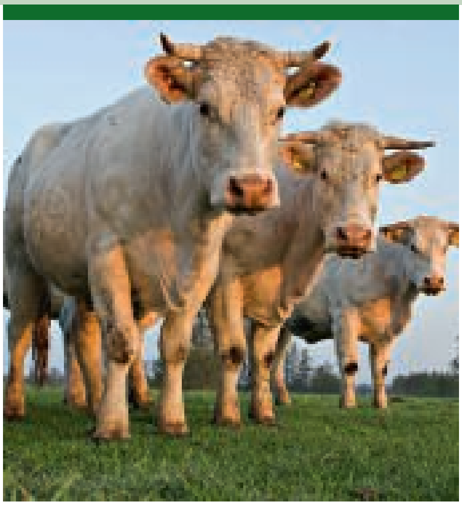
Monitoring ANIMAL HEALTH

Cattle | March 2020

Introduction of *Streptococcus agalactiae*

At the end of the year, Veekijker received reports from veterinarians about dairy farms with a rising farm cell count (>400x1,000 cells/ml). On the three farms, *Streptococcus agalactiae* (SAG) was found in milk samples. These days, SAG outbreaks are seen sporadically in the Netherlands. An outbreak can cause a significant rise in antibiotic use and severe economic damage because of additional work and loss of milk. The three farms had bought dairy cows from abroad, which probably led to the introduction of SAG. GD recommends that farmers pay close attention to the health status of cattle they buy, not forgetting udder health.



Bluetongue (BT) situation in Europe

One animal destined for export in south-east Belgium was found to have the bluetongue virus BTV-8 at the start of October. The animal had no clinical symptoms. Because the virus was detected, this means that the infection took place in 2019 (maximum PCR detection period 180 days). Fourteen cases were known at the end of 2019, mostly following purchase tests. As yet no clinical symptoms have been reported (source Veescoop Diergezondheidszorg Vlaanderen (DGZ) 10/01/2020). See table 1 for the current summary of bluetongue outbreaks in Europe and the various serotypes.

Country	2018 outbreaks	2019 outbreaks	Fourth quarter 2019 and comments
Belgium	0	14	BTV-8 five new infections
Bosnia-Herzegovina	0	0	No new infections.
Cyprus	27	2	BTV-4, 8 and 16, two new infections
Germany	1	59	BTV-8: 2 new infections.
France	666	181	BTV-4 and BTV-8 181 new infections.
Greece	18	28	BTV-4, 16, fourteen new infections.
Italy	118	66	BTV-1, 2, 3, 4, and 16: 23 new infections.
Croatia	0	0	BTV-4: no new infections.
Portugal	7	0	BTV-1: no new infections.
Spain	13	1	BTV-1: no new infections.
Turkey	1	0	BTV-4: no new infections.
Switzerland	75	53	BTV-8: 51 new infections.

Table 1. Bluetongue information from ADNS (for free regions) and DGZ Veescoop.

Nitrate risks in hot summers

Over the past few summers we have seen extreme growing conditions for crops. In the summers to come, extremely high temperatures are expected to occur more often – how will these circumstances affect the risk of nitrate intoxication?

What effects does nitrate have on animals?
Nitrate (NO_3) itself is slightly irritating to the digestive tract of animals if the concentration is high. This effect is usually mild and not dangerous. But if nitrate is converted into nitrite (NO_2) it becomes toxic, because nitrite causes haemoglobin to be converted into methaemoglobin. Methaemoglobin has a poor oxygen binding capacity, and if the methaemoglobin content in blood is too high, this results in tissue oxygen deficiency. The first clinical signs of nitrite intoxication, such as a reduced tolerance for exertion (visible as faster than expected respiration at minimal exertion) can occur when the methaemoglobin fraction reaches around 30 to 40 per cent. It can be fatal at 70 per cent. Clinical effects of severe intoxication are weakness, rapid respiration, collapse, convulsions and eventually death. Long-term exposure to levels that do not cause acute intoxication but are high enough to cause physiological stress are associated with lower milk production, poor feed conversion and weak calves. Foetuses are relatively vulnerable to oxygen deficiency, and this can lead to miscarriage. This often happens three to seven days after exposure to nitrate intoxication.

Microbes convert nitrate into nitrite in the digestive tract of animals. This means that animals with higher microbial populations in the digestive tract are at relatively high risk.

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Consequently, the most vulnerable farm animals are adult ruminants. Young animals and single-stomached animals are at lower risk.

What are the risk factors for exposure to excessive nitrate?

The speed of nitrate absorption can be modulated by the plant by increasing or decreasing the activity of nitrate transporters in the roots. Transporter activity is highest when plants are growing quickly, which is in summer for most plants. If a plant is growing in soil with a high nitrate concentration, this leads to rapid nitrate absorption during this period.

To make the absorbed nitrate usable for plant growth, the nitrate is reduced in the plant to nitrite through the action of the nitrate reductase enzyme and then to ammonium. Nitrite is converted into ammonium fairly quickly. This means that it does not accumulate. The activity of nitrate reductase is adjusted quickly depending on the plant's ability to grow. This adjustment is usually quicker than a decrease in the activity of the nitrate transporters in the roots. This means that the imbalance between the uptake of nitrate and the resulting nitrate reduction can lead to accumulation of nitrate in plant tissues if growing conditions worsen during the growing season.

Environmental conditions that increase the likelihood of nitrate accumulation include abnormal temperatures and drought, as was seen very often during the last two summers. The risk is further increased in plants with a high potential for growth, such as some types of weeds, and plants developed for high yields. Examples of weeds often associated with the accumulation of nitrate include redroot amaranth (*Amaranthus retroflexus*) and goosefoot species (*Chenopodium spp.*). Plants with a relatively high risk, especially when growing in heavily fertilised soil, include rapeseed, beet, maize, sorghum, barley, flax, rye, oats and alfalfa. Table 2 shows factors that cause a higher risk.

How can the risk of nitrate intoxication be managed?

If risk factors are present, it is advisable to test plant material before grazing or harvesting for hay or silage (nitrate tests are available in laboratories that routinely carry out feed quality tests). If nitrate concentrations are too high (table 3), it is advisable to postpone grazing or harvesting until the normal conditions for plant growth have returned. It usually takes three to seven days for nitrate concentrations to return to normal once normal plant growth has resumed. Bear in mind that nitrate concentrations remain high in plants that die off while nitrate accumulation was taking place, such as during harvesting or after (unintentional) herbicide use.

Microbial fermentation that occurs in the pit causes a partial reduction of nitrate. However, the effect is limited and therefore fermentation is not a fully protective process. If silage is made from plants with dangerous nitrate concentrations, it is important to test it in order to confirm that it is safe before it is used.
It is also important to consider all possible sources of nitrate. For example, if nitrate is present in drinking water, this increases the risk of intoxication. Water from some sources has higher than normal nitrate concentrations. It is therefore important to test the nitrate levels of drinking water if the concentrations are unknown. Water itself can cause intoxication if the concentration is above the toxic threshold (table 3). It is sometimes possible to use plant material with a high nitrate concentration in a ration if the material is mixed with feed components with a relatively low nitrate concentration in order to ensure that the overall nitrate intake is at a safe level.

In conclusion

Extreme growing conditions in the future may lead to a higher risk of nitrate intoxication by the accumulation of nitrate in fodder plants. If there is any doubt, it is advisable to measure the quantity of nitrate in crops before grazing or harvesting. In order to manage the risks to cattle, it is important to know what nitrate sources can contribute and how high the concentrations in these various sources are.


Deon van der Merwe and Jet Mars
Veterinary Toxicologist and R&D Investigator

Risk factor	High risk condition(s)
Plant type	High growth potential
Time of year	Peak growing season
Soil	High nitrate concentration
Environmental conditions	Drought; abnormal temperatures
Environmental treatment	Use of herbicide

Table 2. Risk factors for elevated nitrate concentration in plants

	Threshold values	
Material	Most vulnerable animals (for example, pregnant)	All animals
Feed (mg/kg dry matter)	5,000	10,000
Water (mg/L)	500	1,000

Table 3. Feed and water threshold values for cattle of nitrate concentrations related to intoxication risk

Liver abscesses: cause and effect

Liver abscesses occur because bacteria travel from an inflammation in the rumen or reticulum wall via the portal vein into liver tissue, where they cause inflammatory processes. Liver abscesses are chronic foci of inflammation, starting as foci of necrosis, turning into pus as time goes on. Abscesses vary in size and can contain several litres of pus.

The bacteria involved, *Fusobacterium necrophorum* and *Trueperella pyogenes*, belong to the anaerobic flora of the rumen. Rumen acidification attacks rumen flakes, and subsequently these bacteria cause inflammation in the rumen wall. The rumen wall inflammation often resolves without treatment, but in the meantime the bacterial inflammation has penetrated the liver, causing abscesses.

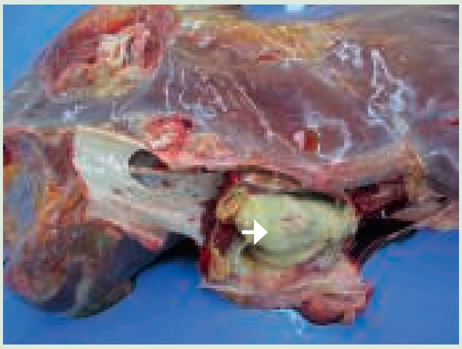

Photo 3. Liver of a cow in which an abscess (arrow) has penetrated the inferior vena cava.

Small blood clots containing bacteria, called bacterial emboli, can move via liver veins to the heart, causing cardiac valve inflammation. Emboli can also cause metastatic pneumonia. Nearby the inferior vena cava (Vena cava caudalis), liver abscesses sometimes spill over into this large blood vessel. This causes inflammation of the wall of the blood vessel, and the abscess can even penetrate it, causing pus to flow directly into the bloodstream. In the past year, liver abscesses were identified as the cause of death in eighteen dairy cows aged 2 to 3 years. Fifteen of the eighteen cows had inflammation of the wall of the inferior vena cava, in some cases with abscess penetration. Nine animals also had metastatic pneumonia and two had cardiac valve inflammation. Rumen wall inflammation was also diagnosed in four animals. Most of the cows died suddenly. Liver abscesses can also occur in animals that have ingested a sharp object, associated with chronic inflammation of the wall of the reticulum. In 2019, necropsies were carried out on six dairy cows aged around 6 years with liver abscesses caused by ingesting sharp objects. In three cases, pieces of wire were found in the injury channel between the reticulum and the liver abscess.

Finally, liver abscesses also occurred in calves as a consequence of an umbilical inflammation. In 2019 liver abscesses were diagnosed in five calves aged around one month, connected with umbilical inflammation via the umbilical cord vein (Vena umbilicalis).

Klaas Peperkamp
Veterinary Pathologist

Animal health barometer for cattle, fourth quarter 2019

VETERINARY DISEASES	SITUATION IN THE NETHERLANDS	Surveillance – Highlights Fourth Quarter 2019
Article 15 GWWD (Health & Welfare Act) compulsory reportable and treatable diseases (diseases named in article 2 of the 'Rules for prevention, control and monitoring of infectious animal diseases and zoonoses and TSEs')		
Bluetongue (BT)	Viral infection. The Netherlands has been officially disease-free since 2012 (all serotypes). Annual screening.	The Netherlands BTV-free according to 2019 screening. BTV-8 in Germany and Belgium.
Brucellosis (zoonosis, infection via animal contact or inadequately prepared food)	Bacterial infection. The Netherlands has been officially disease-free since 1999. Monitoring via antibody testing of blood samples from aborting cows.	Eight retests, no infections detected.
Bovine Spongiform Encephalopathy (BSE)	Prion infection. The Netherlands has OIE status 'negligible risk'. No further cases detected upon monitoring since 2010 (total between 1997-2009: 88 cases).	No infections detected.
Enzootic Leucosis (EBL)	Viral infection. The Netherlands has been officially disease-free since 1999. Monitoring via antibody testing of bulk milk and blood samples of slaughtered cattle.	No infections detected.
Lumpy Skin Disease (LSD)	Viral infection. The Netherlands is officially disease-free.	Infections have never been detected.
Foot and Mouth Disease (FMD)	Viral infection. The Netherlands has been officially disease-free since 2001.	No infections detected.

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Table continuation

VETERINARY DISEASES	SITUATION IN THE NETHERLANDS	Surveillance – Highlights Fourth Quarter 2019
Anthrax (zoonosis, infection via animal contact)	Bacterial infection. Not detected in the Netherlands since 1994. Monitoring via blood smears from fallen stock.	No infections detected.
Rabies (zoonosis, infection via bite or scratch)	Viral infection. The Netherlands has been officially disease-free since 2012 (illegally imported dog).	No infections detected.
Bovine Tuberculosis (TBC) (zoonosis, infection via animal contact or inadequately prepared food)	Bacterial infection. The Netherlands has been officially disease-free since 1999. Monitoring via slaughtered cattle.	Infection determined in an imported animal, no spread.
Article 100 GWWD (Health & Welfare Act) compulsory reportable diseases (diseases named in article 10 of the 'Rules for prevention, control and monitoring of infectious animal diseases and zoonoses and TSEs')		
Campylobacter fetus ssp. venerealis* and *Tritrichomonas foetus	Bacterial infection. The Netherlands has been disease-free since 2009. Monitoring of AI and embryo stations, and in animals for export.	No infections detected.
Leptospirosis (zoonosis, infection via animal contact or inadequately prepared food)	Bacterial infection. Control programme compulsory for dairy farms, voluntary for non-dairy farms.	96 percent of dairy farms have the *L. hardjo*-free status. Four infections detected upon bulk milk monitoring, including via import.
Listeriosis (zoonosis, infection via inadequately prepared food)	Bacterial infection. Occasional infection detected in cattle.	One infection detected in aborted foetus. No infection detected in milk samples.
Salmonellosis (zoonosis, infection via animal contact or inadequately prepared food)	Bacterial infection. Control programme compulsory for dairy farms, voluntary for non-dairy farms.	94 percent of dairy farms had unsuspected results.
Yersiniosis (zoonosis, infection via animal contact or inadequately prepared food)	Bacterial infection. Detected occasionally in cattle, mostly in aborted foetuses.	Two infections detected in cattle at necropsy.
Other OIE-list diseases in the Netherlands subject to compulsory reporting		
Bovine Viral Diarrhoea (BVD)	Viral infection. Control programme compulsory for dairy farms, voluntary for non-dairy farms.	79 percent of dairy farms have BVD-free or BVD-unsuspected status. This was 16 percent among non-dairy farms.
Infectious Bovine Rhinotracheïtis (IBR)	Viral infection. Control programme compulsory for dairy farms, voluntary for non-dairy farms.	75 percent of dairy farms have IBR-free or IBR-unsuspected status. This was 20 percent among non-dairy farms. Nasal swabs from 47 farms: field strain detected at two farms (not milk-providing).
Paratuberculosis	Bacterial infection. Control programme compulsory for Dutch dairy farms. 99 percent has PPN status.	77 percent of dairy farms have Paratuberculosis Programme Netherlands (PPN) status A (unsuspected).
Tick borne diseases	Vector borne diseases. Ticks infected with *Babesia divergens*, *Anaplasma phagocytofilia* and *Mycoplasma wenyonii* are present in the Netherlands.	No infections detected.

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Table continuation

VETERINARY DISEASES	SITUATION IN THE NETHERLANDS	Surveillance – Highlights Fourth Quarter 2019
Other infectious diseases in cattle		
Malignant Catarrhal Fever (MCF)	Viral infection. Infections with Ovine herpes virus type 2 occur occasionally in the Netherlands.	One infection detected at necropsy.
Liver fluke	Parasite. Liver fluke is present in the Netherlands, particularly in wetland areas.	Infections detected at 63 farms.
Neosporosis	Parasite. An infectious cause of abortion in the Netherlands.	Infection detected in four submitted aborted foetuses.
Q-fever (zoonosis, infection via dust or inadequately prepared food)	Bacterial infection. In the Netherlands, a different strain in cattle to that found on goat farms, with no established relationship to human illness.	No infection was detected in submitted aborted foetuses.
From monitoring	Once again, high supply of cattle with a lower status in various programmes, including a high proportion of imported animals. Introduction of *Streptococcus agalactiae* on some farms.	

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.

GD2185/03-20