WAGENINGEN WORLD
MAGAZINE OF WAGENINGEN UNIVERSITY & RESEARCH ABOUT CONTRIBUTING TO THE QUALITY OF LIFE
no.2 2019

‘The ideal plant-based protein sources are already available’

Protein transition, page 10

Saving nature together
Eighteen stakeholders figure out what works and what doesn’t

The real cost of our food
A new calculation method makes the hidden costs visible

Marketing knowledge
More and more scientists are launching startups and spin-offs

WAGENINGEN UNIVERSITY & RESEARCH

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The mission of Wageningen University and Research is 'To explore the potential of nature to improve the quality of life'. Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

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FEATURES

PHOTO GUY ACKERMANS

Rate of nature loss extremely high

'Even though I am a co-author of the IPBES report on the global loss of nature, the conclusions stunned me. In the last 50 years the world economy has quadrupled in size and international trade has increased by 14 times, causing a massive increase in demand for energy and natural resources. At this point, almost half our ecosystems are being severely damaged by agriculture, fishing, mining, climate change and pollution. One million species of animals and plants are in danger of extinction.
Perhaps it already sounds too familiar a story, but the scale and the rate of the decline in nature are astounding. Ultimately, the survival of humanity is going to be at risk. We can already see now that land degradation and the falling diversity of pollinators pose risks for food production. By destroying habitats, agriculture is itself the biggest threat to biodiversity on land. Traditional protection of nature reserves is not enough to prevent loss of biodiversity, says the report. A fundamental change in our market economy is required. We have got to stop emphasizing economic growth and make sustainability and biodiversity key drivers of production.
But this does not mean a return to the Middle Ages. It does mean setting different priorities. Governments must create the right conditions by changing legislation so that protecting nature, the environment and natural resources becomes the rule and not the exception. We also expect banks and large multinationals to be prepared to take the lead on this.
Consumers can do their bit as well: by flying less and eating less meat, for instance. But I think most of all, we must be vigilant and keep government and industry on the right track. As is happening now with the climate marches. And it's a hopeful sign that the 130 countries that participate in IPBES have endorsed the report, including the radical solutions proposed.'

Esther Turnhout, professor of Forest and Nature Policy and co-author of the report on biodiversity and ecosystem loss by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

ANIMAL DISEASES

PHOTO SHUTTERSTOCK

New vaccine for Rift Valley virus

After six years of research, Wageningen Bioveterinary Research has developed a new vaccine for Rift Valley fever, which is transmitted by mosquitoes. This virus is currently found in Africa but there is a risk of it spreading further. It can cause severe illness in cattle, goats and sheep, as well as sometimes affecting humans. The new vaccine is cheap to produce, protects the animal after a single dose and is completely safe, even for pregnant ewes, unlike the old vaccine. Studies are being carried out for registration in Europe. The research was commissioned by the ministry of Agriculture.
Info: jeroen.kortekaas@wur.nl

EDUCATION

Wageningen top again among MSc students

Wageningen is once again the best university in the Netherlands, according to the 2019 Guide to Master's Degrees. Of the 28 Master's programmes, 13 are labelled 'top degrees'. The best scoring degrees are Geo-information Science and International Land & Water Management. Master's students are very positive about 11 other programmes too, including Food Safety, Environmental Sciences and Plant Sciences.
Info: jac.niessen@wur.nl

GRANTS

EU grants for leading researchers

In late March, the European Research Council (ERC) awarded three grants worth 2.5 million euros to John van der Oost, Lourens Poorter and Dolf Weijers. The ERC grants are awarded annually to experienced scientists who can use them to fund five years of research.

Microbiologist John van der Oost studies Argonaute proteins, which play a regulating and protective role in cells. In 2018, he received the Spinoza prize for research that contributed to the development of the CRISPR-Cas technique. Professor of Biochemistry Dolf Weijers studies genes and proteins that function as a kind of compass, helping plant cells to divide in the right direction. Weijers already received an ERC starting grant in 2011. Lourens Poorter, who is one of the WUR researchers with the most publications, studies the recovery of tropical forests after felling and use as farmland.
Info: jac.niessen@wur.nl

CAMPAIGN

Tips to combat food waste

March saw the start of the multi-year campaign 'How #waste-free are you?' Wageningen University & Research is one of the organizations involved in the initiative, along with businesses, government bodies and other organizations.

PHOTO SHUTTERSTOCK

A quarter of all food in the Netherlands is wasted. Consumers throw away an average of 41 kilos per person. Research shows that more than three quarters of Dutch families want to do something about it. The campaign helps them with tips. If the Dutch were to halve food waste in the home, that would save more than 270,000 loaves of bread and 150,000 one-litre packs of yoghurt every day, explains Wageningen food waste expert Toine Timmermans. 'Those are huge numbers. There is big room for improvement in fruit, vegetables and meat too.'
Info: toine.timmermans@wur.nl

WORLD RANKING

Best agricultural university

For the fourth time in a row, Wageningen University & Research is ranked first in the QS World University Rankings for the category Agriculture and Forestry. In the general ranking, Wageningen fell from position 124 to 125. WUR rose from 8th place to 7the place in the Environmental Sciences category, and from 71 to 67 in Life Sciences.
Info: vincent.koperdraat@wur.nl

NATURE CONSERVATION

Caribbean nature in danger

PHOTO ALAMY

PHOTO SHUTTERSTOCK

Invasive species, overfishing, roaming livestock and climate change together form a serious threat to the nature in the Caribbean Netherlands, conclude Wageningen researchers.

The signs are not looking good for biodiversity on Bonaire, Saba and St Eustatius, conclude researchers at Wageningen Marine Research and Wageningen Environmental Research. In a study commissioned by the ministry of Agriculture, Nature and Food Quality, they assessed the state of affairs on the islands. Goats, donkeys, cattle and pigs roaming freely are destroying rare plants and causing large-scale erosion and severe damage to the vegetation. Sediment and fertilizers are ending up in the sea, which is suffocating fields of seagrass and leading to a decline in fish stocks. There seems to be overfishing but there is no hard data. The nature is also being affected by climate change. A warmer, more acidic ocean and bigger storms are causing erosion and damaging the quality of the coral.

The researchers say that island ecosystems are particularly vulnerable to species from elsewhere that endanger indigenous plants and animals. A particularly distressing example is the lionfish, a non-native species that is seriously harming the coral and the fish that live there. On land, the rubber liana is overgrowing and displacing the native plants. The nature is important for the islands' economy and for tourism. However, the researchers are not expecting the loss of biodiversity to abate. They say more needs to be invested in nature conservation, and systematic monitoring is required to provide supporting evidence for nature policies.

Info: dolfi.debrot@wur.nl

WAGENINGEN ACADEMY

Sustainable fashion industry

The Circular Fashion Lab, an initiative from WUR and art school Artez, brings together designers, scientists, students and companies to work on making the fashion industry fairer, cleaner and more sustainable. The textile industry is the world's second biggest polluter after the oil industry. At the last Opening of the Academic Year, Louise Fresco wore a caterpillar-friendly dress with pineapple pumps to draw attention to this issue and showcase developments.

This year the first Circular Fashion Summer School will take place on the WUR campus. Everyone who wants to learn more and contribute to a fairer, cleaner and more sustainable fashion industry is welcome to come and help rethink fashion!

For more information: www.wur.eu/academy

BIO-NANOTECHNOLOGY

Cup from 3D printer changes colour

Wageningen bio-nanotechnology specialists have developed a 3D-printed cup that can change colour. The reddish-brown cup is opaque but when exposed to light, it turns purple and transparent. The two-colour effect comes from the addition of gold nanoparticles to the printing material. It was discovered by chance by student Lars Kool. The particles reflect light or allow it to pass through depending on their size and the position of the light source. In the future, the technology could be used for lenses that selectively let through light, for sensors or in solar cells as a way of concentrating light.

Info: vittorio.saggiomo@wur.nl

PHOTO VITTORIO SAGGIOMO

TOXICOLOGY

What does plastic do to your intestines?

Wageningen toxicologist Hans Bouwmeester is studying the effect of chemical compounds from micro-plastics on our health, without using lab animals. He uses a lab model of the digestive system to see whether chemical compounds such as the plasticizers found in microplastics end up in our stomach and intestines, and what impact that has. The project is part of a programme funded by health research financer ZonMw that started in March on the health effects of microplastics and nanoplastics.

Info: hans.bouwmeester@wur.nl

FRUIT GROWING

PHOTO SHUTTERSTOCK

Mystery of fruit rot in cold room solved

Two fungal species turn out to be the main causes of a mysterious form of rot in apples and pears that often only appears after months of cold storage. Fruit growers can prevent major damage by keeping the orchard clear and spraying in good time.

Apples and pears can be stored in a cold room for up to a year before they are put on sale in supermarkets. But unfortunately, cooled fruits often rot after a couple of months. That is a major source of losses for fruit growers. Phytopathologist Marcel Wenneker looked at what was causing the fruit rot. He found 15 fungal diseases, two of which were responsible for most of the damage. These two fungi probably do well on the apple and pear varieties that are grown in the Netherlands. But Wenneker thinks it is also possible that they become a problem after lengthy storage.

He found high concentrations of the fungi in leaf remains, fruit left on trees and dead weeds in apple and pear orchards. Wenneker suspects that fungal spores are released from the plant waste and infect the fruits while they are still growing. The fungal diseases then enter a dormant phase and only produce symptoms after a few months of storage. Growers can take preventative measures to reduce the risk of fruit getting infected during the growing season, says Wenneker. 'For example, it's important not to be too late in spraying the fruit with fungicide. That also lets you reduce the number of treatments. Growers can also remove the main sources of infection, such as plant and fruit remains, from the orchard.' Wenneker, who obtained a PhD for his research at the end of February, is now studying the lifecycles of the fungi.

Info: marcel.wenneker@wur.nl

ENVIRONMENT AND HEALTH

Better measurements needed for microplastics

92 per cent of the studies of microplastics in water are incomplete or unreliable. That makes it difficult to assess the risks from microplastics for human health and the environment.

This conclusion comes from Bart Koelmans, professor of Water and Sediment Quality. He heads a research team that analysed data on microplastics in drinking water, fresh water and wastewater in Asia, Australia, Europe and North America. High concentrations of microplastics – particles smaller than 5 millimetres – can harm the environment and living organisms. However, no harmful effects have been demonstrated for humans so far. Koelmans: 'We now see that this is mainly because of the use of unreliable methods. We cannot assume there is no risk, purely because the data is insufficient.' He advocates improvements and standardization in the measurement methods for microplastics, as well as long-term monitoring, not just of drinking water but also of food products.
Info: bart.koelmans@wur.nl

PHOTO ALAMY

BIODIVERSITY

PHOTO SHUTTERSTOCK

Conserving wild bees

A new report shows which species of wild bees and hoverflies are found in which kinds of landscape. Wageningen researchers contributed to the report. It ties in with the National Bee Strategy, in which the ministry of Agriculture, Nature and Food Quality is collaborating with businesses, organizations and research institutes on initiatives aimed at protecting the pollinators. More than half the wild bee species and a third of the hoverflies are classed as endangered in the Netherlands. The report tells landowners who want to do more to help bees and hoverflies which species they can best concentrate on.
Info: wim.ozinga@wur.nl

LANDSCAPE

Drenthe is the most attractive

The Randstad metropolitan area has the least attractive landscape in the Netherlands and Drenthe the most attractive landscape. That is the result of the National Landscape Survey organized by nature conservation society Natuurmonumenten. With more than 45,000 respondents, it was the largest public survey on Dutch landscapes ever. Wageningen Environmental Research carried out the survey. The Dutch countryside scored 7.5 out of 10 on average. 'The further east, the higher the score for the landscape. An exception is Noord-Brabant, which scores relatively poorly,' says researcher Arjen Buijs. People appreciate landscapes most that are home to birds, insects and other creatures, and that have trees, hedgerows and flowers. Business parks and residential housing bring the scores down.
Info: arjen.buijs@wur.nl

PHOTO SHUTTERSTOCK

MONITORING

PHOTO YURI TURKOV / SHUTTERSTOCK.COM

Smart turf for football clubs

The Royal Netherlands Football Association (KNVB) will work with Wageningen to see whether more football clubs can improve their pitches with a smart system. The Johan Cruijff ArenA in Amsterdam already has a smart pitch system. Sensors in the turf and weather stations monitor the soil temperature, humidity, grass quality and amount of light and ventilation. The groundsmen then know exactly when the grass needs fertilizer, light or water. The KNVB will also be implementing the monitoring system for the training fields used by the Dutch national squad in Zeist.
Info: paul.struik@wur.nl

GRANTS

Vici grants for seed and deltas

Two Wageningen scientists have secured Vici grants of 1.5 million euros each. This money from the Dutch Organization for Scientific Research (NWO) will let them develop a line of research and build a research group over the next five years. Leónie Bentsink studies mRNA in plant seeds. Normally, mRNA has a short lifespan but it can last a long time in seeds. Bentsink wants to find out how. Ton Hoitink focuses on tidal zones in river deltas, lower lying areas that are often flooded. These tidal zones are disappearing due to rising sea levels and land reclamation. This is leading to river bank erosion, cloudy waters and accumulation of sand and silt. Hoitink wants to get a better understanding of these phenomena as they are a threat to shipping and ecosystems and increase the risk of flooding.
Info: jac.niessen@wur.nl

MARINE ECOLOGY

Sponge helps clean up

Sponges of the species *Chondrosia reniformis* feel quite at home in polluted water near fish farms. They even purify the water. PhD candidate Mert Gökalp discovered this when he was investigating the best method for breeding sponges.

Interest in creatures such as *Chondrosia* is growing in part because they produce useful biomaterials, for example collagen, and in part because they could be sources of new medicinal compounds. Gökalp and his colleagues in the Marine Animal Ecology chair group carried out experiments in the coastal waters off southwest Turkey, where there are a lot of fish farms. The sponges did almost twice as well in terms of growth and survival in the polluted waters near the fish cages compared with unpolluted water. Gökalp: 'This is probably because there is more food available in the vicinity of the fish farms and possibly also because the cloudy water lets less light through, which sponges like.' He thinks combining sponge farms and fish farms could lead to more sustainable fish farming. The research results were published in *Marine Drugs*.
Info: ronald.osinga@wur.nl

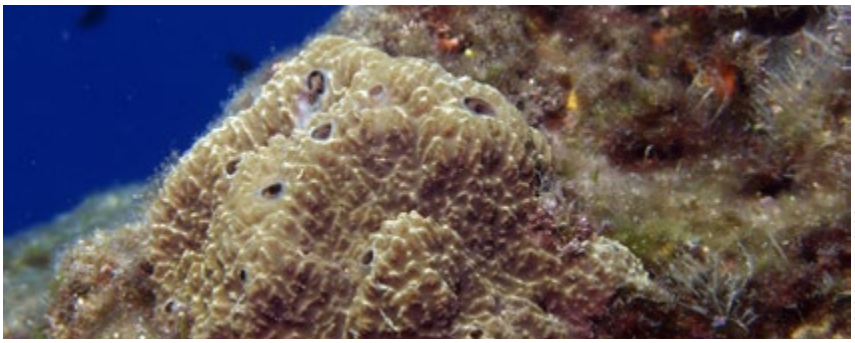


PHOTO SHUTTERSTOCK

ANIMAL WELFARE

Investigating the great tit's character

Research into the personality of animals can help improve the welfare and health of animals in captivity, argued Kees van Oers, professor by special appointment of Animal Personality, in his inaugural lecture on 21 February.

If we know more about animals' personalities, we will be in a better position to judge their wellbeing,' reasoned Van Oers. 'That could help protect species from extinction. Reintroduction programmes could also be more successful if they take account of the personality of the animals being released into the wild.'
Van Oers uses the great tit as a model species, but he sees parallels with many other species, including farm animals. 'This knowledge will help our understanding of how individual animals adapt to changes – often due to humans – in the environment,' said Van Oers.
Van Oers is also employed by the Netherlands Institute of Ecology, which is funding his chair. He has been studying the personality of the great tit for more than 20 years.
Info: kees.vanoers@wur.nl

ARCHAEOLOGY

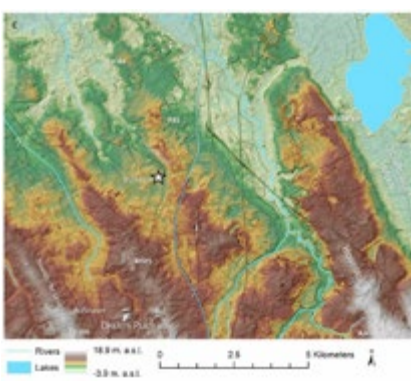
PHOTO DRENTS MUSEUM, ASSEN

Glimpse of the world the Yde girl lived in

Wageningen research has revealed new information about the world the Netherlands' most famous bog body lived in. The Yde girl may have been murdered only a quarter of an hour's walk from her home.

Two labourers found the body, preserved in the peat, in 1897 near the Drenthe village of Yde. After her face was reconstructed in 1994, she became the Netherlands' most famous bog body. The 16-year-old girl was killed about 2000 years ago.

Now Wageningen scientists have revealed information about her surroundings using archaeological soil and pollen studies. The study results were published in the scientific journal *The Holocene*. The study shows that the area in which Yde now lies had a lot of hamlets and arable and heathland fields. The relatively open landscape was a mosaic of ridges and low-lying peatland, grassland and small river valleys, says archaeologist and peat expert Roy van Beek. 'People lived on the more elevated land to keep dry. The girl may have come from a settlement on the nearby Yde ridge. Her body was



left about a kilometre from there, in a small, shallow marsh.' The girl was probably ritually strangled, either as a human sacrifice or as an execution. Van Beek hopes similar studies will be performed for other bog bodies so that we can learn more about this strange phenomenon.

Info: roy.vanbeek@wur.nl

ONLINE EDUCATION

Free lessons in ecotourism

Two Massive Open Online Courses (MOOCs) will be starting in July and November for people who want to make tourism greener. The two MOOCs, 'Society & Environmental Aspects' and 'Rethinking the Future', form the online Professional Certificate Programme in Sustainable Tourism. Each one requires about six to eight hours of study per week and takes five to six weeks, depending on the student's pace.

Info at www.wur.eu/moocs or email wageningen.x@wur.nl

DIET

Cookbooks reveal changing eating patterns

Old cookbooks give valuable information about changes in our diet, discovered Marjolein Buisman of the Operations Research & Logistics chair group. She and her colleague Jochem Jonkman selected 187 recipes for evening meals from the 1950, 1970, 1989 and 2010 editions of the Dutch cookbook *Margriet Kookboek*. A computer analysis of the ingredients showed that the portions have become smaller over time. The share of vegetables and basic ingredients such as pasta and potatoes was smaller in the more recent recipes but the share of protein increased, especially animal protein. The results largely agree with the Dutch National Food Consumption Survey (NDFCS).

Info: marjolein.buisman@wur.nl

PROTEIN TRANSITION

The planet is too small for a meat-rich diet

One quarter of the world's children suffer stunted growth due to protein-related deficiencies. Meanwhile, in the West we eat more animal protein than is good for the environment or our health. But it is misguided to believe that there is one paramount solution to this problem. 'We need to foster several lines of development in parallel.'

TEXT ARNO VAN 'T HOOG **ILLUSTRATIONS** JEROEN MURRÉ

GLOBAL MEAT CONSUMPTION
The FAO predicts a doubling in global meat consumption by 2050. 70 per cent of agricultural land worldwide is currently used for livestock, more than half of it for growing livestock feed.

'There is an almost linear link between a growing gross domestic product and consumption of animal protein,' says Stacy Pyett, Proteins for Life programme manager at Wageningen Food & Biobased Research. 'China is a clear example of that, with meat consumption having risen by a factor of 13 in the past few decades. Emerging economies are following in our footsteps, whereas you would really rather not export our worst habit – the Western diet.'

> 'A tin of chickpeas is the perfect solution'

In a recent World Bank white paper on meat consumption, several graphs illustrate that meat consumption in China is growing particularly fast, and that the rest of Asia, South America and Africa have been rapidly catching up since 2000. The UN Food and Agriculture Organization FAO predicts a doubling in global meat consumption by 2050. The world population will be hovering around the 9.5 billion mark by then, and a fast-growing middle class will have a lot more money to spend. And meat, eggs and dairy products will consistently be at the top of the shopping list. In the West there is a growing realization of the problems caused by overconsumption of animal protein, and yet at the same time that pattern is spreading around the globe.

The problem is that overconsumption of meat contributes to environmental problems and health risks. According to Dutch online guide to sustainable living MilieuCentraal, 40 per cent of the country's climate footprint from its diet can be traced to Dutch meat consumption. Today's methods of livestock farming cause methane and carbon dioxide emissions as well as producing an excess of nitrate- and phosphate-rich manure. Worldwide, a change to a healthy diet based on less meat and more fruit and vegetables would prevent 5.1 million deaths caused by chronic diseases by 2050.

Meat consumption in the Netherlands has gradually doubled since the 1950s to nearly 40 kilos per person per year. And that is 30 per cent too high, says Pyett. Sixty per cent of the protein we eat nowadays comes from animals, and 40 per cent comes from plants. The proportions ought to be the other way round. Twenty kilos of plant material are needed to make one kilo of beef. If people eat more plant foods themselves, rather than via animals, the protein production system will automatically become more efficient and healthy.

Seventy per cent of farmland worldwide is currently used for livestock farming, not just for barns and pasture but above all for growing livestock feed. About 40 per cent of agricultural land is used to produce feed. The growing demand for animal protein and the expansion in livestock farming is therefore responsible for the destruction of forests and natural grasslands. Add a growth in population of at least two billion more people by 2050, and it is obvious that the planet is too small for a mainly animal-protein diet. If livestock farms were to feed their stock exclusively on waste flows from the food-processing industry and on biomass that humans do not eat, such as grass, hay and straw, you would produce animal protein much more sustainably, says Pyett.

Wageningen researchers Hannah van Zanten and Imke de Boer have done some calculations on this. They concluded that a circular production system of this kind could provide 28 grams of animal protein per person per day. Pyett: 'That is the most sustainable scenario, even more sustainable than a world in which everyone eats vegan.'

But it's no good just declaring that everyone should eat less animal protein, says Pyett.

'Globally, distribution is unequal. Around the world, 23 per cent of young children suffer from stunted growth due to a deficiency of essential amino acids from proteins. If you already get enough animal protein, as we do in the west, to eat even more protein is unhealthy, but if you have deficiencies, extra protein from meat or milk is exactly what you need.'
These are all reasons to change the production, consumption and availability of proteins. This is the idea behind the decision to make the research theme of Protein Transition a priority in the strategic plan of Wageningen University & Research, including additional financing over the coming four years.

MORE EXPERTISE

'Protein transition is highly complex. That makes it a suitable topic for us as a research institute to further develop our expertise on,' thinks Pyett. 'We can tackle it from almost every angle, from nutrition science to agricultural and production technology, and consumer behaviour.'
Wageningen researchers can submit project proposals on various topics on which they have already been working for some time. Projects, for example, that stimulate the use of local waste flows instead of imported soya to feed animals, tying in with ideas about circular agriculture. Extra funding particularly enables different disciplines to collaborate in new projects. 'For example, we link up hardcore technologists who work on proteins from algae with social scientists and philosophers who seek to understand how consumers and society are likely to react to a new food product containing algae,' says Pyett, who formerly worked as a chemical technologist on milk proteins at the dairy company Campina, but who now organizes research projects as leader of the Protein Transition theme.

Protein science and research on meat substitutes have been a focus of interest in Wageningen for years now. Entomologists and food scientists see grasshoppers, mealworms and various insect larvae as an environmentally friendly source of protein for pig feed and for human consumption, especially if the insects are bred on waste that we currently compost or incinerate. Food technologists have developed prototypes of meat cuts based on legumes but with the structure of beefsteak. Research is also underway on whether it is possible to grow edible protein using water, sunlight and microscopic algae, and consumer scientists are looking at how people behave when they have the option of a meat substitute. The difficult thing about such diverse research is that you don't know in advance which innovation will be successful. Pyett: 'You can't select the winners beforehand, so you have to foster several different lines of development side by side, from mealworms to meat substitutes.'
According to Pyett, it is actually misguided to believe in one paramount solution to the problem. She predicts that food production and consumption will become more varied in future. At the moment, 70 per cent of our food is based on just five animal and 15 plant species, says Pyett. That is quite an odd situation, given how much variation there is in biodiversity and geography around the world. The agricultural potential of a landlocked African country with low rainfall is quite different to that of the Netherlands. 'There is no reason to plant protein-rich soya everywhere. We can grow a much wider variety of food crops.'

JUICY BURGER

The simplest solution for the west would seem to be to buy less meat and serve more fruit and vegetables. Pyett: 'The ideal plant-based protein sources are indeed available. If you open a tin of chickpeas or lentils for your dinner this evening, you've got the perfect solution in your hands. Not all changes have to be high-tech. At the same time, we know that many people do not see pulses as the basis of a tasty evening meal. A lot of people want a steak or a juicy burger. I think you have to come up with a whole collection of solutions in order to cater to those consumers as well – using meat substitutes, for instance. So we need both high-tech and low-tech options.'
It would be easy to believe that the transition to a diet with less meat is going swimmingly in the Netherlands. The press and the TV are giving a lot of coverage to vegetarianism, veganism and flexitarians. Restaurants are starting to offer more meat-free options and even Allerhande, supermarket chain Albert Heijn's magazine, offers tips for a more veggie-based Christmas dinner. So it looks as though we are doing well, but that is not reflected in the meat statistics. Production and sales have remained virtually stable for the past 30 years, and even in the last 10 years there is no sign of a change in that trend. 'That discrepancy is getting bigger and bigger because attention for meat substitutes is increasingly prominent,' says consumer sociologist Hans Dagevos, who works at Wageningen Economic Research in The >

PHOTO GUY ACKERMANS

STACY PYETT
Proteins for Life programme manager

PHOTO GUY ACKERMANS

EMELY DE VET
Professor of Consumption and Healthy Lifestyles

HANS DAGEVOS
Sociologist of consumption

Hague. 'All the signals in the media and in the market give you the impression something really is going to change now. We have no good explanation for this.'
It is possible that the group of trendsetters and innovators is relatively small compared with the mass of consumers who buy cheap meat on special offer, Dagevos thinks. 'The broad group in the middle still eat what they have always eaten. Those people are not visible in the media, nor do they have a voice. So as a researcher, you should not let your perspective be warped by vegetarian menus in restaurants or hip vegan trends. It is not the case that the whole world is moving in the same direction.'

CONSUMER CULTURE

In the 1950s, meat was still a luxury item in the Netherlands, whereas nowadays it is within reach on a daily basis for almost everyone. But for many people elsewhere, meat is an enviable symbol of prosperity. The fact that people see meat this way all around the world is an expression of a certain consumer culture, says Dagevos. 'If a large hamburger is the way to show you are successful in life, then that determines how the market develops in Kenya and China as well.'
According to Dagevos, our social norms and ideals around meat are an export product in themselves. 'We're seeing a massive explosion in meat consumption and the sale of convenience food worldwide. We in the western world have helped make that happen technologically and culturally. There is every reason to give this a bit more thought, and if you ask me, not enough of that is going on. We often talk in terms of knowledge and technology. And it is certainly important to solve things technically, but we must also look at the kind of mentality and symbolism we pass on with the technology. What is the collateral damage of our consumer culture? We really do export more than just food.'
Dagevos hopes that non-western countries will not go as far down the meat-eating road as the west did. One thing he thinks you could try to encourage is an earlier switch to plant-based meat substitutes, rather like the way telecom in parts of Africa skipped the phase involving land lines to go straight to mobile phones. 'To make a success of that jump, meat and dairy substitutes must be excellent quality and affordable, and carry the right image and cultural value. That combination of technology, economic viability and cultural associations is incredibly complicated.'

HURRYING UP

It is obvious how hard it is to cut down on meat or replace it with substitutes from the difficulty of changing eating habits in the Netherlands. And this is in spite of numerous advisory bodies emphasizing the urgency of change. In 2018, the Dutch Council for the Environment and Infrastructure appealed for fast action. It said that by 2030,

> 'Radical change is not necessary. You don't have to ban meat'

the Dutch diet should be in line with the government's new dietary guidelines, with much more protein coming from plant sources and less meat – a maximum of 70 grams per person per day, half a kilo per week, or 26 kilos per year. Dagevos: 'Now we eat an average of 38 kilos per person per year. So we need to cut down by 12 kilos and we have 12 years in which to achieve that goal. There is work to be done.'

PROTEIN CONSUMPTION IN THE NETHERLANDS
60 per cent of the protein consumed in the Netherlands today comes from animals, 40 per cent from plants. It should really be the other way round. The Dutch eat 38 kilos of meat per person per year. 26 kilos, or half a kilo per week, would be enough.

Changing our diet will inevitably have an impact on the livestock sector and meat processing industry. So, besides introducing new products, the government needs to shrink the existing sectors in a controlled fashion, says Dagevos. 'You can't reduce meat consumption without paying attention to the production side. Sectors and activities will be lost.'
The meat industry is already thinking about this and taking action, says Dagevos. Various meat processing companies at home and abroad are targeting the development of plant-based meat alternatives. 'As well as that, government could make more strenuous efforts to push people in the right direction. It can help just to run a traditional publicity campaign that simply explains clearly that half a kilo of meat per week is enough. Not many people realize this, but on half a kilo a week, you are already eating 2030-style. Radical change is not necessary. You don't have to ban meat.'

If you want to tempt consumers, it's important to understand what drives our eating habits, says Emely de Vet, professor of Consumption and Healthy Lifestyles. Eating behaviour is largely unconscious and routine, she points out. 'Our preferences are the product of our habits, culture and upbringing. At the same time, your eating habits show who you are, and which group you belong to. And what is available in the supermarket and catering outlets also determines the choices you have. Because so many factors influence eating behaviour, only a limited effect can be achieved by informing and persuading consumers.'

CREATURES OF HABIT

Also, people are creatures of habit and there is little point in preaching revolution or radically banning products. 'Small adjustments are much simpler to introduce than major changes of diet. A few more vegetables and a bit less meat might not make a vast difference, but if a lot of people do it, it adds up. And by taking small steps you avoid the resistance a radical turnaround meets with and the effort and cost of getting people on board.' People respond more emotionally to the idea of cutting down on meat than to advice to eat less fat or sugar, says De Vet. 'Some groups of consumers are very attached to meat. It's part of their identity. These groups will not be inclined to change their consumption pattern and will resist attempts to push them in that direction.'
There are strong links between meat consumption and culture and identity. That's why it is such an interesting subject from the nutrition and social sciences points of view.'
In her research, De Vet looks at ways of steering eating behaviour so as to avoid resistance and controversy. 'The question is how you can design the environment to nudge people towards healthier decisions, without too much effort or making them feel their freedom of choice is being restricted. Especially when people are very attached to a product, as is the case with meat.'
In countries outside Europe and the United States, consumers are currently eager to eat more meat, from a starting point of scarcity. Changing that mentality might require a different approach to that for reducing meat consumption from excessive levels in the Netherlands, says De Vet. 'I think that is an interesting subject to invest in. The question is whether the way we try to influence consumer behaviour here would also work in China and South America.'

POOR REPUTATION

Food production and consumption form a complex ecosystem, says De Vet. Europeans have gradually begun to eat more chicken and less beef, probably because red meat and beef cattle farming have gained a poor reputation. 'That shift is a nice example of how a change in one preference affects another one,' says De Vet. 'Chicken seems more sustainable than beef, so in itself it is not an undesirable change, but if the total consumption of chicken goes up enormously, that will cause environmental problems. It would actually be good to develop computer models in which you could study such processes. If you really want to work towards protein transition, you've got to look at how factors interact. It's all very well for me to study consumer behaviour, but that is just one of several factors. An overview of that whole system, how everything hangs together: that is part of what we want to aim at in the next few years too.' ■

www.wur.eu/protein-transition

Marketing knowledge

Researchers and students are increasingly being challenged to think about how they can market their knowledge. Various startups and spin-offs are already under development. 'We no longer wait until an enterprising researcher wants to go into business.'

TEXT ANJA JANSSEN **PHOTOGRAPHY** BRAM BELLONI

His research should be meaningful for society, feels virologist Jeroen Kortekaas. That is why in 2017 he helped launch BunyaVax, a spin-off of Wageningen Bioveterinary Research. The aim of BunyaVax is to use a technology for creating safe vaccines in 16 weeks to nip outbreaks of infectious diseases in humans and animals in the bud. 'Up till now we are always too late with vaccinations when there is an outbreak. A recent case in point was Zika: there is still no human vaccine for that,' says Kortekaas.

This is an example of the entrepreneurial spirit that Value Creation director Sebastiaan Berendse would like to stimulate in Wageningen. 'Being more enterprising is one of the ways of ensuring that the knowledge we generate gets applied .' Then knowledge can have a greater social impact, he expects. That is why entrepreneurship is prominent in the Wageningen strategic plan for the coming years.

> 'By being enterprising, we put our knowledge into practice'

This entrepreneurship is about much more than setting up startups, says Berendse. 'Entrepreneurship also means being enterprising in our relations with research partners. It is looking at the steps needed to put knowledge into practice.'

CHALLENGES FOR RESEARCHERS

Berendse and his team want to offer researchers opportunities to develop in this direction through things like participation in one of the challenges Wageningen is running. 'We put out a call for teams of researchers to present ideas that meet a demand on the market,' explains Berendse. They get support in developing their proposal, perhaps in developing a product, for instance, with questions such as: What is the demand? Who is the client? How does the client want to use the product or technology? What do they want to pay for it? Which route is the best for creating the product? An example of what can come out of a challenge is the SoilFertility tool. >

MEETING PLACE FOR INVESTORS AND BUSINESSES

Startups and spin-offs need investors in order to grow. A place for them to meet each other is the annual event F&A Next, which Wageningen University & Research, StartLife, Rabobank and Anterra Capital started in 2016. As well as investors and startups, the event brings together agri-food companies and business developers on Wageningen Campus to meet, get to know each other better and close deals.

Young knowledge-based companies are interesting for investors. The amount of risk capital invested in agri-food startups has risen sharply in recent years – to about 18 billion euros per year globally. Collaborating with, investing in, or buying startup knowledge and technology companies is a new way of innovating for established companies.

Wageningen does not invest any money in startups itself, but it collaborates closely with two risk capital funds: Innovation Industries (together with other Dutch science universities and the Netherlands Organization for Applied Scientific Research, TNO) and Shift Invests (Rabobank, TU Delft and OostNL). Shift invested in the Wageningen spin-off ChainCraft, which produces biobased chemicals using waste. Innovation Industries contributed to A-Mansia Biotech, which wants to launch a nutritional supplement on the market.

www.fanext.com

This is used to help farmers to apply the correct amount of artificial fertilizer, depending on the crop and the soil characteristics.

Challenges can also lead to new companies being formed. Berendse's team works closely on this with StartLife – a foundation co-founded by Wageningen which supports startups and spinoffs in the agricultural and food sectors. 'We no longer wait until an enterprising researcher wants to start a company based on their inventions,' says StartLife director Jan Meiling. 'Instead of that, we organize these challenges, as well as meetings, so as to find useful knowledge or technology for setting up new companies. And if a researcher wants to collaborate, but doesn't want to go into business themselves, we look for an external entrepreneur.' StartLife and the new Corporate Value Creation department are building up six spin-offs based on knowledge or technology coming out of Wageningen.

MEAT SUBSTITUTES

One of the spin-offs is Plant Meat Makers, a company being set up now on the initiative of Birgit Dekkers and her PhD supervisor Professor Atze Jan van der Goot. 'We have developed a technology with which you can make large chunks of plant protein with the structure of meat,' says Dekkers. 'So we can produce meat substitutes that resemble beefsteak or pork fillet. They don't exist yet.' The step they want to take with Plant Meat Makers is to upscale the production process. 'A startup is the best way of doing that. We can start small and tackle it step by step. Now we first want to develop products for chefs and sell them in a few restaurants.'

With StartLife's help she has drawn up a business plan. She got 25,000 euros through Climate-KIC, a support programme for startups that contribute to sustainability. 'We are working on expanding our team, making arrangements with partners, such as Wageningen University & Research, and talking to financiers. There are several investors in the area of plant-based meat substitutes. We are now looking into who we are going to work with.'

Wageningen's focus on entrepreneurship does not mean that all scientists with a good idea must start a business, emphasizes Gitte Schober of the Corporate Value Creation department. 'Good scientists should certainly go on doing research. We might suggest to researchers who want to stay in science that they work with companies on developing prototypes. The mindset of an entrepreneur is different to that of a researcher, more restless. That is why we focus on young researchers, PhDs and postdocs, to give them a chance to combine their curiosity – the wish to know – with the experience of realizing an idea in practice.'

LOOKING FOR CLIENTS

Iris Houthoff is a young graduate with an enterprising spirit. A year ago she started Mylium, a company that develops new, sustainable material by growing fungi on agricultural waste flows. She used the fungal mycelium to create a material that has the appearance and feel of leather, but is lightweight and with the elasticity of foam. She is now trying to find clients and applications for this material. 'It is biobased, biodegradable and locally produced.'

Houthoff gets the full support of her boss, professor of Bioprocess Engineering René Wijffels. 'He is wholeheartedly supportive of the fact that I have a startup alongside my part-time job as a teacher of bioprocess engineering. He considers it important because just like me, he aims at implementation and impact. He helps me with things like finding a place in a production lab.'

Houthoff enjoys the many sides to running a business. 'Each week is different. New possibilities keep cropping up and that makes it very enjoyable work. For example, I got the chance to move to the Biotech

‘The mindset of an entrepreneur is different to that of a researcher’

PHOTO JONNE SEIJDEL

Investors and companies got together in May at the annual two-day event F&ANext.

Campus in Delft, where I would be able to make use of the expertise of DSM and set up a product lab. But I first want to try and set one up in Wageningen, since I work here.’ She got a starter’s loan of 8000 euros from StartLife, and Climate-KIC is contributing 10,000 euros.
When she started Mylium, Houthoff benefitted a lot from the Startup Week run by StartHub, Wageningen’s support centre for enterprising students, during which she worked on a business model. She also cherishes the moments with her mentor Christian Koolloos, who she got through StartLife. ‘He mainly helps me by asking the right questions. That helps me discover what I should invest my energy in.’
She obtains further funding for development from subsidies and projects. And wherever possible, Houthoff tries to take part in competitions. Winning StartLife’s Young Hero Award, for instance, brought in 2500 euros.

BUSINESS COURSES

Wageningen’s ambition goes beyond instilling an entrepreneurial spirit in researchers. Such an attitude needs to be fostered in students too. ‘We want the fewer than 10 per cent of students that we currently reach with courses on business skills to grow to 80 per cent. That is a major challenge. It means that we should integrate elements of business education into all the Bachelor’s and Master’s programmes,’ says Berendse. ‘In their further careers, all Wageningen graduates are expected to help to think up and to implement solutions. That requires you not only to look at what you might be able to do, but also how you can actually make it happen.’
So the curriculum will be altered over the next few years. But for years already, students who are interested have had the option of various courses on entrepreneurship. That has led to more and more students choosing to go into business. Berendse: ‘The number of student startups has grown from a handful to about 10 per year.’
For Fabian Lindner from Italy, his interest in entrepreneurship was a reason to come to Wageningen in September 2016 for the Master’s in Management, Economics and Consumer Studies. ‘I chose this university because here you can learn entrepreneurship alongside your academic studies. If I hadn’t come here, I probably wouldn’t have had a business now.’
Lindner’s business, Zzinga, brews mead (honey wine). He chose Entrepreneurship as his Master’s track and participated in StartHub’s Startup Week to see whether he could turn his love of mead into a business plan. ‘In that week you work with a team on a business model. We decided to position Zzinga as a modern interpretation of mead: a lightly sparkling honey drink. Some of the profits go to local NGOs that protect bees and promote biodiversity.’

PERFECTING THE RECIPE

Through one of the StartHub coaches, Lindner, who graduates in June, got in contact with Döhler, an international supplier of food and ingredients. ‘We talked to them and they liked our idea. Together, we have perfected the recipe and now they are producing our drink.’ His company is taking other big strides too. ‘The Rabobank has given us an innovation loan. And thanks to StartHub, we have got in touch with the supermarket Marqt. They are selling Zzinga now.’
Wageningen students and researchers are extremely highly motivated, reckons Jan Meiling of StartLife, but they often tend to associate entrepreneurship with ‘right-wing tendencies and getting rich.’ ‘That image is not true. A business is a powerful instrument of change. We want to make that penny drop as often as we can.’ ■

www.wur.eu/entrepreneurship

TIME TO END POLARIZATION IN THE FOOD DEBATE

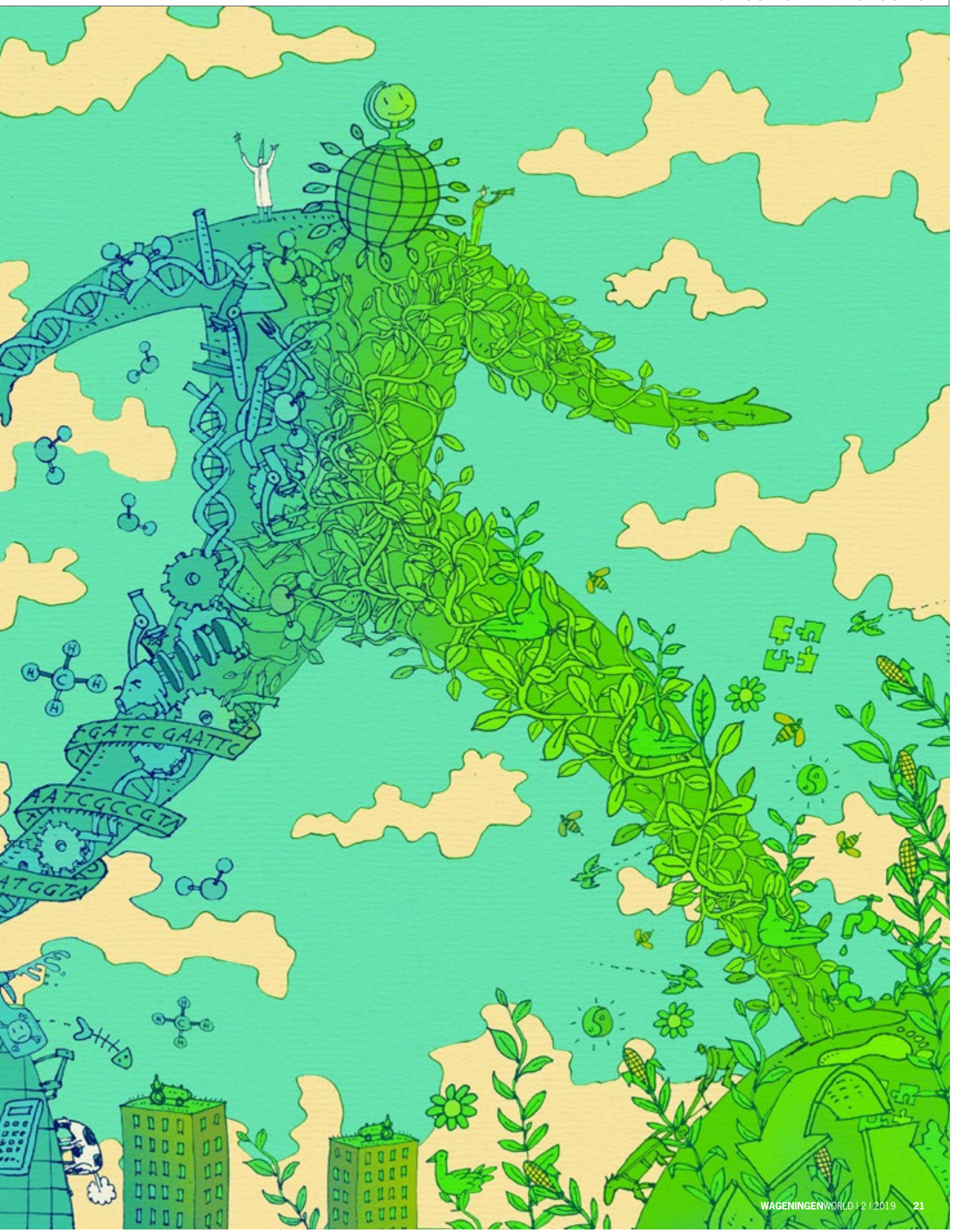
Technology and/or ecology?

We shall only manage to feed the growing world population with agricultural technology and higher productivity, say some. No, say others, sustainable food production requires ecologically oriented agriculture. At a Wageningen symposium an attempt was made to break through this time-honoured division.

TEXT MARION DE BOO **ILLUSTRATIONS** RHONALD BLOMMESTIJN

On Mariahoeve, a modern dairy farm near Deventer, Geertjan Kloosterboer keeps 120 cows on 61 hectares. While milking robots milk the cows, Kloosterboer is active in various farmers' organizations. He is keen to promote understanding between farmers and the general public, and to show how our food is produced, so Mariahoeve holds open days, and hosts school trips and children's parties at which the children get to feed chickens and cuddle calves. The maize fields are edged with flowery verges. 'But ultimately, milk production is our chief source of income,' says Kloosterboer. 'I love nature, but there is not so much scope here for the nature-inclusive farming that is being put forward now. Not every farmer is near a nature area.'

Kloosterboer took part in the symposium held in Wageningen on 29 March, about two movements that have influenced thinking in agriculture and food production for decades: that of the technological optimists and that of the ecological modernists. The techno-optimists argue for modern, intensive agriculture with ever-increasing yields per hectare, so that there is space left over for nature. The eco-modernists go for small-scale slow food >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production in small rural communities, urban agriculture and the interweaving of agriculture and nature.
The guest of honour at the Wageningen symposium was the American historian and science journalist Charles C. Mann. In his book The Wizard and the Prophet, Mann calls the techno-optimists 'wizards' and the eco-modernists 'prophets'.

HIGH YIELDS

For the techno-optimists, innovation is the right route to take so as to be able to feed a projected global population of 10 billion by 2050. Gene technology such as CRISPR-Cas can help agriculture by, for example, building specific resistance genes into existing varieties and helping reduce the use of pesticides by large amounts. High yields per hectare are the key factor. African small farmers, for example, need better access to artificial fertilizer and other aids to self-sufficiency. 'But,' says Mann, 'intensive agriculture also causes massive pollution by pesticides and over-fertilization, algal bloom at sea, vast dead oxygen-less coastal zones, desertification due to wrongly implemented irrigation, and migration from the countryside to slums in megacities all around the world.' According to the ecologists, this makes small-scale, nature-inclusive, ecological farming the right route to sustainable food production. This approach also creates jobs in the countryside, reducing migration to the city slums. Even for small farmers in Africa, agro-ecology is the way to go, say the ecologists. But this still begs the question of whether the yields will then be high enough to feed the fast-growing world population.
Mann: 'It is not just on the world food supply that parties are diametrically opposed to each other. You see the same polarization in discussions on the climate crisis, the water shortage, the phasing out of fossil fuels, you name it... It is difficult to get outside your own discipline, and your own academic compartment. Ultimately, this debate is not about the size of yields per hectare or protecting ecosystems, but about the underlying social values.'
Kloosterboer, the dairy farmer, agrees. 'I use weed killer on my farm to keep the grasslands productive. Some of my colleagues choose not to use any pesticides on principle. Their production is probably lower, but at the moment they get more support from the public.'

ONE WAY AHEAD

Agriculture and food expert Louise Fresco, President of the Executive Board of Wageningen University & Research, identifies neither as a technologist nor as an ecologist. 'It is high time we put the polarization behind us and took steps forward,' she declares. 'There is not just one possible way ahead; there are loads. And science is perfectly suited to exploring that diversity of options.'
According to Fresco, we are gaining a better and better understanding of the harmful side-effects of our technology-driven socio-economic progress. 'We need to redefine progress. A defensive attitude to technology, doom scenarios and ecological pessimism won't get us anywhere. The planet is not on the brink yet and no one sitting here is worried about not having anything to eat tomorrow. On the other hand, technology is not going to solve all our problems either. Science is the best way of getting a handle on our doubts about progress.'
But this is an old and persistent schism. 'This subject matter is incredibly complex,' says Fresco. 'More and more research is being done, and that produces new results all the time. Initially we were happy with DDT, then we were shocked by the effects of it and we banned it. Only much later did we discover that it also helped combat malaria mosquitoes, which led to further research into an alternative – without knowing the effects of that yet either. And so on. Doubts remains on many points.'

MODIFICATION

The tone was set at the symposium by molecular biologist and science journalist Hidde Boersma and political scientist Joris Lohman, the founder of Food Hub, an organization that promotes more sustainable food. It was these two who instigated the discussion about techno versus eco in the food supply with an essay in the Dutch newspaper De Volkskrant. They are both young parents and they are worried about the future of the earth. Boersma was always in the technologists' camp and has supported the use of genetic modification, while Lohman was in the ecologists' camp.
'For a long time we fiercely opposed each

> ‘If you go on bickering, the only winner is the status quo’

other’s point of view, but now we want to shake off that polarization in the food debate,’ says Lohman. ‘I was in a group of political science students in Amsterdam that were full of inspiration about the future of agriculture, but when a farmer’s daughter in the group asked us if we’d ever spent time on a farm, just one hand went up. That was a turning point for me, and I realized how strange it actually was that the next generation of policymakers on the future of agriculture had so little experience of farming practice. Anyway, I think you achieve more by having a conversation with the people who are furthest away from you ideologically. Interesting interactions happen at precisely that cutting edge. I used to get irritated by every single thing Hidde Boersma said on Twitter; now we are working together.’

Their ideas were diametrically opposed, says Boersma. ‘But if you go on polarizing and bickering, the only winner is the status quo. Now we regularly get invited to give presentations at workshops as a duo. There is a lot of scientific evidence for both standpoints. The point is to make the underlying social values explicit. Does it give you a lot of satisfaction to produce your own food? Or do you think it’s better if a small group of farmers do that, so that other people can do other things? Does living in the countryside make you happy or would you rather be in the city? What is your idea of the good life?’

ONE TON PER HECTARE

According to tropical plant breeder Toon van Eijk, the world food supply is not a technological issue. ‘When I went to work in East Africa 30 years ago, the farmers got one ton of maize per hectare. Now, modern high-yield maize varieties have been around for decades, but the ordinary farmer still harvests just one ton per hectare. I can give you 20 reasons for that right now, but they are all political and economic factors. Wageningen needs to focus more on those.’

Student Suzy Rebisz is taking two MSc programmes in Wageningen: International Land and Water Management, and Rural Development and Innovation. ‘There are an awful lot of problems, but there are lots of possible solutions too. Let’s show some solidarity with the supporters of all those solutions, instead of being competitive and aiming to get as much money and support as possible for our own solution. Let’s respect that diversity of viewpoints and show more appreciation of each other’s underlying values. I argue for more collaboration and synergistic relationships. Let’s give each other the space to come out of those scientific compartments and listen to each other. Then we can go forward together, or at least alongside each other.’

NO SINGLE GUIDING PRINCIPLE

Dairy farmer Kloosterboer agrees. ‘We must rid ourselves of that polarization and thinking in black and white terms. There are very extensive livestock farms where the cows get fed a lot of grass and where there is a lot of nature. Other farmers focus heavily on CO_2 reduction and the efficient use of minerals. They have a manure digester on their farm and might keep the cows indoors to keep the manure pit nice and full. There are very many different options at the farm level, and there is not just one guiding principle for all farms. I think every farm has the right to a license to produce. I think it’s brilliant there is such diversity among farmers in the Netherlands. Everyone does it their own way, based on their own principles and with the resources they have.’ ■

www.wur.eu/whizards-prophets

TECHNO-OPTIMISTS AND STRICT ECOLOGISTS

In his book *The Wizard and the Prophet,* the American historian and science journalist Charles C. Mann makes a distinction between techno-optimists, his ‘wizards’ and strict ecologists, his ‘prophets’.

Charles Mann points to the American researcher Norman Borlaug (1914-2009) as the founding father of the techno movement. Borlaug was the godfather of the Green Revolution, which produced high-yield new varieties in the 1960s. These varieties helped save millions of people from famine. In the mid-1980s, the ‘average person’ had enough to eat for the first time in history. ‘Innovation means everyone wins,’ claimed Borlaug.

According to the ‘prophets’, though, it is nature-inclusive, ecological farming that is the key to the future. Even for small farmers in Africa. ‘Take one step back, otherwise everyone will lose,’ says the American ecologist William Vogt (1902-1968) in his bestseller Road to Survival, published in 1948. Vogt introduced the concept of the earth’s carrying capacity. Exceeding that carrying capacity has disastrous consequences such as erosion and desertification, soil exhaustion, water pollution, the extinction of species and eventually mass famine.

Underwater glue

Glue and water don't really go together, yet PhD candidate Marco Dompé has managed to make an underwater adhesive. Thanks to the sandcastle worm.

TEXT ROELOF KLEIS **PHOTO** KEN-ICHI UEDA **ILLUSTRATION** MAARTJE KUNEN

Glues don't stick to wet surfaces. Try mending a tyre that is still wet, or putting a plaster on damp skin. But adhering to things under water is not impossible. Mussels, for example, have no trouble sticking to a fixed surface. Barnacles can do it too. And some marine worms create entire shelters by sticking sand and other hard materials together under water.

This trick is what Marco Dompé, an Italian PhD student in Wageningen's Physical Chemistry and Soft Matter chair group, took as the starting point for his approach to developing a glue that does work under water.

As an adhesive, sandcastle worms use coacervates, viscous liquids made from two polymers that are water soluble. 'These polymers have opposite charges, stick together and form a liquid-like substance that doesn't mix with water,' explains Dompé. It then hardens in response to an external stimulus. The sandcastle worm's glue hardens when it comes into contact with seawater. Other coacervates might harden on contact with oxygen, when the acidity of the surroundings changes or when the temperature changes.

> 'Under water, the glue is 10 times stronger than adhesive tape'

TAKING TIPS FROM NATURE

Dompé used this principle to develop a glue. This scientific field is known as bio-inspired design: finding a design by taking tips from nature. 'The natural adhesives are based on complex proteins,' says Dompé. 'It would be far too difficult and time-consuming to replicate them precisely. What we do is use principles from nature to create something new.'

The external trigger for hardening the glue that Dompé has concentrated on is

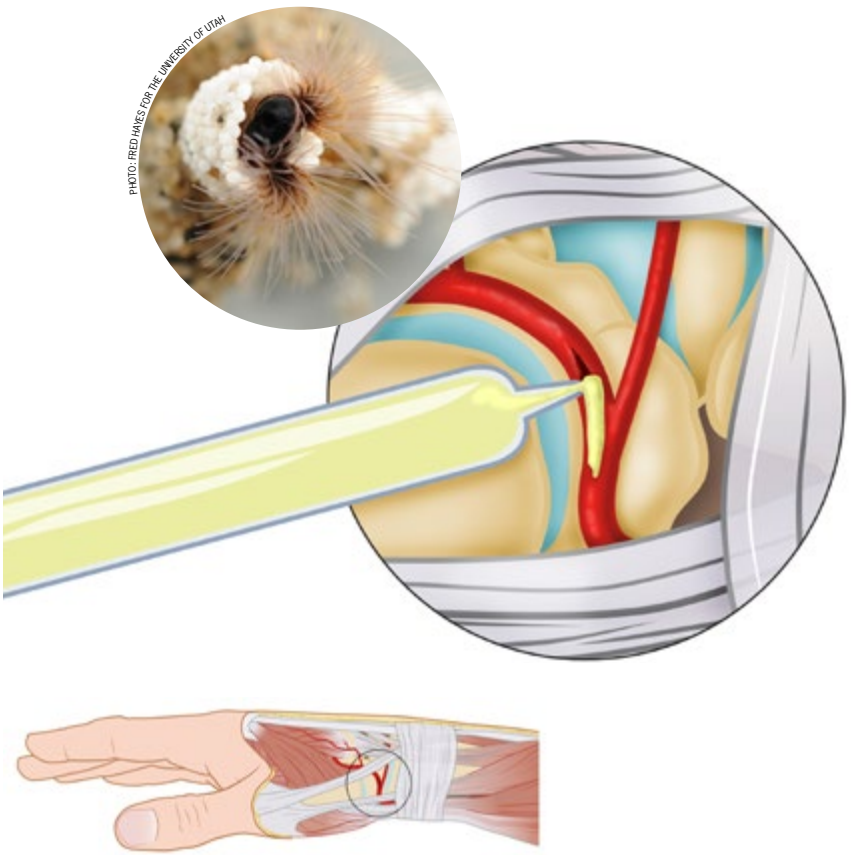
Sandcastle worms build their homes by sticking grains of sand together under water.

temperature. The underwater glue that Dompé wants to make is intended for medical applications. So it should be a glue that can be applied at just the right spot in liquid form in the human body and then harden in response to the body temperature. Doctors would be able to use it to seal wounds or repair tissue.
As polymers, Dompé is using chains based on polyacrylate and polyacrylamide. 'We added poly(N-isopropylacrylamide) side chains to them. They are actually quite water soluble but when temperatures rise, they clump together and repel the surrounding water,' explains Dompé. The side chains clumping together makes sure the glue hardens as it should. This is an irreversible physical process. The glue hardens precisely in the temperature range of the human body.

STRENGTHENING

The glue worked exactly as envisaged on the drawing board. 'We've got the proof of concept, but the glue still has to be developed further,' says Dompé. 'Under water, the glue is 10 times stronger than adhesive tape. But I don't think that is quite strong enough for medical applications. The big plus points of this glue are its thermo-responsiveness and the strength of the electrostatic interactions of the polymers.'
Meanwhile, the chair group has applied for a patent on the process. So the principle does work. The rest is a question of pressing the right buttons. Different polymers and side chains result in different glue characteristics. For example, the salinity of the environment in which the glue is applied has an effect. Dompé: 'The materials you use have to be accepted by the body and must not be toxic. That also depends on the part of the body where you want to use the glue.' ■

www.wur.eu/bio-inspired-design



Marco Dompé used the same principle as the sandcastle worm to develop an adhesive that can stick wet surfaces together. The adhesive hardens at body temperature.

BIOSMARTTRAINEE

Marco Dompé (27, graduated with distinction in Industrial Chemistry at Turin) came to Wageningen through the BioSmartTrainee project, in which 10 universities and companies are collaborating on the development of adhesives that work on wet surfaces. The project is using nature as a source of inspiration. Dompé is one of 11 young researchers who are being trained in this area with money from the EU. Wageningen and Eindhoven University of Technology represent the Netherlands in the project.
Dompé joined the Physical Chemistry and Soft Matter group headed by Marleen Kamperman, who has since been appointed a professor at Groningen. Kamperman has spent her entire scientific career studying nature's chemical tricks and using them as inspiration. Dompé hopes to defend his thesis early next year.

OYSTER FARMERS ARE CHANGING COURSE

Oysters on tables

To outwit a destructive predator snail and a virus, oyster farmers in the Oosterschelde estuary are raising their game. The oysters are being lifted off the seabed to be farmed on tables. 'Without intervention, the whole oyster industry will go under.'

TEXT MARION DE BOO **PHOTOGRAPHY** HARMEN DE JONG

High tide in the Oosterschelde, and the oyster ship C'est la vie is setting course for Yerseke harbour. Captain and oyster farmer Danny Nelis (50) delivers his guests – on a works outing – safely ashore. 'My father was a fisherman. I started farming oysters in 1992,' says Nelis. He farms some of the oysters in the traditional fashion, on beds on the sea floor. But since 2015, Nelis has also been trying out a new method. He farms the oysters in large bags

Oyster farmer Danny Nelis checks his sacks of oysters at low tide in the Oosterschelde.

on about 800 specially constructed tables which become dry at low tide. This system protects the oysters better against predators that live on the sea floor, such as crabs, starfish and the infamous oyster drill. This predatory snail, which originated from Asia, has rapidly spread around the world, first appearing in the Oosterschelde in 2007. It drills a pinprick-like hole in the oyster's shell and sucks it empty. 'One oyster drill eats two or three oysters a week. That doesn't leave many oysters and without intervention the whole oyster industry would go under,' says shellfish expert Pauline Kamermans of Wageningen Marine Research. In recent years, Kamermans has studied the effectiveness and the environmental impact of alternative farming methods, using bags on tables or plastic baskets floating in the water on longlines. Nelis's experiences with longlines were not good, as they were impossible to disentangle after a storm. But farming oysters on tables is working well for him, and the method is effective in stopping the oyster drill. Switching methods is quite a job, however. Nelis has had a new ship built, a flat-bottomed oyster boat in the French style. At high tide, he sails to the oyster tables. At low tide, the boat runs aground and the men wade to the tables, cleaning things up, sorting and shaking the young oysters and transferring the largest to new >

Breeding algae and oyster larvae in the hatchery at Roem van Yerseke, a fish and shellfish wholesaler.

> **‘If the oysters spend some time out of the water, they are not attacked so much by the herpes virus’**

bags in which they have more space. When the tide comes in, the tables disappear underwater again and the boat sails back to Yerseke with the ripe oysters. This method has been in use in France for some time. Nelis harvested the first of his ‘off-bottom oysters’ in the summer of 2018. ‘These summer oysters are very good quality. They are milder in taste and meatier. But the new approach is labour-intensive. We work longer hours and those full bags are heavy, weighing 20 to 30 kilos. We try and get most of the work done between September and June. In the summer months we run sightseeing trips to our oyster farm with our tour company The Oyster Baron.’

ZEELAND CREUSES

Zeeland oysters have been popular for hundreds of years. At first indigenous flat oysters were farmed here, but they were wiped out in the harsh winter of 1963. Then Japanese oysters were imported, and that is now the main species of oyster farmed in the Netherlands. In 2017, Zeeland harvested 28 million oysters, 73 per cent of which were Japanese oysters, also known as Zeeland creuses. The other 27 per cent were flat oysters and the overall turnover was about five million euros. Most of the oysters are destined for export. One hundred people work in the sector. Besides the Oosterschelde (1500 hectares), oyster farming also takes place in Lake Grevelingen, a closed-off part of the Rhine-Maas estuary (500 hectares).

Kamermans and HZ University of Applied Sciences studied the effectiveness of new oyster farming methods. ‘Oysters live off algae, which they filter out of the water with their gills. Traditionally, they live on the seabed and can feed around the clock. With the new techniques, they are out of the water for 20 to 30 per cent of the time. They cannot eat during that time but on the other hand, they are not attacked so much by the oyster herpes virus that is in the waters of the Oosterschelde. We also looked at how well the oysters grow. We thought they would grow more slowly in the middle of the oyster farming area, because their neighbours would already have filtered the water. But they actually grow faster, probably because the water in the middle of the area is calmer.’

MALE BECOMES FEMALE

Oysters are bivalve, hermaphroditic molluscs. They start out as males and turn into females after a couple of years. Spawning entails the male oysters depositing their sperm in the seawater, after which females capture them. The fertilized egg cells then develop into oyster larvae.

At first the larvae swim freely in the water, looking for a place to settle. Larvae develop a foot at 10 days old. At that point, the oyster farmer in the Oosterschelde scatters mussel shells on the bed for the larvae to attach themselves to. Later, these mussel shells with the little oysters growing on them are fished up and brought to the farming locations.

‘This is a roundabout method. You have to sow tons of mussel shells and often you

catch just one little oyster on each shell, and sometimes not even that,' says aquatic technologist Nienke Bakker of Roem van Yerseke, a fish and seafood wholesaler. The company sells millions of oysters per year and since 2005, has had its own shellfish hatchery: a large hall with several nurseries for young shellfish. Wageningen was engaged in 2005 to help start up this hatchery, which is unique in the Netherlands. There are several such hatcheries in France.

FOOTBATH

We step through a disinfecting footbath and reach the parent oysters: adult Japanese oysters from the Oosterschelde, which are now in large white tanks. 'With good nutrition and warming water, we get them spawning. In other words, releasing seed and egg cells,' explains Bakker. The microscopically small larvae are caught on very fine sieves and raised to become young oysters. Every few days they are sorted by size using sieves, and the largest are transferred to new tanks each time. Everything in the nursery chambers fizzes and bubbles. In the algae breeding space there are tall glass columns full of all kinds of brown, green and yellow algae from the Oosterschelde, which are tested here for their nutritional value. The smallest larvae eat the smallest algae, and so on. After 10 days to three weeks, the larvae are ready to settle on hard substrate as oyster spat. They must then be filtered out of the water quickly, otherwise they have to be scraped off the walls, getting damaged in the process. After about three months, the oysters are taken off to the outdoor farms and after three years, they reach adulthood, Bakker explains.

Just like Nelis's oyster fishery, Roem van Yerseke farms oysters in sacks on tables, but this company also makes use of plastic baskets hanging in the water on poles. The oyster drill cannot reach them there. 'In those baskets you have more control over the process and the work is not as heavy as it is when you use those sacks, which you have to turn over regularly,' says Bakker. Together with the Worldwide Fund for Nature (WWF), Stichting Ark and Wageningen Marine research, the company is also breeding young flat oysters to release at new wind farms on the North Sea.

The oyster drill is not the only threat to the oyster industry. They oyster herpes virus has done a lot of damage in recent years too. This virus from Japan came to the Oosterschelde in cargo in 2010. It penetrates to the blood of young oysters and in some years can kill 80 to 95 per cent of them. Working with Roem van Yerseke, Wageningen has set up a programme to breed herpes-resistant oysters. Oysters that looked healthy were removed from the Oosterschelde and brought to the hatchery. There, the offspring of each individual oyster were raised separately. The hatchery has space to breed 40 separate oyster families, each of which gets its own basket in the Oosterschelde. Of those 40 families, there were just two that were totally resistant to the virus. They were cross-bred and new families were bred from those offspring. The hope is to end up with resistant oysters. The oysters are also being selected for fast growth, homogeneity and shape. Nienke Bakker: 'Survival rates are steadily improving. It takes time but I think we will succeed.'

EXPANDING

The 16 oyster farmers in the Oosterschelde want to expand from seven to 50 hectares of off-bottom oyster farming, but the licensing process is slow, partly because the Oosterschelde is part of the protected Natura 2000 network. Pauline Kamermans is monitoring the impact of oyster farming on nature in the Oosterschelde. 'We compare the new methods with the traditional ones. We have installed four cameras to analyse the behaviour of foraging birds. With the off-bottom farming, the farmers are busier doing things at low water, which is also when the birds look for food. We are still at the data analysis stage, but in Ireland it has been found that the disturbance to foraging birds is very limited. The birds get used to the new situation. We look at the formation of new silt too. A lot of silt is not only dangerous for the oysters, which need clear water, but also for all the worms and other animals that live in the sandy Oosterschelde seabed. No accumulation of silt has been noted so far.' ■

www.wur.eu/shellfish-farming

WHAT DOES YERSEKE REGIONAL CENTRE DO?

Yerseke Regional Centre is part of Wageningen University & Research and carries out research assignments for third parties, focused on the sustainable use and management of the Zeeland delta. Other participants include the province of Zeeland, Reimerswaal municipality, the Mussel Producers Organization, the Dutch Oyster Association and the nature conservation organization Staatsbosbeheer. They buy a stake in the centre and can then submit research requests.

About a quarter of the research carried out by Wageningen Marine Research in Yerseke is work for the Regional Centre. Pauline Kamermans monitors the effects of oyster farming on nature in the context of licensing. Other research topics include annual quantities of mussel spat, the reintroduction of oysters in wind farms on the North Sea, the creation of artificial oyster banks, and the cultivation of seaweed as a source of protein. The Regional Centre also has a help desk for the shellfish farmers.

AN ACTION PLAN FOR RESTORING BIODIVERSITY

Farmers and ecologists unite to save nature

Something has to change in nature conservation in the Netherlands, agree 18 stakeholder organizations. Imposing rules and regulations doesn't always work. To halt the decline in biodiversity, they are going to find out for themselves what works and what doesn't.

TEKST RIK NIJLAND

Ecologists used to be inclined to point an accusing finger at farmers when biodiversity came under threat, says David Kleijn, professor of Plant Ecology and Nature Conservation at Wageningen. They would then indignantly demand measures from the government in The Hague. This tended to work against them: people dug their heels in and farmers and nature conservationists lined up in opposition to each other. Now, Kleijn hopes that the Delta Plan for Biodiversity Recovery, the broad lines of which were presented to the relevant organizations at the end of 2018, charts a new course. Named after a major programme in the long Dutch tradition of consensus-based water management, the plan's aim is to boost biodiversity on agricultural land, in public outdoor spaces and in nature areas.

'The Delta Plan for Biodiversity Recovery does not aim at imposing rules,' he says. 'The main aim is to inspire collaboration between regional nature conservationists, farmers and other nature managers.'

Kleijn himself used to be part of the antagonism between nature conservation and the agricultural sector. From 1999 he made a name for himself with his critical evaluations of the 'agricultural nature management' approach. In spite of the roughly 50 million euros that farmers received annually for adapting their farming methods to benefit field birds, for example, the results were negligible. A lot of money and bureaucracy delivered little or no additional biodiversity, concluded Kleijn. Not least because the money went everywhere, even to places where there was no chance of success. Attempting field bird management on land with such low water levels that no black-tailed godwit is going to brood there, for example. 'For most farmers, these were rules imposed from above,' says Kleijn. 'If they just obeyed them, they would get paid. But people had lost sight of what those rules were for and what good it all did. Whereas it is commitment you need the most: you have to work at it. Here I manage the grassland as a habitat for field birds, so what I do in the next field matters too. You don't get far with rules a lone.'

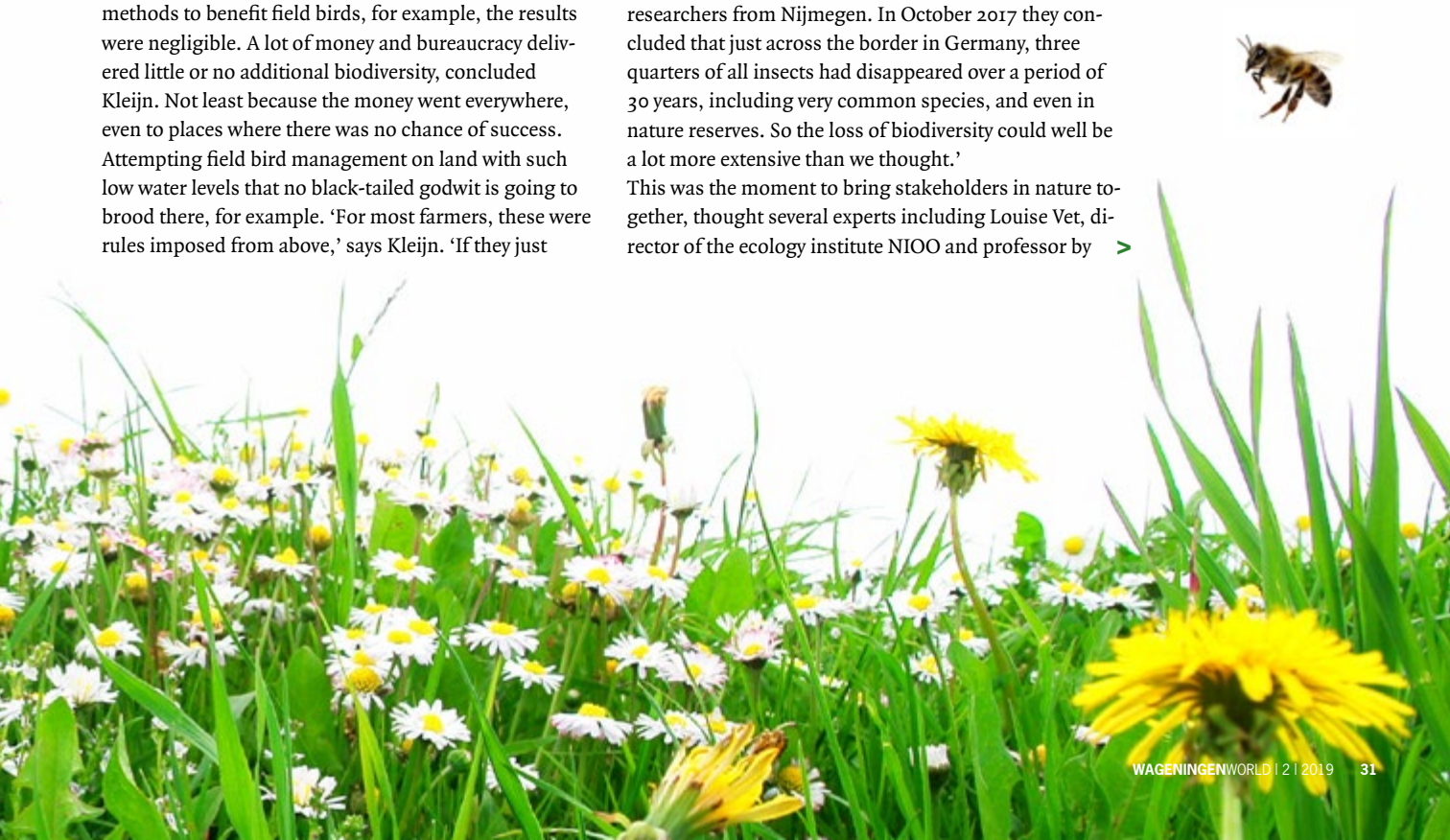
> 'You need a good business model to start with'

'And anyway, it is not just farmers who are held responsible for biodiversity measures, but also nature managers, road verge managers, retail chains and the water board.'

DISAPPEARING INSECTS

The idea of changing course came from the Netherlands Ecological Research Network NERN. Kleijn was not involved in this at first, he says. 'The straw that broke the camel's back was research by Hans de Kroon and fellow researchers from Nijmegen. In October 2017 they concluded that just across the border in Germany, three quarters of all insects had disappeared over a period of 30 years, including very common species, and even in nature reserves. So the loss of biodiversity could well be a lot more extensive than we thought.'

This was the moment to bring stakeholders in nature together, thought several experts including Louise Vet, director of the ecology institute NIOO and professor by >



special appointment at Wageningen. 'And let's keep the government and politicians out of it for the time being,' says Kleijn. 'Otherwise you get polarization: it comes from the left, so right-wingers oppose it. Let's first see whether we can build up trust.'
At the end of 2017, this initiative bore fruit in the Driebergen Declaration, signed by parties such as the nature conservation organization Natuurmonumenten, the Worldwide Fund for Nature (WWF) and the Butterfly Foundation, as well as what Kleijn calls some 'unusual suspects': farmers' organization LTO Nederland, Agrifirm and the Rabobank. On that occasion, 18 organizations pledged to work towards a 'richer Netherlands'. At the end of 2018, the people appointed to manage the process under the leadership of Louise Vet, among them Kleijn, presented the broad lines of the Delta Plan for Biodiversity Recovery.

BOTTOM-UP

This new approach calls for a new mindset,' according to Kleijn. 'More bottom-up. It's important that land users do not see landscape restoration as a burden imposed on them from above. They should be properly recompensed for the nature-friendly management decisions they make.' That is crucial, according to Ben Haarman of farmers' organization LTO Nederland: 'The recovery of biodiversity affects us all. We want to do more to address it and to offer solutions,' says Haarman. 'We initiators emphasize that you need a good business model to start with. Biodiversity comes with a price tag. That needs to be prominently visible in our food supply chain.'
Land users who participate in a biodiversity project will be paid for the progress on biodiversity achieved by their region, the Delta Plan promises. Everybody's contribution will be documented using key performance indicators (KPIs) for biodiversity. This is a system developed by the WWF, the Rabobank and FrieslandCampina dairy company – currently only for dairy farms – for measuring the degree to which the right conditions for biodiversity recovery have been created. In a trial in the province of Drenthe, farms that scored highly had the interest on their loans from the Rabobank lowered by 0.5 per cent per year, as well as getting a higher price for their milk and a bonus from the province.
'As a society, we must start covering the costs that we have hitherto always passed on to the environment and biodiversity,' says Kleijn. 'Farmers are in a tight spot, but so are road authorities. We have let a system grow up in which costs are extremely low. Now that the countryside is getting scarily quiet and bare, we can't expect land users to foot the bill on their own. For just a few cents more per litre of milk, all dairy farmers can switch to nature-inclusive farming,' says Kleijn.
The initiators of the Delta Plan also hope for funding from Dutch and European funds for agricultural nature management and a more sustainable countryside. And there are plans to establish a biodiversity fund, banks can charge lower interest rates on loans to collaborating farms and other businesses, water boards can help by rewarding farmers for cleaner water, and there might be scope for fiscal instruments for incentivizing nature-friendly measures.

2.5 MILLION EUROS

Exactly what form this will take remains to be seen. Work is currently going on to formulate a more detailed version of the Delta Plan, which is due to come out this summer. Minister Carola Schouten of Agriculture, Nature and Food has allocated 2.5 million euros to the work of making the plan more hands-on and building

an organization. She has also promised to support research projects. Within the Delta Plan, Kleijn leads the working group on monitoring. Ideas for this are still on the drawing board, but it is likely that a number of groups of species will be used to determine whether biodiversity really does benefit from implemented plans. 'You have to keep your finger on the pulse, of course, but it also works as a bit of a stick,' says Kleijn. 'Are we achieving something or do we need to up our game? Naturally, the financiers want to see results.'

There are certainly still big gaps in our knowledge that need filling. 'We know a lot about what field birds like, for instance, but we still know very little about some other groups of species.'

In order to garner more knowledge, Kleijn has set up a recovery project for wild bees in the Geul valley in South Limburg. The insects are starving because flowering plants along verges and the banks of ditches are disappearing or being mown. Kleijn brought together an alliance of 10 parties, from the water supply company and municipalities to an agricultural collective, who are prepared to change their management strategies for the sake of the bees. That entails 'an awful lot of talking', the professor grumbles, but this approach is also very much in the spirit of the new Delta Plan: collaborate to save nature.

'You don't get far with rules alone'

'It would be lovely if we could set up a living lab in every province, so as to learn what works and what doesn't together with stakeholders.' Kleijn hopes the focus on bees in South Limburg will inspire other regions. 'If we make the landscape in South Limburg more attractive to bees, it will lead to a better habitat for butterflies, birds and reptiles as well. And once we have got that going, perhaps we can roll out more nature-friendly management and do something for other species such as the hazel dormouse.'

MOWING VERGES

We haven't got that far yet. From the inventories made by Kleijn's students, it appears that there are five times as many species of bee living on the barren grasslands in the nature reserves along the Geul river as there are in the arable fields and road verges. 'So there is a lot of room for improvement, for example by not mowing the verges on both sides of the road at the same time, so there are always some flowers for bees. But things that may seem like small adjustments to make are not so simple at all in reality.'

One reason for this can be that verge management in municipalities is already planned in multiannual contracts, and must not cost too much. And the machines for mowing and transporting the cuttings cannot negotiate narrow or sunken lanes. There the verges are flail-mown, as a result of which the wild flowers give way to stinging nettles. 'It takes commitment from all 10 parties to come up with new solutions. That is time-consuming, but the nice thing is that we talk through the practicalities with the people involved. I think this is the only way we can achieve anything for nature.' ■

www.wur.eu/biodiversity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The true price of food

Food costs more than we pay for it. Producing it can involve soil exhaustion, loss of biodiversity or child labour. A new method aims at making those hidden costs visible. 'Hopefully, this will prompt consumers and producers to look for more sustainable options.'

TEXT RENÉ DIDDE **PHOTO** HOLLANDSE HOOGTE

‘The true price helps people choose the most sustainable product’

Not long ago, Willy Baltussen was standing in the vegetable section of the supermarket with a packet of green beans in his hand. ‘I love green beans,’ says the researcher at Wageningen Economic Research. ‘But they come from Kenya and they are much more expensive than Dutch beans.’ Baltussen, who is involved as a researcher in the ‘True and Fair Price’ project, weighed up the matter. ‘Of course these beans have clocked up a lot of air miles so they score very poorly on transport and CO_2 emissions,’ he says. ‘On the other hand, I feel as though my purchase is a little bit of development aid. Because I know I’m helping Kenyan families get work, and I know there is hardly any child labour there and the children can go to school.’

Baltussen also knows that beans are leguminous crops that capture nitrogen from the air. The use of pesticides is limited and labour conditions in Kenya are good, he says. ‘On water consumption the score is probably poor, although it will depend on the region the beans come from. And I also know that green beans score highly in terms of my health.’

CHILD LABOUR AND ANIMAL WELFARE

The Wageningen economist is doing his bit to ensure that in four years’ time a method is available that indicates the true price of green beans and other foods, including the still hidden costs arising from such things as climate change, soil exhaustion, land use, water and air pollution, and loss of biodiversity. The method must also factor social aspects such as child labour, discrimination and animal welfare into the true price. ‘There are numerous hidden costs which we would like to calculate in hard dollars or euros,’ says Baltussen. ‘We don’t know yet how we are going to communicate it, but if you put the true price on the label with a short explanation, the consumer would get some idea of the main hidden costs. This helps consumers choose the most sustainable product. And hopefully it will prompt producers to look for more sustainable options.’

In a public-private collaboration over four years, Wageningen Economic Research is going to develop a method of calculating the true price which includes the hidden costs currently excluded from the commercial prices. At the most, those costs are paid later from public funds, for example for climate measures, water purification, and soil or nature restoration. Discrimination, animal welfare and child labour are generally not compensated for at all, though.

Two private parties are involved in the consortium alongside Wageningen Economic Research: True Price, whose mission it is to give every product a true price, and Bionext, the branch organization for the organic sector. Other organizations working on the research are the certification organization EKO, the Dutch Potato Organization (NAO), a fruit and vegetable organization Groenten-Fruithuis, the association of Organic Pig Farmers, the Dutch Federation of Agriculture and Horticulture (LTO Nederland), and lastly the Rabobank and the ABN Amro bank. The study, which will cost over two million euros, will get half its funding from two of the Dutch ‘top sectors’: Horticulture and Propagation Materials and Agri & Food. The other half has to come from the participants in the consortium.

CO_2 EMISSIONS

So identifying the true price of food items such as green beans turns out to be quite a task. The easiest part of it seems to be expressing the contribution of the green bean trade to climate change – including air transport – in euros through a price for CO_2 emissions. Researchers can work out how much CO_2 is involved in this crop. Then they add the societal costs of keeping this CO_2 out of the air, or of extracting it from the air, to the kilo price of the beans.

The same can be done with the costs of water purification. But it seems a lot more difficult to measure the societal costs of child labour or the intimidation of women workers. ‘As an independent party, we expose such matters through research,’ says Michel Scholte, co-founder and director of True Price. ‘On the basis of

The price the consumer pays for food does not cover the social costs of the production process, such as loss of biodiversity or contribution to climate change.

compensation for damages, low wages and missed education or the costs of recovery from traumas, we estimate the costs the victims would need for education and physical or mental support.' These are not rough estimates, says Scholte. 'The rules of the International Labour Organization (ILO), for instance, are increasingly detailed and precise. Already, around the world, businesses in every branch increasingly get told how they should perform.'

Bavo van den Idsert, director of the branch organization for the organic sector, Bionext, one of the private parties in the consortium, sees the 'true price' primarily as a tool and a means of communicating to producers and consumers to help them navigate the often hidden costs. 'Since the 1950s, cost effectiveness has been the priority in food production, and the impact on water, soil, nature and climate has been endlessly externalized. Even now, it is still society that bears those costs if something needs cleaning up or restoring. The system has become cut-throat, even for the farmers themselves,' says Van den Idsert, who seeks to strengthen organic agriculture with a staff of 25 in campaigns and projects.

He believes that CO_2 emissions will be a major part of the true price. 'Unlike animal welfare or biodiversity, the CO_2 footprint of food is relatively easy to calculate. And because >

agriculture and food production are responsible for 30 per cent of global CO_2 emissions, a CO_2 tax on food would provide an important incentive to save on energy.'

In the field of climate measures, there are some interesting developments in agriculture taking place at the moment, says Van den Idsert. 'We are involved with "carbon farmers" in the peaty soil area who raise the groundwater level so that less CO_2 is released from the soil. These farmers work with less protein-rich, more herb-rich grassland, which provides a healthier diet for the cow. They plough less and return organic matter to the soil, so less CO_2 escapes. The farmers have a lower milk yield but they earn more from the organic milk and they also save on veterinary costs.' To make investments in these kinds of climate measures standard practice everywhere, all farmers who make the effort should be rewarded for it, says Van den Idsert.

FAIR SHARE

The consortium that is working on a 'true price' is also studying the scope for a protocol for sharing the costs of more sustainable food production fairly among all the parties in the food chain. 'That method aims to ensure a "fair price". A fair price means that the actors who invest in reducing the hidden costs are fairly compensated within the supply chain for their efforts. In the end the costs should be shared across all parties, from supermarkets, greengrocers, importers and trading companies to the carbon farmers and bean growers,' explains economics researcher Baltussen. 'Currently, it is mainly farmers who are expected to pursue sustainability and who meet the costs of improvements such as more spacious, clean barns, alternative crop protection and energy efficiency.'

'The "true price" is intended to make the costs that are currently often met by society visible, and the "fair price" should ensure that farmers are also rewarded for their efforts,' says Van den Idsert. 'That only works in united and ethically responsible chains, from the farmer right up to the consumer.'

WILLY BALTUSSEN
Researcher at Wageningen Economic Research

MICHEL SCHOLTE
Director of True Price

BAVO VAN DEN IDSERT
Director of Bionext

> ‘The CO_2 footprint of food is relatively easy to calculate’

Investing in sustainable production – and therefore reducing the hidden costs – does not always lead to a more expensive product, predicts Scholte of True Price. This can be because a farmer who invests in using less water or energy also has a lower cost price. And sometimes an interesting technology is available which makes more sustainable production economically viable, adds Scholte. ‘Look, those green beans are currently transported by plane from East Africa. But there will soon be ships that can cool their freight with solar energy. This change in transport will lower the impact on climate but also lower the total transport cost. Don’t forget that air transport is a big part of the price of green beans at the moment. Anyway, I think by around 2030 it won’t be normal anymore for companies to work with fossil fuels, to underpay people or to employ children. Companies that are still working like that then will price themselves out of the market.’

BUTTERFLY POPULATION

At LTO Nederland, policy adviser Klaas Johan Osinga hopes this instrument will put an end to the discussion about measuring sustainability. He thinks farmers and horticulturalists are only too keen to make a contribution to tackling issues such as climate, animal welfare and biodiversity. ‘But a true and fair price has to be more than an expenses allowance,’ he says. ‘It would be lovely if we could use a “true price method” to calculate how many more cents per kilo potatoes would cost if there were significant improvements to biodiversity, for example to the butterfly population in the field borders, or to the climate through capturing more CO_2 in the soil. Farmers and horticulturalists should be rewarded by the market when they take action, because farming is an economic activity. That would really promote more sustainable agriculture and horticulture.’

Wageningen Economic Research, Bionext and True Price believe that the independent and scientific knowledge-based tool of a ‘true and fair price’ could provide a full picture of all aspects of production. The tool is to be an open-source method, freely available to all.

Economists attempted to internalize external costs as far back as the 1970s. Roefie Hueting of the Tinberg Institute and later the government statistics agency CBS worked, for example, on a ‘sustainable national income’ in which the costs of the ‘loss of scarce environmental functions’ were factored in. The idea never became mainstream.

CLIMATE DEBATE

Nevertheless, the members of the consortium expect that the ‘true and fair price’ will be embraced this time. ‘The government, industry and even consumers are more open to it now,’ believes Scholte of True Price. ‘Look at the climate debate. There is a price tag on CO_2 emissions for the big industrial energy users in Europe. Increasingly, that plays a role in the price of products and resources, thanks to various emissions trading systems. They are only getting better and more extensive. And don’t forget the influence of technology. With satellites and drones we can measure more and more accurately how many trees are being felled, where nature is being lost, and how much spraying with chemicals is going on. Then we can get closer and closer to the “true price”.’

Willy Baltussen expects the method to lead to companies and farmers seeking to stand out for sustainable and fair products. ‘That will go faster and be more accepted by the public than government legislation, even though that can play a positive role in steering the transition. The private market-based approach is probably the fastest route to sustainability. Conscious consumption can be persuasive for farmers and supermarkets, as well as other players such as transporters. A “true price” with a “fairly” distributed profit margin is the reward.’ ■

www.wur.eu/trueandfairprice

WAGENINGEN AGRICULTURAL COUNSELLORS ABROAD

‘This is the best job on the planet’

The Netherlands’ agricultural counsellors are the Dutch agriculture sector’s eyes and ears abroad. Many of these counsellors have roots in Wageningen, including Patricia de Vries-van Loon in Colombia, Martijn Homan in Poland and Alexander Heydendael, now retired and living in The Hague.

TEXT ALEXANDRA BRANDERHORST **ILLUSTRATION** WUR/PETRA SIEBELINK

The signatures under the peace treaty between the Colombian government and FARC had barely dried when Patricia de Vries-van Loon started as the Agricultural Counsellor in Colombia (see inset). She says she felt very honoured when the ministry of Agriculture, Nature and Food Quality asked her to set up this new function in 2017. De Vries-Van Loon, who calls herself ‘one of the old hands in this line of work’, graduated in Tropical Agriculture in Wageningen in 1987. After working for the Ministry of Agriculture, she became Deputy Agricultural Attaché in Mexico in 1995. Two years later, she started as the Agricultural Attaché in Brazil. She has had various postings since then.

‘This is the best job on the planet. You never know what your day is going to involve. You deal with a wide variety of topics, you draw up strategies but you are also working in the field.’ In her current role as Agricultural Counsellor for Colombia, Peru and Ecuador, she looks at where Dutch expertise and technology might be needed. ‘You need to see opportunities, believe in things, set them up, and push and pull.’

VACCINES

She is currently negotiating with the Ecuadorian government, for example, to get market access for Dutch plant and animal products, such as livestock feed, bovine semen and vaccines. In Colombia and Peru, De Vries-Van Loon is mainly working on food security and improving the sustainability of poultry farming and the cultivation and processing of cocoa, coffee, palm oil, vegetables and fruit. The Netherlands also wants to promote peace and stability in Colombia by boosting agricultural development in rural areas.

Martijn Homan is just as enthusiastic. He is based in Warsaw as the Agricultural Counsellor for Poland, Slovakia and the Czech Republic. He too loves the variety in the job. ‘Yesterday I was discussing the flower trade; today I’m talking about a meat scandal.’ His team is also helping to encourage collaboration in research, for example between three Polish veterinary institutes and Wageningen animal scientists, to get better positioning in international research programmes. In addition, he is alert to the increasing demand for flowers and plants as Poland becomes more prosperous.

Homan emphasizes that the agricultural counsellor is the Netherlands’ eyes and ears in foreign parts. He provides companies, research institutes and government bodies with information about developments in agricultural policy and agrarian markets. ‘We match up Dutch and Polish compa- >

PATRICIA DE VRIES-VAN LOON (57)

Agricultural Counsellor for Colombia, Peru and Ecuador

1987 Tropical Agriculture, WUR
1995-1997 Deputy Agricultural Attaché for Mexico
1997-2002 Agricultural Attaché for Brazil
2002-2007 Agricultural Counsellor for the Czech Republic and Slovakia
2012-2017 Agricultural Counsellor for Brazil

MARTIJN HOMAN (44)

Agricultural Counsellor for Poland, Slovakia and the Czech Republic

1998 Agrarian Economics, WUR
2010-2014 Agricultural Counsellor for Hungary, Austria and Slovenia
2014-2017 Agricultural Counsellor for Poland, Slovakia, Hungary and Austria

PHOTO FLORIS HEUKENSFELDT JANSEN

ALEXANDER HEYDENDAEL (78)

Retired agricultural counsellor

1968 Development Economics, WUR
1975-1979 Agricultural Counsellor for Austria, Switzerland, Hungary and Czechoslovakia
1979-1986 Agricultural Counsellor for Syria and nine other countries in the Middle East

nies, public bodies and science institutes. We aim to bolster relations between them. And we show people how we do things in the Netherlands.' For example, a Dutch garden was laid out in Warsaw's Łazienki Królewskie Park in 2016 with the help of the private sector. 'The garden shows how tradition, colour, innovation and design can be combined in order to create an appealing and sustainable living environment in accordance with the philosophy of the Green City. The garden's story inspired Disneyland Paris to construct its own Dutch garden.' Homan says his work is a good fit with his degree in Agrarian Economics at Wageningen, which he completed in 1998. 'You learn to think in a holistic way and to view problems from different perspectives. It really is a multidisciplinary approach.' His colleague Patricia de Vries-van Loon has also benefited a lot in her job from her agriculture knowledge and expertise. 'In many countries, the agricultural sector is dominated by men. So it is very good that I can hold my own in terms of knowledge about the subject matter,' says De Vries-Van Loon.

> **'You need to see opportunities, believe in things, push and pull'**

CAMPING IN THE DESERT

Former agricultural counsellor Alexander Heydendael graduated in Development Economics in 1968 in Wageningen. He became Deputy Permanent Representative to the FAO, the UN Food and Agriculture Organization, in Rome, then Agricultural Attaché in Vienna. He found the seven years that he spent from 1979 based in the Syrian capital of Damascus to be a particularly 'dynamic and challenging period'. He and his four deputy agricultural attachés in Damascus covered no fewer than 10 countries. During that period the Shah of Iran was deposed and replaced by Ayatollah Khomeini, while a fierce civil war raged in Lebanon. One of his big achievements was winning a public tender to deliver 5000 pregnant heifers to Syria, beating the French and the Americans. 'I was able to steal this order from under their noses because of my good connections and knowledge of the market.' He would often spend the night in the desert with the military attaché when travelling to Baghdad. They would go camping in the desert in the weekends too with their families. In 1986, Heydendael and his family moved to The Hague, where he focused on international agricultural policy at the ministry of Agriculture. 'I had already seen at the FAO that UN agreements are far too non-committal. That was how I learned to appreciate the importance and power of the EU. The EU formulates truly overarching policies that the member states then have to implement, with sanctions if they don't.'
Agricultural counsellors do not stay abroad

> ‘Yesterday I was discussing the flower trade; today I’m talking about a meat scandal’

for years on end. Thus Patricia de Vries-van Loon spent 2007 to 2012 in The Hague working on regional fishery agreements, the bluefin tuna and preparations for the reform of the European fisheries policy. ‘Things change fast in the Netherlands so it is good to spend some time in this country so that you can follow the developments and find out what people are talking about. After all, I represent the Netherlands.’ Countries get a different agricultural counsellor every four to five years. ‘One person might see opportunities in one area whereas another has a different focus.’ When De Vries-Van Loon next returns to the Netherlands and the ministry of Agriculture, she wants to work on the policy relating to the CITES treaty, which is aimed at curbing the trade in endangered animal species.

FORMER EASTERN BLOC

There are some countries where all three alumni have worked, albeit in different periods. Alexander Heydendael was an agricultural attaché in Vienna from 1975 to 1979, where his responsibilities included Austria, Hungary and what was then Czechoslovakia. He operated on both sides of the Iron Curtain. He found the Communist system appalling: ‘There was no freedom at all.’

Patricia de Vries-van Loon was the Agricultural Counsellor for the Czech Republic and Slovakia from 2002 to 2007. ‘That was because of these countries joining the EU in 2004, a unique period.’ Martijn Homan was Agricultural Counsellor from 2010 for the former Eastern Bloc countries of Hungary and Slovenia, and subsequently for Poland, Slovakia and the Czech Republic. ‘Collaboration is not automatic in this region and everything is more hierarchical. On the other hand, life is more easy-going and less planned and structured. In Hungary, no one runs to catch a bus as there is bound to be another one later. People are slightly more rushed in Poland but it is still a lot calmer compared with the pace of life in the Netherlands,’ says Homan. He will be returning with his family to the Netherlands in the summer, where he will be working again at the ministry of Agriculture. He is expecting it will take time to acclimatize.

CIRCULAR AGRICULTURE

Both Alexander Heydendael and Patricia de Vries-van Loon say they are struck by how the ministry in the Netherlands has had to do more and more work with ever fewer staff. ‘That means that dossiers in countries such as Colombia do not always get the time and attention they deserve,’ says De Vries-Van Loon. Looking ahead she also thinks it is important for the ministry to keep in touch with businesses in the agricultural sector.

Alexander Heydendael sees the preservation of nature and biodiversity as the biggest challenge now facing agricultural counsellors. At the end of his career, he worked on the 1992 Biodiversity Convention. ‘Agricultural counsellors need to put that into practice by encouraging circular agriculture and thinking in terms of closed cycles. The Netherlands is a trendsetter in horticulture and livestock farming but things need to change: the scale needs to be smaller, with more respect for networks of life on Earth, from insects to humans and orang-utans,’ argues Heydendael.

Martijn Homan says the challenge is finding the right balance between ‘marketing circular agriculture internationally’ and the Netherlands’ current export position. He does, however, see plenty of openings in Poland. ‘The country has sandy soil, often with a nutrient deficit and few water sources. This offers opportunities for Dutch manure. Adding organic materials and nutrients would make Polish soils more climate-proof.’ ■

WHAT DO AGRICULTURAL COUNSELLORS DO?

More than 70 countries have Dutch agricultural counsellors or agricultural attachés. They spot opportunities for Dutch companies working in agriculture and help them start up projects and find business partners. They also support the host countries in taking steps to make agriculture more sustainable and circular. Furthermore, they work on removing obstacles to trade that prevent Dutch exports of animals, plants or products made from animals or plants.

The agricultural counsellors are based at 53 Dutch embassies and consulates. Some are responsible for more than one country. They also represent the Netherlands at the FAO, OECD and EU. They report to the ministry of Agriculture, Nature and Food Quality.

In the embassies and consulates, the agricultural counsellors collaborate with colleagues employed by the ministry of Foreign Affairs. They form an agricultural team together with local agricultural experts.

The agricultural attaché network is celebrating its centenary this year. The network’s coordinator, Gert Stiekema, studied Horticulture at Wageningen, graduating in 1989. He says that the agricultural counsellors keep in close contact with Wageningen researchers and regional managers. ‘Wageningen operates around the world and often approaches agricultural counsellors proactively for projects. The interaction is good.’ *Information in Dutch: www.agroberichtenbuitenland.nl*

‘We hope other people will follow our example’

Clemens de Vos and Ditsy de Vos-Thijssen are supporting research on combatting tick- and insect-borne diseases with a fund of their own. ‘This makes us happy.’

TEXT ANJA JANSSEN **PHOTOGRAPHY** FRED VAN DE HEETKAMP

PhD candidate Antoine Cribellier improved the design of a mosquito trap so that it now catches about three times as many malaria-carrying mosquitoes as the original trap. This is an example of the Wageningen research that the De Vos Fund has co-financed in recent years. The generous donors behind the fund are Clemens de Vos and Ditsy de Vos-Thijssen from Wageningen. Five years ago, they decided that they wanted to donate money to a number of good causes during their lifetime.

‘We have both worked hard for this,’ says Ditsy. Clemens with his IT firm Epicenter and Ditsy in education. ‘Sadly, we don’t have children, so we don’t need to save money for them.’ They decided on the Dutch Brain Foundation (the Hersenstichting) and a fund of their own under the auspices of the University Fund Wageningen. Clemens: ‘We didn’t study in Wageningen but we have been living here for over 20 years and we feel a bond with the town and the university. My brother works there as a researcher, we have neighbours who work there, and we hear a lot about the research.’ They chose to set up a named fund, with the aim of supporting research on combatting tick- and insect-borne diseases such as malaria, the Zika virus and Lyme’s disease. ‘Because that research goes on at the point where biology and health meet,’ says Clemens.

The couple have a say in the choice of research topics and the researchers update them annually on the results. Clemens: ‘It is nice to be able to pick something that appeals to you.’

PHD RESEARCH

Since 2015, the fund has donated a total of 50,000 euros to research on diseases transmitted by vectors such as insects and ticks. ‘With that money we supported four PhD research projects which were beyond the scope of the PhD students’ project budget,’ says Wageningen mosquito expert Sander Koenraadt, who is on the fund’s supervisory board.

‘As an example, Cribellier is a biomechanical scientist and has used high-speed cameras to film the flight behaviour of mosquitoes around the trap,’ Koenraadt goes on. ‘In the footage he saw how mosquitoes get away from the suction effect of the trap. By factoring that in, he could design better traps.’

Koenraadt: ‘As a researcher, you make a plan for four years, but sometimes you find out as you go along that you’d like to change direction slightly and you need

Mosquito expert Sander Koenraadt (right) explains his research to Clemens de Vos and Ditsy de Vos Thijssen of the De Vos Fund.

extra funding for that. This fund makes that possible. And it is also very nice for a young researcher aiming at an academic career to be able to put on his CV that he has independently secured substantial funding.'

TICK-BORNE DISEASES

The first research that Clemens and Ditsy co-financed was that of tick researcher Helen Esser. She has now graduated with her PhD thesis on the influence of biodiversity on the transmission of diseases by ticks in Panama. She used the money to identify ticks with the aid of advanced molecular techniques. 'Helen gave very enthusiastic accounts of her research,' recalls Ditsy. 'I learned a lot in the process. I didn't know anything about ticks. Now I now that large ruminants are important for the transmission of tick diseases to humans.'
Ditsy's pupils at primary school learned something new too. 'Sander Koenraadt wanted to pay us back in some way, and he gave my class a guest lesson about mosquitoes. He demonstrated that mosquitoes like the smell of sweaty feet using a sock of one of the children's, which they thought hilarious. They also loved it that Sander was on the children's TV programme Klokhuis.'

Ditsy and Clemens are pleased with their fund's results and are going to support the research on vector-borne diseases with a further 50,000 euros over another five years. 'This makes us happy,' says Ditsy. Clemens adds, 'We hope other people will follow our example, especially ex-students.' ■

www.wur.eu/devosfund

NAMED FUNDS

Clemens and Ditsy de Vos chose to set up a named fund under University Fund Wageningen because that way they can be involved in the research they finance. A minimum initial donation of 50,000 euros is required for a named fund. If this is done through a periodic endowment by notarial deed, the donation is tax-deductible. Third parties can also donate to the fund.

Hundreds of alumni united in China

Plans were forged during a tour of China by a Wageningen delegation for regional networks for the many Chinese alumni in this huge country.

China has around 2000 alumni, making it Wageningen's largest foreign alumni network. That large number plus the country's enormous size mean that regional networks are needed, explains Denise Spiekerman of the Wageningen alumni office. In March, she travelled to China with a delegation that included Plant Sciences director Ernst van den Ende, with the aim of strengthening relations with alumni.

'China is a large country and our alumni are in a lot of different regions. Setting up regional networks will let alumni become involved in activities locally,' adds Beizhong Han, chair of the supervisory board of the Wageningen Alumni Chapter China and a professor at the China Agricultural University in Beijing.
China is the first country to get such regional subchapters, says Spiekerman.

They will be set up in the course of this year in Shanghai, Nanjing and Guangzhou, and possibly Wuhan too. At gatherings in Shanghai and Guangzhou, Spiekerman got a variety of enthusiastic responses from alumni who wanted to help set up the regional networks.
The Wageningen delegation visited Beijing and Nanjing as well. In addition to Van den Ende and Spiekerman, the delegation included China account manager Xiaoyong Zhang and business developer Yutong Qiu. Zhang is responsible for relations between Wageningen and China, and Qiu is developing new projects with Chinese partners for the Plant Sciences Group.
During its tour, the delegation also promoted the Urban Greenhouse Student Challenge, which is due to start in October and will be based at a location in China.
Alumni in China often communicate with one another through WeChat. Wageningen University & Research has its own WeChat account: 瓦赫宁根科技.
Info:www.wur.eu/alumni-china

UniversiTREES planted in Food Valley

A Wageningen alumnus had the idea of planting 100 trees for 100 years of Wageningen University & Research.
So far, 21 of these UniversiTREES have been planted around the world.
In March and April 2019, trees were planted in seven municipalities in the Food Valley region. Barneveld got a silver lime, Ede a magnolia, Nijkerk a black walnut tree, Rhenen a copper beech, Renswoude a wing nut, Scherpenzeel a sweet chestnut and Veenendaal a handkerchief tree.
Info: www.wur.eu/universitree

AWARDS

Outstanding alumni wanted

If you know an alumnus who has made an exceptional contribution to healthy diets and a healthy living environment, you can nominate them for the Outstanding Alumnus Award.

The triennial award will be handed out in September 2019 at the opening of the academic year in Wageningen. The deadline for nominating candidates is 1 August. The prize is for a mid-career alumnus who has 'made a significant contribution to the "Quality of Life" domain'. The prize was first awarded in 2005, when it went to Paul Kibwika, one of the founders of Picoteam, an international network organization for sustainable development. In 2013, the award went to Louise Fresco – then still a professor at the University of Amsterdam. The most recent winner was Niels Louwaars, director of Plantum, the association for the Dutch plant reproduction material sector, for his contribution to collaboration between the government, industry and science institutions.
University Fund Wageningen hopes to receive lots of international nominations as well as Dutch ones. To submit nominations, go to *www.universityfundwageningen.eu/alumnusaward*.

GATHERINGS

Reunions for the years of 1969 and 1994

Each year, reunions are organized for alumni who started their degrees 25 or 50 years ago. The reunion in 2019 for alumni who started 25 years ago (the year of 1994) will be on Saturday 26 October. The reunion for the year of 1969 will be on Saturday 16 November. Both events will be on Wageningen Campus.
www.wur.eu/25yearreunion &
www.wur.eu/50yearreunion

DEBATE

'Bulk discounts on the vegetarian shelves'

Our diet needs to become much more healthy and sustainable. But how? Students and alumni discussed this question on Wageningen Campus.

The global population needs to double its consumption of vegetables, fruit, nuts and pulses and halve the amount of red meat and sugar it eats, explained professor of Nutrition, Public Health and Sustainability Pieter van 't Veer (Human Nutrition, 1982). The diverse group – from Nutrition and Health students to civil servants at the ministry of Agriculture – produced a wide range of solutions, including a tax on products with a high sugar content, tougher rules on the sale of unhealthy food, sharper statements by Wageningen scientists, and cheaper meat substitutes.
'It's time for bulk discounts on the vegetarian shelves,' argued researcher and vet Guido Camps.
The meeting was one of a new series of small-scale debates called KLV Impuls, organized by KLV Wageningen Alumni Network.
Info: www.klv.nl/events

WUR CONNECT

Most active user

Startup researcher Joar Nilssen was at the top of the list of active WUR Connect users in May 2019. For StartLife, Nilssen is looking for innovative startups in the food and agriculture sector. Nilssen has completed the MSc in Nutrition and Health, and is one of the founders of the startup Tinyfoods, which markets edible insects.

Events

27 June: Finale of the student competition ReThink Protein. How do you make human protein consumption more sustainable? Wageningen students present their ideas. The winners will go through to the 4TU national finals.
Info: www.rethinkprotein.nl

PHOTO SSR

Nostalgia

There are lots of recent photos on WUR Connect, but there are some old ones too. Of the first residents at the Bornsesteeg in 1973, for instance, of a geology field trip to Belgium in 1979, and of an SSR introduction in 1991. You can upload your own photos.

Videos

You'll find videos from the WURtube channel on the news page at WUR Connect. So if you like, you can relive the 2019 Liberation Day Festival in Wageningen.

Let us know

Did you find an internship, a job or a long-lost friend through WUR Connect? Tell us about it through alumni@wur.nl

More on wurconnect.nl

Prof. Rob Alkemade, WUR Agricultural Sciences 1987, has been appointed professor by special appointment of Global Biodiversity and Ecosystems Services. The chair is funded by the Netherlands Environmental Assessment Agency (PBL). 1 March 2019.

Maria Barbosa PhD, WUR PhD 2003, has been appointed professor holding a personal chair in Microalgal Biotechnology, in the Bioprocess Technology chair group at WUR. Barbosa is also director of AlgaePARC. 1 May 2019.

Prof. Gerard Bot, WUR emeritus professor of Applied Physics, has received the 2018 Award of Merit – Scientific Understanding from the European Society of Agricultural Engineers for his research in the agriculture and horticulture sector. 10 July 2018.

Prof. Martine Bouman, WUR PhD 1999, has become a member of the board of the Dutch Whistle-blowers Authority, an organization that offers facilities and support for whistleblowers. Bouman is the founder and scientific director of the Centre for Media & Health. 11 March 2019.

Edo Dijkman MSc, WUR Land-Use Planning Sciences 1997, is the director of the research and consultancy firm CLM Onderzoek en Advies BV. He used to be the sector director of the Animal & Livestock Management and Management of the Living Environment degree programmes at HAS University of Applied Sciences. 6 May 2019.

Ernest de Groot MSc, WUR Land Development 1982, has been appointed Knight of the Order of Orange-Nassau. De Groot is a member of the executive committee of the Aa en Maas water board. 26 April 2019.

Prof. Wilco Hazeleger, WUR Soil, Water and Atmosphere 1994, professor by special appointment of Climate Dynamics at Wageningen, has been appointed dean of the faculty of Geosciences at Utrecht University as of 1 July 2019. 11 March 2019.

Prof. Wouter Hendriks, WUR Zootechnics 1992, has become Dean of Research at WUR. He will remain the chair holder in the Animal Nutrition group.1 April 2019.

Prof. Laurens Klerkx, WUR Tropical Land Use 2002, has been appointed professor holding a personal chair in the Knowledge, Technology and Innovation chair group. He works on transitional movements in agri-food, such as agro-ecology, circular agriculture and digital agriculture. 22 March 2019.

Prof. Bart Koelmans, WUR PhD 1994, has succeeded Marten Scheffer as professor of Aquatic Ecology and Water Quality Management at WUR. He focuses on research on the implications of plastic waste in the environment and in our society. 1 November 2018.

Wilbert van Pampus MSc, WUR Land Development 1986, has joined the board of directors of BK Ingenieurs. 11 March 2019.

Prof. Lourens Poorter, WUR Biology 1991, professor holding a personal chair in the Functional Ecology of Tropical Forests, has secured an Advanced Grant from the European Research Council (ERC) for his research on the recovery of tropical forests. 28 March 2019.

PHOTO ANKIE MEUTGEERT

Tjapko Poppens MSc, WUR Agrarian Economics 1996, is the new mayor of Amstelveen. The 48-year-old is a member of the VVD political party and has been mayor of Wijk bij Duurstede since 2012. He was previously executive secretary at KLM and financial controller at the municipality of Enschede. Poppens is also one of the 40 Wageningen Ambassadors. 8 April 2019.

Prof. Joris Sprakel, WUR Food Technology 2005, has been appointed professor holding a personal chair in the Physical Chemistry and Soft Matter chair group. Sprakel will be developing a new line of research in the emerging field of mechanobiology. 1 March 2019.

PHOTO KJELL POSTEMA

Prof. Dik Mevius has retired after 25 years at Wageningen Bioveterinary Research in Lelystad. Mevius worked for years on combating antibiotic resistance in the veterinary sector. In recognition of this work, he received the RIVM Jenner medal on his retirement. He also received the J.G. van Bekkum prize for his services to science. 1 February 2019.

‘As an alumnus, I owe WUR an awful lot’

Jeroen Dijsselbloem MSc, WUR Agrarian Economics 1991, was appointed chair of the Supervisory Board of WUR with effect from 1 April 2019, succeeding Prof. Job Cohen.

PHOTO NORBERT WAALBOER

‘As an alumnus, I owe WUR an awful lot and I am keen to use my experience to help Wageningen get ahead,’ he said in WUR’s magazine *Resource*. ‘It’s an institution whose name and relevance to society go beyond the Netherlands. Global challenges demand responses built on scientific evidence, particularly at a time of clashes of interests and views, when facts are constantly being questioned.’
Dijsselbloem also became chair of the Dutch Safety Board on 1 May.
Dijsselbloem was previously minister of Finance in the second Rutte government and president of the Eurogroup.
Dijsselbloem lives in Wageningen.

IN MEMORIAM

Prof. Klaas Jan Beek, WUR Tropical Rural Economics 1962, passed away on 13 January 2019. He was 83. In 1974, Beek started work as a soil scientist at the International Institute for Land Reclamation and Improvement (ILRI) in Wageningen. He was one of the first experts in land evaluation and he received a doctorate for his thesis *Land evaluation for agricultural development* (1978). In 1980, Beek became professor of Land Evaluation and he was also rector of the International Institute for Geo-Information Science and Earth Observation in Enschede. He was chair of the University Fund Wageningen foundation from 1996 to 2002.

Cees Veerman PhD, WUR PhD 1983, former minister of Agriculture and former president of the Executive Board of WUR, has been appointed chair of the supervisory board of the Greenport development corporation. 22 May 2019.

Prof. Jean-Paul Vincken, WUR Food Technology 1988, has been appointed professor of Food Chemistry. He succeeds Professor Harry Gruppen, who had to give up his work as chair holder due to illness. 1 March 2019.

Arnoud de Wilt PhD, WUR Environmental Sciences 2013, consultant in wastewater technology at Royal HaskoningDHV, has won the Jaap van der Graaf prize for his article ‘Enhanced pharmaceutical removal from water in a three step bio-ozone bio process’, published in *Water Research*.
11 January 2019.

IN MEMORIAM

Alumni, KLV members, staff and former employees of Wageningen University & Research who have recently passed away.

Mr M. Bueno de Mesquita MSc,
WUR Tropical Land Development 1978.
15 April 2019.
Prof. R.J.J. Hermus,
WUR Dairy Production 1968.
22 February 2018.
Mr J.U. Hielkema MSc,
WUR Soil and Fertilization Sciences 1975. 16 January 2019.
Mr A.P.C. Kerstens PhD,
WUR Rural Sociology of the Western Regions 1964. 27 February 2019.
Mr M.D. Northolt PhD,
WUR Food Technology 1970.
6 January 2019.
Mr E. Pelinck MSc,
WUR Forestry 1968. 11 January 2019.
Mr G.J. ten Rae MSc,
WUR Agricultural Plant Breeding 1974.
6 June 2017.
Mr G.C. Reijgersberg MSc,
WUR Land Development 1957.
9 March 2019.
Mr J.J. Roseboom MSc,
WUR Rural Sociology of the Western Regions 1974. 15 May 2018.
Prof. W. A. van Staveren,
Professor of Nutrition and Ageing.
24 February 2019.
Mr P. de Visser PhD,
WUR Rural Economics 1965.
23 February 2019.
Mr C.E. Vorst MSc,
WUR Zootechnics 1996. 11 juli 2017.
Mr T. Zwart MSc,
WUR Forestry 1966. 28 March 2019.

If you would like to inform us of the death of a fellow former student or relative, you can email alumni@wur.nl or send a death announcement to the Alumni Department, University Fund Wageningen, Droevendaalsesteeg 4, 6708 PB Wageningen, Netherlands.

Eating off your own land

Barend Hazeleger MSc, WUR Land Development 1983, is making the documentary *Eten van eigen hof* ('Eating off your own land'). The film is about consumers who grow their own food because they want more control over where their food comes from, how it is produced and the distance it travels. 'If that movement were to take off, it could lead to a genuine change in farming. That's what motivates me. Because everyone can see that the current model of industrial agriculture has reached its limits,' argues Hazeleger. The documentary will premiere some time around World Food Day (16 October 2019).

Using waste

Carlos Cabrera PhD, WUR Biotechnology 2011, has received a Take-Off grant from the Dutch Organization for Scientific Research (NWO) for his start-up Greencovery in partnership with the Biobased Chemistry & Technology chair group for research on recovering raw materials from waste streams. Cabrera is a postdoc and the founder of Greencovery. He comes from Panama, did his Master's at Wageningen and got a PhD from Delft. The grant of 40,000 euros will let Cabrera carry out a feasibility study for a combination of techniques from Delft and Wageningen for filtering useful amino acids out of waste streams.

PHOTO CARLOS CABRERA

PHOTO TESSA LOUWERENS

The Achilles heel of allergy

Prof. Harry Wichers, professor of Immune Modulation by Food at WUR, has written the book *De achilleshiel van allergie* ('The Achilles heel of allergy'). As a biochemist in the Fresh Food & Chains department of Wageningen Food & Biobased Research (WFBR), Wichers looks at allergies and immunology.
The book (in Dutch only) can be ordered through Wageningen Academic Publishers and bookshops. 19 December 2018.

KLV

KLV | WAGENINGEN ALUMNI NETWORK

At the AGM on 12 December 2018, it became clear that there is no future for KLV Wageningen as a membership association. KLV is considering its options.

KLV has seen a steady fall in membership and revenue. Meanwhile, Wageningen University & Research has started organizing more and more events for its alumni. For these reasons, the KLV board asked in June 2018 for a rethink of the KLV 2020 strategy. Several scenarios were put to KLV members. 'Our conclusion is that there is no real support for the continuation of KLV,' says chair Hans Swinkels.

KLV does still have active study circles and alumni networks, however. The KLV board and University Fund Wageningen are looking into the feasibility of continuing the study circles.

What comes next after KLV will be discussed at the AGM on 2 July 2019.

Alumni can express their views and ideas through an online survey.

KLV Wageningen Alumni Network is Wageningen University & Research's alumni society with around 7000 members.

Want to become a member?
www.klv.nl

KLV

Chula Bruggeling

KLV member since 2012

A PASSION FOR

Quidditch

Bachelor's student of Molecular Life Sciences Chula Bruggeling (who started her degree in 2012) is crazy about quidditch, a sport that comes from the Harry Potter books. 'It is a very dynamic and strategic contact sport played in mixed teams. The players score when they throw a ball through a hoop. A keeper defends the goal and beaters throw balls at the players to fend them off. After 18 minutes the snitch appears on the pitch and the seekers try and catch him.' Chula plays in the beater position, but for a few years now she has coached the Wageningen team and been on the board of the European Quidditch Federation, as well as an organizer and referee. 'It is great fun to go to tournaments abroad and be on the referee team. Last year I was assistant referee at the World Cup final in Florence.'

Are you a KLV member with a passion, or do you know someone who is? Send an email to secretariaat.klv@wur.nl

WANT TO BECOME A MEMBER?

Visit our website www.klv.nl

PHOTO GUY ACKERMANS

PHOTO ANP

Making dairy farming on Java more sustainable

'We are teaching farmers on West Java how to feed their cows better by, for example, adjusting the feed ration to the production level of the individual cow,' says Marion de Vries of Wageningen Livestock Research. Since 2016, she has been running a project for the international research programme CCAFS, with support from the Dutch government. The project aims at helping Indonesian livestock farmers to produce milk more efficiently while at the same time keeping down manure pollution and greenhouse gas emissions. To this end, she is working with local partners on a number of improvements, which are first trialled in 20 pilot projects.

Many livestock farmers on Java have only a few cows. Because they have very little land at their disposal, they often feed their cattle on straw or roadside grass, and the manure is discharged from the barns. The consequences of this are poor hygiene, water pollution and high greenhouse gas emissions per litre of milk. 'We focus mainly on the feed: is silage a better option, for instance? Another focus is making use of the animal manure,' says De Vries. 'At the moment, 80 per cent of it drains away. That is a great pity. The dairy cooperative we work with has therefore set up a credit system to enable all 4500 members to build a manure storage facility on their compounds. We shall soon be sharing our findings with other dairy cooperatives on Java.' *Info: marion.devries@wur.nl*