SURVEILLANCE OF INFECTIOUS DISEASES

IN ANIMALS AND HUMANS IN SWEDEN 2022

Chapter excerpt:
Poultry Health Control Programme

SVA NATIONAL VETERINARY INSTITUTE

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Editor: Karl Ståhl
Department of Epidemiology and Disease Control
National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden

Authors: Emmi Andersson, Märit Andersson, Charlotte Axén, Anna Bonnevie, Ioana Bujila, Erika Chenais, Mariann Dahlquist, Leigh Davidsson, Rikard Dryselius, Helena Eriksson, Linda Ernholm, Charlotta Fasth, Malin Grant, Gittan Gröndahl, Gunilla Hallgren, Anette Hansen, Marika Hjertqvist, Mia Holmberg, Cecilia Hultén, Hampus Hällbom, Helena Höök, Karoline Jakobsson, Désirée Jansson, Tomas Jinnerot, Jonas Johansson Wensman, Jerker Jonsson, Oskar Karlsson Lindsjö, Sara Kjellsdotter, Ulrika König, Elina Lahti, Emelie Larsdotter, Neus Latorre-Margalef, Mats Lindblad, Anna Lundén, Anna Nilsson, Oskar Nilsson, Maria Nöremark, Anna Omazic, Anna Ordell, Ylva Persson, Emelie Pettersson, Ivana Rodriguez Ewerlöf, Thomas Rosendal, Marie Sjölund, Karl Ståhl, Lena Sundqvist, Robert Söderlund, Magnus Thelander, Karin Troell, Henrik Uhlhorn, Anders Wallensten, Stefan Widgren, Camilla Wikström, Ulrika Windahl, Beth Young, Nabil Yousef, Siamak Zohari, Erik Ågren, Estelle Ågren

Typesetting: Wiktor Gustafsson

Cover: A cultivation of *Salmonella* at the Public Health Agency of Sweden.
Photo: Nicklas Thegerström/DN/TT. Cover design by Rodrigo Ferrada Stoehrel.

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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SVA NATIONAL VETERINARY INSTITUTE

visiting address. Ulls väg 2B **address.** 751 89 Uppsala
telephone. +46 18-67 40 00
e-mail. sva@sva.se **web.** www.sva.se

Poultry Health Control Programme

BACKGROUND

The aim of the Poultry Health Control Programme is to document freedom from the included diseases, to prevent the introduction and further spread of diseases and to allow trade from the participating companies.

The Poultry Health Control Programme is based on provisions (SJVFS 2010:58) issued by the Swedish Board of Agriculture. The programme is mandatory for all Swedish hatcheries producing more than 50 000 day-old chicks per year and all breeding establishments (grandparent and parent flocks of layers, broilers and turkeys) delivering hatching eggs to these hatcheries. In addition to serological sampling for several infectious diseases, the programme consists of biosecurity requirements, standards for poultry houses, management and clinical surveillance.

LEGISLATION AND DISEASES

All diseases covered by the programme are notifiable according to provisions issued by the Swedish Board of Agriculture (SJVFS 2021:10). The diseases included in the programme during 2022 are briefly described below.

Fowl typhoid and pullorum disease

Fowl typhoid and pullorum disease are two poultry diseases caused by *Salmonella enterica* subspecies *enterica* serovar Gallinarum biovar Gallinarum (*Salmonella* Gallinarum, fowl typhoid) and biovar Pullorum (*Salmonella* Pullorum, pullorum disease), respectively. These two biovars of the same serovar are specifically adapted to poultry, and vertical transmission (from the hen to the chicken via the egg) is an important feature, in addition to the common horizontal spread. Pullorum disease mainly affects foetuses and chickens up to 3 weeks of age while *Salmonella* Gallinarum commonly infects and causes disease (diarrhoea, inappetence, production losses and mortality) in older birds. Infection with both biovars are included in the Swedish zoonosis legislation (SJVFS 2004:2) and are listed diseases (categories D and E) in the Animal Health Law, Regulation (EU) 2016/429. The diseases were eradicated from the Swedish commercial poultry population in the beginning of the 1960s. A single case of fowl typhoid (*Salmonella* Gallinarum) was detected in a backyard flock in 1984 but has not been diagnosed since then. *Salmonella* Pullorum is however present in the Swedish backyard poultry population; the last outbreak was diagnosed in 2017.

Mycoplasma gallisepticum, *Mycoplasma synoviae* and *Mycoplasma meleagridis*

Mycoplasma gallisepticum, *M. synoviae* and *M. meleagridis* are important poultry pathogens. However, *M. meleagridis* is only pathogenic for turkeys. These three mycoplasmas can spread both horizontally and vertically. They mainly cause respiratory disease and egg production losses. *Mycoplasma gallisepticum* and *M. synoviae* may also cause arthritis. *Mycoplasma gallisepticum* and *M. meleagridis* are listed diseases (categories D and E) in the Animal Health Law (EU) 2016/429. Due to its potential to cause disease and production losses, testing for *M. synoviae* was included in the programme between 1995 and 2010. During a revision of the programme the agent was excluded but is since 1 June 2015 included again. In 2016, testing for *M. synoviae* was further intensified. *Mycoplasma gallisepticum* and *M. synoviae* are present in the backyard poultry population in Sweden and in 2016, 2017 and 2019 antibodies to *M. synoviae* were detected in chicken breeding flocks. In 2020, antibodies to *M. meleagridis* were detected in a turkey breeding flock in the Poultry Health Control Programme for the first time.

Paramyxovirus type 1

Paramyxovirus type 1 may cause outbreaks of Newcastle disease, with egg production losses, increased mortality, nervous signs and respiratory disease; the severity of the disease may vary. The virus is transmitted through direct and indirect contacts with infected birds and for shorter distances also with the wind. Wild birds are an important reservoir. Since 1995, twenty-three outbreaks of Newcastle disease have occurred in Sweden. The disease is listed (categories A, D and E) in the in the Animal Health Law, (EU) 2016/429. Since all outbreaks have been successfully eradicated, Sweden has a status of Newcastle disease free country without vaccination according to Commission Implementing Regulation (EU) 2021/620.

Egg drop syndrome

Egg drop syndrome virus is a naturally occurring adenovirus in waterfowl (including the wild population) in which it does not cause any clinical disease. In chickens, the clinical signs are only seen during the production period as decreased egg production in an otherwise clinically healthy flock. The virus is able to spread both vertically and horizontally. The Swedish poultry breeding population is free from the disease.

SURVEILLANCE

Serological screening within the programme is administered by the National Veterinary Institute (SVA) and financed by the Swedish Board of Agriculture and the participating companies. In 2022, six breeding companies participated in the programme: four broiler, two laying hen and one turkey breeding company (one company with both broiler and laying hen parent flocks). In accordance with the provisions (SJVFS 2010:58), sixty blood samples were taken from the breeding flocks included in the programme, once during the rearing period and several times during the production period. In the majority of the flocks, blood samples are taken by the breeding companies' personnel after delegation from

Table 31: Sampling schedule for chicken grandparent and parent flocks. Number of blood samples tested at different weeks of age.

	Age in weeks						
Agent	16	24	36	48	60	72	84
S. Pullorum / *S.* Gallinarum	-	60	-	-	-	-	-
Mycoplasma gallisepticum	60	60	60	60	60	60	60
Mycoplasma synoviae	60	60	60	60	60	60	60
Paramyxovirus type 1	-	-	-	60	-	-	-
Egg drop syndrome virus	-	30	-	-	-	-	-

the official veterinarian. In the remaining flocks the official veterinarian takes the samples. The blood samples were sent by mail to SVA where serological tests were performed. The sampling and testing schemes are presented in tables 31 and 32.

Table 32: Sampling schedule for turkey parent flocks. Number of blood samples tested at different weeks of age.

	Age in weeks			
Agent	20	32	44	56
S. Pullorum / *S.* Gallinarum	-	60	-	-
Mycoplasma gallisepticum	60	60	60	60
Mycoplasma meleagridis	60	60	60	60
Mycoplasma synoviae	60	60	60	60
Paramyxovirus type 1	-	-	-	60

RESULTS

Table 33 gives an overview of all samples taken in breeding flocks of chickens and turkeys, and the laboratory methods used, during 2022.

Serological reactions to *M. synoviae* were detected in five chicken parent flocks and one chicken grandparent flock. All six flocks were considered free from *M. synoviae* based on clinical status and testing of new samples. Six chicken parent flocks and one chicken grandparent flock were further investigated due to a few positive samples for *M. gallisepticum*. In addition, one chicken parent flock and one chicken grandparent flock were investigated due to a few positive samples for *Salmonella* Gallinarum/*Salmonella* Pullorum, nine chicken parent flocks investigated based on a few positive samples for Egg Drop Syndrome and one chicken parent flock investigated due to a single positive sample for PMV-1. No clinical signs were seen, and after testing new samples from these flocks the previous positive samples were considered as unspecific serological reactions.

DISCUSSION

In previous years, antibodies have been detected to both *M. synoviae* (chicken breeding flocks in 2016, 2017 and 2019) and *M. meleagridis* (one turkey breeding flock in 2020) within the Poultry Health Control Programme. In 2022, the results from the serological screening support the status of freedom from these diseases as well as several other important infectious diseases in the Swedish breeding poultry population. In addition to the serological screening, the clinical surveillance of the poultry breeding population is also of utmost importance.

Table 33: Number of sampling occasions for grandparent (GP) and parent (P) flocks of chickens and turkeys and total number of samples tested during 2022.

	No. of sampling occasions			No. of samples			
	Chickens		Turkeys	Chickens		Turkeys	
Agent	GP	P	P	GP	P	P	Method
S. Pullorum / *S.* Gallinarum	10	88	4	600	5280	240	Serum plate agglutination test, antigen, Ceva Biovac
Mycoplasma gallisepticum / *Mycoplasma synoviae*	50	413	16	3000	24 780	960	*Mycoplasma gallisepticum/synoviae* Antibody Test Kit, BioChek
Mycoplasma meleagridis	0	0	16	0	0	960	Serum plate agglutination test, antigen, Ceva Biovac
Paramyxovirus type 1	9	95	4	540	5700	240	NDV screen competition ELISA, IDvet
Egg drop syndrome virus	10	88	0	300	2640	0	Antibody haemagglutination inhibition test, antigen, GD Animal Health