Happy cows, happy farmers?
The Netherlands may not be the world’s largest dairy producers, but the TopDutch region is certainly the knowledge hotspot of the global dairy industry. The Northern Netherlands is a pioneering region in circular and sustainable milk production, focusing on the welfare of both the cows and the farmers, as well as being experts in the fields of proteins, lactose and fats in milk. Anyone who wants to catch a glimpse of the future of dairy should pay a visit to the TopDutch region.
SMART DAIRY FARMING: HAPPY COWS, HAPPY FARMERS?
The village of Kantens is situated less than 10 miles from the northern Wadden Sea coast; in the center of the coastal region of Hunsingo, where once upon a time in ancient history, the border between sea and land was fluid. The village, with its 700 inhabitants, is centered around a terp - a sand mound - on which the thirteenth-century Antonius Church was built. During the Middle Ages, these sand mounds protected the villagers from drowning in the case of a flood. These floods are a thing of the past now, but the soil is still among the most fertile on the European continent. During the seventeenth century - the Golden Age of the Low Countries - a canal was
dug along the village that was promptly named Boterdiep. The name refers to the canal that was used regularly throughout history to transport milk to the city of Groningen. The Hunsingo dairy farm is situated directly adjacent to the Boterdiep on the east side of this terp village. The farm is run by Ad van Velde, one of the most well-known farmers in the TopDutch region. With its 200 dairy cows, van Velde’s farm looks like any run-of-the-mill dairy farm. In 1988, he and his family migrated from the southern part of the country to the TopDutch region.

‘I believe in a 100 percent transparent dairy farm. In most countries, milk production is a non-transparent business. When a consumer visits us, we want everything to be accessible and visible.’

Ad van Velde, President Global Dairy Farmers

While many of his colleague farmers were choosing to start fresh in Denmark, Germany, the United States and Canada, van Velde and his wife Annette chose the Province of Groningen. Here, with its vast pastures, affordable land, and where the northern lights can often be seen, they developed their sustainable farm. Van Velde explains ‘I believe in a 100% transparent dairy farm. In most countries, milk production is a non-transparent business. When a consumer visits us, we want everything to be accessible and visible.’ Van Velde thinks the whole world should see how sustainable dairy is produced. By this he means the cows’ welfare, minimal use of antibiotics and no hormones. ‘We hardly use any antibiotics here and no hormones at all anymore. But enormous amounts of antibiotics and hormones are still being used around the world. This kills all the organic ingredients.’ Dutch dairy is highly regarded around the world - in particular in Asia. Recently, a Chinese delegate that he had signed an
export deal for his milk with visited van Velde’s farm. China prefers Dutch milk for the production of milk powder, which is used to feed children. This is one of the reasons why the country exports 65% of the 13.9 billion kilograms of milk it produces annually. One-fifth of Dutch milk is exported outside of the European Union, mainly to China, Japan and South Korea.

Feeding the world with high-quality dairy

The TopDutch region is the heart of Dutch dairy farming. The Province of Friesland in particular is the home of many dairy farms. 40% of Frisian soil (compared to the Dutch average of 30%) consists of green pastures where the renowned Holstein-Frisian pedigree cattle graze under the clear blue skies so characteristic of the Netherlands - a scene that Asian delegates always want to see on business trips to the Netherlands, according to van Velde. ‘We are feeding the world with high-quality dairy. The whole world wants to be fed and they look to us for that. We possess the knowledge, the passion, and the right conditions. Farming is in our blood.’

'We focus on added value, climate-neutral production, without antibiotics, with less methane excretion, more recycling of raw materials from manure.'

Ad van Velde, President Global Dairy Farmers

Van Velde is not just another farmer. He is one of three Global Dairy Farmers in the TopDutch region. This trio belongs to a group of one hundred other pioneering dairy farmers, who are also represented on the boards of large dairy co-ops and businesses. Since 2017, van Velde is the Chairman of the organization. Van Velde is a pioneer himself - he started experimenting with automatic milking robots in 1999. He currently has four of these robots from the Dutch brand Lely installed in his stables. With his farm, he strives toward animal welfare, climate-neutral production, innovation and transparency. In his role as pioneer, he flies around the world to help
farmers in other countries modernize their dairy farms. As a board member of the European Dairy Farmers, his wife, Annette, meets dairy farmers from all over the continent.

Ad van Velde helps farmers from around the world to start-up or modernize their businesses. He has just returned from Ethiopia. ‘100 million people live there and the population is very young. And dairy is extremely expensive there. The demand for milk is enormous - whether it’s organic or even non-dairy. And our Dutch expertise is helping them establish this sector.’ Van Velde is involved in the founding of a new dairy farm, with 100 pedigree cattle at start-up. What do I bring to the table there? My common sense. They’re building new stables and the local knowledge is zero. Sometimes I’m amazed at how simple the know-how they get from me actually is.’ Van Velde is involved in similar projects in Kurdistan, Russia and China.

The Netherlands doesn’t have mega-dairy farms with thousands of cattle. Therefore, the country needs a highly specialized production. ‘Milk is not a commodity here. We make cheese, baby formula, delicious dairy products. They are very popular. When it comes to production costs, we’ll always lose to large producers like New Zealand and the United States. We focus on added value, climate-neutral production, without antibiotics, with less methane excretion, more recycling of raw materials from manure. Van Velde has high expectations for the possibilities precision agriculture has to offer.'
1. LESS MANURE: LESS FEED, MORE MILK
For dairy farming, precision agriculture is about the ‘green gold’ growing on the pastures: grass. In the TopDutch region, grass as a crop is the focal point for researchers and pioneering entrepreneurs. ‘The soil is the foundation of your dairy farm’, says Christel Thijssen of the contracting firm Loonbedrijf Thijssen, one of the pioneers of precision agriculture in the TopDutch region. ‘Dairy farmers often think that precision agriculture is about how much feed a cow eats, and analyses of the feed in the silage. But they often forget about their land.’ A missed opportunity, according to Thijssen, who has developed methods to analyze the soil and fertilize effectively. He does this with soil scanners, equipped with sensors. These machines can analyze the soil’s acidity, growth vitality, nitrogen deficiencies and crop problems in the pasture.
'Good soil has a PH value of 5.3 or 5.4. If your soil is more acidic or more alkaline, we can fertilize exactly where the soil needs it.' Once the grass starts growing, Thijssen uses a drone scanner to see where the grass is growing best. The company Dronewerkers - whose pay-off is De Loonwerkers Van Morgen (Tomorrow’s contractors) - is expanding across the world and currently has drone pilots working in Chile, Australia and New Zealand. It is involved in projects in Poland, Germany, France and the United Kingdom. It also installs trial fields for chemistry giants Bayer, Certis and Arkema. Thijssen moved from the southern part of the Netherlands to Friesland where he established Dronewerkers together with his business partners, Bert Rijk and Peter Holster. Thijssen is enthusiastic about the TopDutch region. Friesland is the ‘milk Mecca of the world’. The Dutch Holstein-Frisian cattle breed is imported all over the world because it produces so much milk. A cow can only do this when it receives quality feed. This means high-quality grass because three-quarters of the pedigree cattle’s diet in the Netherlands is grass.

**Grass management for more and better milk**

This grass comes in two varieties. Young, fresh, green grass provides the grazing cow with more protein for rich, nutritious milk. Older grass has more structure and stimulates the cow’s rumen, which then activates milk production. This is the reason why farmers in the TopDutch region create the so-called ‘lasagnekuilen’ (literally translated, lasagna pits), in which the protein-rich grass is mixed in layers with the silage grass that is rich in fiber. Thijssen is the brains behind the research project ‘Grass4Farming’. In this project, he studies the effect the quality of the grass has on the milk. Thijssen compares the soil to a battery. ‘Crops drain the soil. This is also true for grass that extracts minerals from the soil’. In a project with Frisian farmer, Michiel Kroes from the village of Katlijk, one of Thijssen’s drones analyzed Kroes’ pastures’ soil quality in 2014, after which Thijssen and Kroes started fertilizing very specifically. This allowed Kroes to save on artificial fertilizer. ‘Grass management’ is what Thijssen calls it. ‘Because the cows eat better grass, Kroes now saves on average 50 kg of feed per day on his 120 cows. And every time we measured, the milk production per cow had increased. Compared to 2014, the average annual savings
amounts to 8,000 kg of artificial fertilizer and 18 tons of feed. The result is more and better milk: on average 2.3 kg more milk per cow. A 10% increase. Global positioning technology and sensor technology also help savings. By installing a sensor, such as the Yara N-Sensor, on the tractor or by scanning the soil with drones, savings of up to 35% on artificial fertilizer can be achieved. Less artificial fertilizer also means less natural gas consumption, since the production of 1,000 kg of artificial fertilizer uses about 3 to 4 cubic meters of gas.
2.

ANIMAL WELFARE:
HAPPY COWS,
HAPPY FARMERS
A cow that eats healthier, in turn produces more and richer milk. Another way to accomplish this is through animal welfare. One example is Spinder, a company in the Frisian village of Harkema, who sells water beds for cows. They are installed on the floors of the stalls in the stable. They look like thick rubber mattresses filled with liquid. People standing on them really have trouble keeping their balance, but for cows they are very comfortable to sleep on. The water bed consists of two compartments. The front, an extra sturdy compartment, supports the cow’s knees when lying down. The back, a softer compartment, is where the cow rests her rumen.
15% increase of milk as a result of animal welfare
Healthier homes for cows

The company has become famous for its stable designs. Since 1973, Spinder has been fitting cow stables all over Europe with their typical fences in galvanized steel. The company is known for its - mainly mechanical - innovations. Lately, innovation for Spinder has meant focusing on the cow’s welfare. That is how the water bed for the stalls became part of their product range, so ruminating cows can rest comfortably. Their CEO, Jehannes Bottema, explains, ‘For us, animal welfare is priority number one in the stables. We want that to coincide with farmer welfare.’ The water bed originated from the knowledge that cows are most comfortable lying down on dry sand. Bottema expands, ‘Sand may be comfortable for the cow to lie down on, but for the farmer, sand in the stalls is a nuisance. Cows that rest on sand also relieve themselves on it. Thus creating the need for daily maintenance. If you fail to do that properly, the cow can suffer from mastitis. The water bed, which is made of two layers of rubber with water in between, is easy to clean with a hose.

‘Cows are more active in well-lit stables than in dark ones. This exercise stimulates their appetite, which in turn stimulates milk production.’

Jehannes Bottema CEO of Spinder Dairy Housing Solutions

More welfare in the stables has an effect on the liters of milk produced by the cow, Bottema explains. ‘Not just because of the stalls. Widening the exercise-feeding enclosure from 2.75 meters to (up to) 4.50 meters resulted in cows producing an extra 1.5 to 2 liters of milk - a 15% increase.’ Dutch cows have also become larger, Bottema remarks. ‘Dutch cows were small, with an average height of 1.32 meters at the withers in the 1960s. Cows are much bigger now and have an average height of 1.50 meters at the withers.’
Bottema sees more opportunities to improve the cow’s life. Open stables, where the walls have been replaced by mesh or cloth, can create a pleasant environment for the cattle. A stable where the wind can blow through during the summer has better air quality and fewer flies. ‘This creates tranquility. Flies irritate the cows. The more peaceful the stable, the more comfortable the cow. And the more milk the cow produces. There must also be a sufficient water supply, clean and permanently accessible because, Bottema stresses, ‘milk consists of 88% water.’

And then there is the quality of the lighting in the stable. LED lights are used more and more frequently now. This not only saves energy, it is also better for the cows. Dark stables make the cows restless. ‘A cow likes to walk around the stable with confidence. Cows are more active in well-lit stables than in dark ones. This exercise stimulates their appetite, which in turn stimulates milk production.’

**And when the cow is calving?**

Traditionally, mother and calf are separated very quickly. That meant the enclosure for the calves was often a forgotten part of the stable. According to Bottema, there is currently more focus on the accommodation for the calves. It is good for the calf to be licked by the mother after birth. This way the cow produces oxytocin herself and releases the colostrum. So the farmer can easily milk the first colostrum. In 2016, Spinder won an innovation prize with the so-called cuddle box.

This innovation has increased the company’s export market for more and more of its products. Bottema: ‘Spinder used to be dependent on Dutch customers for 70% of its sales. Now 55% of our orders come from abroad.’ According to him, this percentage will increase to 70% during the next few years.
3. TOPDUTCH REGION: A HOTSPOT FOR DAIRY SCIENCE
Leeuwarden is the scientific hotspot of the European dairy industry. Leeuwarden is also host to the **Dairy Campus**, the innovation center for dairy farming and part of Wageningen University & Research (WUR).
‘The Netherlands is the front runner in AgriFood. Our dairy industry forms a tight community and has excellent contact with the country’s scientific centers.’ According to Bottema, the Netherlands is a hotbed of knowledge, expertise and experience in dairy. ‘If one of our members wants a study carried out, we simply call the Van Hall Larenstein University of Applied Sciences in Leeuwarden or the Dairy Campus.’ Bottema also has regular contact with foreign customers and colleagues in another capacity. He is the Chairman of Dutch Dairy Center, a network of more than 70 Dutch businesses that supply to the international dairy industry, farmers, co-ops and milk processors. As Chairman, Bottema often receives foreign AgriFood delegates who are visiting the Netherlands.

**Sustainable science and smart applications**

Leeuwarden is the scientific hotspot of the European dairy industry. Leeuwarden is also host to the Dairy Campus, the innovation center for dairy farming and part of Wageningen University & Research (WUR). This research center, located on the southern edge of the city, is an innovative experimental farm with 550 dairy cows in six dairy cattle stables, and more than 300 hectares of land for grass and corn. The campus houses training and meeting facilities where entrepreneurs, farmers and researchers collaborate intensively on research, innovation and knowledge sharing.

In addition to the WUR the University of Groningen - Campus Fryslân - and the Van Hall Larenstein University of Applied Sciences in Leeuwarden are knowledge partners of the Dairy Campus, while interest group LTO Nederland and the dairy industry are also connected to them. Meat processors Ion Food Group and Cow House International are located right next to the Dairy Campus. A little bit further away in Leeuwarden, dairy company FrieslandCampina and Royal de Boer, a subsidiary of GEA Farmtechnologie, can be found.

The Manager of the Dairy Campus is engineer Kees de Koning. According to him, dairy farming is leading the way when it comes to global market transitions. The Netherlands exports most of its milk, but also most of its dairy products. Therefore, a lot of research about the sustainability of milk
production and milk as a raw product for dairy is being carried out in Leeuwarden. Scientists and entrepreneurs are looking for new applications for milk production and processing. The focus is on sustainability, circularity, the reduction of harmful emissions, animal welfare and health, smart farming and biodiversity.

'\textbf{The global demand for milk and dairy is increasing. This is why, for example, we are looking into ways to make the transportation of milk more environmentally friendly.}'

\textit{Kees de Koning - Engineer and Manager of the Dairy Campus}

De Koning states ‘The global demand for milk and dairy is increasing. This is why, for example, we are looking into ways to make the transportation of milk more environmentally friendly. This can be achieved by thickening the milk - extracting liquids from the milk - on the farm. Last year, we did an experiment about this in collaboration with membrane technology company Wafilin.’ It was a success: The raw milk was thickened on the farm, reducing the volume by half. ‘In effect, we separated half a liter of milk from half a liter of water.’ This would allow cheese manufacturer DOC Kaas, also involved in the project, to significantly reduce their transportation costs. Though the cheese recipe does have to be adapted. And the residual water? De Koning explains ‘Students at Van Hall Larenstein used it to make carbonated water. We called it Waddenspa. Some students even used the water to brew their own beer.’
4. PREPARING FOR THE PROTEIN TRANSITION
Wafilin Systems is the company that realized the milk thickening on the Dairy Campus. Wafilin Systems develops mechanical membrane applications that can be used to isolate proteins from milk and other liquids. Big customers are multinational dairy producers, starch producers and sugar producers.
Jos van Dalfsen is the son of the company’s founder and works there as R&D Manager. Van Dalfsen has noticed that much of the demand is due to the global protein transition - the large-scale substitution of meat protein by plant-based protein in the production of food products.

Because this is still in the pioneering stage, Van Dalfsen gladly uses the facilities at scientific centers like the Dairy Campus and the Van Hall Larenstein University of Applied Sciences, located close to the Wafilin Systems offices and Wetsus, European center of excellence technology.
‘Membranes, pumps, valves, stainless steel installations - that’s what we work with. We started out as a company building water filtration installations. In 2013, my father shifted the focus to the development of systems for the dairy and food industry. This is strongly represented in the Netherlands and, in particular, in the TopDutch region, where the large R&D departments of food multinationals are located. Danone, Nutricia, FrieslandCampina, Underway and DOC Kaas have their laboratories there.

The Wafilin membranes are used to isolate proteins, lactose or lipids, but also to filter bacteria from a liquid. Sometimes the most valuable part is located on the inside, and sometimes on the outside, Van Dalfsen says. And sometimes the market changes. Right now the whey is more valuable than the cheese itself in cheese production, Van Dalfsen emphasizes: ‘Whey contains lots of protein. This liquid used to be discarded. Now the proteins from whey are used in baby food, medical applications and as additives in juices and sports drinks.’

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But the company also researches if the valuable ingredients from milk can be isolated. Proteins with a composition similar to breast milk, for example. ‘Companies are asking us more and more often to develop membrane processes to isolate and fraction specific proteins.’ These applications will be used in the future to custom make medical nutrition and baby food. ‘In the future, milk will be composed on demand, just like a building kit,’ Van Dalfsen says. ‘The food of the future will become higher and higher in
quality. The consumer no longer accepts unhealthy ingredients in their food. The knowledge from the TopDutch region is used to meet that demand. The Netherlands exports more and more high-grade milk and dairy products to other countries.

**Brick by brick nutrition**

If it is possible to isolate and fraction usable proteins, then they can be produced as a powder. ‘There are currently dairy elements that are sold for €3,000 per kilogram. They owe this high value to their specific qualities, such as the structure they give to a food product or the digestion, for example. In the future, all foods will be assembled brick by brick,’ Van Dalfsen predicts and emphasizes that milk can be separated into more than a hundred different elements. ‘Enough to keep researching for a while. Here in the TopDutch region, we are well prepared for the protein transition.’
JOIN TOPDUTCH

Want to find out more about what makes the TopDutch region a good place to be great, or view the digital edition? Head over to our website www.topdutch.com

Are you interested in exploring what your business possibilities could be? Connect with Joep de Vries, our AgriFood expert.

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