Avian influenza and vaccination

The H5N1 outbreak which began in November 2021 kept its grip on the Dutch poultry farming sector throughout 2022. Following the initial outbreak of H5N1 at a layer farm in Zeewolde, the influenza virus was detected at various farms housing all types of poultry held on an industrial scale in the Netherlands, as well as among backyard poultry. Generally speaking, local increased mortality is the most significant indicator of outbreaks of highly pathogenic avian influenza (HPAI) of subtype H5N1 in (rearing) layers and broilers, and where the clinical signs vary and depend on the stage of the infection. In meat ducks, the main indicator is a decrease in feed intake, while a decline in production is seen as being most characteristic in broiler breeders.

Unlike earlier years, the virus did not completely disappear during the summer months, instead outbreaks continued to occur throughout the Netherlands. It became apparent that the virus is present in the resident bird population. Besides in various ducks and geese, the virus was also detected in non-water birds such as storks, spoonbills, crows, birds of prey and various species of seagulls. In turn, the wild birds infected commercial and backyard poultry; dead birds infected with H5N1 have since been found at more than 350 locations in the Netherlands. Cross infection from one infected poultry farm to another is extremely rare.

Vaccination

Besides further optimisation of the biosecurity, additional protection against avian influenza must be achieved through vaccination of poultry. Unfortunately, no vaccines are available whereby the vaccinated animals no longer spread the virus following infection. Vaccination can only help shorten the period of spread and reduce the volume of virus shed. The existing older generation vaccines only protect against the AI subtype included in the vaccine; they often cannot even provide protection against AI viruses of the same H subtype. An optimal vaccination scheme will need to use second or third generation vaccines. We know that these vaccines offer broader protection. However, there is the issue of these vaccines not yet being registered in Europe, that we are unaware of the length of protection offered and whether the protection of a vaccinated flock is also sufficient to prevent transfer of the virus from farm to farm in the event of a field infection. A field experiment intended to answer these questions is currently under preparation.

Chicken suffering from an infection with avian influenza

The use of dead Ms vaccine and the risk for serological Mg monitoring

The Animal Health Regulation (EU) 2019/2035 (AHR) requires poultry farms of breeder flocks that export birds to undertake frequent testing for the presence of antibodies to *Mycoplasma gallisepticum* (Mg). Research has shown multiple factors to be the cause of non-specific or false-positive reactions in the serological tests (RPA and ELISA tests) used to detect Mg antibodies. False-positive reactions can occur in the Mg serological tests for example, when the flock (1) suffers a *Mycoplasma synoviae* infection (Ms), particularly during the acute phase of an Ms infection (first 2 weeks), or (2) when the flock has been vaccinated with an oil-emulsion vaccine 2 to 3 weeks prior to the Mg blood test. These factors result in false-positive reactions in the Mg tests around once a year during Mg monitoring. The result of such a false-positive reaction is that the flock must be retested. The retesting is the responsibility of the Netherlands Food and Consumer Product Safety Authority (NVWA).

Over the past three months, two false-positive Mg results occurred in breeder flocks, resulting in retesting by the NVWA. These breeder flocks were shown to have been vaccinated with a dead Ms vaccine a few weeks earlier. This dead Ms vaccine has only recently been applied in breeder flocks. Based on the experience gained with these two recent flocks, we advise against taking samples for the compulsory Mg blood test within 3 weeks of administration of the dead Ms vaccine.

Prevalence study Infectious Bursal Disease

Infectious Bursal Disease (IBD), or infectious bursitis, is caused by the Gumboro virus. The disease can occur either clinically or subclinically (see box) and causes extensive damage in both cases. The clinical occurrence becomes visible as a sudden peak in mortality and acutely ill animals. The subclinical occurrence of IBD may be hard to detect. Commonly found issues are wet barns, a decline in technical results and latent increased mortality.

98.1% homology with the classic vvIBD-DV86 virus
Over the past few years, a Gumboro virus has been detected in the Netherlands (and in various other European countries) which displays 98.1% homology with the classic vvIBD-DV86 virus, in genotyping at GD. The issues reported for a field infection with the 98.1% vvIBD-DV86 virus are virtually always subclinical. This is in line with the results of the veterinary practical oriented research conducted in 2019.

Under test conditions, the virus did not cause mortality in 14-day-old SPF layer pullets and SPF broilers. The layer pullets experienced cold symptoms and were unwell for a few days. There were no signs of illness in the broilers. The damage to the bursa was clearly visible, both macroscopically and histologically; it was severe and prolonged (no recovery within 21 days of inoculation).

This is not conclusive evidence of suppressed immunity, but it is however in line with what is seen in the field (health issues without any clear signs of infectious bursitis with mortality). After all, the suppressed immunity can lead to reduced effectiveness of vaccinations and increased mortality due to other illnesses at a later age.

>> Read more on the next page

Clinical occurrence of Infectious Bursal Disease
Acute mortality, diarrhoea and lethargic or sick animals are seen in the barn. The necropsy results include muscular haematoma, bloody or swollen bursa in the acute phase, and subsequently small bursa in a later phase.

Subclinical occurrence of Infectious Bursal Disease
Wet bedding, a decline in technical results and latent increased losses are seen in the barn. The necropsy results include somewhat swollen bursa in the acute phase, and subsequently small bursa in a later phase.

Early Warning System for Infectious Bursal Disease

The third quarter of 2022 saw 12 reports of an IBD outbreak (see Figure 1). This is a considerable increase versus the previous quarters. All the reports were derived from positive PCR testing at GD. This concerns voluntary reporting to GD. It therefore does not provide an overview of all outbreaks.

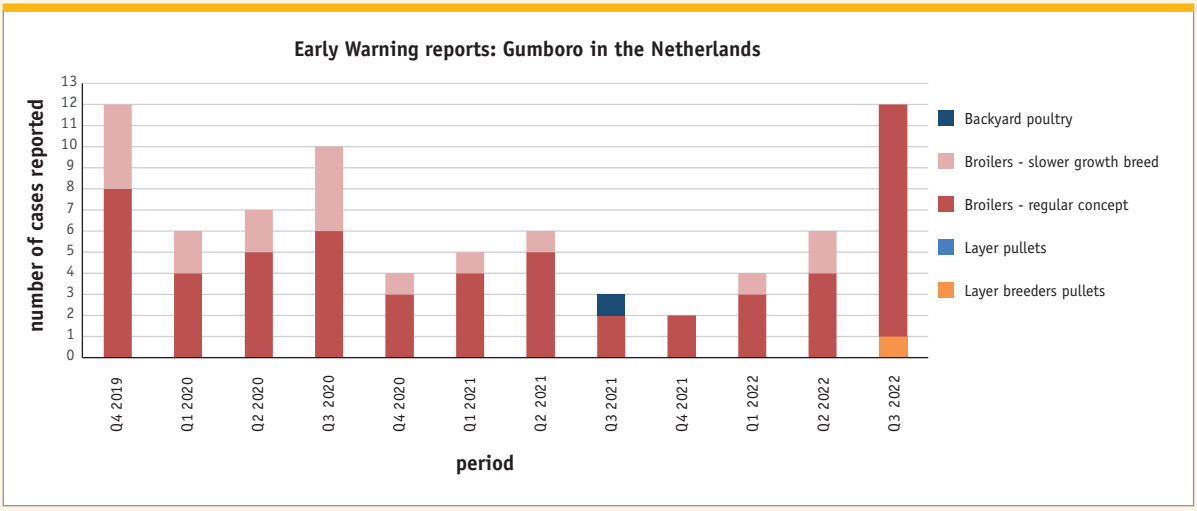


Figure 1 Number of farms or cases of backyard poultry reported to GD as suffering health issues caused by Infectious Bursal Disease (4th quarter 2019 through 3rd quarter 2022) (Source: GD; EWS)

Prevalence study VMP

This increase also did not go unnoticed among the poultry practices participating in the Veterinary Monitoring of Poultry (VMP). However, the signals from those practices are that the presence of field virus does not always result in (sub)clinical problems. By means of the VMP, we aim to compare the presence of the Gumboro virus in healthy flocks with good production figures versus the presence in flocks suffering (various) clinical problems and disappointing production figures. This would provide a better picture of the prevalence of Infectious Bursal Disease, while at the same time gaining a better picture of the role played by the virus in the development of (sub)clinical problems. This study started in December 2022 and will run for a number of months.

Pathogenic O.r. strains once again causing pathological problems

Ornithobacterium rhinotracheale (O.r.) is a bacterium first described in 1994 as the cause of airsacculitis in broilers. The problems caused by the bacterium back in the 1990s resulted in high mortality and high numbers of rejects at the abattoir. Due to the very typical inflammatory tissue found in the air sacs, the affected broilers were named 'cheesy chicks'.

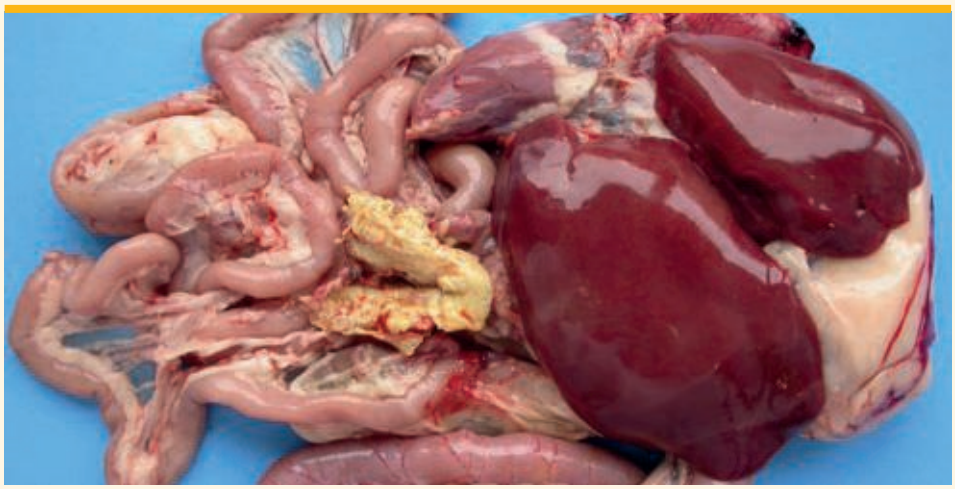
Research at that time showed the presence of various *Ornithobacterium rhinotracheale* strains which varied in terms of pathogenicity, and that the problems mainly occurred during the winter months. The research also showed elevated concentrations of CO_2 in the barn during the first weeks after start-up to contribute to the occurrence of clinical problems caused by O.r.

Over the course of recent decades, there has been a clear decline in problems caused by O.r. Many of the cases attributed to O.r. were actually proven not to be caused by O.r. During an investigation at an abattoir in 2020, where poultry was rejected due to O.r.-related abnormalities, carcasses were checked for the presence of the O.r. bacterium. The bacterium was not found in any of the cases.

Also, only very few cases of O.r. were found in broilers with airsacculitis submitted to GD for pathological examination. Over the past five years, only 3.7 percent of the broilers submitted and diagnosed as having airsacculitis were actually suffering from O.r. However, there have been problems in recent years caused by sepsis due to O.r.

>> Read more on the next page

A change has taken place in recent weeks however: the O.r. bacterium has been detected in a number of necropsies of poultry suffering from airsacculitis. Pathogenic strains of O.r. have therefore reappeared. This may prove to be a forewarning of a difficult winter period. Longer downtime due to situations initiated by avian influenza, in combination with the high energy costs, may result in more difficult climate management. If this leads to less effective ventilation of the barn and subsequently a higher CO_2 concentration in the barn, the conditions for problems caused by O.r. will be created. We therefore advise taking a critical look at the ventilation requirements during this cold period.



Photos 2 to 4 Airsacculitis caused by O.r. infection.

Animal health barometer for poultry

Disease/disorder/health characteristic	Brief description (numbers at farm level)	1st quarter 2022	2nd quarter 2022	3rd quarter 2022	4th quarter 2022	Trend (OVER 2 YEARS)
Execution decree (EU) 2018/1882 of the Animal Health Regulation (AHR) (EU) 2016/429 (Category A disease)						
Avian influenza (AI) in the Netherlands (H5/H7) (Source: GD, WBVR, national government)	**Highly pathogenic AI (H5/H7):**	**H5(N1):** 23 farms, 7x backyard poultry	**H5(N1):** 16 farms, 1x backyard poultry	**H5(N1):** 18 farms, 13x backyard poultry		↑
	Serology (first detection in flock): *(Antibodies for H5/H7)*	Not detected	Not detected	Not detected		-
ND in the Netherlands (Source: GD, OIE)	Commercial poultry:	Not detected	Not detected	Not detected		-
Execution decree (EU) 2018/1882 of the Animal Health Regulation (AHR) (EU) 2016/429 (Categories B through E)						
Campylobacteriosis	No data available	-	-	-		N/A
Avian influenza (AI) in the Netherlands (H5/H7) (Source: GD, WBVR, national government)	**Low pathogenic AI (H5/H7):**	Not detected	Not detected	Not detected		-
Avian mycoplasmosis ***(Source: GD)***						
M. gallisepticum[A]	**Serological monitoring by GD:**					
	Reproduction sector:	4 farms	1 farm	2 farms		↑
	Layer pullets:	-	1 farm	1 farm		-
	Layers:					
	- not vaccinated and infected:	2 farms	5 farms	1 farm		-
	- vaccinated and infected:	2 farms	3 farms	2 farms		-
	Turkeys:	1 farm	-	3 farms		↑
	Reports in EWS[C] based on positive serology and/or voluntary PCR testing:					
	Reproduction sector:	4 farms	1 farm	-		↑
	Layers:	1 farm	5 farms	3 farms		-
	Turkeys:	1 farm	-	4 farms		↑
	Backyard poultry:	-	-	2 cases		-
M. meleagridis *(Source: GD)*		N/A	N/A			N/A
Salmonellosis (non-zoonotic salmonella) ***(Source: GD)***						
Salmonella arizonae		N/A	N/A	N/A		N/A
Salmonella Gallinarum (SG)		Not detected	Not detected	Not detected		-
Salmonella Pullorum (SP)		Not detected	Not detected	Not detected		-
West Nile fever	Not monitored	N/A	N/A	N/A	N/A	N/A
Article 2.1 Designation of animal diseases 'Rules for Animal health' of the Dutch Animal Act						
Avian chlamydiosis (Source: GD)		Not detected by GD	Not detected by GD	Not detected by GD		-

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Table continuation

Disease/disorder/health characteristic	Brief description (numbers at farm level)	1st quarter 2022	2nd quarter 2022	3rd quarter 2022	4th quarter 2022	Trend (OVER 2 YEARS)
Article 2.2. Designation of zoonoses 'Rules for Animal health' of the Dutch Animal Act						
Salmonellosis (zoonotic salmonella) (at flock level) *(Source: NVWA)*						
S. Enteritidis	Reproduction:	0 flocks	3 flocks	0 flocks		↓
	Layer pullets:	0 flocks	0 flocks	0 flocks		-
	Layers:	2 flocks	10 flocks	17 flocks		↑
S. Typhimurium	Reproduction:	0 flocks	0 flocks	0 flocks		↓
	Layer pullets:	0 flocks	0 flocks	0 flocks		-
	Layers:	0 flocks	1 flock	0 flocks		-
Other types of Salmonella (*S.* Hadar, *S. Infantis*, *S.* Java, *S. Virchow)*	Reproduction:	0 flocks	0 flocks	0 flocks		-

↑↑ Increase or strong increase
↑ Limited increase
\- Situation unchanged
↓ Limited decrease
↓↓ Decrease or strong decrease

A Based on serological monitoring
B Based on serological monitoring and/or the differentiating M.s.-PCR
C Early Warning System

Disease/disorder/health characteristic	Brief description (numbers at farm level)	1st quarter 2022	2nd quarter 2022	3rd quarter 2022	4th quarter 2022	Trend (OVER 2 YEARS)
Other WOAH-list poultry diseases in the Netherlands subject to compulsory notification						
Infectious laryngotracheitis (ILT) (Source: GD; EWS)	**Reported in EWS[C]:**					
	Layer pullets:	-	-	3 farms		-
	Layers:	1 farm	-	-		-
	Backyard poultry:	2 cases	-	-		-
M. synoviae[B] (Source: GD)	**Serological monitoring and/or dPCR by GD:**			**% of positive farms versus farms tested**		
	Broiler grandparents (incl. replacement):	0%	0%	0%		-
	Broiler breeders replacement:	10%	15%	9%		↑
	Broiler breeders:	21%	30%	25%		-
	Layer grandparents pullets:	0%	0%	0%		-
	Layer grandparents:	20% (1 farm)	0%	20% (1 farm)		-
	Layer breeders pullets:	0%	8%	0%		↑
	Layer breeders:	9%	13%	7%		-
	Layer pullets:	7%	12%	13%		↓
	Layers:	73%	73%	75%		-
	Turkeys:	17%	12%	12%		↓
Infectious bronchitis (IB) (Source: GD)	**Types most commonly detected by GD:**					
	Broilers:	4-91/D388	D388/4-91	4-91/D388		
	Layers:	4-91/D181	4-91/D181	4-91/D181		
Gumboro (IBD) (Source: GD; EWS)	**Reported in EWS[C]:**					
	Broilers:	4 farms	10 farms	11 farms		↑
	Layer pullets:	-	-	1 farm		-
Turkey Rhinotracheitis (TRT) (Source: GD)	**Detected by GD:**					
	Reproduction sector-meat:	-	1 farm	1 farm		
	Broilers:	1 farm	4 farms	3 farms		
	Layer pullets:	1 farm	-	2 farms		
	Layers:	1 farm	1 farm	1 farm		

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Table continuation

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Disease/disorder/health characteristic	Brief description (numbers at farm level)	1st quarter 2022	2nd quarter 2022	3rd quarter 2022	4th quarter 2022	Trend (OVER 2 YEARS)
Other poultry diseases						
Erysipelas (*Erysipelothrix rhusiopathiae*) (Source: GD)	**Detected by GD:**					
	Layers:	2 farms	1 farm	-		-
Histomonosis (Source: GD)	**Detected by GD:**					
	Reproduction (meat sector):	1 farm	1 farm	5 farms		
	Layer pullets:	1 farm	-	-		
	Layers:	-	1 farm	-		
	Meat turkeys:	-	-	1 farm		
	Backyard poultry:	1 case	-	-		
Avibacterium paragallinarum (Source: GD; EWS)	**Reported in EWS[C]:**					
	Layers:	2 farms	3 farms	1 farm		↓
	Backyard poultry:	2 cases	1 case	3 cases		↓
Pasteurella multocida (Source: GD)	**Detected upon necropsy:**					
	Broiler breeders replacement:	-	-	1 farm		-
	Layer breeders:	1 farm	-	-		-
	Layers:	-	1 farm	3 farms		-
	Ducks:	-	1 farm	-		-

↑ Increase or strong increase
↑ Limited increase
\- Situation unchanged
↓ Limited decrease
↓ Decrease or strong decrease

A Based on serological monitoring
B Based on serological monitoring and/or the differentiating M.s.-PCR
C Early Warning System

Monitoring DIERGEZONDHEID

Animal health monitoring

Since 2002, Royal GD has been responsible for animal health monitoring in the Netherlands, in close collaboration with the veterinary sectors, the business community, the Ministry of Agriculture, Nature and Food Quality, vets and farmers. The information used for the surveillance programme is gathered in various ways, whereby the initiative comes in part from vets and farmers, and partly from Royal GD. This information is fully interpreted to achieve the objectives of the surveillance programme – the rapid identification of health problems on the one hand and the following of more general trends and developments on the other. Together, we team up for animal health, in the interests of animals, their owners and society at large.