the epidemic period of 2020–2021, more than 22 million birds had to be euthanised due to outbreaks. The highest numbers of cases in poultry were recorded in France, Poland and Germany.

In addition to birds, highly pathogenic H5 type influenza viruses were found in individual mammals (foxes, seals and otters) in several countries, including Sweden, the Netherlands, Estonia and Finland.

During the year, the Finnish Food Authority communicated about avian influenza cases detected in Finland, the measures related to them, and other guidelines and recommendations aimed at preventing the spread of avian influenza from wild birds to poultry or other birds kept in captivity. A ban on allowing poultry and other birds outdoor access was in place from 8 February till 31 May 2021.

Disease diagnostics

The diagnostics of poultry samples is based on anatomical pathology examinations and their parasitological, bacteriological and virological follow-up tests. The presence of diseases is also examined in health monitoring studies by testing blood samples from birds for antibodies to certain diseases. In addition, poultry are tested for diseases in connection with import operations and using test kits developed for poultry. Samples were sent for anatomical pathology examinations 402 times from 211 farms, which is considerably more than in the previous year (330 times). The majority of samples submitted for necropsy were broilers (231). Turkeys were examined 32 times, and laying hens 31 times. Kits for decreased egg-laying and respiratory tract infections in poultry were examined from a total of seven farms.

Mycoplasma synoviae, M. gallisepticum and *M. meleagridis* antibody tests are conducted on productive poultry in the context of health monitoring, with respiratory tract kits and in connection with import operations. Mycoplasma tests of native breeds of chickens and other non-commercial poultry are also conducted as part of health monitoring programmes or at the request of owners. Both productive and non-commercial poultry, regardless of bird species, are also subjected to *M. gallisepticum/M. Synoviae* PCR examinations. In non-commercial poultry, an *M. gallisepticum* infection was diagnosed on one farm, an *M. synoviae* infection on 22 farms, and additionally, both *M. gallisepticum* and *M. synoviae* infections were identified on two non-commercial farms in either antibody tests or PCR examinations. On one non-commercial laying hen farm of more than 100 hens, both *M. gallisepticum* and *M. synoviae* infections were diagnosed. Due to the *M. gallisepticum* infection, the Regional State Administrative Agency issued the holding with a decision to prevent the spread of the disease.

Outbreaks of colibacillosis, which have plagued the Finnish broiler industry in the past years, decreased in 2020. The disease numbers have returned to almost normal levels, thanks to the launch of a comprehensive vaccination programme. 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 mainly infect 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. This is why it has been crucial to extend the vaccination programme to the start of the production chain, from where the infection has most likely began spreading. A research project launched by the Finnish Food Authority in 2019 to monitor the problems caused by APEC bacteria continued. The project focuses on taking samples from specific parent 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 two laying hen farms and three pheasant farms. Infections caused by *Pasteurella multocida* in poultry were detected on one laying hen farm. *Pasteurella multocida* causes either a chronic disease or very high sudden mortality, in which case the disease is referred to as chicken cholera.

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. For more information about this programme, visit the website of the Finnish Food Authority.

An exceptional number of infectious bronchitis virus (IBV) infections was detected in 2018, and since that year, these infections were again diagnosed in 2021. Infections were diagnosed by virus detection and testing for antibodies, both in laying hens and in the broiler production chain on 14 farms in total. At the beginning, the main observation in connection with these infections was slightly decreased egg-laying but later, respiratory tract symptoms typical to the disease were also reported. Together with poultry industry representatives, the Finnish Food Authority established an IBV working group to monitor the situation in the field, and the Finnish Food Authority examined the impacts of IB findings on production. The typing results of IBV strains showed that two different virus strains, D274 and 4/91-793B, occur in production

poultry. A change in the severity of the symptoms was also observed in anatomical pathology examinations conducted by the Finnish Food Authority. The IB working group assessed the possibility of extending IB vaccinations by using live vaccines, but the poultry industry decided against this. IBV is a common virus in non-commercial poultry, and there have also been occurrence of the highly pathogenic virus strain QX, which has not been detected in production poultry since 2011. The vaccination programme launched in spring 2012 to vaccinate parent flocks of laying hens against IBV with an inactivated vaccine has been continued.

Marek's disease was detected on four non-commercial poultry farms, but no cases of the disease were found in productive poultry. Laying hens and parent stock are vaccinated against Marek's disease. Infectious laryngotracheitis (ILT) or its antibodies were detected on five non-commercial poultry farms. Clinical (symptomatic) Gumboro disease (IBD), chicken anemia virus (CAV) and avian encephalomyelitis (AE) were not detected in 2021. Birds in parent flocks are vaccinated against Gumboro disease, chicken anemia virus and AE in order to protect the broods from these diseases. If nonvaccinated parent hens contract the AE virus, this can also result in a 5% to 10% decrease in egg production which lasts for a couple of weeks.

Surveillance

The disease situation of poultry is monitored through surveillance programmes organised by the authorities for avian influenza (AI), Newcastle disease (Avian orthoavulavirus-1, AOAV-1, PMV-1) and salmonella. For a summary of studies on avian influenza and Newcastle disease in poultry in 2012–2021, see Appendix B (Tables 8 and 9).

The collection of avian influenza samples targeted different species of poultry in compliance with the European Commission's Decision 2010/367/EC. Samples for Newcastle disease were taken from all holdings with parent and grandparent flocks. EU surveillance found Avian orthoavulavirus 1 antibodies on three farms, but the virus was not detected. Avian influenza virus antibodies were found on three holdings, but no H5/H7 type viruses were detected. Poultry holdings approved for EU internal trade follow the surveillance programme set out in Commission Delegated Regulation (EU) 2019/2035 for the following pathogens: *Salmonella* Gallinarum/Pullorum, *Salmonella arizonae, Mycoplasma gallisepticum* and *Mycoplasma meleagridis*. On approved poultry holdings, monitoring tests on 6,145 broiler and 1,890 laying hen blood samples for *M. gallisepticum* antibodies, and on 1,705 broiler and 300 laying hen blood samples for *Salmonella Gallinarum/Pullorum* antibodies, were conducted in 2021. In addition, 300 laying hen blood samples were tested for *M. synoviae* antibodies in connection with export operations.

Table 8. *Test results of the EU surveillance programme for avian influenza in poultry in 2021. Surveillance tests found avian influenza virus antibodies on three poultry farms.*

Number	Parent holdings[1)]	Laying hen holdings	Organic and free range hen holdings	Organic broilers	Geese and ducks[2)]	Turkey breeder holdings	Fattening turkeys	Farmed game birds	Ostriches	Total
Samples	350	539	352	10	20	30	340	171	5	**1,817**
Farms	34	56	35	1	1	3	34	15	2	**181**

[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 2021 by reason for testing.*

Reason for testing	Avian influenza		Newcastle disease	
	Serology, number (Positive holdings/ positive samples)	Virus detection, number (Positive holdings/positive samples)	Serology, number (Positive holdings/ positive samples)	Virus detection, number (Positive holdings/positive samples)
EU surveillance	1,817 (3/8 [3])	12 (0/0)	6,100 (3/13 [2])	12 (0/0)
Import	2,556 (0/0)	8 (0/0)	2,501 (1/2 [4])	8 (0/0)
Disease diagnosis	273 (0/0)	1,119 (2/29 [5])	232 (0/0)	1,017 (0/0)
Total	**4,646 (3/8 [3])**	**1,139 (2/29 [5])**	**8,833 (4/15 [2] [4])**	**1,037 (0/0)**

[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] Serologically positive results, no disease symptoms
[3] H5 antibodies, virus detection negative, no disease symptoms
[4] Maternal (transferred from mother to offspring) antibodies in imported birds.
[5] Highly pathogenic (HPAI) H5N8 detected on one farm, and influenza A-virus other than H5/H7 on another.

Salmonella

Finland's statutory salmonella control programme covers all generations of broilers, turkeys and laying hens. The prevalence of salmonella is low and has remained below the target of 1%. Salmonella was detected on six poultry farms (six farms in 2020). In laying hens of productive generation, salmonella was found in laying flocks on three farms. *S*. Enteritidis was diagnosed simultaneously in two laying flocks on one farm, and on two holdings, *S*. Typhimurium was detected in a laying flock. Additionally, salmonella was found in one laying hen breeding flock (*S*. Typhimurium), and at two small-scale facilities (*S*. Newport at one facility and *S*. Braenderup at the other). No salmonella was detected in parent flocks or broilers and turkeys in 2021.

Health monitoring package for productive poultry and non-commercial poultry farmers

The poultry health monitoring package is aimed at farmers of productive poultry, keepers of native chicken breeds and non-commercial poultry farmers alike. One poultry health monitoring kit includes 20 bird blood samples from the flocks to be examined, out of which the farmer can choose to test for one to three diseases included in the package. The health monitoring package helps to provide information on the disease situation in poultry and to show if vaccinations of productive poultry have been successful. In 2021, a total of 159 batches of samples were submitted from 87 farms, which is slightly more than in 2020.

The majority of sample batches were from the parent generations of productive poultry, consisting of 64 batches from broilers' parents and 11 from the grandparents and parents of laying hens. In addition, 29 broiler sample batches from productive poultry, 13 from laying hens and 22 from non-commercial chickens were also examined. The number of sample submissions from production generations and non-commercial hens exceeded the figure in 2020. The disease situation in chickens and broilers is monitored by testing blood samples for antibodies, especially for IBV, ILT as well as *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 from productive chickens and broilers in 2012–2021.*

Year	AE	CAV	IB	IBD	APV	ILT	*M. gallisepticum*	*M. synoviae*
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
2020	2251	1,931	1,774	1,265	51	559	360	360
2021	2,049	2,299	2,892	1,945	46	470	502	502

[1)] Positive samples from one chicken breeder farm

In the health monitoring package for turkeys, blood samples are tested for antibodies of PMV-3 infection and APV, as well as *M. gallisepticum*, *M. synoviae* and *M. meleagridis* infections. In 2021, PMV-3 antibodies were found in a total of 19 samples from two farms in health monitoring. Antibodies of this disease have been occasionally detected in some turkey parent flocks, and they 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 following the programme, and samples for health monitoring were submitted a total of 14 times in 2021. 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 from productive turkeys in 2012–2021.*

Year	APV	PMV-3 [2)]	*M. gallisepticum*	*M. synoviae*	*M. meleagridis*
2012	418	418 (81)	438	438	438
2013	653	613 (38)	595	595	595
2014	480	480 (55)	480	480	480
2015	459	459 (11)	459	459	459
2016	120	220 (44)	120	120	120
2017	180	280 (54)	180	180	180
2018	140	240 (9)	160	160	160
2019	242 [1)]	302 (22)	120	120	120
2020	137 [1)]	277 (0)	261	257	257
2021	213	281 (19)	221	221	221

[1)] Some of the samples were positive but their significance is unclear.
[2)] Total number of samples, positive samples in brackets.

4 Sheep and goat diseases

The disease situation of sheep and goats has remained good, and no A to C category diseases or other animal diseases to be combated were detected in 2021. The most common reasons for examinations for sheep and goats were disease surveillance (maedi-visna (MV) in sheep and caprine arthritis/encephalitis (CAE) in goats as well as scrapie and brucella), disease diagnosis or investigation of the reason for abortion, meat inspections and parasite surveys.

Disease diagnostics

In 2021, anatomical pathology examinations were performed on a total of 103 samples from small ruminants, of which 97 were sheep and 6 were goats. The number of samples tested was somewhat lower than in the previous year (117 samples in 2020), and 22 of the samples were taken in connection with meat inspection. Samples submitted by a local veterinary enforcement officer from five sheep farms were examined due to suspicions of animal welfare problems.

Anatomical pathology examinations were performed on a total of 11 samples from five sheep farms to determine the cause of abortion. Abortion caused by *Yersinia pseudotuberculosis* bacteria was diagnosed in samples from one farm.

The majority of the samples submitted for disease diagnosis were whole carcasses, mostly young lambs and goatlings. 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 in samples from six sheep farms. Lancet liver flukes (*Dicrocoelium dendriticum*) were found in sheep from one farm in samples collected in connection with meat inspection.

An intestinal infection and systemic infection caused by *Listeria monocytogenes* bacteria was diagnosed in one lamb. Listeria was also found in eye infection samples from one sheep farm. No cases of CNS listeriosis were diagnosed. *Mannheimia haemolytica* and *Mycoplasma ovipneumoniae* were the causes of pneumonia in the samples from one sheep farm. *Mycoplasma ovipneumoniae* was identified in throat swab samples taken on one sheep farm due to symptoms of respiratory tract infection. Additionally, *Mannheimia haemolytica* caused a systemic infection in sheep on three farms. *Bibersteinia trehalosi* caused a systemic infection in one sheep and one goat. *Clostridium perfringens* type D enterotoxemia was diagnosed in one lamb, and this bacterium was additionally isolated in lamb intestines on one farm in connection with coccidiosis. *Salmonella diarizonae* was detected as an incidental finding in one sheep.

Orf virus was detected on 14 sheep farms during the year. In total, samples from 26 sheep farms were examined for the Orf virus.

A total of 54 submissions of faecal samples from sheep and goats from 44 farms were examined. Samples from two goat farms and seven sheep farms were tested in order to determine the cause of diarrhoea, while the samples from the other 35 farms were tested for

parasite survey purposes. The most common findings were eggs of intestinal roundworms (*Strongylida* and *Strongyloides* sp.) and *Eimeria* sp. coccidia.

Surveillance

Scrapie surveillance is conducted by testing for scrapie all sheep and goats over 18 months of age that have died or been put down in the collection area; the samples are taken at a processing plant located in Honkajoki. Additionally, holdings with at least 50 ewes or nanny goats located outside the collection area must send at least one sheep or goat aged over 18 months that died or was put down during the year for testing. In 2021, samples were submitted from 26 holdings located outside the collection area. Slaughterhouses also collect samples from all sheep and goats aged 18 months and over that show signs of emaciation or neurological symptoms or that have been emergency slaughtered. In 2021, atypical scrapie was detected on one sheep farm, while classical scrapie was not detected.

For the results of scrapie surveillance in 2012–2021, see Appendix B (Table B5).

Lentivirus infections (maedi-visna and CAE) in small ruminants are monitored through voluntary health control. A total of 2,622 samples collected from 54 different holdings were tested for maedi-visna and CAE in sheep and goats in 2021 (Table 12). No maedi-visna/CAE infections were detected in the tests. Brucellosis (Brucella melitensis) monitoring was conducted by testing blood samples collected as part of the voluntary health control programme for MV and CAE in small ruminants as well as the blood samples collected at slaughterhouses during slaughter from 799 sheep and 14 goats in total. No brucellosis infections were found.

***Table 12**. Results of sheep and goat health control and scrapie surveillance in 2021. No cases of maedi-visna/CAE or classical scrapie were detected. Atypical scrapie was detected on one sheep holding.*

Species	Maedi-visna/CAE antibodies	Maedi-visna/CAE antibodies	Maedi-visna/CAE virus detection	Maedi-visna/CAE virus detection	Scrapie, prion detection	Scrapie, prion detection
	Samples	Farms	Samples	Farms	Samples	Farms
Sheep	2,310	53	0	0	1,531	487
Goat	312	1	0	0	229	57
Total	**2,622**	**54**	**0**	**0**	**1,760**	**544**

See Appendix B for summaries of brucellosis surveillance in cattle, sheep, goats and pigs (Table B3) and MV/CAE health control (Table B9) and scrapie surveillance (Table B5) in sheep and goats conducted in 2012–2021.

5 Fish and crayfish diseases

The disease situation of fish and crayfish in 2021 was good, except for an outbreak of infectious haematopoietic necrosis (IHN), a disease to be combated under law, in Åland. The surveillance programme for a previous IHN epidemic, which was detected in Finland in 2017–2018, ended in 2021, and IHN free status was restored for these monitoring areas as of 15 September 2021. The programme for the eradication of viral haemorrhagic septicaemia (VHS) in Åland was continued to gain a disease free status. The goal is that the entire country will be free from VHS in 2022.

The situation of bacteriological fish diseases remained mainly similar to the previous years in 2021. The number of flavobacteria, and particularly columnaris cases (*Flavobacterium columnare*) as well as vibriosis (*Vibrio anguillarum*) infections increased slightly. Water mould infections cause problems both for broodfish and young fish.

Disease diagnostics

A total of 16,987 farmed fish were tested, of which 2,538 for a disease diagnosis, in 2021. A total of 1,488 wild fish were tested. With the exception of IHN in Åland, the fish disease situation was good in 2021 (Figure 2).

Yersinia ruckeri biotype 2 infections, which were detected in inland water areas for the first time in 2020 and associated with serious outbreaks, were no longer found in 2021. Rainbow trout gastroenteritis (RTGE) was diagnosed in Finland for the first time in 2010, and since then the situation of this disease has fluctuated. RTGE is causing increasing problems for fish farming. As its cause is suspected SFBs (*Segmented Filamentous Bacteria*) related to clostridia, but attempts to cultivate them in the laboratory have so far failed. A cooperation project between the Finnish Food Authority and the Natural Resources Institute Finland aiming to develop a diagnostic method and to investigate the occurrence of these bacteria continues. The plan is for the project to develop a PCR method that would be optimised for faster and more certain identification of RTGE infections in fish and possibly also in the environment. With regard to bacterial kidney disease (BKD) in fish, the situation remained good and only one case was diagnosed in 2021.

In recent years, plenty of problems caused by water mould (*Saprolegnia* spp.) both for fish farming and in wild fish have been detected. The Finnish Food Authority is currently conducting a multi-stage research project, which identified *Saprolegnia parasitica* fungus as the cause of water mould infections. The disease has also increasingly been found in young fish, rather than only in mature broodfish as before, and it often occurs as a result of handling the fish. The background factors frequently also include other pathogens that damage the skin (parasites, *Iodobacter limnosediminis* bacteria, flavobacteria). The lack of an effective treatment makes this disease particularly challenging.

The infectious pancreatic necrosis (IPN) virus is still present both in inland and marine waters, and there has been no major change in the number of infections in recent years. In inland waters, only IPN genotype 2 infections, which have not caused high mortality rates, are present.

Individual cases of IPN genotype 5 infections that must be combated by law in inland waters were diagnosed in the marine area in 2021. Approximately one half of all IPN findings were made in follow-up samples, and the rest in connection with disease diagnostics.

Investigations of the health status of wild salmon continued in international cooperation in 2021. The health status of the salmon migrating up the Torniojoki River was better than in previous years, and finding symptomatic wild salmon for samples became more difficult. The salmon were found to still carry water mould, which adheres to damaged skin and can eventually cause the fish to die. So far, no single common cause for the disease in salmon migrating up the river has been found.

The disease situation of the pink salmon, an invasive alien species in the rivers discharging into the Barents Sea, was investigated in cooperation with the Natural Resources Institute Finland during the peak migration season in 2021 in a project funded by the Ministry of Agriculture and Forestry. A total of 69 pink salmon samples were collected in the rivers Näätämö and Teno. No viral infections (VHSV, IHNV, ISAV, SAV, IPNV), BKD infections or *Gyrodactylus salaris* parasite infestations were found in pink salmon. Many of the pink salmon showed external changes (ulcers/skin bleeding). Parasites in the body cavity were also quite common.

Crayfish diseases

The most significant crayfish disease detected in Finland is crayfish plague caused by the *Aphanomyces astaci* water mould. In 2021, acute crayfish plague was detected in two lakes. One case each of type A (As) and type B (Ps1) of crayfish plague were found. In both cases, the whole crayfish population was lost.

Signal crayfish samples were tested for disease diagnosis in three cases. In one case of mortality probably caused by oxygen depletion, signs of crayfish plague were found. In two other cases, crayfish plague was found in crayfish that were in poor condition. As signal crayfish are almost always carriers of crayfish plague, the role of this disease in the symptoms displayed by them is difficult to determine. However, it is known that a signal crayfish may also develop acute crayfish plague in stressful situations.

A total of five signal crayfish were tested for white spot disease of crustaceans (WSD), with all samples coming back negative.

Surveillance

Some 20 different aquatic species are farmed in Finland. Species susceptible to each listed disease are set out in legislation, and disease surveillance is targeted accordingly. The objective of regular risk-based inspections of aquaculture animals by authorities and the samples taken in connection with the inspections is to detect the possible presence of IHN, IPN, VHS, ISA and SAV infections as well as the potential occurrence of new serious diseases on farms. KHV, SVC and WSD are monitored by inspections, but samples are not taken routinely. Efforts to stop the spread of BKD are being made through a voluntary health control programme, and samples are regularly taken from establishments within the scope of this programme. In addition, the spread of *Gyrodactylus salaris* (salmon fluke) to Northern Lapland is monitored though regular sampling. A total of 177 risk-based inspections related to the surveillance programmes were conducted in 2021. The number of BKD health monitoring inspections was 108. Some of them were carried out on the same visit as inspections of the risk-based monitoring programme. For the numbers of tests, see Table B10 in the Appendix B.

Aquaculture species are also tested for diseases in connection with export and import operations as well as when a disease is suspected. Wild fish are examined for fish diseases when they or their gametes are introduced to fish farms for broodstock or for the purpose of producing juveniles, when fish or gametes are moved from the sea to an inland water area (transported over dams) and when a disease is suspected.

IHN spread from Denmark to Åland with fish transfers

In spring 2021, the Danish veterinary health authorities reported IHN infections in Denmark and in fish transfers from infected establishments to Åland. Because of a suspected infection, inspections were conducted and samples taken at two establishments that received fish. Unfortunately, the suspicion proved founded, and a second outbreak of IHN was diagnosed in Finland. The previous IHN epidemic in 2017–2018 was caused by a different virus genotype, and the two IHN epidemics detected in Finland are not linked. Once the infection had been confirmed, all known contacts and nearby establishments were tested, and the infection was found on three other establishments during the summer and autumn. From the establishments that received fish from Denmark, the infection spread to three other establishments through water or by human activity. The Finnish Food Authority has set up a restricted zone around the infected establishments. At all the infected establishments, rainbow trout (and whitefish) are farmed for human consumption in cages. The fish at the infected establishments were slaughtered or euthanised, the equipment and tools were washed and disinfected to eradicate the virus, and the establishments have been kept empty of fish susceptible to IHN after eradication. Aquaculture could be resumed in spring 2022, and a two-year surveillance programme to restore disease-free status was launched at the establishments within the affected zone.

See Appendix D for a list of the disease statuses granted to Finland. The disease statuses of fish changed slightly in 2021. In surveillance areas set up because of IHN cases in Ii, Tervo, Kaavi and Nurmes, the disease-free status was restored in autumn 2021. However, the IHN infection spread again to Finland in 2021. A new restricted zone was set up in Åland, which lost its IHN free status, and an IHN eradication programme was launched in the area. Two-year surveillance with the aim of restoring the IHN free status for this zone began in spring 2022. The monitoring initiated in Åland at the beginning of 2020 with the aim of obtaining VHS free status continues in spring 2022 on a few holdings. The VHS virus has not been detected in Åland since summer 2012.

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 Northern Lapland since 1995, in which year an infection was detected in a now defunct rainbow trout farm located in the buffer zone.

See Appendix B for summaries of the tests performed in 2012–2021 for viral diseases in fish as part of risk-based monitoring and other monitoring programmes (Table B10), BKD (Table B11) and *Gyrodactylus salaris* (Table B12). In addition, fish were tested within the framework of the IHN and VHS monitoring programmes, in connection with broodfish capturing and exports as well as in cases of a suspected disease (Table B13).

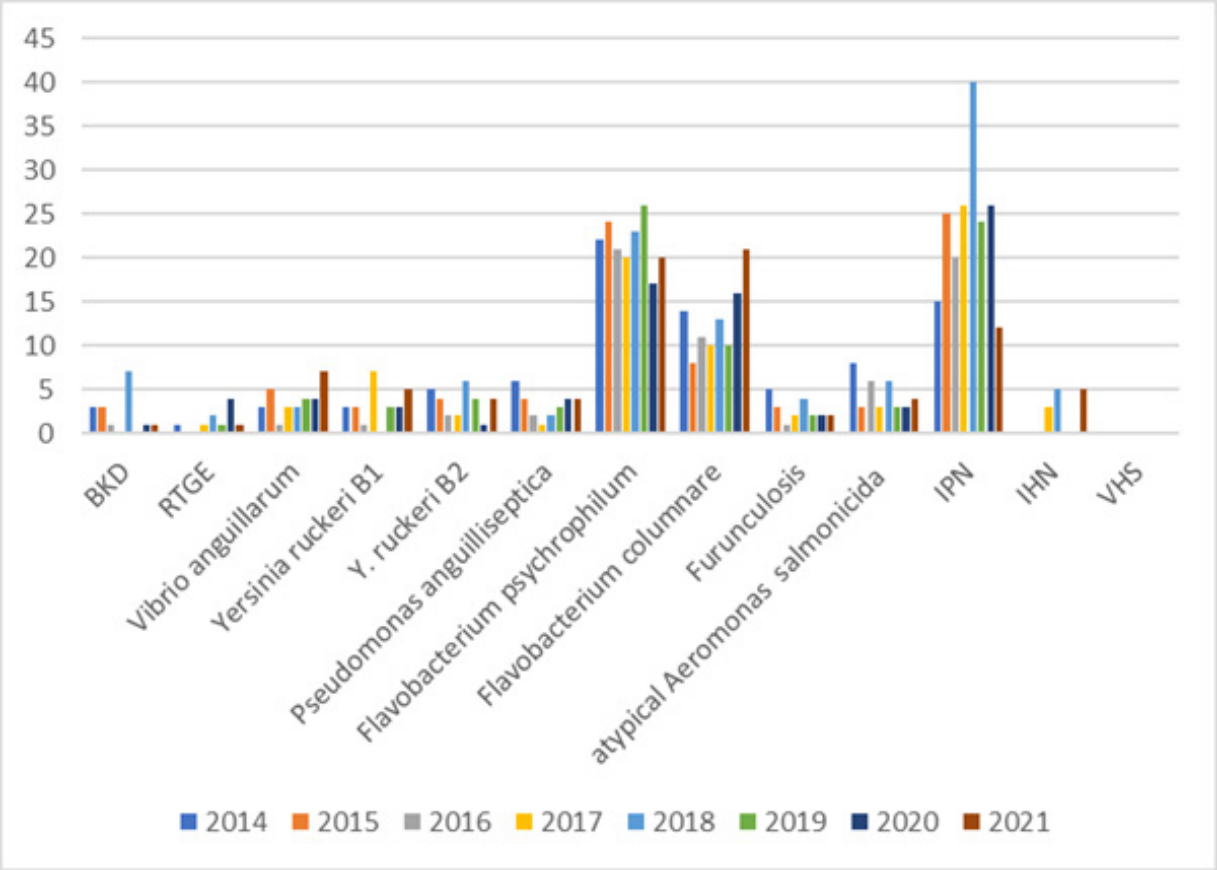

Figure 2. *Occurrence of the most common fish infections in Finland in 2014–2021. The number of aquaculture establishments where the disease was diagnosed is presented on the Y axis. The most common findings are flavobacteria, which affect young fish, and IPN virus, both of which are also common elsewhere 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. Due to failure to meet the import requirements, horses imported from the EU were also examined for dourine, glanders (malleus) and equine infectious anaemia (EIA).

Disease diagnostics

In 2021, a pathological examination was conducted on 50 horses (37 horses in 2020). Out of these, 39 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. In addition, organ samples only were submitted for examination in three cases. No forensic pathology examinations were conducted in 2021. In most of the examinations carried out to determine the cause of abortion, no specific reason for the loss of pregnancy was found, or the loss of pregnancy was caused by an umbilical cord twist. Abortions caused by herpesvirus were detected in four cases (none in 2020). In recent years, herpesvirus has caused a few abortion cases per year at most, and arteritis virus was last found to be the cause of abortion in 2011.

Strangles

The cause of strangles, *Streptococcus equi* sp. equi, was confirmed in samples received by the Finnish Food Authority or sent in by other laboratories examining strangles samples for confirmation in 31 cases.

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 occurrence, 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, including respiratory tract symptoms, neurological symptoms or abortion. Abortion caused by a herpesvirus (equine viral abortion) is nearly always caused by EHV-1. Four cases of equine viral abortion caused by EHV-1 were detected in the Finnish Food Authority's examinations in 2021. Equine rhinopneumonitis, which causes respiratory symptoms, can be caused by both EHV-1 and EHV-4, and only rhinopneumonitis caused by EHV-4 was found during the year. In addition to foals submitted for examination to determine the cause of abortion, samples from 21 horses were examined, either by testing the samples for the virus and/or examining paired serum samples for an increase in antibodies. Independent laboratories must send isolates of any EHV-1 and EHV-4 strains or positive DNA samples to the Finnish Food Authority. A few EHV-1 and/or EHV-4 samples are received from these laboratories each year.

No cases of equine influenza or viral arteritis found

Equine influenza or viral arteritis infections were not diagnosed in the samples examined in 2021. Nine horses were examined for horse influenza by testing either nasal mucus samples and/or paired serum samples for increased levels of antibodies. Samples were examined for viral

arteritis to determine the cause of a disease or abortion. In addition to foals sent for disease diagnostics, samples from 13 horses were examined in 2021 to determine the cause of abortion, either by testing samples for the virus and/or examining paired serum samples for increased levels of antibodies.

Stud testing

In compliance with legislation and following instructions issued by the Finnish Trotting and Breeding Association Hippos, a total of 339 studs used for breeding were tested for *Taylorella equigenitalis*, a bacterium that causes contagious equine metritis (CEM). A *T. equigenitalis* infection was diagnosed in one Finnish Horse stud. This infection was additionally diagnosed in one Finnish Horse mare which the positive stud had covered the year before.

In 2021, 261 breeding studs were examined for viral arteritis with negative results. Antibodies to viral arteritis were detected in a total of nine breeding studs, but the results of further tests on sperm samples were all negative. There have been no changes in the disease situation of viral arteritis in recent years. Studs that have been infected with and excrete the virus 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 equine viral arteritis monitoring in Finland.

A total of 35 studs were tested for EIA, with all samples coming back negative.

No diseases that must be combated by law were found in horses

Under the animal disease legislation, dourine, malleus and EIA are all classified as animal diseases that must be combated by law. Malleus is a category A disease, whereas both EIA and dourine belong to category D; EIA is classified among other animal diseases to be combated in the national legislation, and dourine among animal diseases to be controlled. 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 is 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. Consequently, the spread of EIA through imported horses is a persistent threat, especially as the disease may be completely asymptomatic in a horse.

In addition to breeding stud tests, EIA examinations were conducted in connection with the import of horses and their gametes, failure to meet the import requirements, and inadequate information on imported horses. In 2021, a total of 77 samples were examined for EIA, all with negative results.

The Finnish Food Authority tested samples from 42 horses for dourine and malleus antibodies or import or export purposes or in case of failures to meet the import requirements, all with negative results.

7 Reindeer diseases

The disease situation in reindeer remained good in 2021 based on the samples submitted to the Finnish Food Authority, and no category A to C diseases or other animal diseases to be combated were detected in reindeer. Approximately 50 to 60 reindeer or samples from reindeer are examined every year to determine the cause of a disease. In 2021, only 36 samples from reindeer were submitted for pathological testing, 17 of which were organ samples and 19 whole carcases. Almost all reindeer samples sent in for disease diagnostics were from the reindeer herding area, and they were mostly submitted in the autumn and winter, which is the season for slaughtering reindeer and keeping them in pens. Possible cases of diseases may not be detected in reindeer that roam free in the wild. Scavengers often eat the carcasses before they are found, and especially free-roaming reindeer that die in the summer quickly decompose in warm weather. Almost every year, individual samples from reindeer farmed outside the reindeer herding area are also examined.

Surveillance of chronic wasting disease (CWD) in cervids was discontinued

The surveillance programme for chronic wasting disease in cervids ended in 2021. While the actual surveillance period was 2018–2020, samples collected in 2021 could also be included in the monitoring.

For surveillance purposes, reindeer herding cooperatives submitted heads of reindeer that died spontaneously or were put down due to an illness, or reindeer older than 12 months that were rejected during slaughter or meat inspection. Reindeer killed in road accidents and by predators were also included in the monitoring programme. Reindeer older than 12 months that were submitted for pathological testing were also tested for CWD as far as possible. While intensive CWD surveillance was discontinued, the monitoring of this disease will continue following the same principles. However, samples will no longer be taken from animals killed in road accidents or by predators. CWD has never been diagnosed in Finnish reindeer (Table B6). TSE numbers in reindeer and other cervids have been monitored in Finland since 2003.

Table 13. *TSE tests of cervids in 2012–2021 by species. One TSE positive elk was found in 2018 and 2020.*

Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Reindeer (*Rangifer tarandus tarandus*)	1	4	13	3	6	16	294	616	624	127	**1,704**
Finnish forest reindeer (*Rangifer tarandus fennicus*)	0	0	0	0	4	13	14	12	7	25	**75**
Elk (*Alces alces*)	9	3	3	6	26	48	242	162	200	90	**789**
White-tailed deer (*Odocoileus virginianus*)	2	5	3	4	12	23	50	131	125	55	**410**
Roe deer (*Capreolus capreolus*)	2	2	2	0	7	13	63	208	255	101	**653**
Fallow deer (*Dama dama*)	0	0	1	1	0	1	0	0	0	1	**4**
Red deer (*Cervus elaphus*)	0	0	0	0	0	0	0	0	1	0	**1**
All	**14**	**14**	**22**	**14**	**55**	**114**	**663**	**1,129**	**1,212**	**399**	**3,636**

Bacterial, parasitic and viral findings in samples

A large proportion of reindeer samples are submitted by veterinarians who inspect reindeer meat at slaughterhouses. Of all reindeer samples obtained in 2021, 13 were related to meat inspection. *Echinococcus canadensis* G10 was diagnosed in the lungs of five reindeer, whereas Echinococcus cysts were found in three reindeer in 2020. As in previous years, the infections mainly occurred in the eastern parts of the reindeer herding area. One liver sample contained bile duct cysts considered abnormalities or neoplasms. Because of their appearance, these changes can easily be confused with cysts caused by echinococcus. This is why all suspicious cyst findings must be submitted to the Finnish Food Authority for testing. As a rare finding, tumour-like changes were observed in the abdominal cavity of a reindeer during meat inspection. They turned out to be an actinomycosis (*Actinomyces denticolens*) infection. Additionally, an ulcerative infection in the mouth caused by *Fusobacterium necrophorum* and *Mannheimia granulomatis* bacteria was discovered in one meat inspection sample from the slaughterhouse. Other common meat inspection findings were parasite scars in the liver and lungs.

For diagnosis of disease or examination of cause of death, 23 samples were submitted. Several bacterial infections were diagnosed from these samples, mainly oral infections causing mouth ulcers, but also some ulcerative infections and general infections in the forestomach. Necrobacillosis cases (*Fusobacterium necrophorum* infection) were diagnosed in three reindeer. Mouth ulcers caused by the orf virus were not found in 2021, but a parapoxvirus infection was detected in an oral ulcer in one reindeer. Coarse, dry and poor quality feed is often the susceptibility factor in these cases, and in calves, the replacement of teeth. These reindeer often also are emaciated. Other bacteria causing purulent infections were also found in the samples, including *Trueperella pyogenes* and streptococcus bacteria. All samples containing intestines were tested for salmonella, however with negative results.

Most reindeer not sent to slaughter 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 intestinal parasites. A *Dictyocaulus eckerti* lungworm infestation was discovered in the necropsy of one reindeer. An infestation of *Besnoitia tarandi*, a single-cell protozoan parasite, was found in one reindeer. Tissue cysts caused by parasites of the *Sarcocystis* genus were found in several reindeer. They are a common incidental finding in microscopic tissue examinations of cardiac and skeletal muscles in reindeer, and they have no major health effects on the animal. This parasite does not pose a risk to humans. While *Sarcocystis* geni cysts that could be seen with the naked eye were discovered the year before, they were not found in samples obtained in 2021.

Reindeer are exposed to many dangers in the wild. Traffic, predators and weather conditions, especially the snow situation in winter, are major causes of mortality in reindeer. A reindeer may also become a crime victim: examination of the cause of death revealed that one reindeer had been shot.

8 Fur animal diseases

Disease diagnostics

In 2021, anatomical pathology examinations were performed on a total of 460 fur animal samples. The number of samples examined was higher than in 2020, in which year 390 samples were tested. Out of these samples, 77 were mink; 372 were farmed foxes, mostly blue foxes; and 11 were farmed raccoon dogs. Compared to the previous year, there was a clear decrease in the number of mink examined, whereas the number of foxes increased considerably. The numbers of samples from racoon dogs have remained similar for several years. 28 faecal samples were examined for diarrhoea. The number of faecal samples was the same as in 2020 but significantly lower than in many previous years.

The most common finding in the samples from farmed foxes examined at the Finnish Food Authority was systemic infection. Most of these were systemic infections caused by salmonella in fox cubs. Some intestinal infections and metritis cases were diagnosed, however clearly fewer than systemic infections.

The most common finding in mink was intestinal infection. In the previous two years, the most common finding has been systemic infection, of which few cases were diagnosed in 2021. Plasmacytosis, which is diagnosed serologically in a private laboratory, is a major disease affecting minks. Pathological and anatomical changes indicating plasmacytosis in mink tested by the Finnish Food Authority have been discovered on a few farms every year. Plasmacytosis was diagnosed on two farms in 2021, as in the year before.

Systemic infections and intestinal infections were diagnosed in several farmed racoon dogs, in addition to various individual findings.

Salmonella infections were diagnosed in animals subjected to anatomical pathology examinations and in faecal samples tested to determine the cause of diarrhoea from 52 fur farms in 2021. One strain was of serotype *S*. infantis, while the others were of serotype *S*. Enteritidis. The number of fur farms in which salmonella has been diagnosed has varied strongly each year. In 2020, salmonella was diagnosed on two farms.

Major viral pathogens in fur animals include parvovirus and canine distemper virus. No cases of parvovirus or canine distemper virus were found in tests during the year.

Surveillance

For the time being, monitoring tests for coronavirus (SARS-CoV-2) are conducted on all mink and racoon dog farms. Every second week, the farms send five animals that have died spontaneously or been euthanised because of an illness as samples to the Finnish Food Authority. If sufficient samples are not obtained, the municipal veterinarian takes samples of live animals on the farm. The samples are tested for SARS-CoV-2 infection. In 2021, a total of 10,166 coronavirus monitoring samples from 242 farms were tested. None of these samples were positive for coronavirus (SARS-CoV-2).

Fur animals can be infected with coronavirus (SARS-CoV-2)

COVID-19 caused by SARS-CoV-2 is a human disease that spreads primarily between humans. It has been found, however, that some animals can also contract this virus, and of fur animals, mink are particularly susceptible to such infections. Based on exposure tests, a raccoon dog may also contract a SARS-CoV-2 infection.

Mink mostly develop respiratory tract symptoms, which are usually mild. Higher mortality in mink may additionally be observed on infected farms. The infection may also be completely asymptomatic. No symptoms were observed in infected animals in the exposure test carried out with raccoon dogs.

To detect an infection, a swab sample is taken from the mucous membranes of the throat. The entire carcass of a dead animal may also be submitted as a sample. The virus can be detected with molecular biology methods by duplicating the virus genome in a polymerase chain reaction (PCR).

The most likely scenario is that the infection was originally transmitted to mink from people working on the farms, but the virus also spreads in animal- to-animal contact on farms, for example by droplet infection. Based on exposure tests, the virus may also spread through the air across short distances without close contact between the animals.

In the Netherlands and Denmark it has been found that on infected mink farms, the SARS-CoV-2 virus has been transmitted from mink to individual employees on the farm, which means that the disease can be transmitted to humans from a mink that is a carrier. According to a risk assessment produced by the European Centre for Disease Prevention and Control (ECDC), however, the risk of infections transmitted from mink to people outside fur farms is low.

Due to the nature of the disease and the large numbers of animals on fur farms, it is extremely important to prevent the spread of the virus to farms in Finland. The risk of infection can be reduced by following good disease prevention and hygiene practices on fur farms.

Under Finnish legislation on animal diseases, SARS-CoV-2 infections in minks, raccoon dogs and sables farmed for fur production are classified among other animal disease to be combated. Anyone suspecting a SARS-CoV-2 infection on a fur farm should contact the municipal veterinarian immediately. They will inspect the animals and, if necessary, take samples for testing. If an infection were detected on a fur farm, the Regional State Administrative Agency would issue orders and restrictions to the farm to prevent the spread of the disease. Other measures to be taken on the farm would be decided by the Finnish Food Authority.

SARS-CoV-2 infections of fur animals have been diagnosed in farmed mink in several countries. In the Netherlands and Denmark infections in mink have spread widely, making it necessary to euthanise a large number of animals on the affected farms. SARS-CoV-2 has not been diagnosed in fur animals in Finland. In this country, all mink and raccoon dogs are monitored for SARS-CoV-2.

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

9 Bee diseases

The most notable diseases affecting honey bees in Finland are Varroa destructor mites and the viral diseases spread by them as well as American foulbrood, caused by the *Paenibacillus larvae* bacterium. The majority of the samples sent to the laboratory are submitted for testing for American foulbrood. In 2021, a total of 1,580 honey samples submitted by 257 beekeepers were tested for American foulbrood. In 2021, *P. larvae* were detected in 4% of the samples (10% of beekeepers). No cases of clinical American foulbrood were found. Compared to previous years, the proportion of positive samples has remained low. In 2012–2021, 4% to 29% of the samples have been positive.

While *Varroa destructor* mites are widespread in mainland Finland, samples are usually not laboratory tested. Åland has official varroa-free status granted by the EU, and the occurrence of the mite is monitored with annual surveillance samples examined by the Finnish Food Authority. In 2021, 33 farms with a total of 204 hives in Åland were tested for varroa mites, and unfortunately the infection was diagnosed in two apiaries.

Varroa mites were found in Åland for the first time

Åland is one of the few regions in the EU and throughout the world that has remained free from the *Varroa destructor* mite, a bee parasite. This mite originating in south-east Asia has caused considerable economic damages to apiaries worldwide. It weakens bee colonies by absorbing fatty tissue from bees and spreading certain viral diseases. Without measures to combat the mite by the beekeeper, an infected colony will eventually die out as the mite load becomes excessive. Åland was granted official varroa-free status in the EU in 2013. To maintain this status, apiaries in Åland have been examined annually for varroa with a risk-based approach. Regrettably, these mites were found in one apiary in the municipality of Brändö in the monitoring of 2021. Known contacts of the infected farm and the nearby farms were examined, and an infestation was also found in another nearby apiary. It is likely that the infection originated in mainland Finland. The Finnish Food Authority set up a restricted zone in the municipality of Brändö to prevent the spread of the infestation. All beehives in the restricted zone have been destroyed or moved to the mainland where the mites are commonly found. An effort will be made to restore varroa-free status for the entire area of Åland.

Thanks to the efforts to combat Varroa destructor mites, honey bee tracheal mites (*Acarapis woodi*) have also become less common throughout Europe, although they are still occasionally found in Finland. No honey bee tracheal mites were found in 2021.

European foulbrood infections are usually diagnosed in a few apiaries each year. *Melissococcus plutonius*, the bacterium that causes European foulbrood, was not found in 2021.

Nosema apis and *N. ceranae* parasites are common in Finland but rarely cause a serious disease. In 2021, nosema spores were detected in samples from two farms, but clinical nosemosis was not diagnosed.

Bee viruses were examined on seven farms. The sacbrood virus (SBV) was detected on four farms, black queen cell virus (BQCV) on three, and deformed wing virus (DWV-A) on one. No acute bee paralysis virus (ABPV, KBV and IAPV) and chronic paralysis virus (CBPV) were detected.

To identify small hive beetles (*Aethina tumida*), beekeepers are invited to submit beetles or larvae found in apiaries to the Finnish Food Authority free of charge. Small hive beetles have not been found in Finland.

10 Pet diseases

The disease situation of pets has remained good, and no category A to C diseases or other animal diseases to be combated were detected in 2021. As a rule, the Finnish Food Authority monitors the occurrence of animal diseases in pets from samples submitted for reasons other than monitoring studies on animal diseases, such as disease diagnosis or determination of cause of death for which a fee is charged. The samples are examined based on case-by-case discretion for animal diseases which could be indicated by the preliminary data and the animals' symptoms, or which cannot be excluded based on the symptoms.

The most common reasons for examinations of pets were determining the cause of a disease or death, infectious diseases, investigating animal welfare issues, identifying hereditary diseases and determining the cause of death of new-born animals.

Disease diagnostics

In 2021, pathological examinations were conducted on approx. 900 pets, of which 545 were dogs, 221 cats and approximately 123 other species. Some of the examinations (approx. 7% in 2021) are forensic necropsies, mainly related to suspected animal welfare offences. In addition to necropsies, 266 faecal samples were also tested for parasites. Of these samples, 191 were from dogs, 55 from cats and the rest from other animals.

Dogs

The most common causes for diseases in dogs are different developmental disorders, tumours, heart, liver and kidney diseases as well as neurological diseases. Currently, commonly occurring infectious diseases in dogs are mainly respiratory tract 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. In 2021, a parvovirus infection was diagnosed in two puppies examined by the Finnish Food Authority.

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.

Infectious diseases are especially dangerous for young puppies due to their underdeveloped immune systems in puppies and young animals. Young puppies are mainly diagnosed with different bacterial infections, including omphalitis, pneumonia and systemic infections, the most common causes of which are *Escherichia coli*, *Staphylococcus pseudintermedius* and *Streptococcus canis* bacteria. These bacteria commonly occur in the bodies and environments of dogs, whereas herpesvirus infections in dogs are a moderately rare cause of mortality in new-born pups; no cases were detected in 2021.

Parasitic diseases are rarely diagnosed in pathological studies of pets. Infections caused by *Neospora caninum* protozoans are rare in dogs, and no cases were found in 2021 (two cases in 2020). The more widespread practise of feeding dogs raw meat significantly increases the risk of neospora infection. Intestinal infections caused by *Giardia* sp. or *Cryptosporidium* sp. protozoans are diagnosed regularly from faecal samples, as their pathogens are common in the environment. In 2021, the Finnish Food Authority tested for giardia 177 faecal samples from dogs, 46 of which were positive. These infections are usually asymptomatic in adult dogs but can cause diarrhoea in puppies and dogs with a weakened immune system. In one puppy examined by the Finnish Food Authority in 2021, an intestinal infection caused by coccidiosis (*Isospora* sp.) was diagnosed. Ectoparasites are detected in individual cases; in 2021, brown dog mites were found in a dog illegally imported from Liberia, and a severe scabies infestation (*Sarcoptes scabei*) was found in one Finnish dog. This probably was a scabies species specific to wild canines (*var. canis*) which, however, can also infect humans.

Thanks to regular vaccinations, such dangerous viral diseases as rabies and infectious canine hepatitis never occur in Finnish dogs nowadays. Ten dogs were tested for rabies, two 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).

Bacterial infections caused by *Brucella canis* occur from time to time in imported dogs as well as Finnish dogs taken abroad for breeding purposes. In 2021, samples from seven dogs were examined serologically, either in connection with export operations or for disease diagnosis, whereas eight samples from dogs were examined bacteriologically to investigate the reason for abortion. No brucella antibodies were found in any of the samples, and no *Brucella* infections confirmed by bacterial culture were diagnosed.

No leptospirosis caused by the *Leptospira* bacteria was diagnosed in dogs in 2021.

A total of 124 cases of canine leishmaniasis caused by *Leishmania* protozoa were diagnosed in dogs based on monthly reports from veterinarians. In particular, these infections are detected in imported and rescued dogs. A dog may contract the infection while travelling in countries where sandflies, which act as intermediary hosts for the parasite, are found.

Cats

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 the feline coronavirus. In 2021, the Finnish Food Authority diagnosed 16 cats with FIP. Cat plague caused by feline parvovirus also often occurs in inadequately vaccinated young cats, normally those from feral cat colonies and animal welfare facilities. In 2021, cat plague was found in three kittens.

Viral infections that cause respiratory tract infections also occur regularly in cats. Typically, the feline herpesvirus and calicivirus cause a self-limiting upper respiratory tract disease (cat flu). Infections spreading to the lower respiratory tract are rare but possible, especially in young kittens. In 2021, the Finnish Food Authority diagnosed a serious pneumonia caused by herpesvirus in one kitten. The Finnish Food Authority no longer tests cats for feline leukaemia virus (FeLV) and Feline immunodeficiency virus (FIV) infections.

Similarly to dogs, respiratory and digestive tract infections caused by bacteria are relatively common in cats and kittens. The most common cause is a bacterium found in the environment or the normal microbial system of the cat, such as *Escherichia coli*.

A few cases of systemic infections caused by the protozoan *Toxoplasma gondii* occur in young cats each year. In 2021, the Finnish Food Authority diagnosed one cat with a multiple organ infection caused by these protozoa. Freely roaming cats also often have roundworm and tapeworm infections. The Finnish Food Authority tested 51 faecal samples from cats for giardia, four of which were positive. Chewing mite and ear mite infections are relatively common in feral cats. In 2021, one cat was also diagnosed with an extremely rare lungworm infection.

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

The Finnish Food Authority has also monitored the possible occurrence of coronavirus (SARS-CoV-2) in pets. Coronavirus infections have been diagnosed in pet cats and zoo animals around the world. In late 2021, one cat was diagnosed with a coronavirus infection in Finland (SARS-CoV-2, delta variant), which the cat had probably contracted from one of its infected human family members.

Rabbits

A few cases of *Rabbit Hemorrhagic Disease* (RHD), which was first found in wild and pet rabbits in Finland in 2016, are still diagnosed nearly every year. In 2021, the Finnish Food Authority found infections in two pet rabbits. Caused by the rabbit calicivirus, RHD is a highly infectious and often fatal disease. While there is no treatment for RHD, a vaccine is available, and vaccinating all pet rabbits is advisable as the virus is persistent and highly contagious.

Myxomatosis infections caused by the poxvirus were diagnosed for the first time in wild rabbits in 2020. In 2021, the monthly reports from veterinarians contained 26 myxomatosis cases diagnosed by clinical symptoms in pet rabbits. Pet rabbits can also be vaccinated against this disease.

Other common findings in pet rabbits include bacterial respiratory infections, and a few cases of *Encephalitozoon cuniculi* fungus infestations are found each year (five cases in 2021). An intestinal infection caused by coccidia protozoan parasites was diagnosed in one pet rabbit.

Salmonella in pets

The majority of salmonella infections in pets are asymptomatic and consequently unlikely to be detected. In 2021, 14 salmonella strains were isolated in samples from pets that were submitted to the Finnish Food Authority for confirmation and typing. Twelve of them were found in dogs and two in reptiles. There was major variation in the salmonella serotypes in dogs, and no clearly dominant serotype emerged among the samples. Serotypes Typhimurium, Enteritidis, Derby and Anatum were identified twice each. In addition, individual cases of serotypes *S.* Altona, Brandenburg, and Bredeney were found, as well as one strain belonging to subtype *Salmonella enterica* ssp. *enterica*, which could not be serotyped. In reptile samples, a strain belonging to subtype *S. enterica* ssp. *salamae* was identified in a turtle, whereas *S.* Florida was found in a snake. Reptiles (snakes, lizards, turtles) typically carry strains of subtypes *arizonae, diarizonae* and *houtenae* in their intestines.

11 Wild animal diseases

Surveillance of wild animal diseases in Finland focuses primarily on diseases that can be spread between animals and humans (zoonotic diseases or zoonoses). The occurrence of other animal diseases and new outbreaks are also monitored by testing animal samples submitted by members of the public. In addition to the wild animal tests discussed in this Chapter, information about tests on wild fish and crustaceans is contained in Chapter 5, Fish and crayfish diseases.

No completely new infectious diseases of wild animals were diagnosed in the disease monitoring of 2021. A highly pathogenic avian influenza made its way to Finland again in early January 2021. The first cases were diagnosed in a pheasant flock in Häme, and cases also began to occur in other species shortly afterwards. As in the previous year, a large number of tularemia cases was diagnosed, also outside the typical high season of late summer and early autumn. Squirrel chryptosporidiosis was now also diagnosed in flying squirrels. In 2021, information on the occurrence of several diseases of wild animals was added to the Finnish Food Authority's open information portal for the citizens' benefit.

Avian influenza epidemic spread to Finland with force

In the avian influenza epidemic that began in 2021, more cases have been detected in Finland than ever before. In January 2021, the highly pathogenic influenza A virus of type H5N8 caused the first epidemic in a pheasant flock in Finland. Scores of pheasants released from a farm for hunting died of sudden illness caused by the virus in Häme. A short while later, the virus also managed to spread to the pheasant farm that had released birds. Individual cases began to emerge in Northern goshawks, swans and wild ducks in Uusimaa and Southwest Finland later in the winter. One whooper swan that had contracted avian influenza was also found in North Savo. In May, several barnacle geese that had died of avian influenza on their migration route were found in southeast Finland. At this point, H5N1 became the predominant virus type. In the summer, avian influenza (both types H5N1 and H5N8) caused the deaths of hatchlings in some white-tailed eagle nests. Avian influenza deaths of golden eagle nestlings were also confirmed in one nest. The cases of late summer concentrated in Southwest Finland and Uusimaa. Other species affected by avian influenza were the European herring gull and common gull, grey heron, Eurasian eagle owl, Ural owl and common merganser. The epidemic gathered momentum again in September, as new outbreaks were found in pheasant flocks in Häme and now also in Southwest Finland. Thousands of dead pheasants were picked up in the forest to be destroyed. The virus type was highly pathogenic H5N1. Due to the large number of pheasants in these areas, the Finnish Food Authority established infection zones around the sites on which the disease occurred in an attempt to prevent its spread to poultry and other birds kept in captivity in the area. For example, restrictions on movements of poultry and captive birds as well as bird hunting were imposed in the infection zone, and requirements for protecting bird farms from infection were set. The epidemic took a new turn as the first cases of avian influenza in mammals in Finland were confirmed in late 2021. Two foxes and one otter had contracted the H5N1 virus in the areas where the mass deaths of pheasants had occurred. The avian influenza epidemic never showed any signs of abating. The last case in 2021 was a greater white-fronted goose, which was found in Helsinki in late December. A total of 66 outbreaks were detected

in birds during the year. An outbreak can mean the death of an individual bird, or even mass mortality of thousands of birds on the same site.

Influenza monitoring of wild birds is an activity that continues from year to year and focuses on birds that are found dead or euthanised because of a disease. Aquatic birds and birds of prey play a major role in the monitoring, but birds of other species should also be examined, especially in cases of mass deaths. In 2021, 560 birds were examined for avian influenza A viruses. Of the examined birds, 110 tested positive for influenza A virus, and 99 of the positive birds were found to have the highly pathogenic (HPAI) avian influenza virus, while 11 had an influenza A virus of a type other than H5 or H7.

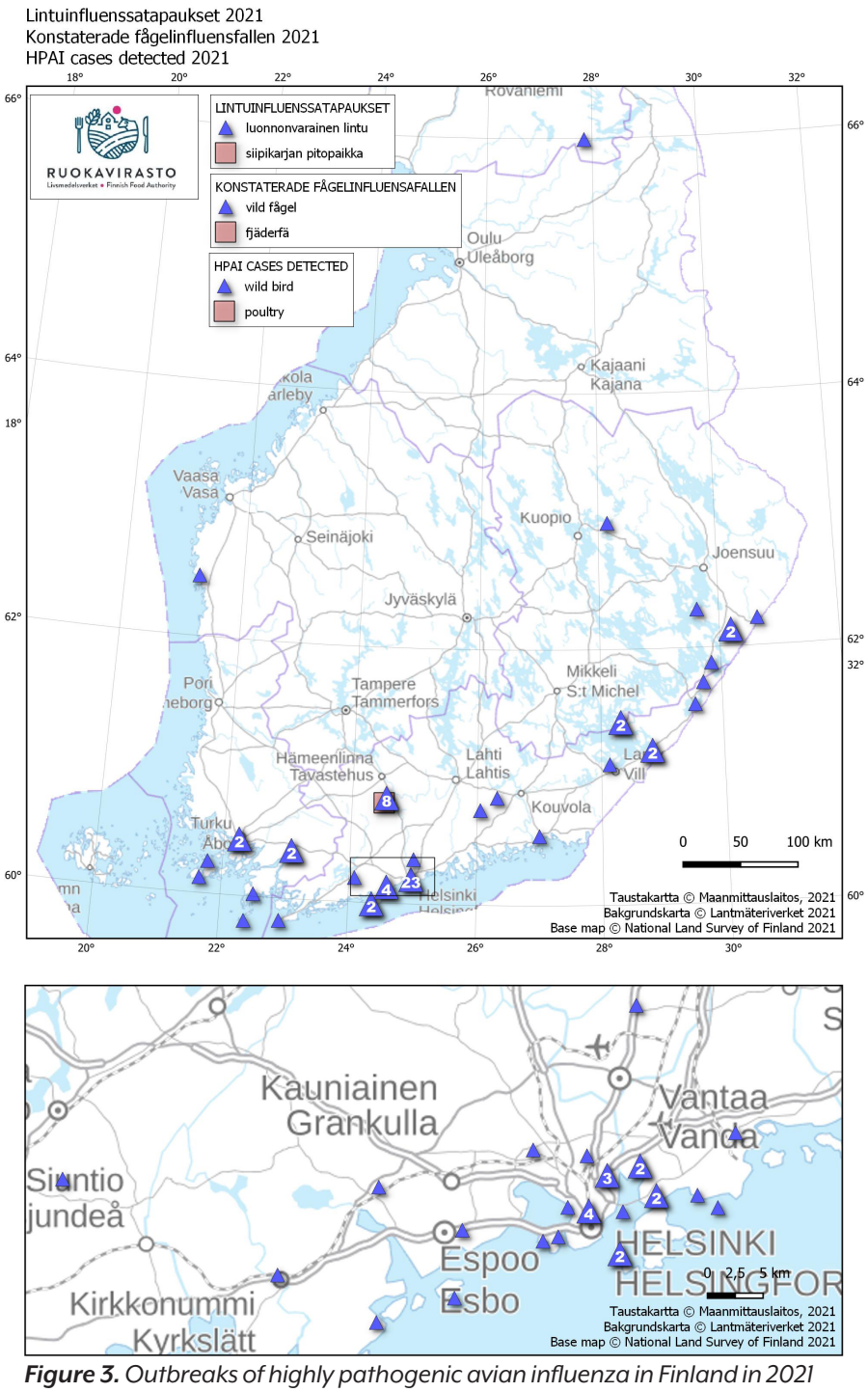

Figure 3. *Outbreaks of highly pathogenic avian influenza in Finland in 2021*

Intensive surveillance of chronic wasting disease (CWD) was discontinued

The surveillance programme for the chronic wasting disease (CWD) of cervids implemented by certain EU Member States in compliance with European Commission Regulation 2017/1972 ended in 2021. While the actual surveillance period was 2018–2020, samples collected in 2021 could also be included in the monitoring. The aim was to examine a total of 3,000 cervids while the programme was in progress. In 2021, 272 wild cervids and 127 reindeer, or 399 cervids in total, were tested for CWD (Table B6). Of these, 375 met the criteria set for samples in the surveillance programme. Overall, 3,403 samples were collected in the surveillance programme, 3,119 of which fulfilled the criteria. The objective of the programme was consequently achieved successfully, thanks to active game management associations and reindeer herding cooperatives. While the actual cervid CWD disease has never been detected in Finland, a prion disease, or transmissible spongiform encephalopathy (TSE), was diagnosed for the first time in Finland in an old elk found dead in Kuhmo in 2018. Another similar case of TSE was found in Laukaa in 2020 in an 18-year-old elk that was euthanised because it was ill. Elk in both areas in which the TSE cases were discovered were examined intensively, but no other infections were found. Similar TSE cases in old elk have also been discovered in Sweden and Norway in recent years.

The EU surveillance programme used as samples cervids that were found dead, including animals involved in traffic accidents or killed by a predator, and animals that were euthanised due to a disease, or found to be ill at slaughter and aged over 12 months. While intensive CWD surveillance was discontinued, the monitoring of this disease will continue following the same principles. However, samples will no longer be taken from animals killed in road accidents or by predators. The monitoring will continue for reindeer, Finnish forest reindeer, elk, white-tailed deer and roe deer. The up-to-date accumulation of sample numbers by species and region can be followed on the Finnish Food Authority's open information portal.

Finland remained rabies free

Efforts to combat rabies continued as in previous years. Vaccine baits intended for wild animals are scattered in the forest in Finland to stop small wild predators from spreading rabies to the country. In 2021, the vaccine baits (a total of 189,000 vaccines) were dropped from an aircraft in September and October. The occurrence of rabies and uptake of the vaccine baits are constantly monitored by testing hunted animals and those found dead. Hunters' assistance in collecting animal samples is crucial for the monitoring of diseases. Samples are mainly collected in Southeast Finland and North Karelia, areas in which bait vaccines are spread. In 2021, the targeted number of samples was reached. The aim of the Finnish Food Authority was to obtain 360 animal samples from the rabies bait vaccination area. A total of 474 foxes and raccoon dogs were sent in, out of which 430 animals provided brain samples for rabies testing and 284 blood samples for vaccine success monitoring. Antibodies generated by the vaccine were found in 47% of the tested animals. The tracer used in the vaccines, tetracycline, was found in 80% of jaw bone samples.

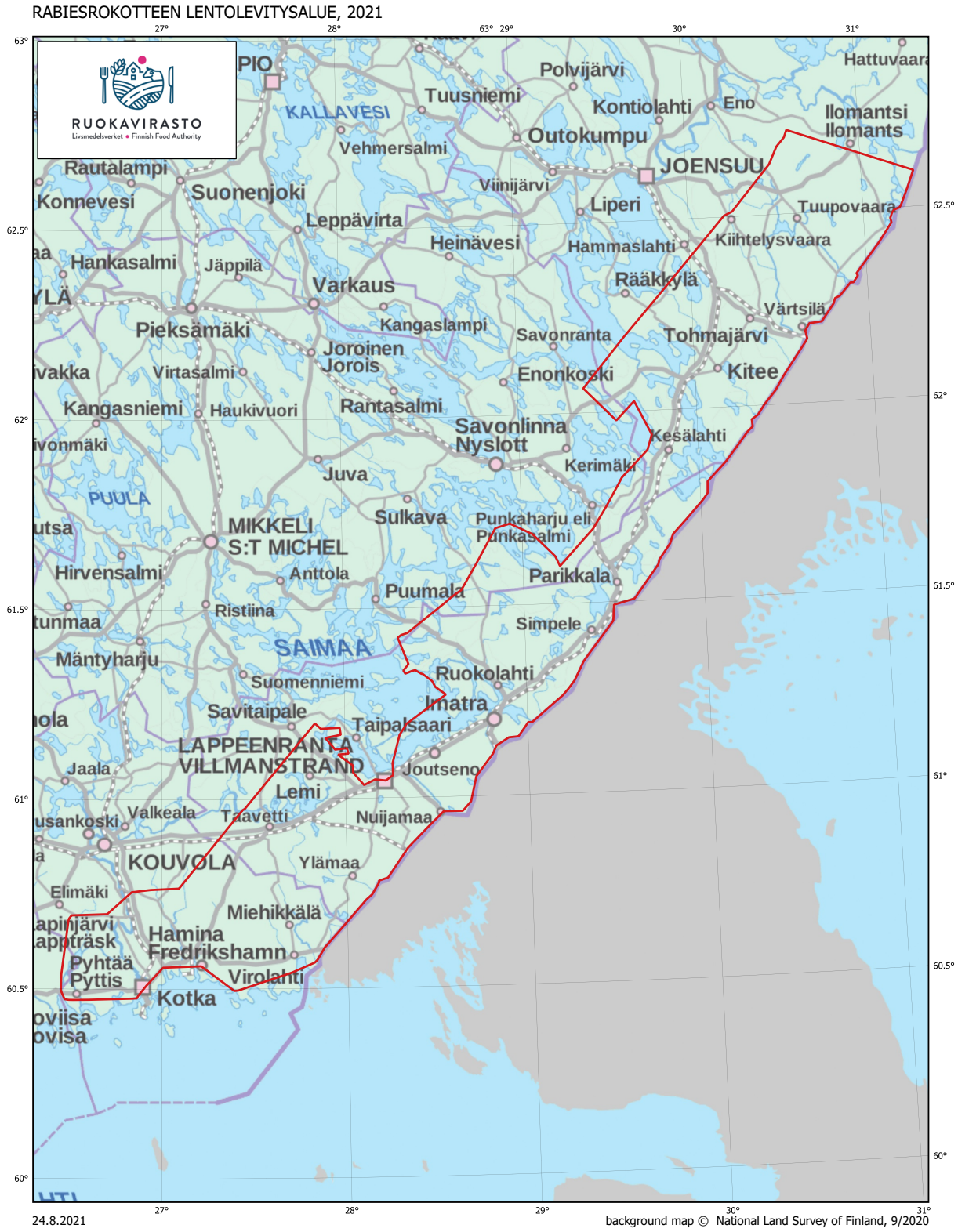

Figure 4. *The zone in which rabies vaccine baits were dropped in 2021.*

In the whole country, 623 wild animals were collected in connection with rabies monitoring. Most of them were racoon dogs (363) and foxes (141). No cases of rabies were detected. In addition, 54 bats were also tested for rabies.

Table 14. Animals tested for rabies for different reasons in 2021. ***No cases of rabies were found.***

Species	Road accident	Put down - aggressive	Put down - illegally imported	Put down because of injury	Put down - other neurological symptoms	Put down sick	Put down healthy	Found dead	Preliminary data results/ positive	Samples examined/ positive
Cat	0	5/0	0	0	0	0	0	**0**	5/0	**5/0**
Dog	0	3/0	2/0	0	3/0	2/0	0	**0**	10/0	**10/0**
Cattle	0	2/0	0	0	0	0	0	**0**	2/0	**2/0**
Wolverine	1/0	0	0	0	0	0	0	**1/0**	2/0	**2/0**
Lynx	5/0	0	0	3/0	0	5/0	0	**15/0**	28/0	**35/0**
Bear	2/0	0	0	1/0	0	3/0	0	**1/0**	7/0	**8/0**
Fox	1/0	1/0	0	0	0	1/0	0	**27/0**	30/0	**141/0**
Bat	0	0	0	0	0	1/0	0	**53/0**	54/0	**54/0**
Weasel	0	0	0	0	0	0	0	**1/0**	1/0	**1/0**
Badger	0	0	0	0	0	0	0	**2/0**	2/0	**8/0**
Pine marten	0	0	0	0	0	0	0	**1/0**	1/0	**1/0**
Otter	3/0	0	0	1/0	0	0	0	**33/0**	37/0	**43/0**
Racoon dog	0	0	0	0	0	4/0	0	**5/0**	9/0	**363/0**
Wolf	4/0	0	0	0	0	4/0	1/0	**5/0**	14/0	**19/0**
Wild mink	0	0	0	0	0	0	0	**1/0**	1/0	**2/0**
Total	**16/0**	**11/0**	**2/0**	**5/0**	**3/0**	**20/0**	**1/0**	**145/0**	**203/0**	**694/0**

Examinations of wild boar living in the wild

The threat of African swine fever persisted in 2021, as this 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 Finland since 2010. In 2021, a total of 1,215 samples from wild boar were received, which is 23% more than in the year before (of these animals, nine were found dead, six were killed in road accidents, and one had been put down due to illness). The number of hunted wild boar was 1,199. The Natural Resources Institute Finland estimated that the average size of the wild boar population is approx. 3,100 individual in January 2022. According to the Finnish Wildlife Agency, 1,443 wild boars were hunted in Finland in 2021 and 1,195 in 2020. Overall, samples from a very high proportion of hunted wild boar (83% in 2021, 78% in 2020) are sent to the Finnish Food Authority, and this share has even increased compared to 2020. 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. In addition, blood samples were tested for brucella antibodies. Brucella antibodies were found in 19 samples, and the total number of samples tested was 685. In autumn, Aujeszky's disease (AD) antibodies were found in a sample from two wild boars living in the wild that had been shot by hunters near the Russian border in North Karelia (Kitee and Tohmajärvi). In Finland, Aujeszky's disease antibodies in wild boars living in the wild have most recently been discovered in 2019 and 1980. However, an Aujeszky's disease diagnosis was not made in these cases, as no virus was found in the samples, the animals did not show any symptoms compatible with the disease, and there is no known link to a diagnosed case or outbreak. Neither can the occurrence of the disease be confirmed by law based on the available information. While Aujeszky's disease is relatively common in wild boar in Europe, there is no information on any cases of this disease near the Finnish border on the Russian side. Aujeszky's disease has officially been eradicated in Finland, and the disease has never been found in productive pigs in Finland.

The tests carried out by the Finnish Food Authority also revealed that one of the hunted wild boar mentioned above (Tohmajärvi) had classical swine fever (CSF) antibodies. The sample was later examined by the EU reference laboratory, which confirmed the test result. No classical swine fever virus was detected in the tests (PCR). The animal in question was a sow aged approx. 4 to 5 years, in which hunters had observed no abnormalities. There is quite a plentiful wild boar population in the area where the sow was shot and, according to local hunters, no symptoms of the disease have been observed. CSF was not diagnosed in this case, as no virus was found in the tests, the animal did not show any symptoms compatible with the disease, and there is no known link to a diagnosed case or outbreak. Neither can the occurrence of the disease be confirmed by law based on the available information. Due to the unusual findings, however, the possibility of the wild boar's antibody result having been caused by a vaccination was investigated, as classical swine fever can be controlled by vaccinations. According to information received from Russia as part of inter-authority cooperation, there are wild boar farms in the Republic of Karelia in Russia, and an oral vaccine against classical swine fever was used there until 2017. The information obtained indicates that wild boars have also escaped from the farms. Consequently, it is quite possible that the positive antibody finding is due to the fact that the (originally farmed) wild boar sow had been vaccinated against classical swine fever.

In 2021, 675 samples from wild boar living in the wild were tested for CSF antibodies, and 1,215 samples were tested for the virus in Finland. All results except for the one positive antibody result were negative. In North Karelia, 74 samples from wild boar were tested. These figures support the theory that the positive antibody finding is due to vaccination rather than a swine fever infection, as classical swine fever infections in wild boars living in the wild would not stop at one individual. In the last ten years (2012–2021), 2,150 boars have been tested for CSF antibodies and 4,761 boars for the virus in the monitoring of wild boars living in the wild. Finland has official CSF free status granted by the World Organisation for Animal Health (OIE).

For more detailed information on samples from wild boar living in the wild tested in 2012–2021, see Table B14.

Table 15. *Samples from wild boar living in the wild by region in 2021*

Region	Tested animals
South Karelia	555
Kymenlaakso	251
Uusimaa	127
North Karelia	74
Kanta-Häme	46
Päijät-Häme	40
Pirkanmaa	30
South Savo	18
Central Finland	16
Southwest Finland	15
South Ostrobothnia	12
Satakunta	11
Kainuu	7
Ostrobothnia	5
North Ostrobothnia	4
Central Ostrobothnia	2
North Savo	2
Åland	0
Lapland	0
Total	**1,215**

Viral diseases in rabbits detected once more

Viral rabbit haemorrhagic disease (RHD) was relatively common in wild rabbits in the Helsinki metropolitan area in late summer and autumn. A total of 12 RHD cases were confirmed in Helsinki, Espoo and Vantaa, and one case was also found in Porvoo. Myxomatosis caused by the rabbit Myxoma virus was a less common finding: two cases were confirmed, both from Helsinki. One of these cases was found in March and the other in September. Myxomatosis is in most cases a chronic disease that causes typical external symptoms, including a purulent eye inflammation and skin tumours. RHD, on the other hand, rapidly leads to the death of the rabbit without any specific outward changes. Young rabbits may also die suddenly of myxomatosis before visible symptoms occur.

Again outbreaks caused by paramyxovirus-1 in domestic pigeons

An outbreak of highly pathogenic paramyxovirus 1 (PMV1) was diagnosed in pigeons in Mikkeli. Not only several dead pigeons but also apathetic birds with diarrhoea had been seen in the city centre. These symptoms are compatible with a PMV-1 infection. The virus may also cause neurological symptoms. Typically, PMV-1 causes mortality in pigeons in the cold season. The outbreak in Mikkeli, too, took place at the end of November. While PMV-1 is not a risk to humans, it causes Newcastle disease in poultry, which must be combated by law.

No cases of *Echinococcus multilocularis*, less *Echinococcus canadensis* than in 2020

Small carnivore samples from foxes and raccoon dogs are tested for *Echinococcus multilocularis*. *Echinococcus multilocularis* has never been detected in Finland, and Finland is considered a country free of *E. multilocularis* in the EU. In 2021, 653 animals were tested for this parasite (244 foxes and 409 raccoon dogs), and no cases of the parasite were found. Monitoring of *Echinococcus multilocularis* has been carried out especially in Southern and Southwestern Finland in cooperation with the regional offices of the Finnish Wildlife Agency. Foxes and raccoon dogs obtained from all areas of Finland are also needed as samples, and they are tested for *Echinococcus multilocularis*. Small carnivores examined as part of rabies monitoring are also tested for *E. multilocularis*.

Echinococcus canadensis, which uses cervids as its intermediate host, and wolf and dog as its definitive hosts, has occurred widely in Finland in recent years in areas where both elk and wolves are present. In 2021, this parasite was detected in 17% of wolves (7 positive out of 41 tested), which is slightly less than in 2020 (37%). In 2020, positive *Echinococcus canadensis* cases occurred in the wolf range in different parts of Finland, whereas in 2021, the cases again appeared to concentrate in Eastern Finland. Five of the infections in wolves were diagnosed in North Karelia or Kainuu, and the remaining two in Lapland (Rovaniemi and Posio). One *E. canadensis* infection was diagnosed in a female elk hunted in Joensuu, and two in wild forest reindeer in Kainuu. Five cases of *Echinococcus canadensis* were confirmed in reindeer (see also Chapter 7, Reindeer diseases). *Echinococcus canadensis* can occur throughout the country, which is why correct handling of elk slaughtering waste is vital. Elk lungs and livers, which may contain cysts caused *by E. canadensis* larvae, should not be fed to dogs or left in the wild to be eaten by wild canines.

Carnivorous mammals and birds are tested for parasitic roundworms (*Trichinella* spp.) that live in the muscle tissue. *Trichinella* worms are fairly common in the wild in Finland (Table B16). 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 26 wild animals, which is in the same range as in 2020 (29 cases). Eleven cases were diagnosed in raccoon dogs, six in foxes and eight in lynxes. One wolf also had a scabies infestation. Animals with scabies mainly came from Southern and Eastern Finland (Southeast Finland, South Savo, North Karelia, Uusimaa, Häme, Southwest Finland). One fox with scabies was submitted for testing from Enontekiö in Lapland. In 2021, scabies occurred particularly between January and April.

Coronavirus (SARS-CoV-2) was not detected in wild animals

Some wild animal species may contract the coronavirus (SARS-CoV-2). This is why 239 raccoon dogs, two otters and three badgers were examined for coronavirus in 2021, in addition to 47 white-tailed deer. No coronavirus was found in any of the tested animals.

High numbers of tularemia cases diagnosed again

As in 2020, a large number of hares were also obtained for testing in 2021 (28 blue hares and 171 brown hares). A large number of tularaemia cases was found; this figure was in the same range as in 2020. A total of 31 cases of tularemia were confirmed by the Finnish Food Authority, of which 28 (90%) in brown hares, two in blue hares and one in a muskrat. Cases have also been diagnosed in muskrats in Finland before, and this species is apparently susceptible to tularemia. The disease cases were spread more evenly throughout the year than usual. Normally, most cases occur in late summer and autumn from mid-July to September. In 2021, 13 cases were already diagnosed in the first half of the year between January and June, while 18 cases were found in the second half of the year. As before, the cases concentrated in areas known for the occurrence of tularemia in Kymenlaakso and Southeast Finland (15 cases), Central Finland (four cases) and Oulu region (six cases). The infected muskrat was found in Häme, from which area two brown hares positive for tularemia were also obtained. Two cases were found in Satakunta and one in Uusimaa. The second most common infectious disease in hares was systemic infection caused by *Yersinia pseudotuberculosis* bacteria, or pseudotuberculosis, 23 cases of which were confirmed around Finland. Other infectious pathogens in hares were the *Toxoplasma gondii* parasite (three cases) as well as the bacteria *Pasteurella multocida* (two cases), *Listeria monocytogenes* (two cases) and *Staphylococcus aureus* (two cases). All of these pathogens cause severe systemic infections in blue and brown hares, and infections occur every year in Finland. Salmonella is found in hares relatively seldom, and no cases were diagnosed in blue or brown hares in 2021.

Squirrel cryptosporidiosis

Cryptosporidiosis is an intestinal disease caused by *Cryptosporidium* sp. protozoan parasites, which results in severe dehydration and emaciation due to intestinal infection and diarrhoea. It was only discovered in recent years that cryptosporidiosis can be seen fairly often in young squirrels, among other species. In 2021, 28 squirrels were submitted for examination. Four Siberian flying squirrels were also examined. Squirrel cryptosporidiosis was detected for the first time in Finland in 2020, and in 2021, there was again a high number cases. Diarrhoea caused by cryptosporiosis was found in 71% (20/28) of the squirrels. The squirrel cases concentrated strongly in southern Finland (Uusimaa, Häme, Southwest Finland, South Savo). One case was found in Joensuu and one in Seinäjoki. Two of the Siberian flying squirrels had diarrhoea caused by cryptosporiosis. One was found in the forest in Tampere, while the other was picked up outside an apartment block in Jyväskylä. Both were young individuals. All infections were diagnosed with an immunofluorescence staining test of intestinal contents samples. Samples were submitted to the Swedish National Veterinary Institute (SVA) for more detailed typing. Two types of infections were found in squirrels: *Cryptosporidium sciurinum*, which is typical in squirrels, and *Cryptosporidium* chipmunk genotype I, which has so far not been specifically named. Squirrel *Cryptosporidium* parasites are zoonotic and can consequently be transmitted to humans through squirrel faeces, causing unpleasant diarrhoea. This is why care must be taken when handling sick squirrels, and good hygiene should be ensured.

Cause of death and disease monitoring of large carnivores

The Finnish Food Authority examines large carnivores that have been found dead (including those killed in traffic) and that have been euthanised because of an illness or injury or under police orders. Since 2021, all lynxes that have died in road accidents will no longer be examined by the Finnish Food Authority. The Natural Resources Institute Finland (Luke) handles large carnivores that were hunted under a permit granted on the basis of damage or population

management. The Finnish Food Authority and the Natural Resources Institute Finland work closely together to collect and record samples from large carnivores.

For monitoring the cause of death or disease in large carnivores, whole carcasses of 2 wolverines, 37 lynx, 21 wolves and 10 bears were obtained from different parts of the country. Samples from large carnivores are currently obtained from all areas of Finland. Eleven of the wolves were from the eastern half of the country, while ten came from the western part. Bear samples mostly came from Eastern Finland (80%), while samples from Western Finland predominated among the lynx (65%). The highest number of large carnivore samples was obtained from Finnish Wildlife Agency districts of North Karelia (11) and Satakunta (10).

The wolverines had died in road accidents, one in Kainuu and the other in North Savo.

Most of the lynx (59%) had been killed in traffic accidents. One had been hit by a train, the others by a car. Scabies (*Sarcoptes scabiei* mite) was found in eight lynx (22%). Listeriosis, or a systemic infection caused by *Listeria monocytogenes* bacteria, was diagnosed in a lynx cub. Another pathogenic bacterium was also found in the liver of the same individual, *Yersinia pseudotuberculosis*. Three cubs had starved. In one emaciated adult male, encapsulated shots were found in different parts of the body. Two cubs were also euthanised because of their injuries.

Injuries caused by incorrectly set traps intended for catching small carnivores were again found in the paws of bears. In 2020, the Finnish Food Authority found two such cases and in 2021 three, two in Eastern Finland and one in Satakunta in the west. The traps kill immediately the species for which they are intended but cause painful injuries to a bear whose paw is caught up in the trap. The trap compresses the toes and prevents blood circulation, resulting in slow necrosis and amputation of the part below the trap. Other findings in bears were mainly also different types of injuries. Two of the bears died in collisions with trains, while two had been hit by cars. One bear had been shot illegally and left wounded and paralysed in the forest. The bear was euthanised by the authorities. One large male bear that had repeatedly approached human settlements was shot by permission of the police. One bear cub had been shot in connection with hunting under licence and submitted by the police for age determination. The bear was found to be less than a year old.

Seven wolves had been hit by cars and, additionally, one had been hit by a train. Nine wolves had been put down by a police order. Of these animals, two young wolves in Southwest Finland were euthanised for animal welfare reasons, as they had advance scabies. One was euthanised because its front leg had been amputated due to an old injury caused by shooting. One wolf had been injured in connection with hunting under licence and was later euthanised by a police order. Other wolves shot with permission of the police had been constantly approaching human settlements. Four wolves were found to have been shot illegally. Two of them were discovered dead in the forest. One was found badly injured and had to be euthanised, and one had been shot by a hunter in the forest to protect their dog.

Few disease cases in small birds

Salmonella, which often plagues bird feeding sites in winter, did not appear to be a significant problem in 2021. Small birds that had died of salmonellosis (systemic infection caused by *Salmonella* Typhimurium bacteria) were only submitted as samples from one feeding site in

Oulu, where common redpolls had been found dead in January. One magpie had additionally died of a *Salmonella* Hessarek infection in Rovaniemi in November.

Cases of trichomonosis, an infection of the crop affecting small birds caused by *Trichomonas gallinae* parasites, were identified in European greenfinches at three different locations, in a Eurasian siskin at one, and in a yellowhammer at one location. All of these cases were found in Southern Finland. Trichomonosis was also diagnosed in one domestic pigeon.

Avian diphtheria, which is caused by the avian avipoxvirus, was diagnosed in four magpies and two great tits. These cases occurred in different parts of Finland, from Rovaniemi to Vantaa. In magpies this disease typically takes the form of rough lumps on the toes. Great tits, on the other hand, usually develop hives in the head area. The hives can reach the size of 1 to 2 cm in diameter and become inflamed in which case they cause serious harm to the bird. Avian diphtheria cases are usually obtained as samples in the cold season, and this was also the case in 2021.

Avian chlamydosis (caused by *Chlamydia psittaci*), a zoonotic bacterial disease which can also be contracted by humans, was only diagnosed in one yellowhammer found in Imatra in 2021. In previous years, a few cases of avian chlamydosis have been found regularly, most often in tits and yellowhammers. Avian chlamydiosis can be transmitted to humans from wild birds as a result of prolonged, close contact. However, the risk of infection posed by birds visiting bird feeders is practically zero.

No cases of *Suttonella ornithocola*, which caused disease in blue tits both in Finland and Central Europe in 2020, were confirmed in 2021. No blue tits samples were obtained. The occurrence of this bacterium consequently appears to vary a great deal from year to year.

Lead poisonings in wild birds

Four white-tailed eagles were found dead due to lead poisoning in 2021, which was less than in previous years (five in 2020, eight in 2019). Two golden eagles had also died of lead poisoning. As in 2020, the highest number of poisoning cases was found in whooper swans (seven cases) in 2021. In eagles, the poisoning is caused by lead bullet chips and shotgun pellets, which the bird may swallow with the tissues of its prey or carrion. Lead shot accumulating in the bottom sediment of a water system are a problem for swans, as swans accidentally swallow them to use as gastroliths. Another environmental source of lead, or the lead weights in fishing lures, was highlighted in 2021. A common merganser and a cormorant had swallowed these rather large, spherical lead weights. Both birds had slowly starved to death.

A high number of online reports on swans and rabbits

Wild animals that are found sick or dead can be reported on the Finnish Food Authority's website, especially if sending the animal in as a sample is not possible. Online reporting has become more and more popular in recent years. In 2020, the record number of 634 reports was submitted on the website, whereas the milestone of 600 reports was not quite reached in 2021 (579). Observations were received from around Finland, although the highest numbers came from the most populous areas of the country. The largest number of reports came from Uusimaa, or 222, followed by Häme (79), North Ostrobothnia (65) and Southwest Finland (44). Reports on different birds were submitted 242 times, and 100 of these reports concerned swans. Avian influenza did not increase the number of reports on birds particularly. In fact,

birds suspected of having died of avian influenza were often submitted directly as samples, and these cases were not reported separately. Three reports of fish deaths were received. The number of reports received on mammals was 334, 143 of which concerned hares (blue or brown) and 29 wild rabbits. Observations of cervids were reported 51 times, otters 21 and squirrels 15 times. Dead seals had been found 16 times along the Baltic Sea coast, both in Lapland and Uusimaa. One person in Tornio reported having seen a live golden jackal in March. The highest number of observations was reported in the spring (April to May) and after the summer from August to October. Reports on hares concentrated specifically in the period after the summer, as 44% of them were received between August and October.

Appendix A: Occurrence of selected animal diseases in Finland

Table A1. Occurrence of selected multiple species diseases in Finland in 2021

Animal disease	Primary species affected	Zoonosis *	Last detected
Aujeszky's disease (pseudorabies)	Pig, ruminants, dog, cat Wild boar		Never 2021 [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		2021 [1), 4)]
Echinococcosis		x	
· *E. multilocularis*	Fox, racoon dog, rodents		Never
· *E. canadensis*	Cervids, dog, wolf		2021
Heartwater	Ruminants		Never
Tularemia	Blue hare, brown hare, rodents, birds	x	2021
Rinderpest (cattle plague)	Ruminants		1877
Leptospirosis	Cow, pig, horse, dog	x	2020 [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	2021
Foot-and-mouth disease	Cloven-hoofed animals		1959
Trichinellosis		x	
· Livestock	Pig, farmed wild boar, horse		2021 [5)]
· Other mammals	Carnivores, wild boar		2021
TSEs (Transmissible Spongiform Encephalopathies)			
· BSE	Cattle	x	2001
· Classical scrapie	Sheep, goat		2005 [6)]
· Atypical scrapie	Sheep, goat		2021
· CWD	Cervids		Never
Vesicular stomatitis	Ruminants, horse, pig	x	Never
West Nile fever	Birds, horse	x	Never

*Zoonosis = a disease that can be transmitted from animals to humans

[1)] In wild boars living in the wild

[2)] Clinical disease in two dogs

[3)] In a zoo animal

[4)] Antibodies

[5)] Free range pig

[6)] Has only been found in goats in Finland

Table A2. Occurrence 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	2021
Bovine anaplasmosis (*A. marginale, A. centrale*)	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	2021
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. Occurrence 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	2021
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. Occurrence 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 ART/TRT/SHS, avian/turkey rhinotracheitis/swollen head syndrome)	1999
Infectious bursal disease (IBD)	2014
Fowl cholera (*Pasteurella multocida*)	1993
Fowl typhoid (*S*. Gallinarum)	Never
Highly pathogenic avian influenza • Poultry • Other birds in captivity • Wild birds	 2021 2016 2021
Marek's disease	2021[1)]
Low pathogenic avian influenza (in poultry)	Never
Mycoplasma gallisepticum infection (avian mycoplasmosis)	2021 [1)]
Mycoplasma meleagridis infection	Never
Mycoplasma synoviae infection (avian mycoplasmosis)	2021 [2)]
Newcastle disease • Poultry • Other birds in captivity • PMV-1 infection in wild birds	 2004 2013 2021
Psittacosis, also known as parrot fever, and ornithosis (avian chlamydiosis)	2014 [1)]
Avian infectious laryngotracheitis (ILT)	2021 [1)]
Avian infectious bronchitis (IB)	2021
Pullorum disease (*S*. Pullorum)	1961

[1)] Non-commercial
[2)] Non-commercial and on one laying hen holding of over 100 hens

Table A5. Occurrence 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)] 2021
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. Occurrence 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)	2021
Viral haemorrhagic septicaemia (VHS)	2012
Koi herpesvirus (KHV)	Never
Bacterial Kidney Disease (BKD) in inland water area	2021
Salmon fluke infection (*Gyrodactulus salaris*) in the conservation area in Northern Lapland	1996
Infectious pancreatic necrosis (IPN) virus genotype 5 cases in the inland waterway area	Never [1)]
Salmonid alphaviruses (SAV)	Never
Spring viraemia of carp (SVC)	Never
White spot disease in crustaceans (WSD)	Never
Crayfish plague	2021 [2)]
Marteiliosis in molluscs	Never
Bonamiosis in molluscs	Never

[1)] Genotype 2 infections found annually
[2)] In wild crayfish

Table A7. Occurrence 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)	2021
Equine influenza	2012
Equine infectious anaemia (EIA)	1943
Equine piroplasmosis (EP)	2020 [1)]
Equine rhinopneumonitis/equine viral abortion	2021
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. Occurrence of selected honey bee diseases in Finland

Name of disease	Last detected
American foulbrood	2021
European foulbrood (*Melissococcus pluton*)	2019
Varroatosis (*Varroa destructor*) in Åland	2021 [1)]
Nosemosis (*Nosema apis* and *N. ceranae*)	2021
Acariasis (*Acarapis woodi*)	2016
Small hive beetle (*Aethina tumida*)	Never
Tropilaelaps mite	Never

[1)] Varroatosis is common elsewhere in Finland

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

This Appendix contains data on animal disease surveillance conducted in 2012–2021, grouped by species.

Cattle

Cattle examinations include the results of surveillance programmes for viral diseases based on antibody studies on both dairy and suckler cow farms. All dairy herds in Finland were examined for IBR and leucosis until 2006 and for BVD until 2010. In autumn 2020, Finland applied for BVD free status under new EU legislation on animal diseases ((EU) 2020/689). To demonstrate that Finland is free from this disease in compliance with the legal requirements, intensive surveillance of BVD was carried out in 2021.

Table B1. Surveillance based on antibodies in bulk milk from dairy herds in 2012–2021.

	BVD		IBR	Leucosis
Year	Samples (pcs)	Positive (%)	Samples (pcs)	Samples (pcs)
2012	2,963	0.10 [1)]	1,312	1,312
2013	1,800	0.05 [1)]	1,292	1,292
2014	1,277	0	1,277	1,277
2015	989	0	989	989
2016	920	0	920	920
2017	715	0	715	715
2018	1,255	0	1,255	1,255
2019	1,344	0	1,344	1,214
2020	1,298	0	1,298	1,298
2021	5,326	0	1,287	1,284

[1)] BDV seropositive sample, old infection

Table B2. Surveillance based on antibodies in suckler herds in 2012–2021.

Year	BVD		IBR	Bluetongue	
	Samples (pcs)	Positive (pcs)	Samples (pcs)	Samples (pcs)	Positive (pcs)
2012	5,096	1 [1)]	5,096	5,096	0
2013	2,485	1 [1)]	2,485	2,485	1 [2)]
2014	7,915	1 [3)]	7,915	7,915	1 [4)]
2015	8,141	0	8,141	8,141	1 [4)]
2016	7,901	0	7,901	7,901	0
2017	6,885	0	6,885	6,885	0
2018	1,832	0	1,832	1,832	1 [5)]
2019	1,970	0	1,970	1,970	0
2020	2,450	0	2,450	2,450	0
2021	9,367	0	2,622	2,562	0

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

Brucellosis surveillance in different species

Table B3. Surveillance and health control tests for brucellosis in 2012–2021. All test results were negative.

Year	Sheep	Goat	Cattle		Pig
	Samples (pcs)	Samples (pcs)	Bulk milk samples [1)] (number)	Blood samples (pcs)	Samples (pcs)
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	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	1336	391	1,484
2019	4,512	243	45[2)]	459	1,986
2020	3,434	15	1335	215	1,637
2021	3,106	326	32[2)]	217	1,983

[1)] Surveillance studies are conducted every second year.
[2)] Dairy cattle bulk milk samples were tested 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 surveillance of at-risk cattle groups. As a result, testing was also extended to healthy cattle. As part of the expanded testing programme, all cows over 24 months of age that died spontaneously or were emergency slaughtered or put down 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 was discontinued from 1 March 2013.

Table B4. BSE surveillance samples from cattle in 2012–2021.
BSE was not detected in any of the samples.

Year	Samples tested [1)]
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
2020	11,251
2021	9,555

[1)] The numbers also include animals not covered by the mandatory testing programme.
[2)] BSE testing of slaughtered cows was discontinued on 1 March 2013.

Table B5. Surveillance of scrapie in sheep and goats in 2012–2021.

	Sheep		Goat	
Year	Samples (pcs)	Number of pos. holdings/ samples	Samples (pcs)	Number of pos. holdings/ samples
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
2020	1,644	1/1 [1)]	291	0/0
2021	1,531	1/1 [1)]	229	0/0

[1)] Atypical scrapie (Nor98)

Table B6. TSE testing of other animals in 2021. TSE was not detected in any of the tested animals.

Species	Number of animals
Fur animals	
Mink	56
Fox	33
Racoon dog	12
Wild animals	
Elk (*Alces alces*)	90
White-tailed deer (*Odocoileus virginianus*)	55
Roe deer (*Capreolus capreolus*)	101
Finnish forest reindeer (*Rangifer tarandus fennicus*)	25
Fallow deer (*Dama dama*)	1
Free-ranging	
Reindeer (*Rangifer tarandus tarandus*)	127
Total	**500**

Pigs

Table B7 includes the results of surveillance and health control programmes, disease diagnoses and import and export tests on production pigs. All test results were negative in 2021. Clinical leptospirosis has never been diagnosed in livestock in Finland. The results of brucellosis surveillance have been reported separately (Table B3).

Table B7. Serological tests for viral diseases in pigs in 2012–2021.

Year	Aujeszky's disease	TGE	Swine fever	PRRS	ASF
2012	2,769	3,361	2,678	3,815	1,137
2013	2,649	2,986	2,429	4,058	1,178
2014	2,725	2,740	2,437	3,515	1,227
2015	2,320	2,332	2,050	2,909	180
2016	2,140	1,867	1,929	2,455	24 [1)]
2017	2,387	1,917	2,029	2,661	0 [1)]
2018	2,328	2,096	2,086	2,504	0 [1)]
2019	2,473	2,050	2,195	2,832	0 [1)]
2020	2,895	2,005	2,707	2,619	0 [1)]
2021	2,951	1,746	2,512	2,773	0 [1)]

[1)] Surveillance emphasises virological surveillance instead of serological surveillance

Poultry

Table B8. Results of serological tests in poultry [1] in 2012–2021.
The table includes results of surveillance programmes, disease diagnoses and import tests.

Year	Avian influenza		Newcastle disease	
	Samples (pcs)	Number of pos. holdings/ samples	Samples (pcs)	Number of pos. holdings/ samples
2012	3,223	2/8	10,423	3/42 [3) 4)]
2013	2,712	1/3 [2)]	10,686	4/910 [3) 4) 5) 6)]
2014	4,318	2/12 [2)]	11,606	6/249 [3) 4)]
2015	5,245	1/1 [2)]	10,613	2/14 [3) 4)]
2016	3,902	0/0	9,177	4/10 [3) 4)]
2017	4,369	0/0	9,591	3/6 [3) 4)]
2018	4,583	0/0	8,899	1/3 [4)]
2019	4,322	0/0	8,523	0/0
2020	4,175	1/9 [2)]	8,667	0/0
2021	4,646	3/8 [2)]	8,833	4/15 [3) 4)]

[1)] Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or the breeding programmes of the previously mentioned birds
[2)] H5 antibodies, virus detection negative, no disease symptoms
[3)] Serologically positive, virus detection negative, no disease symptoms
[4)] Maternal (transferred from mother to offspring) antibodies in imported birds
[5)] Vaccination antibodies in imported birds
[6)] Serologically positive, low pathogenic PMV-1 virus detected, no symptoms

Sheep and goats

Table B9. Samples collected in the health control programme for maedi-visna in sheep and CAE in goats in 2012–2021. Maedi-visna or CAE were not detected.

Year	Sheep	Goat	Total samples (pcs)
	Number of holdings tested	Number of holdings tested	
2012	324	39 [1)]	24,548
2013	317	35 [1)]	20,140
2014	111	9 [1)]	4,716
2015	111	4 [1)]	4,566
2016	106	6 [1)]	4,165
2017	75	2 [1)]	3,077
2018	70	1	3,085
2019	72	4 [1)]	3,685
2020	53	2	2,787
2021	53	1	2,622

[1)] Includes holdings that keep sheep in addition to goats

Fish and crayfish

Table B10. Surveillance of viral fish diseases in 2012–2021.

Year	IHN, IPN, VHS	IHN, IPN [1], VHS	ISA	ISA	SAV	KHV	SVC	Number of fish farms where the virus was isolated							
	Inland water farms/fish	Marine area farms/fish	Inland water farms/ fish	Marine area farms/ fish	Inland water farms/ fish	Inland water farms/ fish	Inland water farms/ fish	IHN	IPN Marine area	IPN inland water area [2]	VHS [3]	ISA	SAV	KHV	SVC
2012	68/5406	49/1332	2/320	4/95	0	0	0	0	4	6	1	0	0	0	0
2013	55/3740	46/1870	0	1/20	35/1050	0	0	0	12	6	0	0	0	0	0
2014	54/2480	41/1347	9/603	0	25/750	0	0	0	10	6	0	0	0	0	0
2015	62/2570	45/1382	1/60	0	45/1179	0	0	0	19	4	0	0	0	0	0
2016	53/2753	38/1164	1/10	0	32/1476	0	0	0	12	11	0	0	0	0	0
2017	55/2591	18/991	7/240	0	30/1500	0	2/25	4	16	13	0	0	0	0	0
2018	64/2544	30/1038	6/125	0	35/1700	0	0	3	24	13	0	0	0	0	0
2019	65/2966	52/2082	1/30	0	11/330	0	0	0	12	12	0	0	0	0	0
2020	60/2546	43/2224	1/70	0	22/1025	0	0	0	24	2	0	0	0	0	0
2021	79/2413	35/3850	1/30	0	17/780	0	0	5	6	6	0	0	0	0	0

[1] Since 2020, IPN included in sample testing from the marine area only every 3rd year (2020, 2023)

[2] Only infections of IPN genome group 2 were detected in inland water areas

[3] VHS was found on marine area farms in the restricted area of Åland

Table B11. Surveillance of bacterial kidney disease (BKD) in fish in 2012–2021.

Year	Tests, inland water area	BKD cases
	Farms/fish	Inland water area
2012	79/5830	3
2013	64/5128	3
2014 [1)]	73/4627	2
2015	60/3617	3
2016	71/3910	1
2017	59/3946	0
2018	48/3525	7
2019	44/3285	0
2020	50/3443	1
2021	52/3476	1

[1)] The programme to combat BKD was replaced by voluntary health monitoring on 1 December 2014. Samples from nutritious pond systems are not examined as part of voluntary health monitoring.

Table B12. Surveillance of *Gyrodactylus salaris* in 2012–2020. All test results were negative.

Year	River Teno [1)]	Näätämöjoki River [1)]	Paatsjoki River [1)]	Paatsjoki River, farmed fish	Tuulomajoki River [1)]
	Salmon	Salmon	Grayling	Arctic char	Grayling
2012	100	120	15	100	0
2013	100	120	15	120	30
2014	100	120	15	120	30
2015	100	120	15	120	0
2016	101	120	15	120	10
2017	30	120	15	60	0
2018	99	120	15	60 (brown trout) [2)]	22
2019	101	118	15	60	31
2020	103	121	15	66	32
2021	103	120	15	64	30

[1)] Samples collected from fish caught in the wild
[2)] No Arctic char was available

Table B13. Other examinations of fish samples in 2021, by reason for the examination. For a summary of disease diagnosis results see Figure 2, other test results were negative.

	VHS/IHN/IPN		ISA		SAV		BKD	
Fish, reason for examination	marine area farms/fish	inland water farms/fish	marine area farms/fish	inland water farms/fish	marine area farms/fish	inland water farms/fish	marine area farms/fish	inland water farms/fish
Eradication of the disease/survey of occurrence (IHN)	14/1,178 [1)]	5/284 [1)]	0	0	0	0	0	0
Eradication programmes (VHS)	27/3,600	0	0	0	0	0	0	0
Disease diagnosis, farmed fish	17/416	21/453	0	0	0	0	1/7	1/7
Disease diagnosis, wild fish	16	29	12	0	12	0	11	0
Export (all countries)	0	6/730	0	5/100	0	0	0	2/190
Capturing wild fish and gametes for farming	5/279	1/450 [2)]	0	0	1/60	2/270 [2)]	4/272	3/559 [2)]

[1)] Includes wild fish

[2)] Includes sentinel fish

Wild animals

Table B14. Examinations of samples from wild boar living in the wild in 2012–2021. Number of positive samples in brackets.

Wild boars living in the wild	Aujeszky's disease		Swine fever		ASF		Brucellosis
Year	Serology	Virus detection	Serology	Virus detection	Serology	Virus detection	Serology and/or bacteriological cultivation
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) *
2020	816	937	816	937	0	937	1
2021	672 (2) **	1,215	675 (1) ***	1,215	0	1,215	685 (19)

* Only samples from regions other than Southeast Finland were examined

** In serological studies, AD antibodies were found in two wild boars living in the wild, no AD diagnosed. For more information on the results, see Chapter 11 in this report.

** In serological studies, CSF antibodies were found in one wild boar living in the wild. No classical swine fever was found. For more information on the results, see Chapter 11 in this report.

Table B15. Results of surveillance of avian influenza in wild birds in 2012–2021. All viruses found before 2016 and in 2019 and 2020 were low pathogenic.

Year	Number of birds examined	Positive birds (PCR/virus isolation)
2012	141	1/1
2013	133	0/0
2014	181 [1)]	9/9 [2)]
2015	133 [3)]	1/0
2016	208	15/1 [4)]
2017	316	7/0 [4)]
2018	195	4/3
2019	174	3 [5)]/0
2020	222	3/1
2021	560	110/0 [4)]

[1)] Includes 70 healthy birds that were tested

[2)] Of the positive results, 8 birds were healthy and one was found dead

[3)] Includes 2 healthy birds that were tested

[4)] Virus isolation has not been conducted for all PCR positive birds

[5)] Combined sample from three birds

Table B16. Occurrence of *Trichinella* spp. in wild animals in Finland in 2021.

Species	Number of Trichinella positive animals	Number of animals tested	Proportion of positive animals	Occurrence in 2016–2020
Racoon dog	91	230	39.6%	39.1%
Fox	77	161	47.8%	32.1%
Badger	1	11	9.1%	18.9%
Pine marten	1	2	50.0%	30.4%
Otter	0	45	0.0%	3.3%
Bear	11	279	3.9%	3.9%
Lynx	20	40	50.0%	44.9%
Wolf	19	41	46.3%	42.6%
Wolverine	1	2	50.0%	40.0%
Goshawk	1	30	3.3%	5.6%
Wild boar	1	931	0.1%	0.2%

Appendix C: Numbers of animal holdings and animals in Finland in 2021

Terrestrial animals

Terrestrial animals	Animals	Farms
Cattle	834,568	9,021
Pigs (commercial production)	1,108,786	906
Bisons	148	9
Sheep	137,686	3,987
Goats	9,181	1,067
Honey bees	85,500 [1)]	8,742
Laying hens	3,654,338	330
Broilers	8,499,274	138
Turkeys	306,520	40
Poultry total	**14,182,933**	**553**
Reindeer	177,651	4,298 [2)]
Camelids		131
Horses	74,000	16,000
Dogs	700,000	

[1)] Beehives
[2)] Reindeer owners

Aquatic animals

Aquatic animals	Production [1)]		Farms
	Farmed [2)]	Wild [3)]	
Fish	15,050 t	148,410 t	375
Crayfish		137 t	

[1)] Tons
[2)] Farmed = from aquaculture
[3)] Wild = caught in the wild

Appendix D: Disease-free statuses and additional guarantees granted to Finland in 2021

Animal disease	Status	EU/ OIE*	Valid decision
African horse sickness	Disease-free	OIE	
Aujeszky's disease (pseudorabies)	Disease-free	EU	EU 2021/620
Brucellosis (*Brucella abortus, B. melitensis, B. suis*)	Disease-free	EU	EU 2021/620
BSE	Insignificant risk Negligible risk	OIE EU	2007/453/EC
Bluetongue	Disease-free	EU	EU 2021/620
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	EU 2021/260
Rinderpest (cattle plague)	Disease-free	OIE	
Spring viraemia of carp (SVC)	Disease free status for entire country	EU	EU 2021/260
Classical scrapie	Negligible risk	EU	2016/1396/EC
Classical swine fever (CSF)	Disease-free	OIE	
Infectious salmon anaemia (ISA)	Disease free status for entire country	EU	EU 2021/620
Salmonid alphaviruses (SAV)	Disease-free in the inland water area	EU	EU 2021/260
EBL, enzootic bovine leucosis	Disease-free	EU	EU 2021/620
Bovine tuberculosis	Disease-free	EU	EU 2021/620
Newcastle disease	Disease free without vaccinations	EU	EU 2021/620
Peste des petits ruminants (PPR)	Disease-free	OIE	
Rabies infection	Disease-free	EU	EU 2021/620
Salmonella infections	Additional guarantee	EU	2003/644/EC (breeding poultry flocks and day-old chicks of breeding and productive poultry) 2004/235/EC (laying hens of productive poultry) 95/410/EC (poultry for slaughter) (EC) 1688/2005 (meat and eggs)
Foot-and-mouth disease	Disease-free	OIE	
Infectious bovine rhinotracheitis (IBR/IPV)	Disease-free	EU	EU 2021/620
Infectious pancreatic necrosis (IPN gr 5)	Disease-free in the inland water area	EU	EU 2021/260
Infectious haematopoietic necrosis (IHN)	Disease-free except for eradication programme zone in Åland	EU	EU 2021/620
Varroa	Disease-free except for municipality of Brandö in Åland	EU	EU 2021/620
Viral haemorrhagic septicaemia (VHS)	Disease-free except for eradication programme zone in Åland	EU	EU 2021/620

OIE = World Organisation for Animal Health

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