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Abstract

This publication contains information on the incidence of animal diseases to be combated and the prevalence of certain other infections in various animal species in Finland in 2020. The publication also describes the measures taken to prevent and combat animal diseases. Animal disease situation in Finland remained good in 2020. No easily spreading animal diseases were detected. The first case of myxomatosis in Finland was found in wild rabbits. Myxomatosis is a viral disease of rabbits, that occurs around the world.

In many ways, the COVID-19 pandemic affected sector activity, and as SARS-COV-2 transmits also to several animal species, it was necessary to prepare for possible infections in animals. However, no coronavirus infections in animals were detected in Finland.

Finland remained free of strategically important animal diseases such as enzootic bovine leucosis, brucellosis, and bovine tuberculosis, IBR and BVD infections, PRRS infections in swine and *Echinococcus multilocularis* infection. Preparedness was especially targeted at combating SARS-CoV-2, African swine fever and rabies.

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Tiivistelmä

Tämä julkaisu sisältää tietoa Suomen eläintautitilanteesta vuonna 2020. Julkaisuun on koottu ajankohtaista tietoa vastustettavien eläintautien ja eräiden muiden tartuntojen esiintymisestä eri eläinlajeilla maassamme. Julkaisussa kuvataan myös tehtyjä toimenpiteitä eläintautien ennaltaehkäisemiseksi ja torjumiseksi.

Eläintautitilanne säilyi hyvänä Suomessa vuonna 2020. Helposti leviäviä tai vaarallisia eläintauteja ei todettu. Suomessa uutta eläintautia, myksomatoosia, todettiin kuolleena löytyneestä villikaniinista. Myksomatoosi on kaniinien virustauti, jota esiintyy ympäri maailmaa.

COVID-19-pandemia vaikutti monin tavoin sektorin toimintaan ja kun SARS-CoV-2 -viruksen todettiin tarttuvan myös useisiin eläinlajeihin, jouduttiin varautumaan mahdollisiin tartuntoihin eläimissä. Suomessa ei kuitenkaan todettu uuden koronaviruksen aiheuttamia tartuntoja eläimillä. Suomi säilyi vapaana strategisesti tärkeiksi katsotuista eläintaudeista kuten nautaleukoosista, luomistaudista ja nautatuberkuloosista, nautojen IBR- ja BVD-tartunnoista, sikojen PRRS:stä sekä *Echinococcus multilocularis* -tartunnoista. Eläintautivarautumista kohdistettiin erityisesti SARS-CoV-2-tartunnan, afrikkalaisen sikaruton ja rabieksen torjuntaan.

Beskrivning

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Denna publikation innehåller information om djursjukdomsläget i Finland år 2020. Publikationen innehåller aktuell information om förekomsten av djursjukdomar som ska bekämpas samt information om vissa andra infektioner hos olika djurarter i landet. I publikationen beskrivs också de åtgärder som vidtagits för att förebygga och bekämpa djursjukdomar.

Djursjukdomssituationen i Finland har varit god under 2020. Djursjukdomar som sprider sig med lätthet konstaterades inte. I Finland har en ny djursjukdom, myxomatos (kaninpest), konstaterats hos en vildkanin som påträffades död. Myxomatos är en sjukdom som orsakas av virus och som förekommer runt om i världen. På många sätt påverkade COVID-19-pandemin sektorns verksamhet och när SARS-CoV-2-virus visade sig också infektera flera djurarter var det nödvändigt att förbereda sig för eventuella smittor hos djur. I Finland har det dock inte konstaterats någon infektion hos djur som orsakats av det nya coronaviruset.

Finland är fortfarande fritt från djursjukdomar som ses som strategiskt viktiga, såsom bovin leukos, brucellos och bovin tuberkulos, IBR och BVD hos nötkreatur, PRRS hos svin samt *Echinococcus multilocularis* -infektionen. Beredskapen var särskilt inriktad på bekämpning av SARS-CoV-2, afrikansk svinpest och rabies.

Contents

Disease abbreviation key

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
ASF, African swine fever
CSF, classical swine fever
PRRS, porcine reproductive and respiratory syndrome
SVD, swine vesicular disease
TGE, transmissible gastroenteritis

Poultry

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

Sheep and goats

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

Fish and crayfish

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

Horses

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

Reindeer

CWD, chronic wasting disease
TSE, transmissible spongiform encephalopathy

Fur animals

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

Pets

FIP, feline infectious peritonitis
RHD, rabbit haemorrhagic disease

Wild animals

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

Animal diseases in Finland in 2020

The health of Finnish domestic animals and livestock remained at a high level in 2020. Finland remained free from easily spreading and dangerous animal diseases in domestic or wild animals as well as strategically important diseases, including enzootic bovine leucosis (EBL), infectious bovine rhinotracheitis (IBR) and bovine viral diarrhoea (BVD); porcine reproductive and respiratory syndrome (PRRS) in pigs; and *Echinococcus multilocularis* parasites. The disease-free statuses granted to Finland earlier were retained, and Finland additionally applied for official rabies, bluetongue and BVD free statuses. The official rabies and bluetongue free statuses were granted, and efforts will be made to demonstrate the BVD free status through enhanced sampling in the next few years.

In China in December 2019, cases of pneumonia caused by a previously unknown coronavirus, SARS-CoV-2, were diagnosed in humans. The disease spread rapidly from China to Europe and the rest of the world, and the World Health Organisation (WHO) declared a pandemic on 11 March 2020. The COVID-19 pandemic posed challenges at many levels, including directly in the animal health sector, as SARS-CoV-2 was discovered to be infectious to many animal species. Finland prepared for SARS-CoV-2 infections in animals by, among other things, drawing up a summary risk assessment of the potential threat of COVID-19 infections in humans posed by farmed minks and by launching SARS-CoV-2 monitoring of farmed minks. No SARS-CoV-2 infections in minks were found in this monitoring. Because of the pandemic, inspections and sampling visits in the animal health sector could not be carried out as planned. The affected activities included sample taking at sites where avian influenza and Newcastle disease are monitored as well as inspection and sampling visits made as part of the MV/CAE health monitoring of small ruminants, because maintaining social distancing required to prevent coronavirus infections during the sampling process is not possible. However, sampling was carried out as normal in slaughterhouses, dairies and the processing facility in Honkajoki.

In summer 2020 a new animal disease, myxomatosis, was diagnosed in wild rabbits in Finland. The first confirmed case of myxomatosis was diagnosed in a wild rabbit found dead in Espoo in July, and during the rest of the year, 18 more cases were confirmed by the Finnish Food Authority. Myxomatosis is a disease affecting wild and domestic rabbits caused by the Myxoma virus, which does not infect humans. Myxomatosis is a serious disease with such symptoms as purulent inflammation of the eyelids, swelling of the head and lumps in the skin. Pets can be vaccinated against this disease. Similarly to the year before, RHD (rabbit haemorrhagic fever) caused high mortality in the wild rabbit population in the Helsinki Metropolitan Area, and one infected individual even had both viruses simultaneously. In the monitoring programme for CWD in cervids, Finland's second TSE case was found in an elk, this time in Laukaa. Following the TSE diagnosis, the game management associations of Laukaa and nearby areas collected the heads of 95 healthy elk aged over 12 months in the hunting season 2020–2021 to ensure that TSE infection was not more widespread in the area. No other cases were found.

New cases of salmonella were found on 26 farms, which indicates that following the higher figures of recent years, the case numbers have returned almost to their previous levels. In 2019, a total of 46 new salmonella cases were found on farms; this figure was 36 in 2018 and 19 in 2017. The target of less than 1% was reached in the prevalence of salmonella in livestock.

Due to the increased number of cases in the last few years, intensified efforts were made to combat salmonella in 2020. The COVID-19 pandemic affected these plans, however, and the planned project on investigating the salmonella risk of fur animals had to be interrupted and postponed. Efforts to investigate the origin and spread of salmonella infections were stepped up with the help of new epidemiological investigation forms.

The spread of African Swine Fever (ASF) around the world is a persistent threat to pork production in Finland and calls for continuous disease control and prevention measures. While intensified efforts to prevent ASF continued, travel declined due to the COVID-19 pandemic, reducing the need to inform tourists of this threat. The focus of the communication was on people going about in nature with such messages as 'do not share your picnic with wild boars' and 'report dead wild boars'. In 2020, a set of preparedness exercises titled 'Potsi 2020' was organised by the Finnish Food Authority together with the Regional State Administrative Agencies. The operational preparedness of the authorities and certain stakeholders for situations where African swine fever is detected in a wild boar living in the wild and a restriction zone is set up around the outbreak was tested in eight training and exercise sessions in total. The exercises focused on communication between animal disease authorities and stakeholders as well as other activities needed to combat the disease. Their aim was to improve cooperation and develop preparedness for African swine fever throughout the country. The final reports of the exercises were published on the Finnish Food Authority's website.

The Finnish Food Authority received 213 notifications of suspected cases of animal diseases to be combated, or new serious animal diseases, whereas 163 notifications were received in 2019, 179 in 2018 and 246 in 2017. As in previous years, most of the reports concerned wild animals and a large number of bats, in particular, were tested for rabies.

The tables in Appendix A show the latest incidence 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 and additional guarantees granted to Finland, see Appendix D. More information on the incidence of zoonoses in Finland and the monitoring programmes for infected animals and foods contaminated by zoonoses can be found on the website of the Zoonosis Centre, which is a joint expert network of the Finnish Food Authority and the National Institute for Health and Welfare (www.zoonoosikeskus.fi).

1 Coronavirus SARS-CoV-2

In China in December 2019, cases of pneumonia caused by a previously unknown coronavirus, SARS-CoV-2, were diagnosed in humans. The disease spread rapidly from China to Europe and the rest of the world, and the World Health Organisation (WHO) declared a pandemic (worldwide outbreak) on 11 March 2020.

In humans, SARS-CoV-2 causes COVID-19 disease, which primarily spreads through human-to-human droplet transmission as the carrier coughs or sneezes. The information currently available indicates that SARS-CoV-2 originated in animals. So far, adequate information about the animal species in which the infection originated or its transmission route to humans is lacking. Coronaviruses are an extensive family that includes viruses found in many different animal species. They typically cause respiratory and digestive tract infections. Coronaviruses are often specific to a certain host species and, consequently, do not usually spread easily between species. Most coronaviruses are not zoonotic, or transmitted between humans and animals.

It was observed in 2020 that some animal species are also susceptible to SARS-CoV-2 infection. Infections in pets have mainly been reported in dogs and cats. Typically, the infected animals had been in close contact with a person who had COVID-19, and it is suspected that the infected person had originally transmitted the virus to the pet. A further transmission from one pet to another in the same family was suspected in at least one case. No symptoms have usually been observed in infected dogs and cats. Transmission of the SARS-CoV-2 virus to pets appears to be very rare and irrelevant to the spread of COVID-19. Current information indicates that SARS-CoV-2 is not transmitted to cattle, sheep, pigs, horses, chickens or ducks. Of fur animals, on the other hand, minks are particularly susceptible to it. Based on exposure tests, the racoon dog may also contract a SARS-CoV-2 infection, but no natural infections have been diagnosed in this species.

As several outbreaks of SARS-CoV-2 in minks bred as fur animals were diagnosed in Europe, the Finnish Food Authority drew up a summary of the potential coronavirus threat posed by farmed minks to humans in late 2020 and launched a sampling-based study on mink farms to analyse the situation. In addition, preparations for preventing infections and potential eradication measures were made together with the industry. The study found no SARS-CoV-2 infections on mink farms. In late 2020, a monitoring programme was launched that continues for the time being and covers all fur farms producing minks, sables and rabbits for the fur industry in Finland.

2 Cattle diseases

Disease numbers in cattle remained almost unchanged in 2020, and no dangerous or easily spreading diseases were detected. New salmonella infections were diagnosed on 17 farms, which was less than the number found on cattle farms in the last few years. As in 2019, a high number of infections caused by the bovine coronavirus (BCV) were detected in samples taken in connection with respiratory tract infections, calf and adult bovine diarrhoea and pathological samples. The main reasons for testing cattle were the monitoring programme for cattle diseases that focuses on bovine viral diarrhoea (BVD), infectious rhinotracheitis (IBR), brucellosis, bluetongue disease (BT), enzootic bovine leucosis (EBL) and bovine spongiform encephalopathy (BSE) as well as artificial insemination operations; disease diagnostics for respiratory tract infections, calf diarrhoea or abortion; investigating changes found in meat inspections; and the import and export of cattle.

Fewer new *Mycoplasma bovis* infections were diagnosed in dairy cattle than in 2019

New *Mycoplasma bovis* infections were diagnosed on six dairy farms in 2020, which is less than in 2019. In total, more than 300 farms have had infections since 2012. In almost all dairy herds, the infection appeared in the form of mastitis and was consequently first detected in a milk sample. *M. bovis* infections on beef cattle holdings were diagnosed from respiratory infection samples.

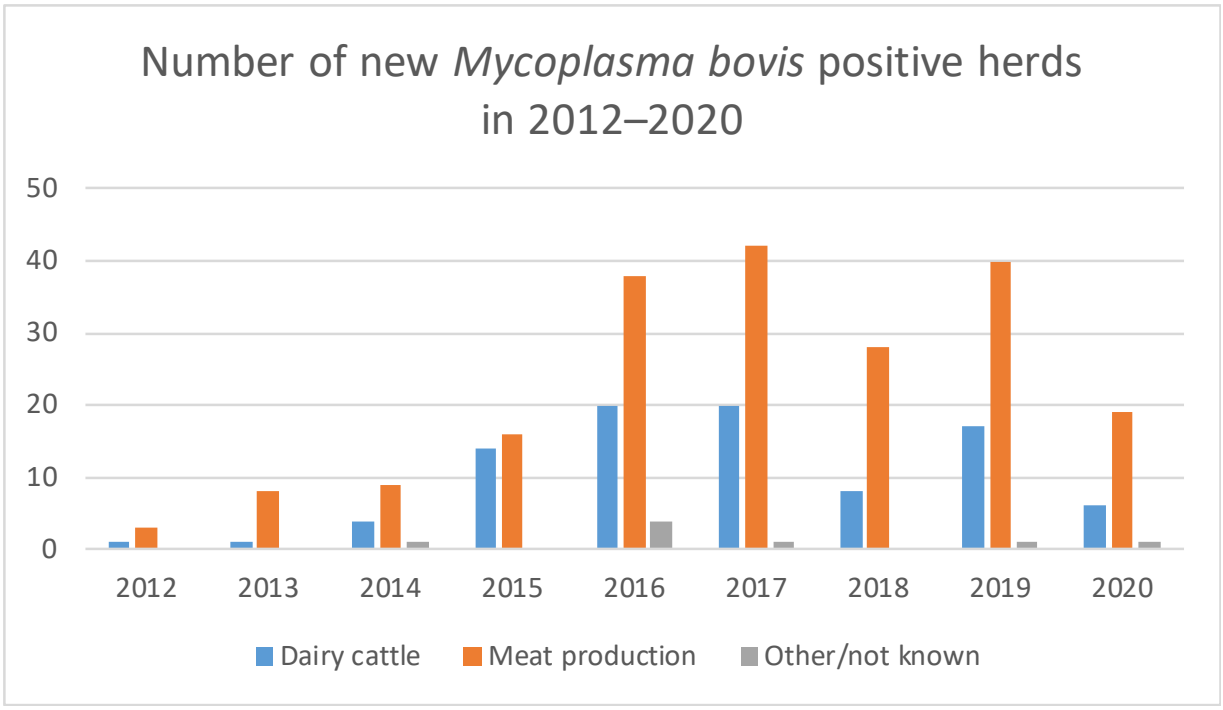


Figure 1. *Number of new herds testing positive for Mycoplasma bovis in 2012–2020.*

Disease diagnostics

The Finnish Food Authority examined a total of 406 samples of whole cow carcasses or organ samples submitted for pathological testing (Table 1). The number of samples decreased from the previous year, as 449 samples were examined in 2019. The greatest decrease was seen in the number of samples submitted for disease diagnostics, which dropped to the same level as in 2018. 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 increased to 85. In addition, 362 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 ones as those found in previous years: *Trueperella pyogenes, Ureaplasma diversum, Bacillus licheniformis* and *Listeria monocytogenes*. A fungal infection was diagnosed as the cause of abortion in four cases. Four *Neospora caninum* infections were diagnosed in aborted 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 2020, which was also the situation in 2014–2018. The Schmallenberg virus was detected in one foetus in 2019.

A total of 193 blood or milk samples from 15 different farms were tested for neospora antibodies using the enzyme-linked immunosorbent assay test (ELISA). Out of this number, 91 blood samples from 15 holdings were examined to find the cause of abortion, and samples from three holdings tested positive for Neospora antibodies. In addition, 102 milk samples from two holdings were examined to determine the incidence of Neospora infection in individual animals. The ELISA test was used to examine 77 cattle blood samples from 12 different holdings and one blood sample from a sheep for Q fever antibodies. The samples were examined in connection with investigations of the cause of abortion, all with negative results.

Table 1. *Numbers of pathological samples of cattle tested in 2011–2020, sorted by reason for testing.*

Reason for testing	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cause of disease	255	257	362	253	250	306	270	237	297	228
Cause of abortion	78	257	368	98	106	120	113	82	99	93
Meat inspection	79	61	108	109	72	66	71	70	53	85
Total	**412**	**575**	**838**	**460**	**428**	**492**	**454**	**389**	**449**	**406**

A large proportion of samples submitted for determining the cause of a disease consisted of calves under the age of six months. The most common findings were calf diarrhoea, respiratory tract infections, and other systemic bacterial infections and gastrointestinal diseases in young calves. The most common causes of diarrhoea were *Cryptosporidium parvum* and the bovine coronavirus (BCV). Ovine herpesvirus-2 (OvHV-2) was diagnosed in one animal.

Deep pharyngeal swab kits were used to test 145 holdings 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 by five farms were examined (one package includes nasal mucus samples from five animals), and three farms out of these five tested positive for respiratory syncytial virus (RSV) and one for bovine coronavirus (BCV). Parainfluenza 3 virus (PIV-3) was not detected.

Table 2. *Results of deep pharyngeal swab samples from cattle in 2011–2020. Number of positive submissions or holdings.*

	2011	2012	2013	2014	2015	2016	2017	2018 [1)]	2019 [1)]	2020 [1)]
Tested holdings / submissions*	**26**	**39**	**93**	**66**	**108**	**154**	**156**	**121**	**150**	**145**
Coronavirus	9	15	59	32	58	75	80	63	100	105
Parainfluenza-3 virus	0	0	0	0	0	0	6	29	15	15
RS virus	8	8	24	13	33	28	32	25	32	26
Histophilus somni	3	2	16	9	18	17	24	16	20	14
Mannheimia haemolytica	4	3	33	12	36	57	40	37	52	60
Mycoplasma bovis	0	3	7	8	18	43	52	42	63	53
Pasteurella multocida	18	30	74	52	96	120	131	100	133	123

[1)] For 2010–2017, the number of submissions is stated, and for 2018–2019 the number of holdings.

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, *Histophilus somni, Pasteurella multocida, Mannheimia haemolytica* and *Trueperella pyogenes* bacteria. *Mycoplasma bovis* bacteria were found in deep pharyngeal, lung, joint and ear infection samples. Antibiotic resistance was detected in *P. multocida* and *M. haemolytica* strains on several holdings.

A total of 243 farms were examined using calf diarrhoea test packages (one package includes testing of five faecal samples). See Table 3 for the results. The incidence of the bovine coronavirus (BCV) was still high. The incidence of coronavirus increased considerably in 2019; this is partly explained by the introduction of a PCR test. Similarly to the year before, the most common cause of diarrhoea in samples from calves was *Cryptosporidium parvum*, but rotavirus also remains a common finding. The number of holdings with *C. parvum* infections decreased slightly from the previous year. Zoonotic *C. parvum* protozoans that cause calf diarrhoea were found on a total of 122 farms through pathological examinations or faecal samples. Some people working with the calves were also contracted cryptosporidiosis.

In addition, the Finnish Food Authority examined faecal samples from cattle (other than calves) from 13 farms for coronavirus. Out of these, the bovine coronavirus was found to be the cause of diarrhoea on six farms.

Table 3. *Results of calf diarrhoea diagnostic test packages from calves aged under six months in 2011–2020. Number of positive submissions or holdings.*

	2011	2012	2013	2014	2015	2016	2017	2018 [1)]	2019 [1)]	2020 [1)]
Tested holdings/ submissions*	**203**	**191**	**229**	**178**	**211**	**246**	**218**	**229**	**277**	**243**
Salmonella	1	0	1	0	1	1	0	0	0	2
Rotavirus (ELISA)	83	78	83	76	74	98	75	87	88	86
Coronavirus (ELISA or PCR))	0	3	6	4	1	1	1	0	33	52
E.coli F5	0	0	0	0	0	0	0	0	0	0
Eimeria, over 10,000 OPG	35	29	38	32	40	34	33	24	45	43
Cryptosporidium (staining)	30	23	26	31	36	76	72	107	140	123
Cryptosporidium parvum	7	13	20	24	30	41	58	85	123	99
Strongylida	4	3	6	3	2	3	4	3	3	1

[1)] For 2010–2017, the number of submissions is stated, and for 2018–2019 the number of holdings.

Salmonella

Salmonella monitoring in cattle is part of the national salmonella control programme in Finland. The incidence of salmonella in cattle is low and has remained below the target of 1%. In 2020, new salmonella infections were diagnosed on 17 cattle farms in total: 12 on dairy farms and five in suckler herds. This is significantly less than in the previous two years (28 cattle farms in 2018 and 24 in 2019), but still slightly more than the average in the early 2010s.

A total of eight serotypes of salmonella were identified on cattle farms. *Salmonella* Typhimurium was clearly the most common serotype; it was found on ten farms, of which six were dairy farms and four suckler herds. None of the new *S.* typhimurium infections found during the year were caused by monophase strains. *S.* Enteritidis was diagnosed on two dairy farms. A *S.* Typhimurium strain was also found on one of them, and *S.* Infantis on the other. Two different strains of salmonella were also found on a third dairy farm. On this farm, not only *S.* Infantis but also *S* Kedougou was found in environmental samples taken during cleaning and disinfection. This strain had not previously been isolated on a livestock farm in Finland. *S.* Konstanz was found on two dairy farms and *Salmonella enterica* ssp. diarizonae (*S.* ssp. IIIb) on a heifer rearing facility. On one dairy farm, *S.* Bispebjerg was found. This strain has previously only been diagnosed once in Finland, in shrews caught for the Finnish Food Authority's and Natural Resources Institute Finland's project 'Impact of harmful animals on the survival and spread of zoonoses on livestock farms'. On one suckler cow farm, *S.* Nuorikkala was found. This is also a very rare salmonella finding; the serotype in question was isolated in Finland for the first time in 2009, and it derives its name from the location where it was found. As before, salmonella infections in cattle were mainly diagnosed in self-monitoring studies commissioned by animal keepers, for example in samples taken for the sale of animals. On three 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 one farm, the infection was detected due to suspicions of salmonella (contact holding). On one farm, the infection was detected in a bacteriological culture from calves sent to obduction, and on another, it was found in a sample collected by the authorities due to lymph node findings in the slaughterhouse.

Surveillance

Dairy and suckler cow holdings were monitored for BT, EBL, IBR, BVD and brucellosis through programmes run by the authorities. The collection of bulk milk samples from dairy herds took place in cooperation with dairies as in previous years, mainly in late winter. Suckler cow blood samples were collected at slaughterhouses during slaughter throughout the year.

Dairy herds that had had an exceptionally high number of abortions over the last year were tested for BVD, IBR, EBL and brucellosis. In addition, dairy herds were also examined for these diseases through random sampling. In addition to BT, samples taken for monitoring from slaughtered suckler cows were examined for BVD and IBR. Samples were also examined for these diseases in connection with artificial insemination operations, imports and exports and disease diagnostics.

Table 4. *Numbers of viral and bacterial infection samples collected from cattle in 2020, sorted by reason for testing and test (serology, virus detection). The number of positive samples is indicated in brackets.*

	BVD		IBR		Leucosis	Bluetongue		Brucel-losis	Schmallenbergvirus	
	Anti-bodies	Virus detection	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies	Virus detection	Anti-bodies	Anti-bodies (Positive)	Virus detection
Dairy cattle monitoring/ bulk milk sample	1 298	0	1 298	0	1 298	0	0	1 298	0	0
Suckler cow monitoring/ individual blood sample	2 450	0	2 450	0	0	2 450	0	0	0	0
Artificial insemination operations	148 [1)]	96	144 [1)]	0	144 [1)]	0	0	144 [1)]	0	0
Disease diagnosis	110	101	90	99	129	0	2	113	10 (1) [4)]	23
Import (cattle, semen, embryos)	58 [2)]	53	39 [3)]	20	0	0	0	0	0	0
Other reasons (animal trade, export)	124	0	0	0	0	0	0	0	2	216
Total	**4 188**	**250**	**4 021**	**119**	**1 571**	**2 450**	**2**	**1 555**	**12**	**239**

[1)] Includes both milk and serum samples
[2)] 45 samples from cows implanted with imported embryos
[3)] 26 samples from cows implanted with imported embryos
[4)] No embryos with antibodies were found

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. The number of BSE tests performed in 2020 was in the same range as in previous years. The majority of the cattle tested had died spontaneously or been put down. The testing age limit for emergency slaughters, animals that died spontaneously or those that were put down remains at 48 months. However, animals of all ages are tested if suspected of having BSE.

Table 5. *BSE tests in 2020. All test results were negative.*

Slaughtered healthy	Clinical suspicions at farms	Emergency slaughters	Spontaneously died or put down at farms	Disease symptoms in ante-mortem inspections	Total
4	0	7	11 240	0	**11 251**

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 2011–2020.

3 Pig diseases

Disease numbers in productive pigs remained at a good level and no dangerous or easily spreading diseases were detected. Salmonella infections were diagnosed in faecal and/or environmental samples on a total of five pig farms, on two of which the infection had already been diagnosed in 2019. Virus A, which causes swine influenza, was detected in samples from nine holdings. Eight of these were of the H1N1 virus type occurring in pigs, and one was human-like H1N1. The main reasons for testing samples from pigs were surveillance studies on swine diseases (Aujeszky's disease (AD), transmissible gastroenteritis (TGE), 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 2020, 265 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 (204), 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 inflammatory symptoms in a specific age group on the farm. Most of the examinations were related to determining the cause of a disease in piglets and young pigs. A number of samples were also sent in for testing in connection with meat inspections, determination of the cause of abortion, and for determining the cause of death in individual pigs.

As in previous years, the *Actinobacillus pleuropneumoniae* bacterium was a major cause of lung infections in growing pigs. In 2020 virus A, which causes swine influenza, was detected in samples from a total of nine holdings. Samples from a total of 44 farms were tested. The number of diagnosed cases was lower than the year before; in 2019, influenza A virus was diagnosed in samples from 19 farms. Influenza viruses found in pigs are usually of the type H1N1 in Finland. All A viruses diagnosed in 2020 were typed in more detail, and in eight cases, the virus strains were discovered to be of the so-called classical H1N1 virus type that is only found in pigs, and one was genetically part of the H1N1 virus type that has been diagnosed in humans in Finland.

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, 801 samples from 37 different farms were tested. No porcine enzootic pneumonia infections were diagnosed in 2020. 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 packages (faecal samples) of weaned piglets and fattening pigs in 2019. Numbers of sample submissions and positive submissions. A submission was recorded as positive if bacteria was detected in at least one sample. A total of 59 samples were submitted and 23 of them were examined for dysentery only.*

Test	Number of sample submissions examined	Number of samples examined	Number of positive samples (percentage of those tested)	Number of holdings submitting samples	Number of positive holdings (percentage of those tested)
Enterotoxic *E. coli*	28	137	37 (27%)	27	15 (56%)
Lawsonia intracellularis	28	136	53 (39%)	27	17 (63%)
Brachyspira hyodysenteriae	42	650	0	38	0
Brachyspira pilosicoli	28	162	58 (36%)	24	11 (46%)

Faecal samples and samples submitted for pathological testing were examined to determine the causes of gastrointestinal infections. A total of 742 faecal samples from 48 holdings were bacteriologically tested for the *Brachyspira hyodysenteriae* bacterium that causes dysentery in pigs and for other pathogens that cause diarrhoea in pigs. Nearly all of the faecal samples tested were from weaned or older pigs, with only a few holdings submitting faecal samples from piglets. The number of faecal samples examined was lower than in 2019, in which year an investigation related to detected cases of dysentery increased the number of samples. In 2020, dysentery was found on one pig farm, whereas in 2019 it was diagnosed in samples from four pig farms. No *Clostridium perfringens* type C infections were detected.

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

Salmonella

Salmonella monitoring in pigs is part of the national salmonella control programme in Finland, and salmonella infections in pigs are included in animal diseases that must be combated under law. The incidence of salmonella in pigs is low and has remained below the target of 1%. In 2020, clearly fewer new salmonella infections (3) were diagnosed on pig farms than in the previous year (13). *Salmonella* Derby was found in a single pig fattening house, to which piglets had been moved under special licence from a farrowing pig farm where *S.* Derby had been detected earlier. *S.* Typhimurium was diagnosed on one combination pig holding. The infection was diagnosed in samples from piglets submitted for necropsy. *S.* Montevideo was diagnosed on one farrowing pig holding in samples taken following a finding in a lymph node sample. In addition, *S.* Derby (sow) and *S.* Enteritidis (fattening pig) were found during the year in lymph node samples collected at the slaughterhouse. However, no salmonella was found in samples from the farms in question. *S.* Derby was also found in one lymph node sample from a fattening pig. Samples from the farm were collected in early 2021, and the same strain was found in them.

Trichinellosis not found in rearing pigs

Trichinellosis, which is classified as an animal disease to be reported, was not identified in rearing pigs, which means that the disease numbers remained the same as in 2018 and 2019. No trichinellosis infections were diagnosed in farmed wild boars either. The incidence of trichinellosis in pigs and wild boars is monitored by sampling and testing conducted in connection with meat inspections.

Surveillance

The monitoring of the disease situation in pigs for Aujeszky's disease, TGE, PRRS and CSF was continued through programmes organised by the authorities. More than 700 blood samples were collected from four large sow slaughterhouses in proportion with the number of animals slaughtered. At maximum eight samples were collected from sows from each holding. Samples from farmed wild boars were also collected during 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. *Blood samples from pigs tested for major viral diseases by the reason for the test in 2020. None of the diseases that the samples were tested for were detected.*

	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
Monitoring studies	762	0	790	804	0	762	0	0
Artificial insemination operations *	1027	0	655	1 056	24	768	0	0
Holdings with special level health classification	0	0	362	431	16	77	0	0
Disease diagnosis **	15	60	1	22	19	9	78	76
Import	129	0	184	156	55	129	0	0
Export	133	0	0	137	8	133	0	0
Farmed wild boars (monitoring)	13	0	13	13	0	13	0	13
Wild boars living in the wild	816	937	0	0	0	816	937	937
Total	**2 895**	**997**	**2 005**	**2 619**	**122**	**2 707**	**1 015**	**1 026**

* Including holdings of origin

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

Samples collected from wild boars living in the wild were also tested for pig diseases. Hunters contributed actively to African swine fever monitoring by submitting blood and tissue samples from wild boars living in the wild to the Finnish Food Authority. 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 an easily spreading 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 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 and Germany. The Czech Republic became officially free of this disease in 2019, and Belgium in 2020. In 2018, ASF also spread to China, and it continues to spread in the Far East.

African swine fever has never been diagnosed in Finland. If the disease were to spread to Finland, it would cause major losses for the domestic pork production industry, 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 food waste containing contaminated food products or when food waste has been left out for wild boars living in the wild. The virus can also spread to new areas in live pigs and sperm as well as through transport vehicles, humans and wild boars.

Prevention in brief

Since African swine fever has spread in several countries through food products transported by humans, ASF prevention efforts in Finland have been 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, tourism declined significantly in 2020, 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.

Collaboration with the Finnish Wildlife Agency and hunting organisations also continued. The Finnish Food Authority participated in information events aimed at hunters, attended the Ministry of Agriculture and Forestry's wild boar working group, and updated guidelines and communications aimed at hunters. The Finnish Food Authority also provided hunting organisations and game districts with supplies for taking and submitting samples. As a result, the number of samples from dead and hunted wild boars was again high, with a total of 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.

Preparations for combating the African swine fever were also made by organising Potsi 2020, a set of preparedness exercises consisting of eight training events and exercises organised by the Finnish Food Authority together with the Regional State Administrative Agencies. They tested the operational preparedness of the authorities and certain stakeholders for situations where African swine fever is detected in wild boars and a restriction zone is established around the outbreak. The exercises focused on communication between animal disease authorities and stakeholders as well as actions needed to combat the outbreak. Their aim was to improve cooperation and develop preparedness for African swine fever. The final reports of the exercises were published on the Finnish Food Authority's website.

See Appendix B for summaries of tests for brucellosis in cattle, sheep, goats and pigs (Table B3) and tests for viral diseases and leptospirosis in pigs (Table B7) in 2011–2020.

4 Poultry diseases

The incidence of contagious animal diseases in poultry is low in Finland compared to many other European countries. Finnish poultry is only vaccinated against a few contagious diseases, whereas in many other countries, poultry vaccination programmes encompass a wide range of different vaccines. The volume of antibiotics used in Finnish poultry production is also very low. Chickens 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 chickens are examined by the Finnish Food Authority. No cases of serious infectious diseases, such as avian influenza or Newcastle disease, were detected in poultry in 2020.

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 packages developed for poultry. Anatomical pathology examinations were conducted on a total of 2,568 poultry samples from 211 holdings, which was more than in 2019 (1,451 samples from 167 holdings). The majority of samples submitted for necropsy were broilers (1,952). 351 turkeys and 149 laying hens were examined. Packages for decreased egg-laying and respiratory tract infections in poultry were examined on a total of fix farms.

Mycoplasma synoviae, M. gallisepticum and *M. meleagridis* antibody tests are conducted for productive poultry in the context of health monitoring, respiratory tract packages and import operations. Mycoplasma tests 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. All bird species, both productive and non-commercial poultry, are also PCR tested for *M. gallisepticum/M. Synoviae. M. gallisepticum* infections were detected on two non-commercial poultry holdings and *M. synoviae* infections on 16 holdings through antibody or PCR testing. In addition, both *M. gallisepticum* and *M. synoviae* infections were diagnosed on a large non-commercial poultry farm of 150 chickens; due to the *M. gallisepticum* infection, the Regional State Administrative Agency issued a decision to prevent the spread of the infection to the holding. No *M. synoviae, M. gallisepticum* or *M. meleagridis* infections were detected in production poultry.

Outbreaks of colibacillosis, which have plagued the Finnish broiler industry in the past years, decreased 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 mother flocks and their descendants as well as examining *E. coli* strains that have caused issues. Typing ensures that the autogenous vaccine used contains the right strains. The three-year research project is carried out in cooperation with the broiler industry.

Swine erysipelas (*Erysipelothrix rhusiopathiae*) was detected on four laying hen holdings and one pheasant holding. Infections caused by *Pasteurella multocida* were detected twice in poultry (on one laying hen holding and one pheasant 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 these infections kept being diagnosed in 2019 and 2020. Infections were diagnosed by virus detection and testing for antibodies, both in laying hens and in the broiler production chain. 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. IBV is a common virus in non-commercial poultry, and there have also been incidences 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 was continued.

Marek's disease was detected on eight non-commercial poultry holdings but no cases of the disease were detected in commercial poultry. Laying hens and parent stock are vaccinated against Marek's disease. Infectious laryngotracheitis (ILT) or its antibodies were detected on five non-commercial poultry holdings. Clinical (symptomatic) Gumboro disease (IBD), chicken anemia virus (CAV) and avian encephalomyelitis (AE) were not detected in 2020. Birds in mother flocks are vaccinated against Gumboro disease, chicken anemia virus and AE in order to protect the broods from these diseases. If laying hens contract the AE virus, this can also result in a 5–10% 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 avulavirus-1, AAvV-1, PMV-1) and salmonella. See Appendix B for a summary of tests for avian influenza, Newcastle disease and avian pneumovirus (APV) in poultry in 2011–2020 (Tables 8 and 9).

Due to the human coronavirus epidemic, sampling for AI and ND on poultry holdings was suspended for part of the year, which is why the targeted number of samples was not quite reached. At slaughterhouses, samples were collected normally throughout the year.

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. No avian avulavirus-1 antibodies were detected in EU surveillance. Avian influenza virus antibodies were found on one holding, but the virus itself was not detected. The facilities approved for intra-community trade follow the monitoring programme set out in the Ministry of Agriculture and Forestry Decree 1036/2013 for the following pathogens: *Salmonella Gallinarum/Pullorum, Salmonella arizonae, Mycoplasma gallisepticum* and *Mycoplasma meleagridis*. In 2020, the facilities approved for intra-community trade conducted monitoring tests on 6,058 broiler and 2,390 laying hen blood samples for *M.* gallisepticum antibodies, and on 1,500 broiler and 480 laying hen blood samples for *Salmonella* Gallinarum/Pullorum antibodies. In addition, 200 broiler and 600 laying hen blood samples were tested for *M.* synoviae antibodies in connection with export or intra-community trade operations.

Table 8. *Test results of the EU surveillance programme for avian influenza in poultry in 2020. No avian influenza viruses were detected, but avian influenza antibodies were found on one poultry holding.*

Number	Chicken breeder holdings [1)]	Conventional laying hen holdings	Organic and free range hen holdings	Organic broilers	Geese and ducks [2)]	Turkey breeder holdings	Fattening turkey holdings	Farmed game birds	Ostriches	Total
Samples	378	386	359	20	60	50	380	78	8	**1 719**
Farms	33	38	35	2	1	5	38	8	2	**162**

[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 2020, sorted by reason for testing.*

Reason for testing	Avian influenza		Newcastle disease		APV[2)]
	Serology (Pos. holdings/ pos. samples)	Virus detection (Pos. holdings/ pos. samples)	Serology (Pos. holdings/ pos. samples)	Virus detection (Pos. holdings/ pos. samples)	Serology (Pos. holdings/ pos. samples)
EU monitoring	1 719 (1/9 [4)])	12 (0/0)	6 291 (0/0)	0 (0/0)	0
Import	2 230 (0/0)	0	2 170 (0/0)	0	150 (x/x [3)])
Disease diagnosis	226 (0/0)	731 (0/0)	206 (0/0)	730 (0/0)	84 (x/x [3)])
Total	**4 175 (1/9 [4)])**	**731 (0/0)**	**8 667 (0/0)**	**730 (0/0)**	**234 (x/x [3)])**

[1)] Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or breeding programmes of the previously mentioned birds
[2)] Virus detection not used at the Finnish Food Authority
[3)] Serologically positive results, no disease symptoms
[4)] H5 antibodies, virus detection result negative, no disease symptoms

Salmonella

Finland's statutory salmonella control programme covers all generations of broilers, turkeys and laying hens. The incidence of salmonella is low and has remained below the target of 1%. Salmonella was detected on six poultry holdings (two holdings in 2019). On laying hen holdings, salmonella was found in one laying flock (*S.* Enteritidis), one breeding flock (*S.* Typhimurium), one hatchery (*S.* Typhimurium) and at two small-scale egg production facilities (*S.* Typhimurium at one, and *S.* ssp. IIIb (=diarizonae) at the other). Salmonella was found on one holding in production poultry (*S.* Infantis). No cases of salmonella were detected in turkeys in 2020.

New 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 package 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 new health monitoring package helps to provide information on the disease situation in poultry and show if vaccinating production poultry has been successful. In 2020, a total of 140 batches of samples were submitted from 59 farms, which is slightly more than in 2019 but less than in previous years.

The majority of sample batches were from the parent generations of production poultry, consisting of 72 batches from broilers' parents and 22 from the grandparents and parents of laying hens. In addition, 14 broiler sample batches from production poultry, one from laying hens and 16 from non-commercial chickens were also examined. The disease situation in chickens and broilers are monitored by testing blood samples for antibodies, especially for IBV, ILT, APV, *M. gallisepticum* and *M. synoviae* infections. Samples from parent generations are mainly examined for Gumboro disease (IBD), avian encephalomyelitis (AE), chicken anemia virus (CAV) and in some flocks for immune responses to the IB vaccine.

Table 10. *Health monitoring samples of chickens and broilers in 2011–2020.*

Year	AE	CAV	IB	IBD	APV	ILT	*M. gallisepticum*	*M. synoviae*
2011	1 137	3 096	3 654	3 056	1 056	1 120	4 672	4 453
2012	1 187	2 746	2 899	2 716	1 100	1 032	4 250	4 150
2013	980	2 717	2 020	2 717	980	739	3 600	3 600
2014	1 020	2 320	2 206	2 440	938	940	3 458	3 458
2015	840	1 759	1 682	1 759	920	702	2 460	2 481
2016	1 728	2 713	1 141	1 913	980	1 001	980	980 [1)]
2017	1 300	1 900	1 018	1 900	770	838	795	795
2018	1 370	1 509	979	1 340	880	819	995	995
2019	1 840	1 928	1 277	1 908	351	469	439	439
2020	2 251	1 931	1 774	1 265	51	559	360	360

[1)] Positive samples from one chicken breeder holding

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 2020, no PMV-3 antibodies were found 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 2020. The disease numbers in turkeys are currently at such a good level in Finland that in general, turkeys do not need to be vaccinated against any infectious diseases. Only in some individual cases have turkey flocks been vaccinated against swine erysipelas.

Table 11. *Health monitoring samples of turkeys in 2010–2019.*

Year	APV	PMV-3	*M. gallisepticum*	*M. synoviae*	*M. meleagridis*
2011	382	382 [1)]	400	400	400
2012	418	418 [2)]	438	438	438
2013	653	613 [3)]	595	595	595
2014	480	480 [4)]	480	480	480
2015	459	459 [5)]	459	459	459
2016	120	220 [6)]	120	120	120
2017	180	280 [7)]	180	180	180
2018	140	240 [8)]	160	160	160
2019	242	302 [9)]	120	120	120
2020	137	277 [10)]	261	257	257

[1)] A total of 25 positive samples on two holdings
[2)] A total of 81 positive samples on three holdings
[3)] A total of 38 positive samples on three holdings
[4)] A total of 55 positive samples on two holdings
[5)] A total of 11 positive samples on one holding
[6)] A total of 44 positive samples on four holdings
[7)] A total of 54 positive samples on two holdings
[8)] A total of 9 positive samples on one holding
[9)] A total of 22 positive samples on two holdings
[10)] No positive samples were detected

5 Sheep and goat diseases

Disease numbers in sheep and goats have remained at a good level and no dangerous or easily spreading diseases were detected in 2020. The most common reasons for examinations on sheep and goats were disease surveillance [maedi-visna (MV) in sheep and caprine arthritis-encephalitis (CAE) in goats as well as scrapie], disease or abortion diagnosis, meat inspections and parasite surveying.

Disease diagnostics

In 2020, anatomical pathology examinations were performed on a total of 99 sheep samples and 18 goat samples. The number of samples was similar to 2019 (115). Twelve samples were examined in the context of meat inspections.

Anatomical pathology examinations were performed on a total of 16 samples from one goat farm and five sheep farms to determine the cause of abortion. Abortions caused by *Yersinia pseudotuberculosis* were diagnosed on one sheep farm, and on another, the cause of abortion was *Campylobacter jejuni*.

The majority of the samples submitted for disease diagnosis were whole animals, mostly young lambs and kids. A common finding was a parasite infection in the abomasum or intestines (*Strongylida* suborder roundworms or *Eimeria* sp. coccidia) and subsequent diarrhoea or emaciation. *Haemonchus contortus* roundworms were detected in samples from two sheep farms. Cysts caused by *Protostrongylus rufescens* lungworms were found in sheep from one holding in samples collected in the context of meat inspection, and lancet liver flukes (*Dicrocoelium dendriticum*) were detected in a sheep on another holding.

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

Orf virus was detected on 12 sheep holdings during the year. In total, samples from 20 sheep farms were examined for the Orf virus.

A total of 51 submissions of faecal samples from sheep and goats from 34 holdings were examined. Samples from three goat holdings and three sheep holdings were tested in order to determine the cause of diarrhoea, while the samples from the other 30 holdings were tested for parasite survey purposes. The most common findings were eggs of intestinal roundworms (*Strongylida and Strongyloides* sp.) and *Eimeria* sp. coccidia. On one goat farm, *Cryptosporidium parvum* proved to be the cause of diarrhoea in kids, and on another goat farm, *Clostridium perfringens* type D caused diarrhoea in adult goats.

Surveillance

Scrapie monitoring is conducted by testing for scrapie all sheep and goats over 18 months of age that have died or been put down in the carcass collection area; the samples are taken at a processing facility located in Honkajoki. Additionally, holdings with at least 50 ewes or nanny goats located outside the carcass 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 2020, samples were submitted from 28 holdings located outside the carcass 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 2020, atypical scrapie was detected on one sheep holding, while classical scrapie was not detected.

For the results of scrapie monitoring in 2011–2020, see Appendix B (Table B5).

Lentivirus infections (maedi-visna and CAE) in small ruminants are monitored through voluntary health control. A total of 2,787 samples collected from 55 different holdings were tested for maedi-visna and CAE in sheep and goats in 2020 (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 maedi-visna and CAE in small ruminants and blood samples collected at slaughterhouses during slaughter. No brucellosis infections were found.

Table 12. *Results of sheep and goat health monitoring and scrapie surveillance in 2020. No cases of maedi-visna/CAE or classical scrapie were detected. Atypical scrapie was detected on one sheep holding.*

Animal species	Maedi-visna/CAE				Scrapie	
	Antibodies		Virus detection		Priority detection	
	Samples	Farms	Samples	Farms	Samples	Farms
Sheep	2 549	53	1	1	1 644	466
Goat	238	2	0	0	291	53
Total	**2 787**	**55**	**0**	**0**	**1 935**	**519**

Summaries of brucellosis surveillance in cattle, sheep, goats and pigs (Table B3) and MV/CAE health monitoring and scrapie surveillance in sheep and goats (Table B9) conducted in 2011–2020 are presented in Appendix B.

6 Fish and crayfish diseases

The disease situation in fish and crayfish remained good, and no diseases that must be combated under law were detected in 2020. The surveillance programmes for IHN (Infectious haematopoietic necrosis), which was found in Finland in winter 2017–2018, were continued in 2020 to restore IHN free status in the monitoring areas. Similarly, the surveillance programme for VHS (viral haemorrhagic septicaemia) was continued in Åland to get a disease free status. The goal is that the entire country would be free from IHN and VHS in 2022.

The situation of bacteriological fish diseases remained mainly at the same level in 2020 as in the previous years. Worryingly, a virulent *Yersinia ruckeri* biotype was found for the first time in an inland fish farm. Relatively few crayfish samples were submitted for testing, which makes it difficult to assess disease numbers in crayfish.

Disease diagnostics

Yersiniosis caused by *Yersinia ruckeri* biotype 2 was found for the first time in inland waters in 2020. *Yersinia ruckeri* are intestinal bacteria in fish that cause ERM (Enteric red mouth). Biotype 2 was first diagnosed in Finland in 2007, and it has probably spread to Finnish fish farms with imported live fish. Until now, infections have only been found in Finnish marine areas, mainly in the Archipelago Sea and Åland. The reason for the infection spreading from the sea to inland farms could not be determined. *Yersinia ruckeri* biotype 2 differs in its properties from biotype 1 which is found inland and in wild fish and which has not caused significant problems for Finnish inland fish farms. Biotype 2 has been frequently isolated in severe outbreaks which may cause significant mortality. If it spread more widely to inland rainbow trout farms, this would mean a significant deterioration in the disease situation. A vaccine is fortunately available to prevent this infection, and it is already in relatively wide-spread use in fish that are being transferred to the marine area.

Of bacterial fish diseases, summer enteritis in rainbow trout has caused increasing problems. The disease is known as RTGE (rainbow trout gastroenteritis), and it typically is a bloody intestinal infection in rainbow trout aged 12 to 24 months occurring in late summer. Its cause is suspected to be SFB (segmented filamentous bacteria) of the Clostridium genus, but attempts to cultivate it in the laboratory or identify it have failed. The increase in case numbers is likely to be linked to the wider use of recirculating aquaculture, in which the conditions are favourable for the growth of SFB bacteria. The Finnish Food Authority together with the Natural Resources Institute Finland have launched a research project aiming to develop the diagnostics and examine the occurrence of these bacteria in different forms of farming. The year was quiet in terms of bacterial kidney disease (BKD), and only one case was found.

While there were no significant changes in the total numbers of IPN virus infections, when we look at the situation separately for marine and inland farms, we find that the number of inland farms testing positive has decreased significantly, or from nine in 2019 to only one in 2020. The reason for this change is not known. Notably, no IPN was found in 2020 in connection with disease diagnosis, and all findings were from samples taken as part of the monitoring programmes.

In autumn 2020, a large number of fish with skin damage were found in the wild trout population of the Tornionjoki river. In fresh water, water moulds stick to damaged fish skin and may ultimately cause the fish to die. So far, a single common cause for the disease has not been found. Investigations of the disease situation in trout have continued in international cooperation. The occurrence of water moulds on fish farms was also studied in a joint project with Åbo Akademi University and the University of Jyväskylä.

New crayfish plague made its way to Finland

The most significant crayfish disease detected in Finland is the crayfish plague caused by the *Aphanomyces astaci* water mould. In 2020, acute crayfish plague was detected in two lakes and the River Kemijoki delta. One case each of type A (As) and type B (Ps1) of crayfish plague were found. In the River Kemijoki, the crayfish plague was identified as genotype D, or Pc, typical of the southern regions of North America. This serotype has not previously been detected in the Nordic countries. It has been found in cases diagnosed in Spain, the Czech Republic and the Netherlands. Its carriers are crayfish species of the genus *Procambarus*, which have been imported to Spain for farming purposes and which are also kept in aquariums. How this crayfish plague type adapted to warm environmental conditions made its way to the bottom of the Bay of Bothnia is a mystery.

Only two signal crayfish samples were examined, and both showed signs of carrying the crayfish plague.

Surveillance

Some 20 different aquatic species are farmed in Finland. Species susceptible to each disease are listed in legislation, and the monitoring is targeted accordingly. The objective of regular risk-based inspections of aquaculture animals by authorities and the samples taken in connection with them is to detect the possible presence of IHN, IPN, VHS, ISA (infectious salmon anemia) and SAV (salmonid alphavirus) as well as the potential occurrence of new serious diseases on farms. While KHV (Koi herpesvirus), SVC (spring viremia of carp) and WSD (white spot disease) are monitored through spot checks, no samples are routinely taken. Efforts to stop the spread of BKD are being made through a voluntary health control programme, and samples are regularly taken from holdings within the scope of the programme. In addition, the spread of *Gyrodactylus salaris* (salmon fluke) to Northern Lapland is monitored though regular sampling. In 2020, a total of 235 risk-based inspections related to the monitoring programme were conducted. The number of BKD health monitoring inspections was 125, some of which 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.

Wild fish are tested for fish diseases when they or their gametes are introduced to fish farms for broodstock or for the purpose of producing juveniles. In addition, fish are tested for diseases in the context of exports and imports, when transporting fish over dams from sea areas to inland waters in the spawning season, and always when a disease is suspected.

The disease-free statuses granted to Finland regarding fish remained unchanged. To restore the IHN free status, the IHN monitoring programme was continued in the monitoring areas set up due to cases in Ii, Tervo, Kaavi and Nurmes. The VHS eradication programme launched in the Åland Islands in 2014 was finished in early 2020, and a two-year monitoring programme aimed at restoring the disease-free status was began. The VHS virus has not been detected in Åland since summer 2012. The rest of the country is still free from VHS and IHN.

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

For summaries of the tests performed in 2011–2020 for viral diseases in fish as part of the risk-based monitoring (Table B10), BKD (Table B11) and *Gyrodactylus salaris* (Table B12), see Appendix B. In addition, fish were tested within the framework of the IHN and VHS monitoring programmes, in connection with broodfish capturing, exports and transporting fish over dams, and in cases of suspected disease (Table B13).

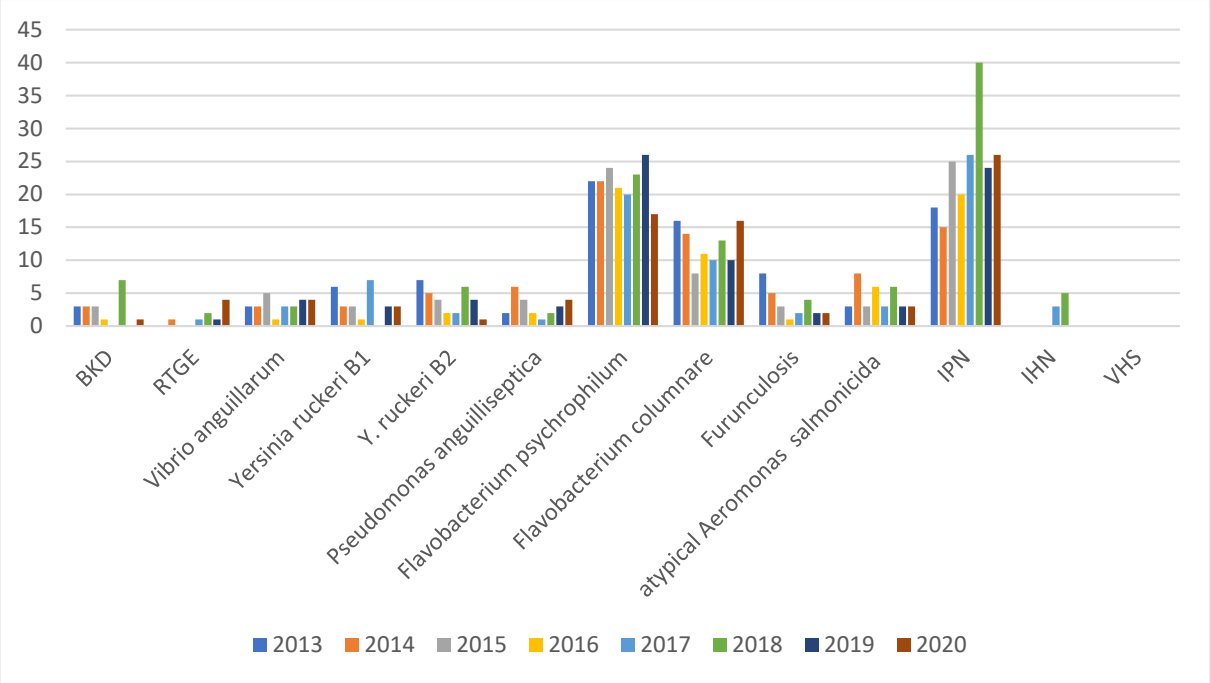


Figure 2. *Incidence of the most common fish infections in Finland in 2013–2020. The number of fish farms where the disease was diagnosed are presented on the Y-axis. The most common findings are flavobacteria, which affect young fish, and IPN virus, both of which are also common elsewhere in the world.*

7 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 2020, a pathological examination was conducted on 37 horses and one donkey (48 horses in 2019). Out of these examinations, 24 were conducted 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. A forensic pathology examination was conducted on one horse. In addition, organ samples only were submitted for examination in three cases. 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 a cord twist. 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

Streptococcus equi sp. *equi*, the cause of strangles, was confirmed in three horses from samples submitted to the Finnish Food Authority. Other laboratories examining strangles samples must submit the *Streptococcus equi* sp. *equi* strains that they have isolated or a positive DNA sample to the Finnish Food Authority. In 2020, samples from 18 horses from more than ten locations were submitted from laboratories for confirmation.

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

The annual number of herpesvirus samples from horses is relatively small, which affects the assessment of its prevalence, but forms of the disease caused by both viruses occur in Finland every year. Diagnostic samples for EHV-1 and EHV-4 viruses have been examined to determine the cause of a disease, including respiratory tract symptoms, neurological symptoms or abortion. Abortion caused by a herpesvirus (equine viral abortion) is nearly always caused by EHV-1. One case of equine viral abortion caused by EHV-1 was detected in the Finnish Food Authority's examinations in 2020. Equine rhinopneumonitis, which causes respiratory symptoms, can be caused by both EHV-1 and EHV-4. In one case, EHV-1 virus was diagnosed as the cause of rhinopneumonitis, and cases caused by EHV-4 were also found during the year. In addition to foals submitted for examination to determine the cause of abortion, samples from 16 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 2020. Eleven 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 14 horses were examined in 2020 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 Finland, all studs used in artificial insemination must be tested annually before the start of the breeding season for both *Taylorella equigenitalis* bacteria and EVA. If a stud's sperm is sold in the European internal market, the stud must also be tested for EIA.

In compliance with legislation, a total of 354 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 male fjord horse. The same horse was also positive in 2019.

In 2020, 208 breeding studs were examined for viral arteritis with negative results. Antibodies to viral arteritis were detected in a total of seven breeding studs, but the results of further tests on sperm samples were all negative. There have been no changes in the disease 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 EVA monitoring in Finland.

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

No dangerous equine diseases diagnosed in Finland

Under the animal disease legislation, dourine, malleus and EIA are all classified as dangerous animal diseases that must be combated. 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 2020, a total of 86 samples were examined for EIA, all with negative results.

The Finnish Food Authority tested samples from 29 horses for antibodies for dourine and glanders for import or export purposes or failure to meet the import requirements, all with negative results.

Glanders – an old threat re-emerging

Glanders, also known as malleus or Rotz, is a disease caused by the *Burkholderia mallei* bacteria. It mainly occurs in solipeds but may also be transmitted to other animals, including carnivores. While this disease is also a zoonosis, it is not particularly contagious to humans. Infections spread between horses in direct or indirect contact with a sick animal as well as via contaminated food or water. The disease is usually chronic and may be present in an animal for years, ultimately leading to death in most cases. The symptoms include fever, respiratory tract symptoms, purulent focal infections and ulcers in upper respiratory tracts and nasal cavity, swelling and hardening of lymph nodes under the jaw, and malodorous discharge from the nostrils. A cutaneous form of the disease ('farcy') also exists, in which small ulcers develop in the lymphatic system of the skin that later burst, oozing thick pus. When healed, they leave star-shaped scars. While the disease typically causes clinical symptoms in the horse, it may present with little or no symptoms. Asymptomatic horses can also excrete bacteria and thus spread the disease, however.

Several serological methods have been developed for diagnosing glanders, but so far the only one approved by the World Organisation for Animal Health (OIE) for international trade, in other words for the import and export of solipeds, is the complement fixation test (CFT), which is also used by the Finnish Food Authority. CFT is very sensitive to glanders antibodies but gives some false positives due to cross-reactions. Definite diagnosis of glanders is based on isolating the bacteria from the animal's excretion or organ samples which, however, is hampered by the small amount of *B. malleus* bacteria compared to other bacteria contaminating the sample. Consequently, a negative culture does not exclude the disease, and its confirmation or exclusion in an asymptomatic but seropositive horse is extremely difficult. Efforts have also been made to develop PCR tests for diagnosing this disease.

While glanders has been eradicated in such areas as Europe and North America, it is endemic in Africa, Asia, the Middle East and Central and South America. The number of outbreaks has increased in recent decades and, consequently, glanders is considered a so-called re-emerging animal disease. The increased international mobility of horses also poses a persistent risk of the disease spreading to areas where it is no longer endemic. In 2014, glanders was diagnosed in Germany in a horse that had never travelled outside the country, and the source of the infection was never discovered. This is why vigilance against this disease is also needed in countries that have been free from it for a long time.

8 Reindeer diseases

In 2020, the disease situation of reindeer remained good, and no dangerous or easily spreading diseases were detected. Approximately 50 to 60 reindeer or samples from reindeer are examined every year to determine the cause of a disease. In 2020, 59 samples from reindeer were submitted for pathological testing, out of which 35 were organ samples and 24 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. New-born calves were also submitted for examination in the spring. Possible cases of diseases in reindeer roaming freely in the wild may not be detected, and especially in the summer, reindeer that die in the wild decompose rapidly if the weather is warm, and scavengers might eat them before they are found. Individual samples were obtained from reindeer kept in pens outside the reindeer herding area.

Monitoring of chronic wasting disease (CWD) continued

The three-year monitoring programme launched in 2018 to detect the presence of CWD in Finland was continued in 2020. For monitoring purposes, herding cooperatives submit 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. Samples collected from reindeer older than 12 months that were submitted for pathological testing were also tested for CWD insofar as possible. CWD has never been diagnosed in Finnish reindeer (Table B6). TSE numbers in reindeer and other cervids have been monitored for several years now.

Table 13. *TSE testing of cervids in 2011–2020 by species. One TSE-positive elk was found in 2018 and 2020.*

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Reindeer *(Rangifer tarandus tarandus)*	2	1	4	13	3	6	16	294	616	624	**1 579**
Finnish forest reindeer *(Rangifer tarandus fennicus)*	0	0	0	0	0	4	13	14	12	7	**50**
Elk *(Alces alces)*	4	9	3	3	6	26	48	242	162	200	**703**
White-tailed deer *(Odocoileus virginianus)*	1	2	5	3	4	12	23	50	131	125	**356**
Roe deer *(Capreolus capreolus)*	1	2	2	2	0	7	13	63	208	255	**553**
Fallow deer *(Dama dama)*	1	0	0	1	1	0	1	0	0	0	**4**
Red deer (*Cervus elaphus*)	0	0	0	0	0	0	0	0	0	1	**1**
All	**9**	**14**	**14**	**22**	**14**	**55**	**114**	**663**	**1 129**	**1 212**	**3 246**

Meat inspection samples important for disease monitoring

A large proportion of reindeer samples are submitted by veterinarians who inspect reindeer meat at slaughterhouses. Of all reindeer samples obtained in 2020, 20 were related to meat inspection. *Echinococcus canadensis* G10 was diagnosed in the lungs of three reindeer, whereas Echinococcus cysts were found in six reindeer in 2019. As in previous years, the infections mainly occurred in the eastern parts of the reindeer herding area. The meat inspection samples also indicated liver bile duct cysts, which are 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. Other findings in meat inspections were tissue cysts caused by parasites of the *Sarcocystis* genus, which can be seen in a visual inspection of the muscles. The reindeer is an intermediate host for parasites of the *Sarcocystis* genus. The final host of this parasite is a predator infected by consuming meat which has cysts. The parasite proliferates in the final host's gut, and the oocysts are excreted with stools onto the ground, infecting grazing reindeer. Tissue cysts caused by parasites of the *Sarcocystis* genus 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. The cysts of some *Sarcocystis* species can even be seen with the naked eye. While this parasite does not pose a risk to humans, visible cysts may raise suspicions towards meat containing them.

Bacterial infections and starvation

A few cases of necrobacillosis (*Fusobacterium necrophorum* infection) were diagnosed in reindeer that were examined to determine the cause of a disease or death. Mouth ulcers caused by the orf virus were found in two reindeer. No other parapoxviruses were found. Oral infections with ulcers caused by other reasons were diagnosed in individual cases, mainly in reindeer kept in pens. In two reindeer, infection-induced changes were also found in the forestomach. Incorrect feeding, overfeeding or fodder that was excessively coarse or of poor quality was often the cause, or a susceptibility factor, in these cases. Three calves aged a few days were diagnosed with a systemic bacterial infection. In two of these cases, the infection entry point was the umbilicus. *Listeria monocytogenes* bacteria were diagnosed as the cause of lung infection in one reindeer that was found dead. Other bacteria causing purulent infections were also found in the samples, including *Trueperella pyogenes* and streptococcal bacteria. In one meat inspection sample, necrotic hepatitis caused by *Yersinia pseudotuberculosisi* was detected. One reindeer's liver was found to be infected with a purulent focal infection caused by the swine erysipelas bacteria (*Erysipelothrix rhusiopathiae*). A few cases of enteritis were diagnosed. All samples that included intestines were tested for salmonella with negative results. Several of the examined reindeer were found to have a poor nutrition status, and a few were determined to have starved to death. Starvation was often associated with other diseases, such as mouth ulcers, or incorrect feeding. The winter with heavy snows made it difficult for reindeer living in the wild to find food.

Parasites are a part of a reindeer's life

Reindeer living in the wild are susceptible to parasitic infections. Although parasites are rarely the main cause of a disease in reindeer, the parasite burden may increase when the reindeer are kept in a pen, and especially young animals can contract diseases caused by parasites. The death of one calf was indeed caused by intestinal coccidiosis, which is an intestinal infection caused by the unicellular *Eimeria* genus parasites. Parasites can also expose reindeer to other diseases, and abnormalities caused by parasites often result in rejection in meat inspections.

Several samples from slaughterhouses showed scarring from parasites migrating in the organs. Some reindeer had *Setaria tundra* roundworms in the abdominal cavity and infection-induced changes caused by the worms in the peritoneum. One reindeer was infected with *Elaphostrongylus rangiferi*, or meningitis that could have been caused by a brain worm infection. One reindeer presented with scars caused by the warble fly (*Oedemagena tarandi*) in the subcutaneous tissue. Most living reindeer are treated annually for parasites in connection with round-ups. Similarly to previous years, the number of parasites was low in faeces and blood samples that were examined for parasites.

9 Fur animal diseases

Disease diagnostics

In 2020, anatomical pathology examinations were performed on a total of 390 fur animal samples. The number of samples examined was lower than in 2019, in which year 431 samples were tested. Out of these samples, 287 were minks; 88 were farmed foxes, mostly blue foxes; and 15 were raccoon dogs. Compared to the previous year, there was a clear increase in the number of minks examined, whereas the number of foxes decreased considerably. The numbers of racoon dogs examined have remained similar for several years. There was a marked year-on-year decrease in the number of stool samples examined for diarrhoea: 28 such samples were tested in 2020 and 219 in 2019.

The most common finding in the samples from farmed foxes examined at the Finnish Food Authority was metritis, followed by systemic infections. Few cases of enteritis were diagnosed, which is a major change compared to previous years.

As in 2018 and 2019, the most common finding in minks was systemic infection. Similarly to foxes, very few cases of enteritis were diagnosed in minks. Plasmacytosis, which is diagnosed serologically by a private laboratory, is a major disease affecting minks. Pathological and anatomical changes indicative of plasmacytosis are identified in the minks examined by the Finnish Food Authority each year, and in 2020, plasmacytosis was diagnosed in minks from two fur farms.

In farmed raccoon dogs, different individual findings were made. No enteritis caused by parvovirus, which has been diagnosed in racoon dogs for several years, was found in anatomical pathology examinations of racoon dogs in 2020.

Major viral pathogens in fur animals include the parvovirus and canine distemper virus. Parvovirus was diagnosed in 18 samples during the year. No cases of canine distemper virus were found in tests during the year.

Salmonella infections were diagnosed in animals subjected to anatomical pathology examinations and faecal samples tested to determine the cause of diarrhoea from three fur farms in 2020. All strains found in these tests were of the serotype S. Enteritidis.

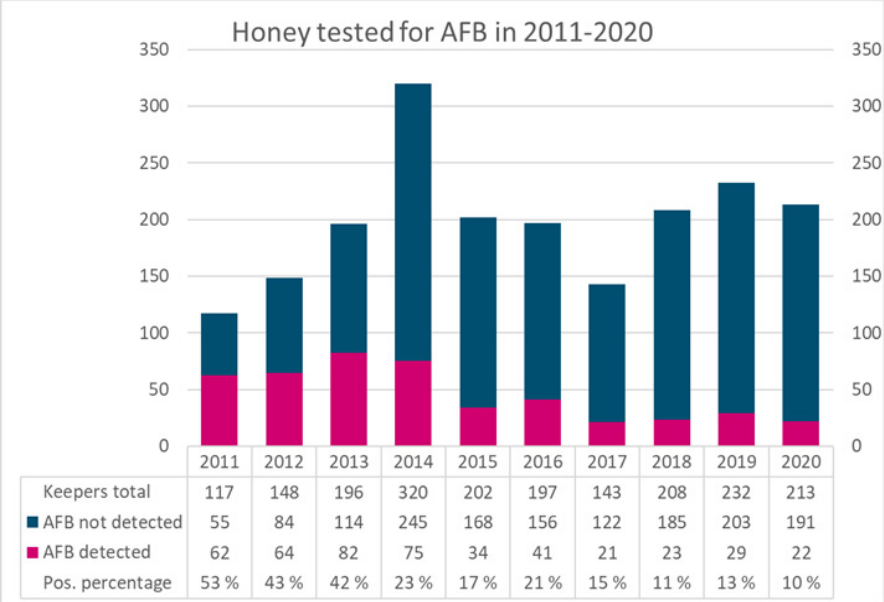
Surveillance

Monitoring studies of coronavirus (SARS-CoV-2) in minks were begun in late 2020. For more information on coronavirus infections in animals, see Chapter 1.

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

10 Honey bee diseases

The most notable diseases affecting honey bees in Finland are Varroa destructor mites and the viral diseases spread by them as well as American foulbrood, caused by the *Paenibacillus larvae* bacterium. The majority of the samples sent to the laboratory are submitted for testing for American foulbrood. In 2020, a total of 2,101 honey samples submitted by 213 beekeepers were tested for American foulbrood. A fee has been charged for testing for American foulbrood since 2015, which is why the number of samples submitted in 2014 was exceptionally high. Since then, the number of beekeepers submitting samples has returned to the same level as before the introduction of the fee. In 2020, P. larvae was detected in 7% 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 2011–2020, 5 to 29% of the samples have been positive.



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Keepers total	117	148	196	320	202	197	143	208	232	213
AFB not detected	55	84	114	245	168	156	122	185	203	191
AFB detected	62	64	82	75	34	41	21	23	29	22
Pos. percentage	53 %	43 %	42 %	23 %	17 %	21 %	15 %	11 %	13 %	10 %

Figure 3. *Beekeepers who submitted honey samples for testing for American foulbrood in 2011–2020.*

While *Varroa destructor* mites are widespread in mainland Finland, samples are usually not laboratory tested. In 2020, 189 honey bee hives in the Åland Islands were examined for mites. The Åland Islands were declared to still be free from Varroa.

Thanks to the efforts to combat *Varroa destructor* mites, honey bee tracheal mites (*Acarapis woodi*) have also become less common throughout Europe, though they are still occasionally found in Finland. No honey bee tracheal mites were found in 2020.

European foulbrood infections are usually diagnosed in a few apiaries each year. *Melissococcus plutonius*, the bacterium that causes European foulbrood, was not found in 2020.

Nosema apis and *N. ceranae* parasites are common in Finland but rarely cause a serious disease. In 2020, nosema caused by *N. ceranae* parasites was detected in one apiary.

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.

11 Pet diseases

The disease situation of pets has remained good, and no dangerous or highly contagious diseases were detected in 2020. As a rule, the Finnish Food Authority monitors the occurrence of animal diseases in pets from samples submitted for the diagnosis of a disease or determination of cause of death for which a fee is charged, for a reason other than monitoring studies on animal diseases. 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 2020, pathological examinations were conducted on over 900 animals, of which 609 were dogs, 236 were cats and approximately 90 were other species. A large proportion of these examinations (approx. 10%) consists of forensic necropsies, some of which are conducted in connection with investigations of suspected animal welfare offences. In addition to necropsies, 233 faecal samples were also tested for parasites, out of which 183 were from dogs, 36 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 2020, a parvovirus infection was diagnosed in one puppy 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. Small 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*. These bacteria commonly occur in the bodies and environments of dogs. Canine herpesvirus is a relatively rare cause of mortality in new-born puppies. A herpesvirus infection was diagnosed in one puppy examined by the Finnish Food Authority in 2020 (no cases in 2019).

Parasitic diseases are rarely diagnosed in pathological studies of pets. Infections caused by *Neospora caninum* protozoans are rare in dogs, but neosporosis was diagnosed in two dogs 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 2020, the Finnish Food Authority tested 166 faecal samples from dogs for giardia, of which 32 were positive. These infections are usually asymptomatic in adult dogs but can cause long-term diarrhoea in puppies and dogs with a weakened immune system. Each year, individual flea infections are detected in imported dogs.

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

Canine distemper was diagnosed in two young dogs from the same litter. This was suspected to be a rare infection caused by the attenuated virus in the vaccine, in which the factor leading to illness probably was a disorder of the animal's immune system.

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 2020, samples from ten dogs were tested serologically, and samples from another ten were tested bacteriologically for export purposes, because of a suspected disease, or to determine the cause of abortion. Five of the samples were serologically positive. No confirmed *Brucella* infections were diagnosed.

Based on monthly reports from veterinarians, three dogs were diagnosed with clinical leptospirosis caused by *Leptospira* bacteria in 2020.

A total of 94 cases of canine leishmaniasis caused by *Leishmania protozoa* were diagnosed 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 with sandflies that act as intermediary hosts for the parasite.

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. Last year, the Finnish Food Authority diagnosed 15 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 2020, cat plague was found in four 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 2020, the Finnish Food Authority diagnosed a fatal pneumonia caused by the herpesvirus in one kitten. The Finnish Food Authority does not test for feline leukaemia virus (FeLV) and 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*. In 2020, a rare *Yersinia pseudotuberculosis* infection was diagnosed in an adult outdoor cat. These infections are usually contracted from rodents or birds caught by the cat.

A few cases of systemic infections caused by the protozoan *Toxoplasma gondii* occur in young cats each year. In 2020, the Finnish Food Authority found no infections. Freely roaming cats also often have roundworm and tapeworm infections. In 2020, the Finnish Food Authority tested 34 faecal samples from cats for giardia, all of which were negative. In addition, a rare infection caused by *Pseudamphistomum truncatum* flukes was diagnosed in an adult cat. Infections caused by this parasite have previously been diagnosed in wild animals in Finland (seals, racoon dogs), but they are extremely rare in pets. The animal is usually infected by eating raw cyprinid fish with parasite larvae. Chewing mite and ear mite infections are relatively common in feral cats.

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

Rabbits

A few cases of rabbit haemorrhagic disease (RHD), which was first found in wild and pet rabbits in Finland in 2016, are still diagnosed nearly every year. In 2020, 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. Three cases in pet rabbits, which had been diagnosed by laboratory tests conducted by a third party, were reported to the Finnish Food Authority. Additionally, the monthly reports from veterinarians contained 12 myxomatosis cases diagnosed by clinical symptoms. 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* fungal infections are diagnosed each year (two cases in 2020). Enteritis or cholangitis caused by coccidi protozoans was diagnosed in ten pet rabbits.

Figure 4. *Myxomatosis in a rabbit. Photo: Tiina Nokireki, the Finnish Food Authority.*

Salmonella in pets

In 2020, 21 salmonella strains were found in samples isolated from pets that were submitted to the Finnish Food Authority for confirmation and typing. The majority of salmonella infections in pets are asymptomatic and consequently unlikely to be detected. Seven infections were diagnosed in cats, one of which was of the serotype *S*. Derby, one *S enterica* ssp. *enterica* (-: v: 1,2) and five *S*. Typhimurium infections. *S*. Typhimurium was isolated in five dogs, *S*. Derby in one, and *S*.Agona in one. In addition, a strain belonging to the *Salmonella enterica* ssp. *arizonae* subtype was detected in three snakes, and S. Florida in one. Reptiles (snakes, lizards, turtles) typically carry strains of subspecies *arizonae*, *diarizonae* and *houtenae* in their intestines. *S*. Kisarawe was found in one lizard, and *Salmonella enterica* ssp. *salamae* subtype strain was found in another.

12 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 incidence 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.

A new animal disease in Finland, myxomatosis, was diagnosed in wild rabbits of the Helsinki Metropolitan Area in summer 2020. As in 2019, RHD (rabbit haemorrhagic fever) also caused high mortality in the wild rabbit population in the Helsinki Metropolitan Area, and one infected individual even had both viruses simultaneously. In the monitoring programme for CWD in cervids, Finland's second TSE case in an elk was found, this time in Laukaa. After a couple of summers with lower case numbers, 2020 was another peak year in the prevalence of tularemia. Cryptosporidiosis, or diarrhoea caused by a parasite of the *Cryptosporidium genus*, was identified as the cause of mortality in young squirrels.

Myxomatosis in rabbits finally spread to Finland

The first confirmed case of myxomatosis was diagnosed in a wild rabbit found dead in Espoo in July 2020. In July and September, another 18 cases were confirmed by the Finnish Food Authority, one of which was from Vantaa and the rest from Helsinki and Espoo. Typical findings in rabbits that had contracted myxomatosis included severe, purulent inflammation of the eyelids, which had often spread deeply into the eye, as well as scabby ulcers in the nose and ears. Infected individuals were often emaciated following a long period of illness. A marketing licence for vaccines against the virus was issued in 2020 shortly after its detection.

Myxomatosis

Myxomatosis is a disease in rabbits caused by the myxoma virus, which is one of the poxviruses (*Oryctolagus cuniculus*). This disease is not contagious to humans. Myxomatosis originates in North and South America, where local rabbits of the *Sylvilagus* genus are carriers of the virus. Unlike in European rabbits, the myxoma virus only causes a mild disease in American rabbit species. Through human action, the virus has spread widely to wild rabbit populations in Europe and Australia. In southern Sweden, myxomatosis has been present for a long time.

The myxoma virus causes a serious disease in both wild and tame rabbits, the symptoms of which include swelling and a purulent inflammation in the eyelids, swelling of the head and skin lumps. Skin tumours start as a swelling at the point of infection, after which the virus spreads to the rest of the body. Scabby lumps appear especially in the head and ears, and sometimes in other areas, too. Death may occur as soon as five to six days after infection, but rabbits with a milder form of the disease can live much longer. Kits are the most

susceptible to this disease and may show a peracute form of the disease, which results in sudden death without visible symptoms. The virus weakens the immune defence, making the animal vulnerable to secondary bacterial infections. A form of the disease affecting the respiratory tract is also known, in which no skin changes occur. The disease may cause extremely high mortality in a population.

The diagnosis is based on typical clinical symptoms and necropsy findings. The infection can be confirmed using molecular biology methods to detect the virus or its genome in tissue or swab samples. Blood can also be tested for virus antibodies.

The virus can be spread by insects, including mosquitoes and fleas. It can also be transmitted in direct contact between animals. The virus is excreted into eye and nose secretions, skin changes and possibly also sperm. The virus infects animals of all ages. Vaccines against myxomatosis are available.

Myxomatosis is an animal disease that must be reported without delay, and a veterinarian who suspects or diagnoses it must inform the official veterinarian in the municipality or the Regional State Administrative Agency.

Chronic wasting disease (CWD) monitoring programme detected a second TSE case

The three-year programme initiated to determine the prevalence of CWD continued in 2020. The aim is to examine a total of 3,000 cervids over these three years (2018–2020). In 2020, 588 wild cervids and 524 reindeer, or 1,212 cervids in total, were tested for CWD (Table B6). Of these, 1,081 met the criteria set for samples in the monitoring programme. A decision was made to continue the monitoring programme further in 2021. Actual CWD has never been detected in Finland. In 2018, however, a prion disease was diagnosed for the first time in Finland in an old elk found dead in Kuhmo. This disease was cervid TSE (transmissible spongiform encephalopathy). Another case of TSE was found in Laukaa in 2020 in an 18-year-old elk that was put down because it was ill. Both TSE cases have motivated intensive testing of elk close by the sites where they were found. In connection with the elk hunt in 2020–2021, the heads of 95 elk aged over 12 months were collected for the Finnish Food Authority's TSE research. No other infections were found.

The monitored species include the reindeer, Finnish forest reindeer, elk, white-tailed deer and roe deer. The monitoring programme uses as samples animals that are found dead, including animals involved in traffic accidents or killed by a predator, and animals that are put down due to a disease or that are aged over 12 months and found to be ill at slaughter. Samples are collected in all parts of the country. 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 2020, the vaccine baits (a total of 180,000 vaccines) were dropped from an aircraft in September. The incidence 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, or areas in which bait vaccines are spread. In 2020, the targeted number of samples was not reached. The aim of the Finnish Food Authority was to obtain 360 animal samples from the rabies bait vaccination area. A total of 306 foxes and raccoon dogs were sent in, out of which 292 animals provided brain samples for rabies testing and 234 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 72% of jaw bone samples.

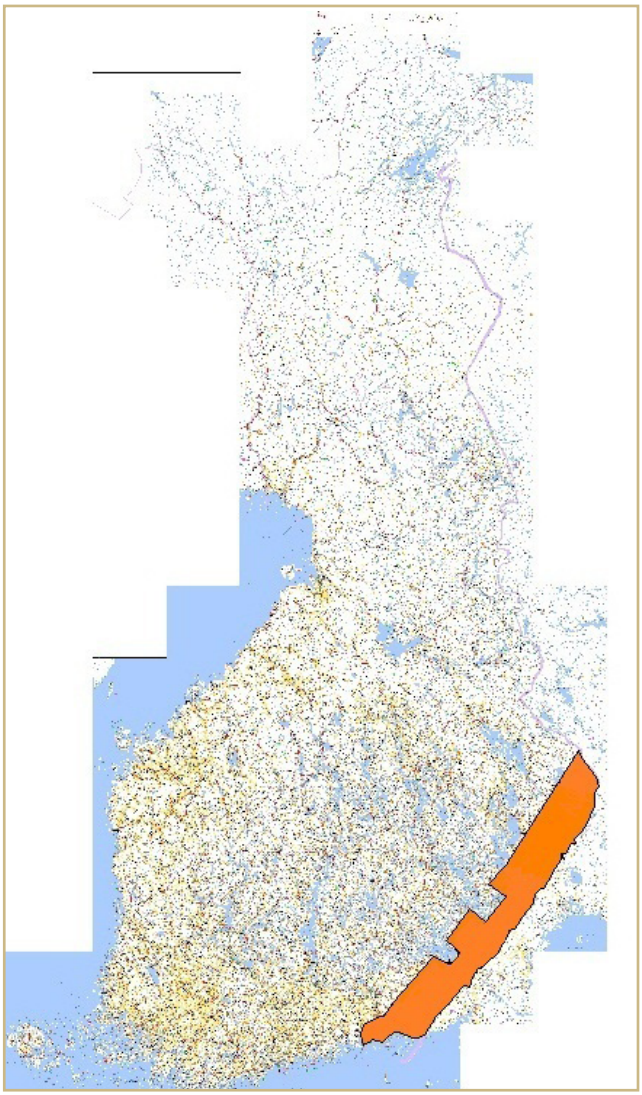


***Figure 5**. The zone in which rabies vaccine baits are dropped.*

In the whole country, 429 wild animals were collected in connection with rabies monitoring. Most of them were racoon dogs (250) and foxes (60). No cases of rabies were detected. In addition, 78 bats were also tested for rabies.

Table 14. *Animals tested for rabies for different reasons in 2020. No cases of rabies were detected.*

All samples examined, number of preliminary data results	Aggressive	Suspected shot	Neurological symptoms	Traffic accident	Put down - aggressive	Put down - illegally imported	Put down due to injury	Put down - other neurological symptoms	Put down sick	Put down healthy	Found dead	Preliminary data results/ positive	Samples examined/ pos.
Cat	0	0	1/0	0	1/0	0	1/0	2/0	0	0	0	5/0	5/0
Dog	0	0	0	0	1/0	8/0	0	1/0	0	0	1/0	11/0	11/0
Sheep	0	0	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Cow	0	0	1/0	0	0	0	0	1/0	1/0	0	0	3/0	3/0
Wolverine	0	0	0	0	0	0	0	0	0	0	2/0	2/0	2/0
Ferret	0	0	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Lynx	0	0	0	20/0	0	0	1/0	0	6/0	0	17/0	44/0	46/0
Bear	0	0	0	3/0	0	0	3/0	0	1/0	2/0	0	9/0	10/0
Fox	0	0	0	0	0	0	0	0	1/0	0	8/0	9/0	60/0
Bat	0	0	0	0	1/0	0	0	0	2/0	0	75/0	78/0	78/0
Weasel	0	0	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Badger	0	0	0	0	0	0	0	0	0	0	0	0	7/0
Pine marten	0	0	0	0	0	0	0	0	0	0	2/0	2/0	4/0
Otter	0	0	0	5/0	0	0	0	0	0	0	21/0	26/0	29/0
Racoon dog	1/0	0	0	2/0	1/0	0	0	0	2/0	0	6/0	12/0	250/0
Wolf	0	1/0	0	5/0	0	0	0	0	2/0	1/0	5/0	14/0	18/0
Wild boar	0	0	0	0	0	0	0	0	0	0	1/0	1/0	1/0
Total	**1/0**	**1/0**	**2/0**	**35/0**	**4/0**	**8/0**	**5/0**	**4/0**	**15/0**	**3/0**	**132/0**	**219/0**	**527/0**

Examinations on wild boar living in the wild

The threat of African swine fever persisted in 2020, 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 2020, a total of 937 samples from wild boar were received, which is more than the year before. The samples consisted of 23 wild boar that were found dead, killed in car accidents or put down due to illness, or fitted with GPS collars by the Natural Resources Institute Finland, as well as 914 animals shot by hunters. The Natural Resources Institute Finland estimated that the average population size in January 2021 was around 3,426 individuals. The Finnish Wildlife Agency received reports of 1,195 wild boars shot by hunters in 2020, whereas this figure was 863 in 2019. Overall, a very high proportion of the samples submitted to the Finnish Food Authority are obtained from hunted wild boar (78% in 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. None of the diseases that the samples were tested for were detected.

Serum samples from wild boar living in the wild were tested for *Brucella* antibodies as part of the monitoring in 2019, and in 2020, samples from the organs of ten serologically positive animals were cultured. *Brucella suis* biovar 2 was found in the organs of one wild boar. This animal had been shot in Uusimaa in October 2019. For more detailed information about samples from wild boars living in the wild tested in 2012–2020, see Table B14.

Table 15. *Number of samples collected from wild boars by region in 2020*

Region	Tested animals
South Karelia	434
Kymenlaakso	191
Uusimaa	94
North Karelia	59
South Savo	36
Kanta-Häme	23
Pirkanmaa	23
North Ostrobothnia	18
Päijät-Häme	15
Central Finland	13
Satakunta	8
North Savo	7
South Ostrobothnia	6
Southwest Finland	5
Ostrobothnia	3
Åland	1
Central Ostrobothnia	1
Kainuu	0
Lapland	0
Total	**937**

Highly pathogenic avian influenza was not detected in wild bird surveillance

Increasing numbers of avian influenza cases were observed in Europe in autumn 2020, mainly caused by the highly pathogenic H5N8 virus. Cases were found in many bird species, especially in barnacle geese, greylag geese and Eurasian wigeons. The incidence of avian influenza in Finland is monitored by examining wild birds that are found dead. A total of 222 wild birds were examined throughout the year. No highly pathogenic avian influenza was detected in Finland in 2020. Samples from three birds were found to contain influenza A virus, however not a type that causes serious disease (not types H5 or H7). See Table B14 in Appendix for more detailed information about tests for avian influenza in wild birds in 2011–2020.

Two separate outbreaks of highly pathogenic paramyxovirus 1 (PMV1) were diagnosed in pigeons. One of these was found at a shopping centre in Porvoo, and the other in an industrial estate in Kouvola. A number of birds had died over a short period of time, and weak, unsteady individuals had also been seen. PMV-1 typically causes mortality in pigeons in winter, and the 2020 cases were also diagnosed in January and December. While PMV-1 is not dangerous to humans, it causes Newcastle disease in poultry.

Echinococcus multilocularis-free status retained, Echinococcus canadensis is spreading geographically

Small predator samples from foxes and raccoon dogs are tested for *Echinococcus multilocularis*. *Echinococcus multilocularis* has never been detected in Finland, which means that Finland is considered a country free of *E. multilocularis* in the EU. In 2019, 526 animals were tested for this parasite (216 foxes and 310 raccoon dogs). *E. multilocularis* surveillance in Southern and Southwest Finland is conducted in cooperation with the regional offices of the Finnish Wildlife Agency. Small predators examined as part of rabies monitoring are also tested for *E. multilocularis*.

Echinococcus canadensis, whose intermediate hosts are cervids and definitive hosts wolves or dogs, occurs primarily in Eastern Finland (Eastern Lapland, Kuusamo, Kainuu, North Karelia) but it has been spreading westwards in recent years. In 2020, this parasite was detected in 37% of wolves (11 positive out of 30 tested), which is slightly more than in 2019 (24%). In practice, positive cases were now found throughout the wolf range: six were found in the western half of the country extending from south of Oulu to Southwest Finland, and the remaining seven in the eastern part from Kuusamo level to Leppävirta in Savo. Three cases of *Echinococcus canadensis* were confirmed in reindeer (see also Chapter 7, Reindeer diseases). One infection was detected in a female elk shot in Siikajoki. The gradual spread of *E. canadensis* towards western and southern Finland stresses the importance of appropriate processing of elk slaughterhouse waste throughout Finland. 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 29 wild animals, which is clearly less than in 2019 (57 cases). Ten cases were diagnosed in racoon dogs, and the same number in foxes. A scabies infection was also diagnosed in seven lynx. Not only predators but also other species are susceptible to scabies. In 2020, a hedgehog found in Pirkanmaa had a severe case of scabies. Most of the animals with scabies were found in Southern Finland (Southeast Finland, Uusimaa, Häme), but also from North Karelia and Tornio area in Lapland. Scabies cases were diagnosed in all seasons.

Tularemia became more common once again

In 2020, a high number of hares were obtained for testing (34 blue hares and 154 brown hares). The proportion of blue hares among the tested lagomorphs increased slightly from the year before to 18% in 2020 (11.5% in 2019). Tularemia once again became more prevalent after a few years with fewer cases. A total of 27 cases of tularemia were confirmed by the Finnish Food Authority, of which 22 (81%) in brown hares and the remaining five in blue hares. Most cases (85%) occurred in the late summer and autumn, or between July and September. As before, the cases concentrated in areas known for the occurrence of tularemia in Kymenlaakso (12 cases), Central Finland (6 cases) and Oulu region (6 cases). Two cases were found in Western Lapland and one in Satakunta. Other infectious pathogens in hares were the *Toxoplasma gondii* parasite (10 cases) and the bacteria *Yersinia pseudotuberculosis* (14 cases), *Pasteurella multocida* (10) and *Listeria monocytgenes* (3). 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 2020.

Cryptosporidiosis in squirrels

In late summer and autumn 2020, an unusually large number (12) of young squirrels that had died spontaneously were sent in as samples. Common findings in the squirrels were diarrhoea, severe dehydration and emaciation. Immunofluorescence staining showed a large number of cryptosporidium (*Cryptosporidium* sp.) in intestinal samples. The species was not *C. parvum*. At the time of writing of this report, the precise identification has not been completed. In at least one case, there was a strong suspicion of humans looking after a sick squirrel having contracted a cryptosporidium infection from the patient. They had symptoms of diarrhoea, which indicates that the cryptoporids in the squirrels are zoonotic. These squirrels were found in different parts of the country, mostly in southern Finland but also in Joensuu and Oulu.

Cause of death and disease monitoring of large predators

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

For the cause of a disease or death monitoring, whole carcasses of 3 wolverines, 56 lynx, 18 wolves and 11 bears were obtained from different parts of the country. While the large majority of large carnivore samples has previously been obtained from Eastern Finland, the situation had evened out in 2020. The largest number of samples were received from the Finnish Wildlife Agency's operating areas in Uusimaa (13) and Southeast Finland (13). Ten samples were obtained from North Karelia.

One of the wolverines had been shot illegally, one was found partially eaten and its cause of death could not be confirmed, and one was a stillborn pup.

Of the lynx, 71% had been killed in traffic accidents. Scabies (*Sarcoptes scabiei* mite) was found in 12.5%. Two cubs had starved, and a systemic infection caused by the *Yersinia pseudotuberculosis* bacterium was diagnosed in one. One young male had been killed by another large carnivore in September. The remaining lynx had bruises or leg injuries which had caused their death or because of which they had been put down.

Three of the bears died in collisions with trains, and one was hit by a car. Two bears had caught their front paws in a trap and had to be put down. One bear had had one its front legs completely amputated half-way up the forearm. Three bears had been put down by an order of the police because they had repeatedly come close to human settlements. Two of these bears were females and one male, and they weighed between 48 and 65 kg. One small cub that had starved to death was found in May.

Six wolves had been hit by cars. In addition, the injuries of one wolf found dead in the ditch indicated a collision with a car. Three wolves had been put down by order of the police because they had repeatedly come close to human settlements. Six wolves were found to have been

shot illegally. Three of these were found dead. The other three wolves had to be put down because of a leg injury, which in closer examination turned out to be the result of a previous shooting. Two old wolves that had died naturally were found in the forest. One had died from a bite, while the other was emaciated and suffered from infections caused by both external and internal parasites. The teeth of both wolves were well worn, and the animals had arthrosis.

Bacterial infections in blue tits were back, salmonella was found at bird feeders

Infections caused by the *Suttonella ornithocola* bacterium were first diagnosed in Finland in 2017. Since then, no new cases have been found until spring 2020. In April and May 2020, sick or dead blue tits were reported to the Finnish Food Authority. Around the same time, news about unusually high mortality in blue tits, which was linked to *S. ornithocola* infections, came from Germany. Two blue tits obtained from Turku were diagnosed with an infection caused by *S. ornithocola* in their lungs. *S. ornithocola* was also detected in the intestine of a blue tit found dead in Suomussalmi. This bacterium typically cause focal pneumonia in tits. It was originally discovered in the United Kingdom in the early 2000s. The outbreaks appear to occur in all countries between March and May in spring.

Salmonellosis, or crop and systemic infections caused by the salmonella bacterium (*Salmonella Typhimurium*) occurred in fairly high numbers in small birds in the late winter, mainly in March and April. At first, cases were mainly reported from Southern Finland, but in late April and May, cases were found in Northern Finland as far north as Kittilä. As in previous years, the infected birds were Eurasian bullfinches and common redpolls found at bird feeders, and also Eurasian siskins in Southern Finland.

Cases of trichomonosis, an infection of the crop affecting small birds caused by *Trichomonas gallinae* parasites, were identified in European greenfinches at two locations and in one bullfinch. Trichomonosis was also diagnosed in a common wood pigeon and a sparrowhawk. The sparrowhawk in question was also diagnosed with salmonellosis (*Salmonella* Typhimurium), and it had a severe infection of the mouth and oesophagus. The trichomonosis cases were found in different parts of Finland, which shows that the parasite has spread practically across the country.

Avian chlamydosis (caused by *Chlamydia psittaci*), a zoonotic disease which can also be contracted by humans, was diagnosed in two magpies and one yellowhammer in 2020. 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.

Lead poisonings in eagles and swans

Five white-tailed eagles were found dead due to lead poisoning in 2020, which was less than in 2019 (eight). A high level of lead was also found in the liver of one golden eagle. The highest number of lead poisonings, or nine cases, was found in whooper swans. As many as four of them were found in the same water system in Suonenjoki, which is close by a shooting range. Swans that died of lead poisoning have also been found in the same location in previous years. Three cases were found in Mäntsälä. Plenty of lead pellets may accumulate in the bottom sediment over time near shooting ranges and in popular hunting waters. Swans may inadvertently swallow lead shotgun pellets to use as gastroliths, after which the pellets start slowly dissolving in the bird's stomach. Eagles can end up ingesting a toxic amount of lead by

eating the carrion of shot animals that contain lead shotgun pellets or bullet splinters. Lead dissolves quite quickly in a raptor's stomach.

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 every year. In 2020, 634 reports were made, which is a record-breaking number. The observations reflect relatively well the picture of diseases formed based on animal samples, and to some extent also population densities. Observations were obtained from all parts of the country. The highest number of reports by far came from Uusimaa (276), followed by North Ostrobothnia (77 pcs) and Häme (66 pcs). Reports on different birds were submitted 250 times, and 133 of these reports concerned swans. Swans were observed in all months, but the greatest concentration of reports was recorded during the spring migration between March and May (72). Reports of lagomorphs were clearly the most common among mammals (224), followed by seals (34), cervids (30), squirrels (19) and otters (18). The reporting activity spiked during two periods: the spring migration of birds in May (81) and the peak season for rabies and rabbit diseases in August (120). The viral diseases that were rampant among rabbits in the Helsinki Metropolitan Area in 2020 were reflected as reports of dead rabbits in July (12), August (34) and September (19). A high number of reports on dead brown hares was also received from Uusimaa (59).

Appendix A: Incidence of selected animal diseases in Finland

Table A1. *Occurrence of selected multiple species diseases in Finland in 2020.*

Animal disease	Primary target animals	Zoonosis *	Last detected
Aujeszky's disease (pseudorabies)	Pig, ruminants, dog, cat Wild boar		Never 2019 [1), 4)]
Bluetongue	Ruminants		Never
Brucellosis		x	
▪ *B. abortus*	Ruminants		1960
▪ *B. melitensis*	Small ruminants		Never
▪ *B. suis*	Pig		Never
▪ *B. suis* bv.2	Wild boar		2019 [1)]
Echinococcosis		x	
▪ *E. multilocularis*	Fox, raccoon dog, rodents		Never
▪ *E. canadensis*	Cervids, dog, wolf		2020
Heartwater	Ruminants		Never
Tularemia	Blue and brown hare, rodents, birds	x	2020
Rinderpest (cattle plague)	Ruminants		1877
Leptospirosis	Cattle, 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	2020
Foot-and-mouth disease	Cloven-hoofed animals		1959
Trichinellosis		x	
▪ Livestock	Pig, farmed wild boar, horse		2017 [5)]
▪ Other mammals	Predators, wild boar		2020
TSEs (Transmissible Spongiform Encephalopathies)			
▪ BSE	Cattle	x	2001
▪ Classical scrapie	Sheep, goat		2005 [6)]
▪ Atypical scrapie	Sheep, goat		2020
▪ CWD	Cervids		Never
Vesicular stomatitis	Ruminants, horse, pig	x	Never
West Nile Fever	Birds, horse	x	Never

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

[1)] In wild boars living in the wild

[2)] Clinical disease in four dogs

[3)] In a zoo animal

[4)] Antibodies

[5)] In a farmed wild boar

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

Table A2. *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	2020
Bovine anaplasmosis	Never
Bovine genital campylobacteriosis (vibriosis)	Never
Bovine spongiform encephalopathy (BSE)	2001
Bovine viral diarrhoea (BVD)	2010
EBL, enzootic bovine leucosis	2008 [1)]
Bovine tuberculosis	1982
Bovine babesiosis	2020
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	2020
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 tyhpoid (*S.* Gallinarum)	Never
Highly pathogenic avian influenza ▪ Poultry ▪ Other birds in captivity ▪ Wild birds	 Never 2016 2018
Marek's disease	2020 [1)]
Low pathogenic avian influenza (in poultry)	Never
Mycoplasma gallisepticum infection (avian mycoplasmosis)	2019 [1)]
Mycoplasma meleagridis infection	Never
Mycoplasma synoviae infection (avian mycoplasmosis)	2020 [1)]
Newcastle disease ▪ Poultry ▪ Other birds in captivity ▪ PMV-1 infection in wild birds	 2004 2013 2020
Psittacosis, also known as parrot fever, and ornithosis (avian chlamydiosis)	2014 [1)]
Avian infectious laryngotracheitis (ILT)	2020 [1)]
Avian infectious bronchitis (IB)	2020
Pullorum disease (*S.* Pullorum)	1961

[1)] Only in non-commercial poultry

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)] 2020
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)	2018
Viral haemorrhagic septicaemia (VHS)	2012 [1)]
Koi herpesvirus (KHV)	Never
Bacterial kidney disease (BKD) in inland water area	2018
Salmon fluke infection (*Gyrodactulus salaris*) in the conservation area of Upper Lapland	1996
Infectious pancreatic necrosis (IPN) in inland water area	2020 [2)]
Salmonid alphaviruses (SAV)	Never
Spring viraemia of carp (SVC)	Never
White spot disease in crustaceans (WSD)	Never
Crayfish plague	2020 [3)]
Marteiliosis in molluscs	Never
Bonamiosis in molluscs	Never

[1)] In the VHS restriction area of Åland [2)] Genogroup 2 infection [3)] In wild crayfish

Table A7. *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)	2020
Equine influenza	2012
Equine infectious anaemia (EIA)	1943
Equine piroplasmosis (EP)	2017 [1)]
Equine rhinopneumonitis/equine viral abortion	2020
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	2020
European foulbrood	2019
Varroatosis	2020
Nosemosis	2020
Acarapis woodi (honey bee tracheal mite, acarapisosis)	2016
Small hive beetle (*Aethina tumida*)	Never
Tropilaelaps mites	Never

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

This Appendix contains data on animal disease surveillance conducted in 2011–2020, 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. Surveillance of Schmallenberg virus antibodies began in 2012 with the testing of blood samples collected from suckler cows and expanded in 2013–2014 to testing bulk milk samples to provide information on the spread of the virus in Finland. The surveillance of bluetongue started in 2007–2008. Testing of bulk milk samples from dairy cows for bluetongue disease was discontinued in 2015, but the testing of suckler cow samples continued.

Table B1. *Serological testing of bulk milk samples from dairy cows in 2011–2020.*

Year	BVD		IBR	Leukosis	Bluetongue	Schmallenberg	
	Samples (pcs)	Positive (%)	Samples (pcs)	Samples (pcs)	Samples (pcs)	Samples (pcs)	Positive (pcs)
2011	3 302	0.09 [1)]	1 449	1 449	860	0	0
2012	2 963	0.10 [1)]	1 312	1 312	0 [2)]	0	0
2013	1 800	0.05 [1)]	1 292	1 292	795	991	374
2014	1 277	0	1 277	1 277	849	615	108
2015	989	0	989	989	0	0	0
2016	920	0	920	920	0	0	0
2017	715	0	715	715	0	0	0
2018	1 255	0	1 255	1 255	0	1 149	218
2019	1 344	0	1 344	1 214	0	0	0
2020	1 298	0	1 298	1 298	0	0	0

[1)] BVD seropositive sample, old infection

[2)] The surveillance of bluetongue disease in dairy cattle was rescheduled to be conducted using samples collected in spring 2013

Table B2. *Serological testing of suckler cows in 2011–2020.*

Year	BVD		IBR	Bluetongue		Schmallenberg	
	Samples (pcs)	Positive (%)	Samples (pcs)	Samples (pcs)	Positive (pcs)	Samples (pcs)	Positive (pcs)
2011	4 661	1 [1)]	4 661	4 661	0	0	0
2012	5 096	1 [1)]	5 096	5 096	0	1 093	93
2013	2 485	1 [1)]	2 485	2 485	1 [2)]	97	8
2014	7 915	1 [3)]	7 915	7 915	1 [4)]	0	0
2015	8 141	0	8 141	8 141	1 [4)]	0	0
2016	7 901	0	7 901	7 901	0	0	0
2017	6 885	0	6 885	6 885	0	0	0
2018	1 832	0	1 832	1 832	1 [5)]	472	93
2019	1 970	0	1 970	1 970	0	0	0
2020	2 450	0	2 450	2 450	0	0	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 monitoring tests for brucellosis in 2011–2020. All test results were negative.*

Year	Sheep	Goat	Cattle	Cattle	Pig
	Samples (pcs)	Samples (pcs)	Bulk milk samples (pcs) [1)]	Blood samples (pcs)	Samples (pcs)
2011	3 036	1 868	0	823	2 079
2012	3 183	1 853	88 [2)]	1 245	2 126
2013	2 709	534	130	1 072	2 079
2014	4 156	160	869	715	2 076
2015	4 501	6	929	681	1 297
2016	4 295	52	908	681	2 055
2017	3 856	16	91 [2)]	439	1 711
2018	3 931	0	1 336	391	1 484
2019	4 512	243	45[2)]	459	1 986
2020	3 434	15	1 335	215	1 637

[1)] Monitoring 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 in cattle in 2011–2020.*

Year	Number of tested samples *
2011 [1)]	56 187
2012	38 718
2013 [2)]	15 911
2014	10 778
2015	11 576
2016	11 234
2017	11 596
2018	11 316
2019	11 289
2020	11 251

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

Table B5. *Surveillance of scrapie in sheep and goats in 2011–2020.*

Year	Sheep		Goat	
	Samples (pcs)	Number of pos. holdings/samples	Samples (pcs)	Number of pos. holdings/samples
2011	1 251	0/0	217	0/0
2012	1 387	1/1 [1)]	200	0/0
2013	1 431	1/1 [1)]	276	0/0
2014	1 305	1/1 [1)]	156	0/0
2015	1 325	0/0	149	0/0
2016	1 398	2/2 [1)]	137	0/0
2017	1 673	0/0	205	0/0
2018	1 593	2/2 [1)]	282	0/0
2019	1 665	3/3 [1)]	270	0/0
2020	1 644	1/1 [1)]	291	0/0

[1)] Atypical scrapie (Nor98)

Table B6. *TSE testing of other animals in 2020. TSE was detected in one elk.*

Species	Number of animals
Fur animals	
Mink	51
Fox	35
Racoon dog	15
Wild animals	
Elk (*Alces alces*)	200
White-tailed deer (*Odocoileus virginianus*)	125
Roe deer (*Capreolus capreolus*)	255
Finnish forest reindeer (*Rangifer tarandus fennicus*)	7
Red deer (Cervus elaphus)	1
Free ranging	
Reindeer (*Rangifer tarandus tarandus*)	624
Total	**1 313**

Pigs

Table B7 includes the results of surveillance and health monitoring programmes, disease diagnoses and import and export tests on production pigs. All test results were negative in 2020. Clinical leptospirosis has never been diagnosed in livestock in Finland. The results of brucellosis monitoring have been reported separately (Table B3).

Table B7. *Serological tests for viral diseases and leptospirosis in pigs in 2011–2020.*

Year	Aujeszky's disease	TGE	Swine fever	Leptospirosis (pos. results in parentheses)	SVD	PRRS	ASF
2011	2 599	2 883	2 818	100 (0)	1 264	3 754	128
2012	2 769	3 361	2 678	97 (0)	699	3 815	1 137
2013	2 649	2 986	2 429	39 (0)	26	4 058	1 178
2014	2 725	2 740	2 437	2 (0)	0	3 515	1 227
2015	2 320	2 332	2 050	0	0	2 909	180
2016	2 140	1 867	1 929	0	0	2 455	24 *
2017	2 387	1 917	2 029	0	0	2 661	0 *
2018	2 328	2 096	2 086	0	0	2 504	0 *
2019	2 473	2 050	2 195	0	0	2 832	0 *
2020	2 895	2 005	2 707	5 (0)	0	2 619	0 *

* Surveillance emphasises virological surveillance instead of serological surveillance

Poultry

Table B8. *Results of serological tests for diseases in poultry [1] in 2011–2020. The table includes results of surveillance and health monitoring programmes, disease diagnoses and import tests.*

Year	Avian influenza		Newcastle disease		APV	
	Samples (pcs)	Number of pos. holdings/ samples	Samples (pcs)	Number of pos. holdings/ samples	Samples (pcs)	Number of pos. holdings/ samples
2011	3 011	1/11 [2]	9 289	2/48 [3] [4]	9 521	1/63 [4]
2012	3 223	2/8	10 423	3/42 [3] [4]	10 078	1/60 [4]
2013	2 712	1/3 [2]	10 686	4/910 [3] [4] [5] [6]	9 921	1/53 [4]
2014	4 318	2/12 [2]	11 606	6/249 [3] [4]	5 933	3/17 [4]
2015	5 245	1/1 [2]	10 613	2/14 [3] [4]	2 592 [7]	2/41 [4]
2016	3 902	0/0	9 177	4/10 [3] [4]	1 728	3/43 [4]
2017	4 369	0/0	9 591	3/6 [3] [4]	2 244	4/50 [4]
2018	4 583	0/0	8 899	1/3 [4]	2 700	x/x [8]
2019	4 322	0/0	8 523	0/0	2 021	x/x [8]
2020	4 175	1/9 [2]	8 667	0/0	234	x/x [8]

[1] Poultry refers to all birds that are raised or kept in captivity for the production of meat or eggs and other products for consumption, introduction of wildfowl, or 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
[7] The EU surveillance programme for APV ended in 2015
[8] Serologically positive results, no disease symptom

Sheep and goat

Table B9. *Samples collected in the health control programme for maedi-visna in sheep and CAE in goats in 2011–2020. Maedi-visna or CAE were not detected.*

Year	Sheep	Goat	Total samples (pcs)
	Number of holdings tested	Number of holdings tested	
2011	287	30 [1]	23 828
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

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

Fish and crayfish

Table B10. *Surveillance of viral fish diseases in 2010–2020.*

Year	IHN, IPN, VHS		ISA		SAV	KHV	SVC	Number of fish farms where the virus was isolated							
	Inland farm/ tests [1]	Marine area farm/ tests [1]	Inland farm/ tests	Marine area farm/ tests	Inland farm/ tests	Inland farm/ tests	Inland farm/ tests [1]	IHN	IPN marine area	IPN inland area [1]	VHS [2]	ISA	SAV	KHV	SVC
2011	44/2 588	38/1 256	0	0	0	0	1/12	0	6	0	2	0	0	0	0
2012	68/5 406	49/1 332	2/320	4/95	0	0	0	0	4	6	1	0	0	0	0
2013	55/3 740	46/1 870	0	1/20	35/1 050	0	0	0	12	6	0	0	0	0	0
2014	54/2 480	41/1 347	9/603	0	25/750	0	0	0	10	6	0	0	0	0	0
2015	62/2 570	45/1 382	1/60	0	45/1 179	0	0	0	19	4	0	0	0	0	0
2016	53/2 753	38/1 164	1/10	0	32/1 476	0	0	0	12	11	0	0	0	0	0
2017	55/2 591	18/991	7/240	0	30/1 500	0	2/25	4	16	13	0	0	0	0	0
2018	64/2 544	30/1 038	6/125	0	35/1 700	0	0	3	24	13	0	0	0	0	0
2019	65/2 966	52/2 082	1/30	0	11/330	0	0	0	12	12	0	0	0	0	0
2020	60/2 546	43/2 224	1/70	0	22/1 025	0	0	0	24	2	0	0	0	0	0

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

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

Table B11. *Surveillance of bacterial kidney disease (BKD) in fish in 2011–2020.*

Year	Tests inland water area	BKD cases
	Farms/fish	Inland water area
2011	84/6 748	4
2012	79/5 830	3
2013	64/5 128	3
2014 [1)]	73/4 627	2
2015	60/3 617	3
2016	71/3 910	1
2017	59/3 946	0
2018	48/3 525	7
2019	44/3 285	0
2020	50/3 443	1

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

Table B12. *Surveillance of Gyrodactylus salaris in 2011–2020. All test results were negative.*

Year	Tenojoki Tana [1)]	Näätämöjoki River [1)]	Paatsjoki River [1)]	Paatsjoki River, farmed fish		Tuulomajoki River [1)]
	Salmon	Salmon	Grayling	Others	Arctic chars	Grayling
2011	65	156	15	120	30	30
2012	100	120	15	100	0	30
2013	100	120	15	120	30	0
2014	100	120	15	120	30	30
2015	100	120	15	120	0	30
2016	101	120	15	120	10	0
2017	30	120	15	60	0	10
2018	99	120	15	60 (brown trout) [2)]	22	0
2019	101	118	15	60	31	22
2020	103	121	15	66	32	31

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

Table B13. *Other examinations of fish samples in 2020, by reason for the examination. For a summary of disease diagnosis results see Figure 2, other test results were negative.*

Fish, reason for examination	VHS/IHN/IPN		ISA		SAV		BKD		Other tests	
	"marine area farms/ fish"	"inland waters farms/fish"	"marine area farms/ fish"	"inland waters farms/fish"	"marine area farms/ fish"	"inland waters farms/fish"	"marine area farms/ fish"	"inland waters farms/fish"	"marine area farms/ fish"	"inland waters farms/fish"
Eradication programmes (IHN)	3/437	4/347 *	0	0	0	0	0	0	0	0
Eradication programmes (VHS)	22/2 355	0	0	0	0	0	0	0	0	0
Disease diagnosis, farmed fish	4/97	28/487	0	0	0	0	1/70	3/133	10/431	42/2 301
Disease diagnosis, wild fish	15	40	0	0	0	0	0	0	0	0
Export (all countries)	0	6/900	0	4/110	0	0	0	4/360	0	0
Capturing wild fish and gametes for farming	4/575	5/749 **	0	0	3/256	3/670 **	4/575	4/108	0	0

* Includes wild fish

** Includes sentinel fish

Wild animals

Table B14. *Examinations of samples from wild boar living in the wild in 2012–2020. 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

* Only samples from regions other than Southeast Finland were examined

Table B15. *Results of surveillance of avian influenza in wild birds in 2011–2020. All viruses found before 2016 and the viruses in 2019 and 2020 were low pathogenic.*

Year	Number of birds examined	Positive birds (PCR/virus isolation)
2011	86 [1)]	0/0
2012	141	1/1
2013	133	0/0
2014	181 [2)]	9/9 [3)]
2015	133 [4)]	1/0
2016	208	15/1 [5)]
2017	316	7/0 [5)]
2018	195	4/3
2019	174	3 [6)]/0
2020	222	3/1

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

Table B16. *Occurrence of Trichinella spp. in wild animals in Finland in 2020.*

Species	Number of Trichinella positive animals	Number of animals tested	Proportion of positive animals %	Occurrence in 2010–2020 %
Racoon dog	64	197	32.5	37.5
Fox	36	211	17.1	32.5
Badger	3	9	33.3	12.0
Pine marten	3	7	42.9	15.1
Otter	0	38	0.0	4.1
Bear	8	293	2.7	5.0
Lynx	27	56	48.2	45.4
Wolf	11	29	37.9	36.7
Wolverine	0	2	0.0	56.0
Goshawk	1	12	8.3	4.1
Wild boar	1	1152	0.09	0.6

Appendix C: Numbers of animal holdings and animals in Finland in 2020

Terrestrial animals

Terrestrial animals	Animals	Farms	Bee hives	Bee farms
Cattle	835 664	9 502		
Pigs (commercial production)	1 087 666	958		
Bisons	169	10		
Sheep	142 500	3 777		
Goats	8 801	1 001		
Bees			82 200	8 742
Laying hens	3 811 547	973		
Broilers	8 507 327	141		
Turkeys	267 986	53		
Other commercial poultry	27 597	411		
Camelids		131		
Horses	74 300	16 000		
Dogs	700 000			

Aquatic animals

Aquatic animals	Production [1]		Farms
	Farmed [2]	Wild [3]	
Fish	15 300 T	163 780 T	381
Crayfish		135 T	

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

Appendix D: Disease-free statuses and additional guarantees granted to Finland in 2020

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

OIE = World Organisation for Animal Health

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