SURVEILLANCE OF INFECTIOUS DISEASES

IN ANIMALS AND HUMANS IN SWEDEN 2022

Chapter excerpt:
Enzootic bovine leucosis

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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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Enzootic bovine leucosis

BACKGROUND

Enzootic bovine leucosis (EBL) is caused by bovine leukaemia virus (BLV), which is an oncovirus in the family *Retroviridae*. The viral infection is transmitted by infected lymphocytes via contact with contaminated biological material from an infected animal. Sweden is officially free from EBL since January 2001. Before this, a voluntary control programme had started in 1990 and a mandatory eradication programme had been running since the autumn of 1995.

DISEASE

EBL is characterised by multiple cases of multicentric lymphosarcoma in adult cattle within a herd after an incubation period of 4–5 years. The tumours can develop rapidly in many sites, which may cause variable clinical signs depending on the site. Persistent lymphocytosis, without clinical signs, develops earlier but rarely before two years of age. The infection can also result in immunological dysfunction with a greater susceptibility to other infectious diseases, a decrease in milk production and lower conception rate.

LEGISLATION

EBL is a listed disease (category C, D and E) in the Animal Health Law, (EU) 2016/429. Sweden is officially free from the disease in accordance with (EU) 2021/620 and surveillance to demonstrate freedom from EBL is implemented in accordance with (EU) 2020/689. EBL is notifiable on clinical suspicion as described in SJVFS 2021/10 (K12).

SURVEILLANCE

The purpose of the surveillance is to document freedom from EBL. The Swedish Board of Agriculture is responsible for the surveillance, which is implemented by Växa, Sweden's largest cattle farmer association, through their milk quality control programme and is synchronised with the programmes for bovine viral diarrhoea and infectious bovine rhinotracheitis. The surveillance also includes serum samples from beef cattle, collected at abattoirs. The sample size for dairy herds is calculated based on a herd design prevalence of 0.2% and a confidence level of 99%, and for beef cattle on a herd design prevalence of 0.2%, an animal design prevalence of 10% (beef cattle) and a confidence level of 99%.

To achieve this, approximately 1500 herds need to be randomly sampled per year. Bulk milk samples are collected within the quality control programmes of the dairies. The surveillance in beef herds is performed with an aim to randomly sample 1–3 animals per herd in 2300 herds every year. Serum is collected from slaughtered cattle above 2 years of age originating from sampled herds. Details on numbers of herds and animals tested in 2022 are given in Table 8.

Diagnostic testing is performed at the National Veterinary Institute (SVA). Milk is analysed using the IDEXX Leukosis Milk Screening Ab test kit (IDEXX Laboratories, Westbrook, Maine, United States) and serum is analysed using the IDEXX Leukosis Serum X2 Ab Test kit (IDEXX Laboratories, Westbrook, Maine, United States). For confirmation, a blocking ELISA (IDEXX Leukosis Blocking Ab test, IDEXX Laboratories, Westbrook, Maine, United States) is used for serum samples, and IDEXX Leukosis Milk Verification Ab test (IDEXX Laboratories, Westbrook, Maine, United States) is used for milk samples.

In addition to the active surveillance, pathological findings indicating lymphoma are investigated for EBL using PCR (Ballagi-Pordány & Belák 1996) as a part of passive surveillance.

Table 8: Total numbers of herds and animals tested for bovine leukaemia virus antibodies in 2022.

Herd type (sample type)	Herds	Animals
Dairy herds (one bulk milk sample per herd)	1761	-
Beef herds (blood from 1–3 animals per herd)	2648	5387
Beef herds with at least three tested animals	267	-
Beef herds with two tested animals	1930	-
Beef herds with one tested animal	418	-

RESULTS

Fifteen bulk milk samples from different herds were tested antibody positive in 2022. All herds were resampled on herd and/ or individual level, and the final conclusion was that the results from these samples were falsely positive.

Samples from five clinical cases where EBL could be suspected (three tumours in lymph nodes, one alimentary lymphoma and one with lumps in the skin) were reported and further investigated. In three of the cases, tissue samples were analysed by PCR and in two cases bulk tank milk from the herd was tested by ELISA, all with negative results.

DISCUSSION

Sweden was declared free from EBL in 2001 (Commission Decision 2001/28 EC) and has had a very stable disease-free situation since then. In 2012, one slaughtered animal above two years of age was positive for EBL. All animals over six months in the herd from which the positive animal originated were tested for EBL in spring 2013, and all samples were negative. The herd was thereafter cleared from suspicions of EBL infection. In late 2019 / early 2020, a new test kit for milk samples was introduced that resulted in a slight increase of the number of milk samples being falsely positive. This increase has been steady since then.

EBL is present in many countries in the world, but several countries, especially in Western Europe, are officially free from this infection. However, the infection is present in several countries close to Sweden such as Poland, Latvia, Lithuania, Russia and Ukraine. This may pose a risk for new introduction of the disease into the country.

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