

SURVEILLANCE OF INFECTIOUS DISEASES

IN ANIMALS AND HUMANS IN SWEDEN 2022

*Chapter excerpt:
Infectious diseases in wild boars*



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Cover: A cultivation of *Salmonella* at the Public Health Agency of Sweden.
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Reporting guidelines: Reporting guidelines were introduced in 2018 for those chapters related to purely animal pathogens. The guidelines build on experiences from several EU projects, and have been validated by a team of international experts in animal health surveillance. The aim is to develop these guidelines further in collaboration within the global surveillance community and they have therefore been made available in the form of a wiki on the collaborative platform GitHub (<https://github.com/SVA-SE/AHSURED/wiki>). Feel free to contribute!

Layout: The production of this report continues to be accomplished using a primarily open-source toolset. The method allows the source text to be edited independently of the template for the layout which can be modified and reused for future reports. Specifically, the chapter texts, tables and captions are authored in Microsoft Word and then converted to the LaTeX typesetting language using a custom package written in the R software for statistical computing. The package uses the pandoc document conversion software with a filter written in the lua language. Most figures and maps are produced using R and the LaTeX library pgfplots. Development for 2022 has focused on generalising the R package to accommodate conversion into formats other than LaTeX and PDF, with a focus on markdown files which can be published as HTML websites using the Quarto publishing system. The report generation R package and process was designed by Thomas Rosendal, Wiktor Gustafsson and Stefan Widgren.

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Infectious diseases in wild boars

BACKGROUND

Wild boars are susceptible to contagious diseases that affect domestic pigs, and they can therefore play a role in spreading disease to and from domestic pigs. For example, Aujeszky's Disease (AD) is present in several wild boar populations in the EU, which has led to sporadic transmissions of the disease to domestic pig herds. Wild boars were involved in the spread of Classical swine fever (CSF) during outbreaks in domestic pigs in several EU countries in the 1990s and early 2000s. In recent years, African swine fever (ASF) has spread in Europe and in 2022, cases of the disease were reported in the wild boar population of 11 EU countries. Since 2020, the pig-adapted *Salmonella* Choleraesuis is known to be regionally present in the wild boar population. The Swedish wild boar population is increasing rapidly and is now estimated to be 250 000–300 000 animals. Established wild boar populations are found primarily in the southern parts of the country, but the northern border of the wild boar's range in Sweden is extending and it has, at present, passed the level of the river Dalälven. Surveillance of infectious diseases in Swedish wild boar has been ongoing since 2000. The purposes of this monitoring are to provide evidence that Sweden is free from several important infectious pig diseases and to enable early detection of introductions of these diseases into the country. Enhanced monitoring of salmonella in wild boar is in place nationally (see chapter "Salmonellosis", page 80).

LEGISLATION

Several diseases capable of infecting wild boar, including ASF, CSF, AD, brucellosis and Porcine reproductive and respiratory syndrome (PRRS), are included in the Swedish Act of Epizootic Diseases (SFS 1999:657 with amendments) and are therefore notifiable upon clinical suspicion. If any of these diseases are suspected or confirmed, measures will be taken to control the disease and to prevent further spread.

SURVEILLANCE

Passive surveillance

Any sick or dead wild boar that is reported to have shown clinical signs, or found to have post mortem lesions consistent with a disease included in the Swedish Act of Epizootic Diseases, is sampled and investigated.

Additionally, an enhanced passive surveillance programme for ASF in wild boars has been in place since 2013. Anyone who finds a dead wild boar can voluntarily submit the whole carcass or samples from it to the National Veterinary Institute (SVA) for post-mortem examination. In case a finding is reported and the reporting person is unable to assist with sampling, a veterinarian is appointed by the Swedish board of Agriculture (SBA) to visit the carcass and collect the required samples. All submitted samples are analysed for the presence of ASF virus genome with PCR, whether lesions suggestive of the disease are present or not.

Since late 2020, wild boars submitted to SVA are also examined for the presence of *Salmonella* by tissue culture (see chapter "Salmonellosis" (page 80).

Active surveillance

Since the year 2000, samples from hunted wild boars throughout Sweden have been collected for surveillance purposes every year. Hunters voluntarily collect blood samples when free-living wild boars are harvested. The samples are sent to SVA for analysis for the presence of antibodies to infectious agents that are of importance to domestic pig production. In 2022, the samples were used for the active surveillance of AD and CSF. The samples were tested for antibodies against AD and CSF using the ELISA kits SVANOVIR[®] PRV-gB-Ab ELISA (Svanova, Uppsala, Sweden) and IDEXX HerdChek[®] CSFV Ab Test Kit (IDEXX Laboratories, Westbrook, Maine, United States). The surveillance was designed to detect these diseases at a 1% prevalence with a 99% confidence level. To reach this level of confidence, it was calculated that 500 samples would need to be submitted for analysis.

Since late 2020, hunters have also had the opportunity to submit tissue and faecal samples from hunted wild boars for *Salmonella* culturing. More information about this surveillance can be found in the chapter "Salmonellosis" (page 80).

RESULTS

Passive surveillance

Samples from 78 wild boars that were found sick or dead were submitted by members of the general public for examination for the presence of ASF virus genome in 2022. The number of wild boars submitted annually over the last three years represents an approximate doubling in the number of animals submitted for analysis as compared to previous years. This increase is likely a result of several awareness campaigns that were carried out to increase voluntary reporting of dead wild boar findings, as well as heightened awareness and concern about ASF among the general public as a direct result of the spread of the disease in the EU in recent years. The use of veterinarians through the SBA have further supported the increased sampling of wild boar found dead. The recent finding of *Salmonella* Choleraesuis in populations of wild boar in some areas of the country (see chapter "Salmonellosis", page 80) has likely also increased public interest in submitting dead wild boars for post mortem examination.

The geographic distribution of the sampled dead wild boar is shown in Figure 64. All samples from the submitted wild boar were negative for ASF. Additional post mortem findings in these wild boars are reported in the chapter "Post mortem examinations in wildlife" (page 151) in this report. The results of the *Salmonella* surveillance in wild boar are reported in the chapter "Salmonellosis" (page 80).

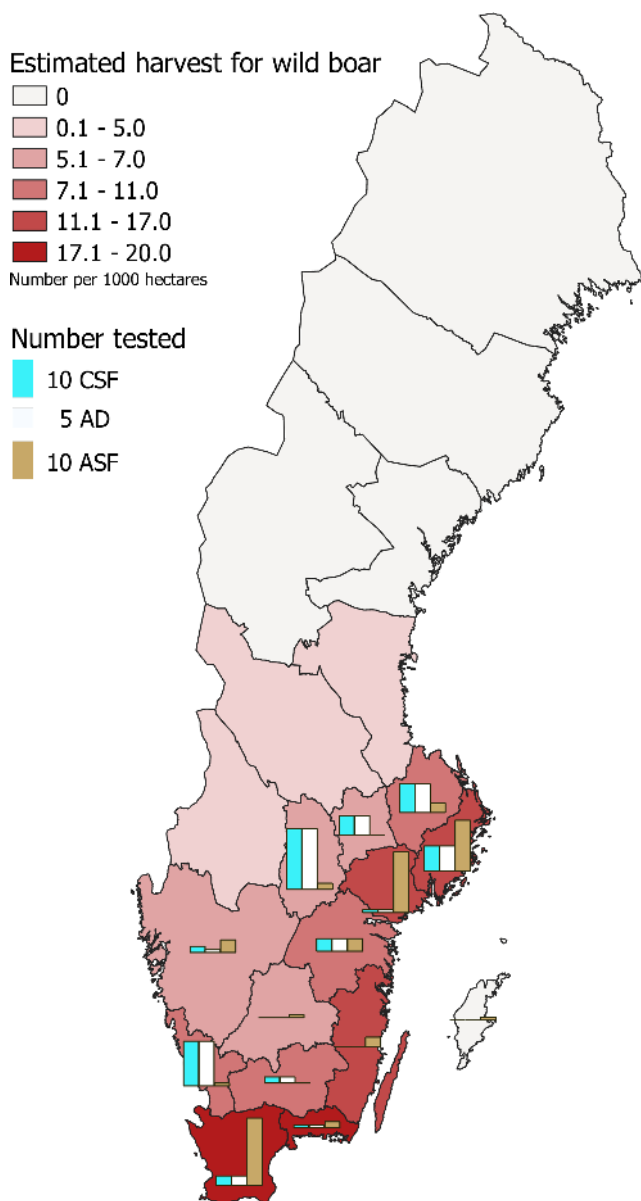


Figure 64: Geographical distribution by county of origin of wild boar samples included in the surveillance for 2022. Note that in some cases, the coordinates for the site at which a wild boar was sampled were not provided and those animals are not included on the map. The number of hunted wild boar sampled and tested for antibodies against classical swine fever (CSF) are indicated by the cyan bars (79), while those tested for antibodies against Aujeszky's disease (AD) are indicated by the white bars (78). The brown bars indicate the number of wild boars found dead and tested for African swine fever (ASF) (total 78). The background colours indicate wild boar density based on hunting statistics from 2021-2022 (Swedish Association for Hunting and Wildlife Management, game monitoring).

During 2022, suspicions of diseases included in the Swedish Act of Epizootic Diseases were investigated in free-living wild boar on two occasions. Suspicions of ASF arose at necropsy of wild boar found dead, as the post mortem lesions were compatible with infection with ASF virus. In both cases, organ samples from the dead animals were analysed for the presence of ASF virus genome by PCR and found negative. One of the two were in addition analysed for CSF virus by PCR and found negative for that disease as well.

Active surveillance

In 2022, 79 blood samples were collected from hunted wild boars and analysed for the presence of antibodies against CSF and 78 for AD. All samples were negative. The geographical distribution of sampled wild boars was roughly correlated to the distribution and density of the Swedish wild boar population (Figure 64) (location information was not available for 16 of the hunted wild boar). The goal of analysing 500 samples for antibodies against these two diseases was not met. However, the surveillance evidence collected in 2022 is sufficient to indicate that the prevalence of AD and CSF in the Swedish wild boar population is <4% with a certainty of 95%.

DISCUSSION

The Swedish wild boar population is growing, and the boundary of the population is moving north. In areas where wild boars are already present, the population is also becoming denser, which increases the risk of direct and indirect contact between wild boars and domestic pigs. The area in Sweden inhabited by wild boars is surrounded by the sea so there is no risk of wild boars migrating into Sweden. Instead, the role of the wild boar in disease spread might be to pick up infectious agents introduced into Sweden by other routes. For example, wild boars could gain access to infected meat or other animal products in garbage or following indirect spread by other means from people, vehicles or equipment. The unfavourable development of the global ASF situation is of special concern and calls for efficient approaches to early detection of disease in the wild boar population. As such, methods to further increase the number of wild boars found dead that are reported and/or voluntarily submitted by the public for post mortem and ASF testing are currently being investigated.