SURVEILLANCE OF INFECTIOUS DISEASES IN ANIMALS AND HUMANS IN SWEDEN 2019

Chapter excerpt -
Poultry Health Control Programme

SVA NATIONAL VETERINARY INSTITUTE

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Reporting guidelines: Reporting guidelines were introduced in 2018 for those 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, produced by authors, 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 using pandoc and R to the LaTeX typesetting language. Most figures and maps are produced using the R software for statistical computing. Development for 2019 has further improved the importing of content from Word to LaTeX. The method can now import text, tables and figure captions from Word, as well as the newly designed 'IN FOCUS' sections of some chapters. The tool is available as an R-package at GitHub (https://github.com/SVA-SE/mill/). This year the report was also built with a continuous integration pipeline on Microsoft's Azure DevOps platform, allowing every committed change to the content to be built and tested automatically. The report generation R-package and process was designed by Thomas Rosendal and Stefan Widgren. In 2019, figures and the final typsetting were done by Wiktor Gustafsson and Thomas Rosendal with contributions from the report authors.

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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, except for *Mycoplasma synoviae*, are notifiable according to provisions issued by the Swedish Board of Agriculture (SJVFS 2013:23). The diseases included in the programme during 2019 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. Both biovars are included in the Swedish zoonosis legislation (SJVFS 2004:2) as well as in the European legislation on trade in poultry and hatching eggs (Council Directive 2009/158/EC). The diseases were eradicated from the Swedish commercial poultry population in the beginning of the 1960's. 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 and are present in the backyard poultry population in Sweden. Testing of breeding flocks for *M. gallisepticum* and *M. meleagridis* (only turkey flocks) is included in the European legislation on trade in poultry and hatching eggs (Council Directive 2009/158/EC). 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.

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 outbreaks of Newcastle disease have occurred in Sweden. The disease is included in the Swedish Act of Epizootic diseases (SFS 1999:657 with amendments). Since all outbreaks have been successfully eradicated, Sweden has a status of Newcastle disease free country without vaccination according to Commission Decision 95/98/EEC.

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 and financed by the Swedish Board of Agriculture and the participating companies. In 2019, eight breeding companies participated in the programme; five broiler-, three 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 the official veterinarian. In the remaining flocks the official veterinarian takes the samples. The blood samples were sent by mail to the National Veterinary Institute where serological tests were performed. The sampling and testing schemes are presented in tables 29 and 30.

RESULTS

Table 31 gives an overview of all samples taken in breeding flocks of chickens and turkeys, and the laboratory methods used, during 2019. All analysed samples tested negative for paramyxovirus type 1.

Serological reactions to *M. synoviae* were detected in fifteen chicken parent flocks. The majority of these reactions could be linked to a change of method for confirmatory testing used for samples positive in the combined *M. gallisepticum/M. synoviae* ELISA. Fourteen flocks were considered free from *M. synoviae* based on clinical status and testing of new samples. However, in one flock new samples obtained two weeks later were also positive for *M. synoviae*.

Three chicken parent flocks were further investigated due to a few positive samples for *M. gallisepticum*. In addition, two chicken parent flocks were investigated due to a few positive samples for *Salmonella* Gallinarum/*Salmonella* Pullorum and Egg Drop Syndrome respectively. No clinical signs were seen in these flocks and after testing new samples from these flocks, the previous positive samples were considered as unspecific serological reactions.

Table 29: 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
S. Pullorum/ *S.* Gallinarum	-	60	-	-	-
Mycoplasma gallisepticum	60	60	60	60	60
Mycoplasma synoviae	60	60	60	60	60
Paramyxovirus type 1	-	-	-	60	-
Egg drop syndrome-virus	-	30	-	-	-

Table 30: 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

DISCUSSION

In conclusion, the results from the serological screening in the Poultry Health Control Programme in 2019 support the status of freedom from several important infectious diseases in the Swedish breeding poultry population. However, the finding of *M. synoviae* antibodies in a chicken breeding flock and possible implications on animal health and production both in the breeding and in offspring flocks need to be further considered. *Mycoplasma synoviae* may spread both horizontally and vertically (from the hen to the chicken via the egg), hence infection in breeders may have consequences for the next generation as well. Infection may result in respiratory signs, articular disease and egg production losses. In addition, eggshell abnormalities associated with infection with *M. synoviae* have been reported. Antibodies to *M. synoviae* were also detected in chicken breeding flocks in 2016 and 2017. As *M. synoviae* is present in e.g. the hobby poultry population it is imperative to keep the breeding flocks under strict biosecurity measures. Wild birds might also play a role in the transmission of *M. synoviae*. Finally, the clinical surveillance of the poultry breeding population is also of utmost importance.

Table 31: Number of sampling occasions for grandparent (GP) and parent (P) flocks of chickens and turkeys and total number of samples tested during 2019.

	No. of sampling occasions			No. of samples			
	Chickens		Turkeys	Chickens		Turkeys	
Agent	GP	P	P	GP	P	P	Method
S. Pullorum / *S.* Gallinarum	14	99	4	840	5940	240	Serum plate agglutination test, antigen, Ceva Biovac
Mycoplasma gallisepticum / *Mycoplasma synoviae*	67	446	16	4020	26 760	960	*Mycoplasma gallisepticum/synoviae* Antibody Test Kit, ID. vet
Mycoplasma meleagridis	0	0	16	0	0	960	Serum plate agglutination test, antigen, Ceva Biovac
Paramyxovirus type 1	14	91	4	840	5460	240	NDV screen competition ELISA, ID.Vet
Egg drop Syndrome-virus	14	99	0	420	2970	0	Antibody haemagglutination inhibition test, antigen, GD Animal Health)