Low-pathogenic avian influenza H6 in the Netherlands

In the Veekijker News of July and September 2019, GD reported in detail on the situation regarding H3N1 in Belgium and on the research being conducted by GD on this strain of avian influenza (AI). It is currently quiet in the Netherlands when it comes to both high-pathogenic and low-pathogenic avian influenza. Luckily, the Netherlands remained free from H3N1 and no further cases have been detected in Belgium. However, we must stay alert to avian influenza. In 2019, several cases of low-pathogenic avian influenza of the (non-notifiable) H6 type were found in the Netherlands.

An AI virus of the H6N2 type was detected in a turkey flock with respiratory symptoms and increased mortality. The H6N2 virus has been detected on a number of laying farms over the past year. In these cases, which were discovered through monitoring (serologically positive), no clear clinical symptoms were reported. It is not certain whether H6 played a role in the clinical symptoms at the turkey farm. Supplementary research is required to confirm this.

There are more examples of low-pathogenic AI viruses possibly being responsible for clinical symptoms, such as the outbreaks of H3N1 in Belgium. Another H6 strain (H6N1) has already been proven to cause clinical symptoms in layers.

High-pathogenic AI still occurs as well. An outbreak of H5N8 was recently reported in Poland, Hungary, the Czech Republic, Romania, Slovakia and Ukraine. Strict hygiene management is essential in order to prevent the introduction and spread of low-pathogenic and high-pathogenic AI viruses.

Salmonella Pullorum detected in layers

In October 2019, 41-week-old layers were submitted to GD for necropsy due to severely increased mortality (around the notifiable norm). The necropsy showed sepsis (enlarged spleen, enlarged livers) and in a number of hens, peritonitis. A bacterial culture was made of the liver and bone marrow, from which an immobile strain of group D salmonella was isolated. Based on this, there was reason to suspect *Salmonella* Gallinarum. Following further typing by the RIVM, the Dutch National Institute for Public Health and the Environment, it was shown to be *Salmonella* Pullorum.

Salmonella Gallinarum (S.G.) and *Salmonella* Pullorum (S.P.) are biovars of the same salmonella serotype (*Salmonella* Gallinarum). Generally, a distinction can be made between the clinical symptoms of S.G. and S.P. Where S.G. is more problematic in adult hens, S.P. occurs particularly in young animals. Incidentally, S.P. can also cause high mortality in adult hens, whereby the clinical symptoms and treatment approach are the same as for S.G. S.P. is relatively rare in the Netherlands, having last been detected in commercial poultry in 2011. Clinical S.P. rears its head in backyard poultry once every three years.

S.P. and S.G. are actively controlled in the breeding sector, but not among layers. The flock was treated and a treatment for red mite was initiated. However, mortality remained high and the flock has since been slaughtered prematurely. The other flock at the farm and a newly introduced flock were vaccinated against S.G., and there is no increase in losses in these flocks. In addition, hygiene measures were recommended and taken in order to prevent the disease from spreading to other farms.

Reovirus genotyping, an overview

Since 2011, GD has detected an increasing number of cases of tenosynovitis caused by reoviruses during necropsies (see Figure 1). Reoviruses are classified in genotypes based on the σC-(sigma-C) gene. This gene codes for the 'outer capsid protein'. The viruses use this protein to bind to cells, but neutralising antibodies also bind to these proteins. Therefore, it is theorized that the gene can be used to distinguish between viruses with various pathogenic strengths or reduced cross-protection. There is insufficient scientific evidence for this. However, genotyping can be used to check whether (pathogenic) strains closely resemble each other and discover possible epidemiological relationships.

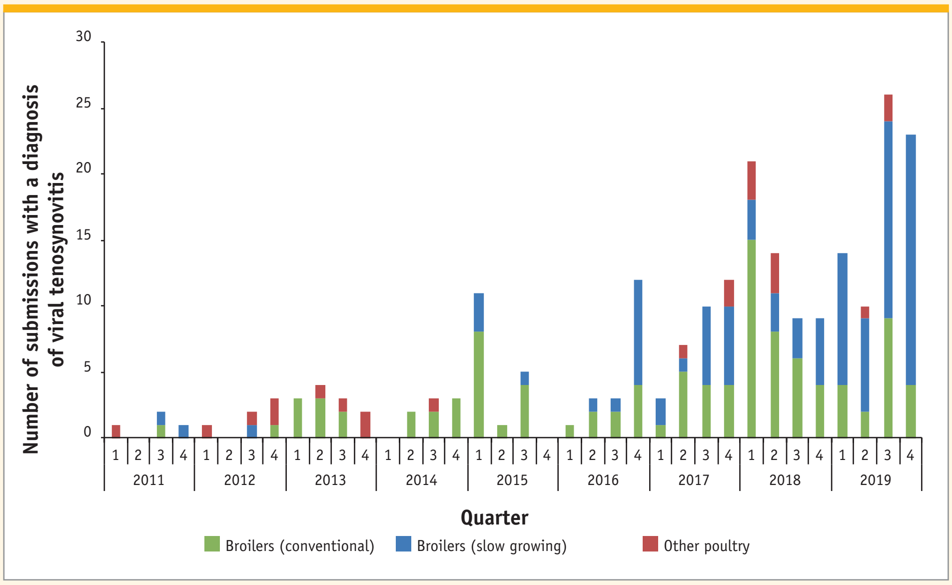

Figure 1. Number of broilers and (breeding) reproduction animals submitted per quarter, whereby GD diagnosed viral tenosynovitis based on histology and PCR. From Q2 of 2016 onwards, almost 30 percent of the animals were submitted within the scope of the monitoring vets project or other pilots and projects. The data for Q4 of 2019 concerns completed submissions up to and including 25 November 2019 (source: GD).

Since 2015, the reoviruses detected by GD are genotyped regularly. The results are shown in Figure 2. The tree shows the five genogroups in which reoviruses can be classified. A striking feature is the great diversity in the strains detected each year. Nevertheless, it is possible to distinguish main groups. In 2015, most isolates were of genotype 1, bearing a strong resemblance to strains found in France. In 2016, 2017 and 2018, the emphasis was on genotype 5. In 2019, the viruses were classified in genotypes 2 and 4, with genotype 5 not being found. There are a number of large circles representing multiple findings in which the virus was identical. Further investigation showed that the animals came from different parent stock. Therefore, in these cases the virus had spread horizontally.

Reoviruses can be transmitted both horizontally (from flock to flock) and vertically (from parent stock to offspring). Reoviruses are naked viruses, which makes them extremely resistant to environmental influences and disinfectants. As a result, reoviruses can be transferred extremely easily and are very capable of surviving outside the host. If insufficiently protected young hens become infected with a reovirus that causes tenosynovitis, this can have a serious clinical effect. However, if the chicks have sufficient maternal antibodies or become infected at a later age, the effect is less serious, and in some cases they will remain symptom-free. That is why following a (sub-)clinical infection, targeted cleaning and disinfection are important, as is setting up chicks with sufficient maternal antibodies.

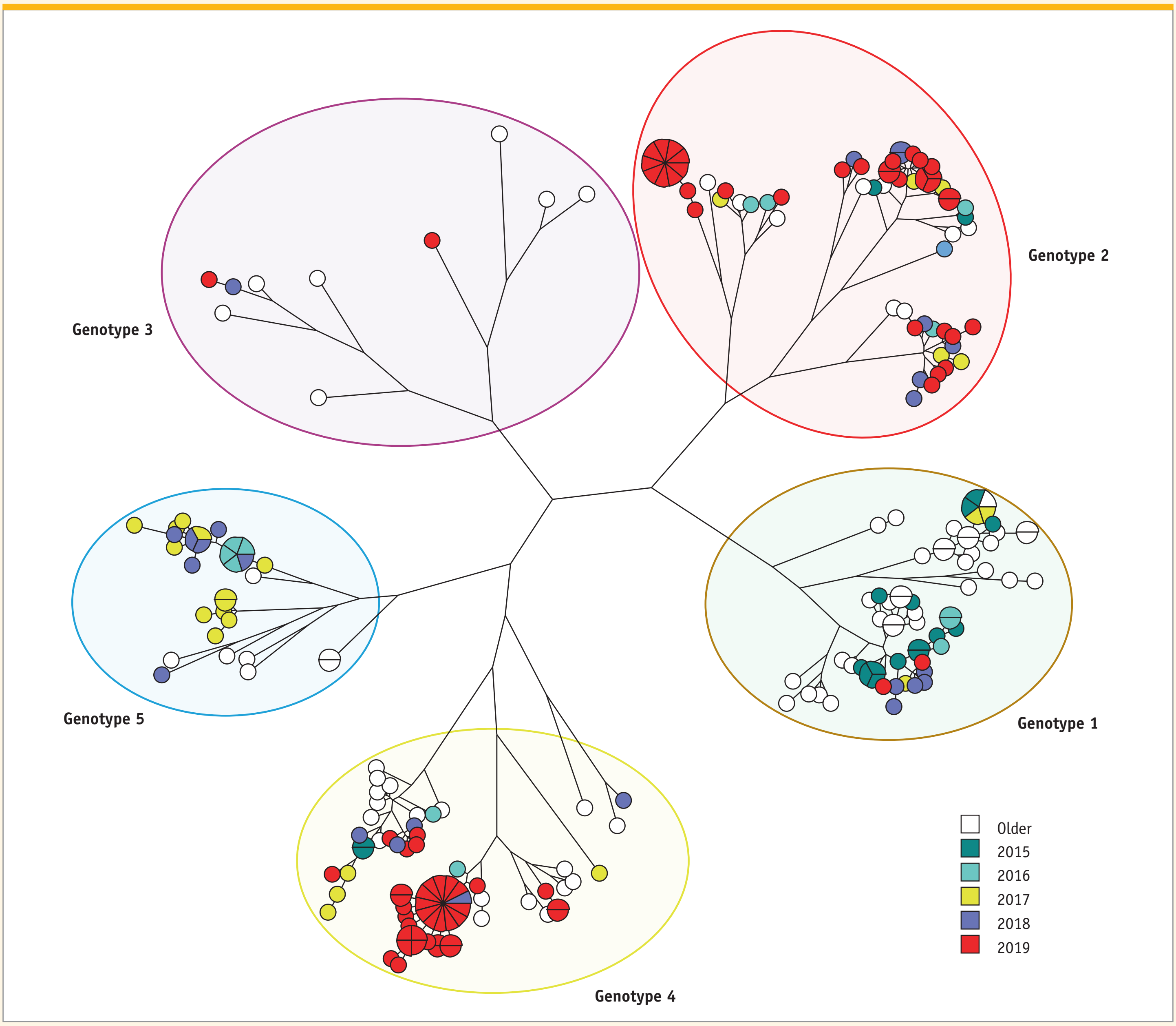

Figure 2. Phylogenetic tree based on the σC gene of Dutch reovirus isolates and a number of foreign reference strains, coloured per year. Each circle is a particular genotype in which multiple isolates of the same genotype are indicated as pie slices. Isolates that resemble each other are closer together. The figure shows the five main groups (source: GD).

Amyloidosis

Over the past period, GD received a few submissions of poultry for necropsies in which peri-arthritis of the knees was detected (Photo 1), and in several submissions for necropsies joint amyloidosis was established in the hens (Photo 2). GD cultured the *Enterococcus faecalis* bacteria from the peri-arthritis visible in Photo 1. This bacterium is known to cause joint amyloidosis. GD received a number of questions about this disease as a result of the necropsies, which is why a brief explanation of amyloidosis will be provided here.

What is amyloidosis?

When an inflammatory reaction persists, the liver can sometimes continue to produce surplus acute-phase proteins. When incorrectly processed in the body, these proteins can then take on a deformed structure that can no longer be broken down by the body, resulting in them being deposited in soft tissue. This is the amyloid, which in chickens is found particularly around joints. Even after the original inflammation is gone, the amyloid remains in place and adversely affects the normal functioning of the animal. In growing animals, it may restrict bone growth. For example, layers with joint amyloidosis in the knees often have typically short legs.

What causes the inflammation?

As time progresses, the cause of the inflammation (for example the aforementioned *E. faecalis* bacteria) can often no longer be established (Photo 3). That is why pathology cannot discover the cause of joint amyloidosis in chickens in all cases. Because research has shown that some bacteria cause joint amyloidosis when injected, but not when a chicken has become infected via a natural route, in field cases special attention is always paid to possible infection through an injected vaccine.

However, this is not the only way in which amyloidosis can occur. In ducks, for example, amyloid deposits in the liver are commonly seen in case of chronic bacterial inflammation elsewhere in the body (Photo 4).

Photo 1.
Peri-arthritis of the knee joint, resulting in abscess formation. E. faecalis *was cultivated from the pus exuded on opening the abscesses. (Source: GD)*

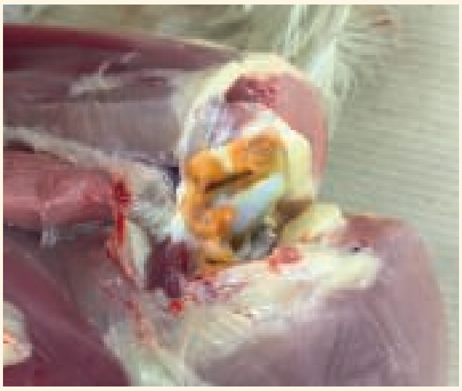

Photo 2.
Opened knee joint. The strong orange discolouration of the joint capsule is a sign of joint amyloidosis. (Source: GD)

Photo 3.
Opened heel joint. Old joint amyloidosis detected on the slaughter line. The bacteria responsible can often no longer be isolated in such old injuries. (Source: GD)

Photo 4.
A duck with chronic bacterial inflammation of the joints and amyloidosis of the liver. The affected liver is hard and enlarged. These animals generally have no amyloid in the joints. (Source: GD)

Animal health barometer for poultry 1st to 3rd quarter of 2019

VETERINARY DISEASES		1st QUARTER 2019	2nd QUARTER 2019	3rd QUARTER 2019	TREND (OVER 2 YEARS)
Article 15 GWWD (Health & Welfare Act) diseases (diseases named in articles 3 and 7 of the 'Rules for prevention, control and monitoring of infectious animal diseases and zoonoses and TSEs')					
Avian influenza in the Netherlands (H5/H7) (Source: GD, WBVR, national government)	**HPAI (H5/H7):**	Not detected	Not detected	Not detected	↓
	LPAI (H5/H7):	Not detected	Not detected	Not detected	↓
	Serology (new flocks): (Antibodies for H5/H7)	2 flocks	1 flock	0 flocks	↓
Avian influenza in Europe (H5/H7) (Source: OIE)	**HPAI (H5/H7):**	Bulgaria: H5N8 Russia: H5	Bulgaria: H5N8	No OIE reports	↓
	LPAI (H5/H7):	Denmark: H5 and H7N7	Denmark: H5	No OIE reports	↓
NCD in the Netherlands (Source: GD, OIE)	Commercial poultry	Not detected	Not detected	Not detected	-
NCD in Europe (Source: GD, OIE)	Commercial poultry/ backyard poultry	No OIE reports	No OIE reports	Russia: 1x (non-commercial)	↓
M. gallisepticum[A] (Source: GD)	**Serological monitoring by GD:**				
	Reproduction sector:	0 farms	0 farms	0 farms	-
	Layer pullets:	0 farms	0 farms	0 farms	-
	Layers:				
	- *not vaccinated and infected:*	0 farms	1 farm	1 farm	↓
	- *vaccinated and infected:*	4 farms	5 farms	5 farms	↑
	Turkeys:	0 farms	0 farms	0 farms	-
	Reports in EWS[C] **based on positive serology and/or voluntary PCR testing:**				
	Layers:	5 farms	5 farms	3 farms	-
	Backyard poultry:	-	-	1x	-
M. synoviae[B] (Source: GD)	**Serological monitoring and/or dPCR by GD:**	**% of positive farms versus farms tested**			
	Grandparent stock (incl. pullets) (meat):	0%	0%	0%	-
	Broiler breeder pullets:	2%	2%	7%	↓
	Broiler breeders:	14%	17%	17%	-
	Layer grandparents (incl. pullets for parents and grandparents):	0%	0%	0%	-
	Layer breeders:	11%	9%	12%	↑
	Layer pullets:	13%	12%	22%	-
	Layers:	77%	72%	70%	-
	Turkeys:	18%	11%	14%	↑
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)		1 case detected in backyard chickens	Not detected	Not detected	↑
Article 100 GWWD (Health & Welfare Act) diseases (diseases named in article 10 of the 'Rules for prevention, control and monitoring of infectious animal diseases, zoonoses and TSEs')					
Campylobacteriosis	No data available	-	-	-	N/A

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Table continuation

VETERINARY DISEASES		1st QUARTER 2019	2nd QUARTER 2019	3rd QUARTER 2019	TREND (OVER 2 YEARS)
Salmonellosis (zoonotic salmonella) (at the flock level) (Source: NVWA)					
S. Enteritidis	Reproduction: Layer pullets: Layers:	1 flock 0 flocks 10 flocks	1 flock 0 flocks 5 flocks	0 flocks 0 flocks 18 flocks	↑ - ⬆
S. Typhimurium	Reproduction: Layer pullets: Layers:	0 flocks 0 flocks 0 flocks	1 flock 0 flocks 0 flocks	0 flocks 0 flocks 0 flocks	↑ - -
Other types of salmonella (*S.* Hadar, *S.* Infantis, *S.* Java, *S.* Virchow)	Reproduction:	S.I. detected in 1 flock	0 flocks	0 flocks	-
Other OIE-list poultry diseases in the Netherlands subject to compulsory notification					
Avian chlamydia (Source: GD)		Not detected by GD Animal Health	Not detected by GD Animal Health	Not detected by GD Animal Health	-
Gumboro (IBD) (Source: GD; EWS)	**Reported in EWS[c]:** Broilers: Layer pullets	 11 farms -	 6 farms -	 7 farms 1 farm	 ↑ -
Infectious bronchitis (IB) (Source: GD)	**Types most commonly detected by GD:** Broilers: Layers:	 D388 4-91/D181/D388	 D388 4-91/D181/D388	 D388 4-91/D181/D388	 ↑ -/↑/-
Infectious laryngotracheitis (ILT) (Source: GD; EWS)	**Reported in EWS[c]:** Parent stock (layer): Layer pullets Layers: Broilers: Backyard poultry:	 - - - 1 farm -	 1 farm - 2 farms 1 farm -	 - 1 farm - - 1 case	 - - ↓ ↓ ↓
Turkey Rhinotracheitis (TRT) (Source: GD)	**Detected by GD:** Parent stock (layer): Layers Broilers:	 1 farm - 2 farms	 - - 3 farms	 - 3 farms 1 farm	
Other poultry diseases					
Coryza (*Avibacterium paragallinarum*) (Source: GD; EWS)	**Reported in EWS[c]:** Layers: Backyard poultry:	 5 farms 2 cases	 7 farms 2 cases	 8 farms 1 case	 ⬆ -
Erysipelas (*Erysipelothrix rhusiopathiae*) (Source: GD)	Detected by GD: **(new infections):** Layers:	 2 farms	 1 farm	 1 farm	 -
Pasteurella multocida (Source: GD)	**Detected upon necropsy:** Layers: No reports to the NVWA	 -	 1 farm	 1 farm	 -
Histomonosis (Source: GD)	**Detected by GD:** Reproduction (meat sector): Reproduction (layer sector): Layers: Turkeys: Backyard poultry:	 5 farms - 1 farm 1 farm -	 4 farms - 1 farm - -	 5 farms 1 farm 3 farms 1 farm 1 case	 ↑ - - - -

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

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Monitoring
ANIMAL HEALTH

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 – rapid identification of health problems on the one hand and monitoring trends and developments on the other. Together, we team up for animal health, in the interests of animals, their owners and society at large.

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