

**TOP
DUTCH**

**A good place
to be great**



PUSHING INNOVATION IN AGRIFOOD

How the TopDutch mentality helps solve societal challenges

From within its agricultural hinterland, the TopDutch region plays an important role in solving social problems. **From multinational to farmer, from scientist to start-up - in the Northern Netherlands they all work together on solutions to the global food problem and the transition to a sustainable society.** A high level of knowledge, fertile soil and - above all - cooperation form the key to success. Read how the ecosystem in the AgriFood sector in the **TopDutch region** works and the innovation it leads to.

THE GREAT DUTCH COOPERATIVE: PUSHING INNOVATION IN AGRIFOOD

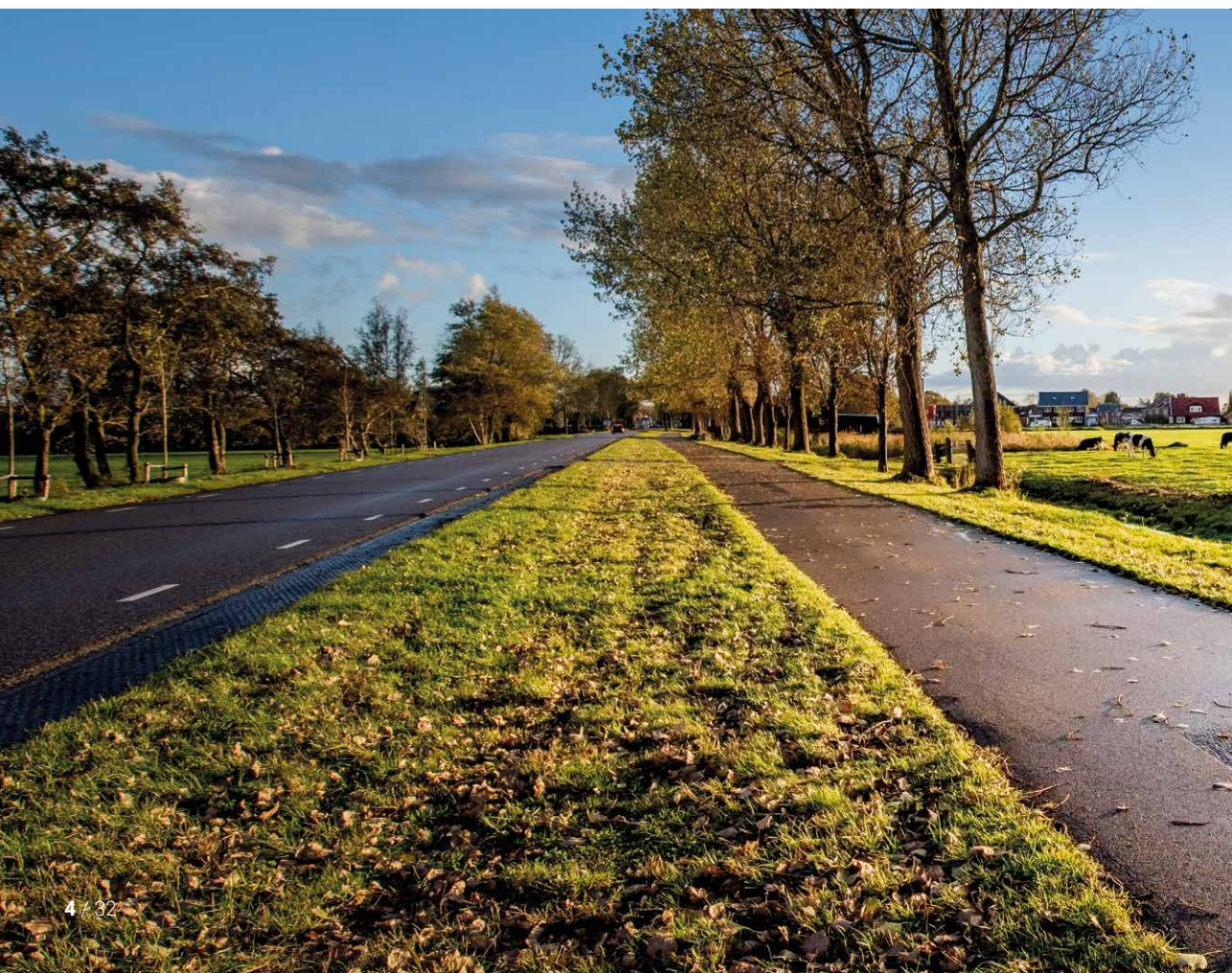
Cooperation is key

Driving through the Northern Netherlands, nobody could fail to notice the abundant crops of potatoes, sugar beet, maize and grain. But there's also juicy grassland where cows graze peacefully and where stately homes stand in the shadows of trees. The Netherlands is one of the most densely populated countries. But as well as its urban areas and industry, the country also has an internationally renowned agricultural sector.

That position owes much to the TopDutch region.

Cooperation in the AgriFood sector has traditionally been key.

The cooperative, for example, is a typically Dutch concept. It turned out to be an organizational model that offered farmers many benefits. Dairy farmers could collectively negotiate a good price for their milk and make joint investments. Cooperatives still play an important role to this very day:



In making the agricultural sector more sustainable, for example (case 3) Cooperation has increasingly transcended the traditional chain in recent years. In the TopDutch region, partners from other sectors look for smart, sustainable applications. The AgriFood sector offers opportunities for such cross-over partnerships (case 2).

But start-ups are also responsible for innovation in the AgriFood sector. They are driven to find solutions to the global food problem or to accelerate the transition to a sustainable society. In the TopDutch region they can find a pleasant ecosystem that contributes to their success (case 1).

Let's take a closer look at some TopDutch entrepreneurs who - through co-creation - each innovate in their own way.



1.

START-UP ECOSYSTEM

'This is where the magic happens.'

Start-ups enjoy a pleasant ecosystem in the North. 'There's no competition between them, it's all about cooperation.' Large companies like EV Biotech, a spin-off from the University of Groningen, which operates at the cutting edge of digital technology, chemistry and AgriFood, are happy to give the **'youngsters'** a helping hand.

At the height of summer, the Zernike Campus Groningen is deserted. The students are all on vacation. But there are still some places where work is done. It's business as usual for some companies located on the university campus. We see employees arriving at the recently opened Innolab Agrifood, a striking building featuring lots of wood and glass.

EV Biotech is also fully up and running today. The start-up has no time to lose in solving the molecular puzzle that will give the world a vanilla extract that is no longer based on mineral oil. 32-year-old CEO Linda Dijkshoorn proudly presents her company. Most colleagues are working at their laptops. Two employees are working in the opposite laboratory.

Vanilla puzzles

Linda Dijkshoorn is a pharmaceutical biologist and started EV Biotech last year together with former fellow students Sergey Lunev and Agnieszka Wegrzyn. The young company uses innovative technology to create micro-organisms that can produce high-quality molecules. One of the challenges is to modify the bacteria in such a way it secretes vanilla. 'Only a small percentage comes from the vanilla orchid that grows in Madagascar,' explains Linda Dijkshoorn. Most of it is made artificially from

Labs in the Zernike campus



crude oil, which emits a lot of carbon. Vanilla production is a billion-dollar market; it's in our ice cream, our shampoo, our yoghurt, our cola.

'The Groningen-based start-up isn't the only company wanting to turn bacteria into vanilla. For fifteen years now, a large, international player has been puzzling on the same issue, still without getting the desired result. Linda Dijkshoorn smiles: 'We're always up for a challenge.' She is convinced that EV Biotech will be the first to succeed because her team uses computer models. 'That's quicker than experimenting in the lab.'

Baker's yeast

EV Biotech uses baker's yeast for the vanilla-producing organisms.

'These organisms emit CO₂ and create the aeration of our bread. But you can give them a different function by adding an extra gene. The first step is to find out how the vanilla plant makes its vanilla; this is described in its DNA. This code is then copied to the baker's yeast.'

That might sound simple, but it's a complicated process. 'It would take a lot of time and manpower if we did it exclusively in the lab. That's why we go a different way. We translate the function of the genes in the organisms into computer models. That's how we digitally manipulate the organisms.' EV Biotech uses these models to calculate the effect of adding a gene and how an organism produces vanilla as efficiently as possible. 'We can also predict which routes have the most chances of success, and which do not.'

Digital laboratory

The results of the digital laboratory are tested with real life experiments in the laboratory. Two employees are working on that today. 'This is where the magic happens', begins Linda Dijkshoorn. The worktop contains bottles of micro-organisms, food, genes and secreted materials. 'We're mimicking the promising routes here. We use the data to improve our software models. The laboratory looks brand-new and well-equipped. But EV Biotech has also invested in its own equipment. Linda Dijkshoorn points out one device that copies DNA and another which purifies protein. In the adjoining room there is a machine in which bottles of organisms and food are being agitated to allow the bacteria to grow.

'The North has a strong chemical sector where sustainability is given high priority.'

Linda Dijkshoorn

Revolutionary technology

EV Biotech started out in early 2019 with funding by the investment funds Carduso Capital, Triade Investment and the University of Groningen holding. Investors describe EV Biotech's technology as 'revolutionary'. The company aims to achieve earnings with the technology and the production organisms. 'We won't be making vanilla ourselves, although a showcase might be needed to prove we can do it.' In addition to vanilla, EV Biotech works in a similar way on processes that lead to bioplastics, high tensile silk and flavors and fragrances. Where bioplastics are concerned, Dijkshoorn sees opportunities to work together with regional partners. 'After all, the North has a strong chemical sector where sustainability is given high priority.'

American investor

Linda Dijkshoorn has nothing but praise for Groningen's ecosystem. She finds that everyone is willing to help each other. According to her, that's the strength of the ecosystem. 'We are doing each other little favors, and that's how we move forward together. In Amsterdam, where I was initially planning to set up shop, I felt a lot more mutual competition.'

Larger companies are also helpful and open up their networks for us. Many of our discussion partners find our business 'cool' and are happy to introduce me to other entrepreneurs. A few months ago, I happened to be meeting with the American investor Neal Dempsey. He turned out to be interested. 'I think I'll visit him in San Francisco when I go there for a conference.'

The energetic entrepreneur hopes that in ten years' time EV Biotech will have its own lab at the Zernike Campus in Groningen and will have made its mark in the chemical industry. 'It would be great if we could manage to eliminate some harmful processes.'



Modern laboratory

As well as EV Biotech and CarbExplore in Groningen, the German Candidum also uses the Innolab Agrifood. A spin-off from the University of Stuttgart, this company is successfully designing pure enzymes. Candidum was drawn to Innolab Agrifood for a number of reasons. 'It's modern and can be built up quickly how we want it,' says Philip Schellenberger, head of Candidum's laboratory. It was especially the flexibility that appealed to him. The Innolab Agrifood team is able to respond quickly and contribute constructive ideas about the possibilities.'

2.

**KNOWLEDGE
- INTENSIVE
INNOVATION**

'The soil is better here, and there's more knowledge.'

The TopDutch region is bursting with knowledge when it comes to the potato, hemp and magnesium salt. While the possibilities are far from exhausted, innovation has recently started to focus on the intersection of these products. Companies such as Hempflax, Avebe and Nedmag are working together to find smart applications by combining the properties of potato, magnesium salt and hemp.

Residents of East Groningen no longer see anything unusual about it. But cycling tourists are still caught by surprise when they see large fields full of hemp. The plant looks suspiciously like the marijuana plant. But the reality is different. The hemp crop that grows here belongs to the same family. 'But it won't get you high,' says Mark Reinders, CEO of the hemp processor Hempflax. 'Cannabis Sativa contains an extremely low amount of THC, tetrahydrocannabinol, the substance in cannabis Indica that has a mind-altering effect.'

But the crop does have very strong fibers. For more than 25 years Hempflax has been processing hemp, which yields one of the strongest natural fibers. In recent years, the company has been able to keep up with the growing demand for sustainable products. 'The hemp fiber is currently used in BMW and Mercedes Benz car doors and dashboards, but also in the construction industry for underlay, bedding, door mats and insulation material.'

Hemp: a multi-purpose raw material

Farmers like to grow hemp. Mark Reinders tells us 'The crop is attractive because of the low grain price. Also, all the farmer has to do is sow the seeds. The plant grows so fast - about 4 centimeters a day - that weeds don't stand a chance and there's no need to spray.' Hempflax does the harvesting itself with a Double Cut Combine. The company developed it together with the local John Deere dealer.

In East Groningen, 1,300 hectares of hemp are cultivated, from which Hempflax uses the fibers and wood. The company also opened a factory in Romania in 2015. From the hemp grown here, Hempflax also extracts the tops of the leaves with which oil is made. This oil has a beneficial effect thanks to the substance cannabidiol (CBD). Mark Reinders expects to be able to integrate the same process in the TopDutch region in the near future. 'The soil is better here, and there's more knowledge,' says Reinders



The Hempflax CEO sees hemp as the ultimate raw material for the future biobased economy. 'The possibilities are almost endless. We can make a huge impact with hemp. We're already able to make bioplastics, but it's also an alternative to textiles. A lot of ideas have yet to be developed.' With that aim in mind, Hempflax sought cooperation with the University of Groningen and the Hanze University of Applied Sciences. A creative workshop was set up, the Hemp Design Factory, where students work on new hemp products.

Starch in jeans

The TopDutch region has more companies that have spent years producing innovative applications of their agricultural products. Such as Avebe in Veendam. Thanks to cooperation with local growers, it has grown into the world's largest potato starch group. The potato cooperative would never have succeeded in this without innovation.

Avebe has come up with an endless number of applications for potato starch. The 'white gold' is used in veggie burgers, noodles and ready-made pizzas. But it's also found in less obvious products, such as flower pots, dog chews, plastic bags and toilet roll tubes. Potato starch is even found in the fillers we see in the DIY market. It also provides the thick texture of yoghurt, for example, and is responsible for the firm yarns in jeans.

The company sells around 200 products worldwide based on starch, protein or fibers that give food specific properties. The head office employs 1,350 people, about one hundred of whom are involved in innovation. The secret of the potato has still not been unraveled. The Avebe Innovation Center moved to the Zernike Campus Groningen last year in order to give innovation an extra boost. The starch manufacturer aims to create more innovation by exchanging ideas with students, PhD students and customers.



Deeply rooted

The Northern Netherlands is also home to Nedmag, which is literally deeply rooted in the region. The company, which is also based in Veendam, extracts magnesium salt at some 2,000 meters underground. There we find a layer of salt that was created millions of years ago. The salt layer contains magnesium salt of the purest kind. Nedmag uses this to make high-quality products. Magnesium chloride is used to combat dust and slipperiness. Magnesium salt is also a good product for softening water to make it suitable for the production of cheese or beer. Nedmag's showpiece is Dead Burned Magnesium Oxide (DBM), which is used to make fireproof bricks. These bricks can withstand extremely high temperatures and are therefore valuable for iron foundries and cement kilns.

Innovation Hub

Avebe, Nedmag and Hempflax all continue to produce smart applications with their innovation teams. But why not also innovate by combining the properties of potato, magnesium salt and hemp? This has been taking place since March 2019 at the East Groningen Innovation Hub (IHOG).

The Innovation Hub was created thanks to the efforts of five scientists and one entrepreneur. The story illustrates how short the lines in the Northern Netherlands are, which can lead to great initiatives. The six men know each other from the past; coming from the same village, Pekela in East Groningen. It was entrepreneur Jakob Zwindeman who presented the plan for a hub to his fellow townsmen - all scientists and innovators in their field of expertise. He was given immediate support. They visited the three companies and managed to gain their enthusiasm.

A year and a half later the IHOG had become a reality. 'The innovation hub is fully financed and facilitated by the three companies. That's also the strength of this initiative', says Willem Jonker, Professor of Data & Security at the University of Twente and director of the European driver of the digital sector, EIT Digital.

'Promising innovations here have a great chance of success because they have access to the international network of large companies.'

Willem Jonker

Economic opportunities

The IHOG aims to boost innovation at the cutting edge of starch, magnesium salt and hemp. 'There are economic opportunities in biochemistry, the pharmaceutical industry, the food sector and the construction sector,' says Willem Jonker. The three companies Avebe, Nedmag and Hempflax invest in facilities and also free up staff. Hanze University of Applied Sciences and the University of Groningen supply students and scientists who, together with their employees, investigate which applications are possible with the raw materials.

Nedmag has set up a laboratory where students from the University of Groningen or Hanze University of Applied Sciences can do research projects. One of them is already up and running. Willem Jonker says 'Insulating panels are made of hemp fiber, glued with natural adhesive from Avebe and made fire-resistant with the aid of magnesium salt. Talents from the other two companies will also be able to get down to work at a later stage.'



Working hard at the IHOG

Big chance of success

The initiators are convinced that the IHOG will create a new manufacturing industry. 'That will take a while, but the potential is there,' says Willem Jonker, who was previously closely involved in the High Tech Campus in Eindhoven at electronics company Philips. 'It will mainly be new companies that will emerge; it's great for students to market a good idea. They're supported in this by companies and scientists.' Willem Jonker predicts that perhaps not all the projects will succeed. 'But if you shoot ten times, you're bound to get a hit,' says the co-initiator. 'Promising innovations here have a great chance of success because they have access to the international network of large companies.'

3.

**COOPERATIVES
AS VEHICLES
FOR SUSTAIN-
ABILITY**

'Cooperation is the secret of the Netherlands' success in dairy.'

Cooperation has traditionally been a key part of the in the AgriFood sector. Previously, farmers united in cooperatives to negotiate a good price for their agricultural products.

Cooperatives continue to play an important role today in aspects such as making the AgriFood sector more sustainable. Hochwald Foods, a German dairy manufacturer, benefits from this and sees even more opportunities for the future.

The cooperative is typically Dutch. It turned out to be a suitable organizational model for farmers that offered many advantages. Dairy farmers were able to negotiate a good price for their milk and to make major investments together. By the end of the nineteenth century, the cooperatives had built more than 160 dairies in Friesland. Most of them have gone now. They made way for larger dairy processors with branches in industrial areas.

Bolsward is one of the few dairies still in production. Since 1893 it has produced condensed, or sweetened milk, which was intended for the seafaring population at the time. The high sugar content made it possible to keep it on board for long periods of time. Diluting it with water produced sweet milk.

Partnership of dairy farmers

The dairy was bought by the Swiss dairy company Nestlé in 1929. When Nestlé put it up for sale in 2006, the German dairy company Hochwald Foods expressed an interest. 'The condensed milk complemented the range nicely, and the company also wanted to strengthen its position in the export market', says Koos Elzinga, branch director of Hochwald Foods. Hochwald Foods also chose the Netherlands for the high quality of its milk. And because, with 140 dairy farmers as partners, it has access to the entire chain.

The noisy machines in the monumental factory run 24 hours a day. Wearing earplugs, branch director Elzinga shows us with hand signs how the process works. At the production lines, cans are cut from aluminum, painted, formed into round tubes and given bottoms and lids. The lids fly high above your head, stuck to moving belts, on their way to the right can or jar. A hot, enclosed space forms the beating heart of the factory. This is where the milk is sugared and boiled in large tanks.

The milk is packaged and readied for transport on pallets in the adjoining hall. The goods are transported by truck to the port in Harlingen, and then by ship via Rotterdam across the world. Hochwald Foods produces mainly

for export. The sugared milk is popular in Asian and African countries, but also in Southern Europe.

The most efficient dairy industry

Sustainability is a theme that is high on the agenda at Hochwald Foods. 'The Dutch branch in Bolsward is leading the way', says the Hochwald director. Hochwald pays bonuses to its milk suppliers in Germany and the Netherlands if they meet certain sustainability criteria. The Dutch farmer doesn't have to do much for that. The dairy farmers perform better than their German colleagues on many environmental aspects. They score better, for example, on energy efficiency and fertilizer reduction.'

Hochwald Foods in Bolsward



It also helps that the dairy in Bolsward is centrally located, which adds to its sustainability score. Koos Elzinga tells us 'Most livestock farmers are located within a fifteen kilometers radius of the dairy. That results in low fuel consumption: two tankers are enough to collect the milk.'

The Netherlands has the most carbon neutral cow compared to other countries. The Dutch cow emits the equivalent of 1.27 kg of carbon, compared to 2.4 kg worldwide, according to the Dutch Dairy Organization (NZO), the sector association for the dairy sector. Of the total greenhouse gas emissions, 14.5% is accounted for by total livestock farming, while dairy farming is responsible for 2.9%.

Highly trained dairy farmers

How do they get this done in the Netherlands? Dairy farmers are producing more and more efficiently; cows produce more milk with less feed. According to Koos Elzinga, this is because the Netherlands has highly educated farmers who manage their farms well. 'They constantly strive to improve their carbon footprint. For environmental reasons, but also because it costs entrepreneurs money if they fail to produce in an environmentally conscious way. If a farm produces too much phosphate, the farmer has to cut back his herd.'

Farmers and dairies have been working closely together since 1990 to reduce the environmental impact of milk production. Agreements are made within the sector. Hochwald organizes several meetings a year with the milk suppliers to brainstorm on how these agreements can be translated to the farm. 'We're a medium-sized dairy company, so the lines are short. Decisions aren't handed down from above, but are coordinated with the farmer.'

Milder fodder

According to Koos Elzinga, the environmental impact can be further reduced by improving the composition of animal feed. 'What a cow ingests has an effect on phosphate emissions. Milder fodder reduces emissions. We're looking into this together with our supply chain partners. What's the best choice?' Koos Elzinga advocates that every farmer should be able to make his own choices. It depends on which breed of cow he has. 'A Blaarkop likes everything, whereas a Holstein-Frisian is much more picky. The first breed may be stronger, but it produces less milk.' The carbon footprint is also reduced if dairy farmers start growing feed on their own land. 'That does away with the need to import soya from South America.' Hochwald milk suppliers are also experimenting with this.



Smart farming

Innovation in the dairy chain is partly down to the fact that the Dutch dairy farming industry actively engages in smart dairy farming. Milk robots and sensors on dairy machines generate a large amount of data. In the TopDutch region, for example, Hochwald receives data on the quality of the milk even before it is collected. 'Non-conformities could be a sign that cows have been given penicillin. In that case, we don't buy the milk.' According to Koos Elzinga, sharing this data ensures transparency in the chain.

He also sees other opportunities. 'The dairy farmer collects much more data through smart farming. Such as the use of manure, the welfare of the cows, the number of liters of milk produced, the consumption of animal feed. All this data enables the farmer to manage his farm increasingly sustainably.' Koos Elzinga would like to see farmers share this data with each other in the future. A platform was recently built for this purpose. 'It would be nice if we, as a cooperative, were to be judged in the future on our environmental performance. That would enable us to share each other's resources.' Elzinga explains that the Dutch and European legislators should not charge individual farmers for their emissions. 'It makes a lot of difference what kind of soil - sand, clay or peat - a dairy farm is located on. One farmer may have land that absorbs a lot of manure, another does not. This has an effect on the permitted ammonia or phosphate production. Custom solutions must be found for this.'

'It would be nice if we, as a cooperative, were to be judged in the future on our environmental performance. That would enable us to share each other's resources.'

Koos Elzinga

The best open land

According to Koos Elzinga, reducing the livestock population in the Netherlands is a bad idea. Global demand for dairy products continues to grow. If we want to continue to feed the world in the future, we must focus on dairy products. That means that we should produce them on the most fertile soil. England, the Northern Netherlands, Northern Germany and Belarus; these regions have the best open land for cows. And let's not forget that the Netherlands has the most carbon-neutral cow. And, he assures us, 'the tastiest milk.'

Opportunities for foreign companies

Foreign AgriFood companies value the ecosystem of the TopDutch region. They have settled close to valuable resources. Or seen opportunities for cooperation with existing companies.

A good example of this is the New Zealander dairy company Fonterra. In 2016 the multinational built a dairy next to the Dutch dairy company Royal A-Ware. Since then, Fonterra has used the whey left over from cheese production to produce various products, including baby food, sports drinks and medicines. Both companies signed up for another collaborative effort: A mozzarella and cream factory is due to be opened at the end of 2019.

A major player that settled in the Northern Netherlands more than twenty years ago is the Japanese soy sauce manufacturer Kikkoman. In 1997, it opened a production site in Sappemeer, south of the City of Groningen. Kikkoman Foods produces five million liters of sauce a year here, which is distributed from Sappemeer to all European countries. The Netherlands, like Germany, is an important market. The Dutch have been fond of sushi for many years now, and soy sauce benefits from that success.



Clearly structured business community

An important reason why Kikkoman chose Sappemeer was the high quality of the water. It's pure and less hard. The manufacturer hardly needs to work on the water to get the same quality as in Japan. The TopDutch region was also attractive in terms of logistics. The soybeans from South America arrive via the port of Rotterdam, and then go by truck to Sappemeer. Kikkoman gets its wheat from northern Germany. Another aspect that played a role at the time was Kikkoman felt particularly welcome in Sappemeer. 'And it still does,' says Masashi Kasuga, general manager of the European office for the past four years. Local partners, such as the Northern Netherlands Investment and Development Agency (NOM), are helpful in finding qualified personnel. We can't outsource that to a recruitment agency. The NOM knows our company and how to find the right people.'

Another plus in the North: The region has a clearly structured and supported business community. Masashi Kasuga explains 'In the rest of the Netherlands there is more competition, which makes the search for a good partner more complicated. It also helps how we do business. When we request quotations in the Randstad, the companies concerned want to know the next day whether we have already decided. Not here. Here, companies wait for us to respond. Doing business is relaxed in the North.'

Egalitarian labor relations

The Japanese general manager admits that he keenly feels the cultural differences. Laughing heartily, he tells how he had to get used to the more egalitarian relations between employers and staff. In Japanese organizations, the manager is the boss and his decisions are implemented without question. It was different here. 'I was surprised to see that employees gave their opinions and suggested how things could be done differently.' He is now open to his employees. 'It sometimes leads to even better ideas', says Masashi Kasuga.

'Doing business is relaxed in the North.'

Masashi Kasuga

Kikkoman is happy to give interested parties a glimpse of the factory that has been set up for this purpose. A corridor with windows and information boards shows the process in various areas. The soy sauce is still brewed according to an old Japanese tradition. According to a natural process and with only four ingredients: water, soybeans, salt and wheat. The manufacturer adds *Aspergillus* fungus to this extract, which ensures fermentation. After six months, the sauce can be bottled in the distinctive bottles with a red pouring cap.

From the first floor the visitor has a wide view of the Groningen landscape. Kikkoman owns a large piece of land that still contains potato plants. The manufacturer expects to grow significantly in the future. Clearly, all's well in Sappemeer.

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

T: +31 6 253 926 71
E: jdevries@nom.nl

TOPDUTCH.com

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