WAGENINGEN WORLD

MAGAZINE OF WAGENINGEN UNIVERSITY & RESEARCH ABOUT CONTRIBUTING TO THE QUALITY OF LIFE

no.1 2018

'We have a duty to continue working on the major issues facing the planet'

Louise O. Fresco

Tomorrow's world in Wageningen

Scientists get excited about algae, Big Data, plant meat and organic waste

'You have to stay ambitious'

The job of a dairy farmer has changed fundamentally in recent decades

Environmental health

Wageningen exports its expertise but there is still work to be done at home

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 ADRIE MOUTHAAN

100years
1918 — 2018

100 years of solutions

'The subject of this issue of Wageningen World is 100 years of scientific research and education in Wageningen. Many thousands of students and staff have delved with curiosity and enthusiasm into the conundrums of food production, nutrition and health, and our living environment.
It is in part thanks to them that the world has become a little better over the past 100 years. Hunger and poverty have been reduced and now affect less than 10 percent of the global population. That is still too much, but we're on the right course.
Our contributions to the solutions have made the name of our town on the Rhine resonate around the world. Significant early contributions to safeguarding food production by farmers sound childishly simple and self-evident to us now. We easily forget that 100 years ago, physiology, genetics, economics and sociology were in their infancy. Crops became diseased, but why exactly? Figuring out the causes of plant and animal diseases was crucial in the quest for remedies: viruses, fungi and nematodes were still uncharted territory. Once they had been identified, work could be done on effective treatment through improvement of the cultivation system and development of pesticides and resistant varieties.
Wageningen University & Research has proven its worth in this regard but our quest continues. Every day, our students and staff study new solutions for new problems: how can we protect our crops sustainably, what is the relationship between nutrition and health, and how can we protect and improve biodiversity on our planet.
In this issue, we are looking back but also forward to the future. As the number one in the world in our domain, we have a duty to keep working on solutions for the major problems facing the planet. We are doing this in the Wisdom & Wonder programme. I am looking forward to meeting many of you at the scientific conferences, seminars and other activities that we are organizing to give content to that mission. Keep an eye on the programme.'

Louise O. Fresco,
President of the Executive Board of
Wageningen University & Research

CELEBRATORY YEAR

PHOTOS SHUTTERSTOCK

Kick-off for university's centenary festivities

The Agricultural College in Wageningen officially became an academic institution on 9 March 1918. So the celebrations for the university's centenary will kick off on 9 March. There will be a laser show on campus at midnight showing Wageningen's past, present and future.

The Foundation Day keynote speaker this year is the chemist Lee Cronin, a professor at the University of Glasgow. On 9 March, Cronin will look at deciphering the mystery of life from the perspective of chemistry. How did life arise from 'dead' material and what was needed for this? Four honorary doctors will also be inaugurated. There will be a big party for students in the evening, spread across five venues in the town centre.
The centenary festivities will focus on three themes: Life (until the end of April), Food (May to August) and Earth (September to November). The programme of activities offers a combination of conferences, exhibitions, performances, competitions and events such as the Great Dutch Universities Championship, a sports competition that Wageningen will be hosting. In addition to staff at Wageningen University & Research, many alumni are involved in organizing the activities, along with students and partners in the public and sectors, academia and civil society. Hundreds of donors are offering financial support, together with sponsors and stakeholders. The principal sponsor is the provincial authority of Gelderland.
In November there will be a closing event for students and a gala outside Wageningen. Many activities will also be open to people who have not studied at Wageningen or worked at WUR.
Info: www.wur.eu/100years

SCIENCE WEEKS

What do we know about life?

What is life exactly? What do we know about life and, in particular, what not? Those questions will be discussed in the first of three science weeks celebrating 100 years of WUR.

The theme of the first science week, 'What's life?', can be approached empirically, says Marcel Verweij, professor of Philosophy at Wageningen and one of the organizers. 'To what extent can we turn inorganic material into living matter? This is all about the cutting edge of knowledge. Scientists like talking about what they know but it's much more exciting to work out what we don't know and may never be able to know.'
The origins of life and the boundary between life and death will be discussed during the three-day event, with guest speaker Karen Nelson, director of the J. Craig Venter Institute in the US. The second day will be about biomimicry, imitating nature, with alumnus David Lentink of Stanford University as the speaker. Lentink is an expert in deciphering flight movements in nature. Until a few years ago, he worked in the WUR Experimental Zoology group.
The third and final day will look at tinkering with genetic material. New techniques such as CRISPR-Cas and gene drives are paving the way for unprecedented applications that will be literally life-changing. The Wageningen CRISPR-Cas pioneer John van der Oost will peer into the future.
Info: www.wur.eu/100years

BOOK

Journalists describe the rescue of WUR

In the 1990s it seemed as if the agricultural university was at death's door. But Wageningen recovered, in part thanks to a merger with the agricultural research institutes (DLO). Two journalists wrote a book about this.

As the last century drew to a close, the agricultural university was suffering from falling student numbers. In *Metamorfose* (metamorphosis), Joost van Kasteren and Martijn de Groot describe how the ailing institution was transformed into the perpetually expanding WUR we have now. According to De Groot, the book's title refers not just to the merger between the agricultural university and DLO. 'The university has also broadened its outlook,' he explains. 'WUR had traditionally been hand in glove with the agricultural sector and its research was very focused on increasing productivity and scale. Now WUR is more aware of the issues in society, for example in nutritional research. The third metamorphosis is in the concentration of research activities on an ultramodern campus where you are constantly bumping into one another.'

PHOTO WAGENINGEN ACADEMIC PUBLISHERS

In contrast to the three existing books on the early years of agricultural education in Wageningen, which were mainly based on archive research, a journalistic approach was taken for *Metamorfose*. De Groot and Van Kasteren interviewed dozens of people. 'The aim was to write a readable book with interesting stories,' says De Groot.
The book launch for *Metamorfose* is on 19 March. The book (in Dutch only) can be ordered online through *www.wageningen-academic.com*.

PHIL HOGAN,
EU Commissioner for Agriculture and Rural Development

'My congratulations to WUR on 100 years of innovations in agriculture. I have seen your amazing work in the areas of food security, climate change, the circular economy, and protecting and utilizing biodiversity. The future of Europe's agri-food sector is brighter and more ambitious thanks to your work.'

FESTIVAL

Wisdom & Wonder Festival

On Saturday 15 September, everyone will be welcome to come to the Wisdom & Wonder festival on Wageningen campus. The programme in the afternoon will be mainly for children with kids' labs and play activities, for example. In the evening there will be workshops, performances and food trucks with sustainable food and drink. There will be a big party in the evening too with top acts and a DJ.
Info: www.wur.eu/100years

WAGENINGEN ACADEMY

The relatively short history of postgraduate education

In 1972, the PAO-LH foundation was officially established with the aim of offering postgraduate education to graduates from the Agricultural College as well as more generally supporting the education of the entire agricultural sector. Before the official formation of the PAO-LH foundation in 1972, about 40 programmes were already being offered in the period from 1950. In the first 10 years of PAO-LH, more than 100 courses were given. Over the years, the organization changed its name and official constitution several times; today, it is known as the Wageningen Academy. Nowadays it provides customized programmes on request alongside the open enrolment courses. There is also more variation in the open enrolment courses, with online learning, summer schools and executive education programmes. For more information, visit *www.wur.eu/academy*

PAUL DE KROM,
CEO of TNO

'The Netherlands can be proud of its 100-year-old WUR. Congratulations from an 85-year-old TNO! Together, we can look back on many years of fruitful collaboration. In our opinion all the more reason to continue collaborating intensively for the next 100 years on a healthy and sustainable world!'

COMPANY DAY

PHOTO JESSE REY

Treasure house for companies

On 27 September, Wageningen University & Research will be welcoming companies that operate in areas overlapping with Wageningen themes. The Future Perspective company day is a treasure house of innovation and knowledge. Scientists will give talks, take visitors on guided tours around laboratories and demonstrate prototypes. Corporate visitors will also be able to take part in experiments themselves. Some of the topics that will be discussed at Future Perspective are Big Data, CRISPR-Cas, block chains, closed-cycle food production, precision agriculture and photosynthesis.

CREATIVE INNOVATION

Eggshell made of blood

Artist Basse Stittgen creates objects made from cow's blood. In March and April, he will be working with animal scientists at Wageningen on an innovative way to produce multiple copies of his objects.

'People have powerful associations with blood,' says Basse Stittgen. 'When we see blood, we think of pain, aggression and death. There is more resistance to using an object made of blood than there is to eating meat but in fact blood is a natural material and rich in valuable protein.'
Stittgen is one of the ten artists who will be working with Wageningen scientists on creative and innovative technology. Each artist taking part in these Creative Innovations will spend two months on campus some time between March and November.
Stittgen has already made small objects from animal blood in his previous project, *Blood Related*. They included a jewellery box, eggshells and even an LP that played the heartbeat of a pig. Now he wants to scale up the production of these objects.
Every year, around two million cows are slaughtered in the Netherlands. Each cow contains between 20 and 25 litres of blood, 70 percent of which is sterilized and discharged into the sewer system. Only 30 percent is dried and used as a source of protein for fertilizer. This waste prompted the artist to investigate how blood could be turned into something useful. Some people find it a repulsive idea, but not Stittgen.
He is taking part in the *Creative Innovations* project because he wants to scale up his production. 'That way I'm not only raising awareness but also offering a solution that can reduce the waste streams of blood from abattoirs. In the best case, I'll be able to use this to replace plastic objects,' says Stittgen.
Info: www.wur.eu/100years

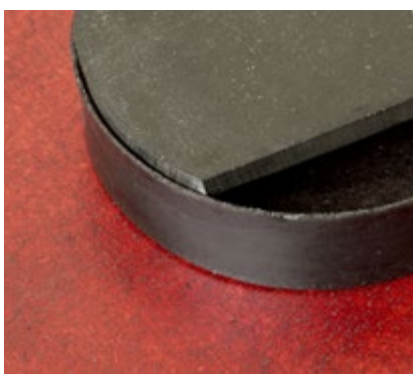


PHOTO DONGHWAN KAM

Objects created by the German artist Basse Stittgen, made from animal blood.

GREEN STUDENT CHALLENGE

PHOTO ROBOTA, OMA

Design competition for prison redevelopment

24 student teams from around the world are producing designs for the redevelopment of the old Bijlmer prison in Amsterdam. The idea is to turn it into urban greenhouses for the production of food, with hanging gardens.

The first Green Student Challenge is part of a major metamorphosis. Within a few years, the old Bijlmer prison and surrounding grounds will be converted into the Bajes Kwartier, a green, energy-neutral city district with restricted car access and 1350 new homes, ranging from starter homes to luxury apartments.

The six participating student teams from Wageningen are working on their sustainable urban greenhouse on the ground floor of the Atlas building on campus. They will present their designs on 28 August. That is also when the winning team will be announced.
Info: rio.pals@wur.nl

MOOC

Online lessons on beer

A group of 14 students are developing an online course (MOOC) on beer. Anyone who is interested can take the course. Four modules delve into the topics of production, the raw materials, marketing and nutrition. There are also practical assignments, such as tasting beer, brewing beer yourself and designing an advert. The knowledge that is transmitted in the videos was compiled with the help of experts from various disciplines. The course is free, takes eight weeks including the exam and requires three hours of study per week. Participants will start on the first module on 24 April. You can register for the MOOC via the '100 years of WUR' site.
Info: www.edx.org/course/the-science-of-beer

PHOTO SHUTTERSTOCK

SUSTAINABLE DEVELOPMENT GOALS

Finding solutions for major food problems

In September 2015, the United Nations set 17 sustainable development goals (SDGs) intended to bring an end to poverty, inequality and climate change. The Sustainable Development Goal conference in Wageningen on 30 and 31 August 2018 will focus on two of these goals: SDG2 – food security, improved nutrition and sustainable agriculture – and SDG17 – cooperation and sharing knowledge in order to achieve the goals. Centring on these two goals, scientists, companies, politicians and NGOs at the conference will investigate solutions for major food issues.
In addition to talks and debates for visitors, there will also be a Foodathon, in which students from all over the world work in teams to come up with solutions for a specific food problem. To make sure their solutions are realistic, they can call on the aid of the experts attending the conference.
Anyone wanting to share a research study or experience relating to sustainable food supplies, for example in a short presentation or poster, can contact the organization.
Info: www.wur.eu/sdgconference.

100 YEARS OF EDUCATION

Alumni in film about studying at Wageningen

Roel Dijksma, Teacher of the Year in 2016, is making a film with students about different generations of alumni and their memories of studying at Wageningen. The aim is to show the changes in 100 years of teaching at Wageningen. The film will be presented on 24 April on Wageningen campus when the prizes are handed out for Master's dissertations and the Teacher of the Year Award by the University Fund Wageningen.
Info: roel.dijksma@wur.nl

Impact of agricultural education

The Agricultural History Society and Gelre Society have seized the opportunity offered by the centenary to organize a symposium about the university's history, on 20 April on Wageningen campus. They will look at the National Agricultural College and national agricultural research stations, agricultural research and education in Gelderland and their impact on farming and rural areas.
Info: piet.vancruyningen@wur.nl.

WUR ON WHEELS

PHOTO SHUTTERSTOCK

Cycling to sow knowledge

In September, students, staff and alumni can take part in the WUR on Wheels event. Each participant cycles their own route and shares their stories and pictures from the trip via a website.

This can be a trip with friends – fellow alumni or Wageningen colleagues – or a holiday or commute to work. 'We want to show that we cover a lot of kilometres in our daily lives and that when we travel, we take our Wageningen knowledge with us and spread it,' explains Door van der Sloot, project leader for 100 Years of WUR. 'That knowledge is often the key to resolving complex issues and problems. WUR on Wheels combines both the enthusiasm and the desire to be practical that typify people from Wageningen.' The aim is to collect enough cycling kilometres to get once round the earth (40,000 kilometres). A map of the world will show where everyone cycled. Registration will start in May.
Info: wur.eu/100years

ART

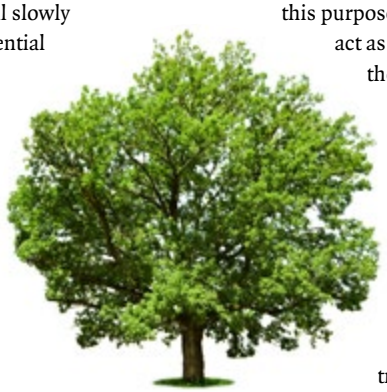
Students design fair clothing

In September, innovations will be on show on Wageningen campus that can make the world of fashion fairer, cleaner and more sustainable. They are the result of cross-fertilization between technological knowledge, management science and design, and were developed by WUR students working with designers. The results range from new business models to alternatives to leather based on fungi. The project is part of a collaborative venture between WUR, ArtEZ art school and State of Fashion aimed at making fashion a circular-economy sector.
Info: kim.poldner@wur.nl

UNIVERSITREES

Planting trees as a growing reminder

Trees will be planted around the world this year as a permanent and growing reminder of 100 years of university education. On campus, a large tree will slowly rise up that has the potential to live a very long time. A number of trees will be planted in the Belmonte Arboretum that fit in with the collection. WUR employee Chris van Kreij took the initiative to plant a UniversiTree in his home town of Renkum. He donated the money for this via the 100x100 website and also used his year-end gift from work for this purpose. Alumni abroad who act as hosts for gatherings on the worldwide alumni day on 23 June will also be given a tree to plant in their country, one that is suitable for local soil and climate conditions. The more donations are made via 100x100.wur.nl, the more commemorative trees can be planted.



ALUMNI DAY

Connecting around the world

The World Wide Wageningen Alumni Day will take place on Saturday 23 June. Its theme will be Sustainable Food & Nutrition. Graduates around the world will gather to celebrate 100 years of Wageningen and share this moment as a global community.

All over the world, teams will be taking part in the Live Cooking Get-together, in which a sustainable menu for the future will be prepared. There will also be an Online Worldwide Dialogue in which a panel of scientists and experts in six locations around the global will link up via satellite to talk about sustainable and healthy menus for the future in megacities. In Wageningen itself, various talks and debates will be organized dealing with trends and developments in Wageningen's domains. Alumni will be able to swap memories and enjoy food and drink together in a square with food trucks, music and entertainment by alumni. The WUR Studio on the festival grounds will have a live link with alumni gatherings abroad, both in the big cities and beyond.

Visit 100x100.wur.nl to support foreign alumni who would like to attend an activity in their own country but do not have enough money to do so.
For more information, registration and admission tickets: wur.eu/worldwidewageningen.

PHOTO WUR

VICTOR VAN DER CHIJS,
chair of the 4TU.Federation

'The collaboration with Wageningen means we now have real possibilities for drawing on bio-inspired solutions in technical research. Such solutions are the future, especially if we can link them to hi-tech. With further consolidation of the partnership, we can make a difference in more fields and on a global scale.'

MEMORIES

Striking stories from the past online

The website 100x100.wur.nl has now accumulated a wealth of striking memories contributed by former students and staff, for example about the rice trip in 1964 and the song 'A horse in Hoogstraat'.

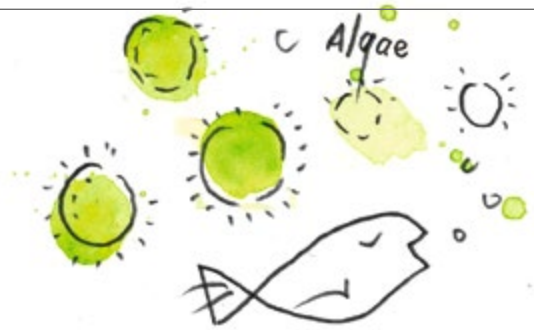
In September 1964, a group of ten students started on a trip that took in 23 countries in one and a half years. In each country, they investigated the conditions in which farmers produced rice and other tropical and subtropical crops such as sugar cane, pineapple and banana. In 2007 they wrote a book about this experience that is available online: *Rijstreis in Retrospectie* (rice trip in retrospect). The song 'A horse in Hoogstraat' has also turned up, composed by Kees van der Does, nicknamed Don Lapides and a former member of student society SSR-W. University magazine *Resource* talked to him and put his song on its website (www.resource.wur.nl). People wishing to share memories can do so until the end of March via the website 100x100.wur.nl. These memories will be available for viewing on the World Wide Alumni Day on 23 June and will be displayed on screens.
In addition to sharing memories, you can also support anniversary projects at 100x100.wur.nl.
Info: alumni@wur.nl
Rice trip: http://edepot.wur.nl/117178

What does Wageningen have to offer us for the future? Which new plans and developments are making the hearts of eight discerning scientists beat faster?

TEXT HANS WOLKERS **ILLUSTRATION** JORRIS VERBOON

Working on tomorrow's world


biofuel
cloud
62%
BIG DATA
efficient plants
bacterial therapy
Algae
plant meat
changing DNA



MARIA BARBOSA,
BIOPROCESS ENGINEER

‘Algae can provide a breakthrough for food and energy supplies’


PHOTO GUY ACKERMANS

‘Algae are the perfect plants. They are super-efficient, you can grow them in places where agriculture isn’t possible, and they contain lots of different valuable ingredients. These microscopic plants could provide a breakthrough for our future food and energy supplies. Large expanses of forest are being felled for more farmland to cater for our need for food and biofuels, and that demand is only going to increase in future. Algae can take us a long way towards solving these problems. Look at the production of oil-rich crops for biofuels. Algae produce six times as much oil per hectare as, say, oil palms. To provide the entire European transport sector with enough algae biofuel would only take an area the size of Portugal. As a byproduct, we can harvest a vast amount of protein: more than 40 times the total quantity of soya protein imported annually by the EU. That could save our last primeval forests.
Algae also produce healthy omega-3 fatty acids. Together with algae protein, these can replace fishmeal and fish oil from wild fish in feed for farmed fish. To meet global demand would require an area the size of two of the larger Dutch provinces. I expect that by about five years’ time, all the omega-3 fatty acids in fish feed will be sourced from algae. That will make aquaculture a lot more sustainable.’

www.wur.eu/algae

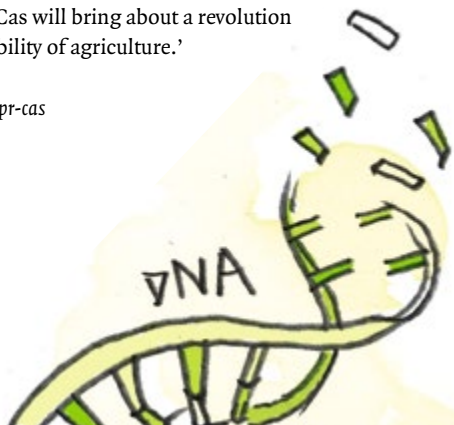
RENÉ SMULDERS,
PLANT BREEDING RESEARCHER

‘Thanks to CRISPR-Cas, the use of pesticides will drop drastically’


PHOTO GUY ACKERMANS

‘CRISPR-Cas is a new way of changing DNA. This revolutionary technique is not a substitute for classic plant breeding, but an important addition that can give breeding a big boost. Some bacteria make use of a plant’s genes when they infect a plant. That happens in rice, for instance, where they switch on a gene that causes cells to start exporting sugars. This enables the pathogen to grow and to infect the plant. CRISPR-Cas was used to selectively switch off the sugar-transporting gene, making rice resistant to those bacteria. It is also possible to use CRISP-Cas to influence the ‘switch’ which switches a gene on or off. This technique was used to make a maize variety whose yield is no longer affected by drought in the flowering season.
With CRISPR-Cas we can progress faster towards plants with the characteristics you need in sustainable agriculture. We can save a lot of time, especially in cases where traditional breeding goes very slowly, such as the vegetative propagation of fruit trees, potatoes and flower bulbs. These are precisely the crops on which a lot of fungicide gets used. Thanks to the new techniques, a disease-resistant variety can be created quickly, and pesticide use will be drastically cut. So I also think CRISPR-Cas will bring about a revolution in the sustainability of agriculture.’

www.wur.eu/crispr-cas



RICHARD FINKERS, RESEARCHER IN GENOMICS AND BIG DATA IN PLANT BREEDING

'Big Data is going to play a big role in improving varieties'

PHOTO GUY ACKERMANS

'Modern agriculture, in which drones and all sorts of sensors are used to monitor the growth and yields of crops, produces a glut of data. There are smart ways of bringing all that data together and analysing it to breed new improved varieties in a more targeted fashion. Good farmland is being lost to urbanization, and farmers are being forced onto less suitable land, often with poorer soils. Farmers aim at a stable yield by fertilizing crops. There is a challenge for us to breed crops so that they produce a stable higher yield with less artificial fertilizer, even under these circumstances. Big Data will play a key role here. If we link the harvest to data about the soil and the weather, for instance, we can carry out precise genetic analyses to determine why the harvest is or is not stable. Then we can use that data in breeding the plants we want. I hope that in 20 years we will have better varieties that produce higher yields and better nutritional quality with less management.'

www.wur.eu/bigdata

WILLEM DE VOS, PROFESSOR OF MICROBIOLOGY

'This paves the way for treating people with bacterial therapy'

PHOTO BRAM BELLONI

'Thanks to sequencing research, with which we can analyse all bacteria and their genes, our understanding of the relationship between humans and bacteria has been drastically revised. We used to think the only good bacteria were dead bacteria, but that is an outdated attitude now. Our bacteria populations play a crucial role in our health. All human beings have thousands of species of bacteria with millions of genes in their guts. That enormous variety implies a huge metabolic capacity, which helps in the digestion of food. Countless correlations have been found between the diseases of prosperity and the composition of gut microbiota, with the *Akkermansia muciniphila* bacterium appearing to play a key role in many cases. The guts of people who are overweight or have diabetes type II, for instance, often contain very few bacteria of this species. Mice put on a high-fat diet became overweight unless they were simultaneously dosed with *Akkermansia* bacteria. This paves the way for treating people with bacterial therapy. This is already happening now in the form of faecal transplants, which are yielding spectacular results in, for example, people whose gut flora have been disrupted by antibiotic use.

In future, bacteria in and on our bodies will play an important role in the diagnosis, treatment and prevention of diseases. We might even be able to improve cancer therapies by making sure the patient has the right combination of gut bacteria.' >

www.wur.eu/intestinal-acterium

DAVID STRIK,
ENVIRONMENTAL TECHNOLOGIST

‘We can fly on fuel made from organic waste’

PHOTO HARMEN DE JONG

‘Organic waste is usually fermented to make methane gas. But micro-organisms can also turn the waste into other useful resources. Bacteria convert some of it into small fatty acids and then other bacteria turn those into large fatty acid molecules such as hexanoic acid. This is fantastic stuff: you can use it as a supplement in animal feeds, and as the basis for plastics, lubricants and fuel. Bacteria convert more than 30 percent of organic waste into hexanoic acid. Our spin-off company Chaincraft has a pilot plant facility in Amsterdam where bacteria convert organic waste into animal feed in no time.

But hexanoic acid is the perfect raw material for fuel too. That conversion is already being made successfully in the lab, also using bacteria. It still relies on large quantities of ethanol, which the bacteria use as an electron donor for the conversion. The problem with that is that land and water are needed to produce sugar beets for the ethanol. So we have developed an alternative: electricity delivers the electrons straight to the bacteria, doing away with the need for ethanol. Electricity generated by wind turbines will certainly be competing with agricultural ethanol production in the near future.

From the food waste in the EU we could produce enough biofuel for 10 percent of all the aircraft in the world! If we start using our organic waste to produce hexanoic acid all around the world, the circular economy will be well on its way and we will be flying mainly on fuel made from organic waste.’

www.wur.eu/biorecovery

MARTIN SCHOLTEN,
DIRECTOR OF THE ANIMAL SCIENCES GROUP

‘Circular agriculture is the best business model’

PHOTO SVEN MENSCHEL

‘Within a few decades we have got to produce 70 percent more food worldwide. But there are already tensions surrounding land use. We just cannot expand the area used for agriculture any more. So we shall have to find smarter ways of producing food. Yet at the same time, 70 percent of what we produce from agriculture gets wasted. If you could make smart use of that waste, you could produce enough food with the land surface in current use.

Smart agriculture uses everything. Protein-rich beet leaves are not waste but livestock feed. Inspiration can be found in nature. An ecosystem is super-efficient: cycles and species diversity ensure nothing gets wasted. And we’ve got to build that into our future agricultural system. By linking crop farming with livestock farming in smart ways, you can use crop waste as feed and the manure can maintain the soil fertility. The farming system used to be based on homogeneous monocultures: that is efficient and predictable. But with improved technology we can manage an integrated system well too nowadays. That kind of diverse agricultural system is less vulnerable to diseases. It is important to make use of natural conditions when choosing crops, and the livestock farming linked to them. Ten years from now, circular agriculture will be the norm. It just is the best business model.’

www.wur.eu/circular-agrofood-system

ATZE JAN VAN DER GOOT, PROFESSOR OF SUSTAINABLE PROTEIN TECHNOLOGY

'Plant meat will conquer the world'

PHOTO GUY ACKERMANS

'We have succeeded in introducing fibrous structures into plant proteins using relatively simple technology, enabling us to make large pieces of plant "meat" with a texture that is very like that of real meat. Our technology is making a substantial contribution to sustainable eating patterns because real meat has a negative impact on the environment. A consortium of various companies was established a year ago to get the technology and the product ready for the market. The factory is coming; we are going into production! It will become more and more normal to eat meat substitutes. Especially if the taste and texture closely resembles that of real meat. Currently available meat substitutes are relatively pricy and usually come in small pieces, sometimes compressed into larger pieces. That doesn't do anything for the texture. Thanks to this Wageningen technology, the new products are better and cheaper than today's meat substitutes, and pricewise, they can compete with meat.

It is kind of magic: soya protein goes in at one end of the machine and half an hour later, a beefsteak rolls out of the other end. It is less complicated than baking bread. So some time in the future we might be carving a meat substitute at Christmas dinner, not a turkey.

Even in the United States, where meat consumption is sky-high, they realize the importance of this initiative. So I predict that our plant meat will conquer the world and help cut meat consumption.'

www.wur.eu/plant-meat

RENÉ KLEIN LANKHORST, MOLECULAR BIOLOGIST

'More efficient plants can feed the world'

PHOTO GUY ACKERMANS

'Photosynthesis is the most important process on earth. It is the source of all our food and fuel. It is also the only process that can extract CO_2 from the atmosphere on a large scale. But the photosynthesis efficiency of many agricultural crops is very low: a field of potatoes only converts 0.5 percent of solar energy into biomass. In theory, this could be up to eight times as much. If we could double the photosynthesis efficiency of agricultural crops, we could produce enough to feed the growing world population. But photosynthesis is a complex process, which we do not yet fully understand. With a view to getting plants using solar energy more effectively, we are studying the genetics of photosynthesis. Once we have identified the genes, we can then adapt plants in order to improve their photosynthesis efficiency and boost production. This has to be done in the right part of the plant: in potatoes that means in the tubers and not in the leaves.

As well as efficient plants, we also want sustainable plants that do not need much water or minerals, and are climate-proof. Those plants of the future can potentially have a massive impact: they can feed the world population, curb climate change and replace fossil fuel byproducts – for the production of plastic for instance.' ■

www.wur.eu/photosynthesis

‘BEFORE YOU KNOW IT, A HYPOTHESIS TAKES ON A LIFE OF ITS OWN’

Confusing science

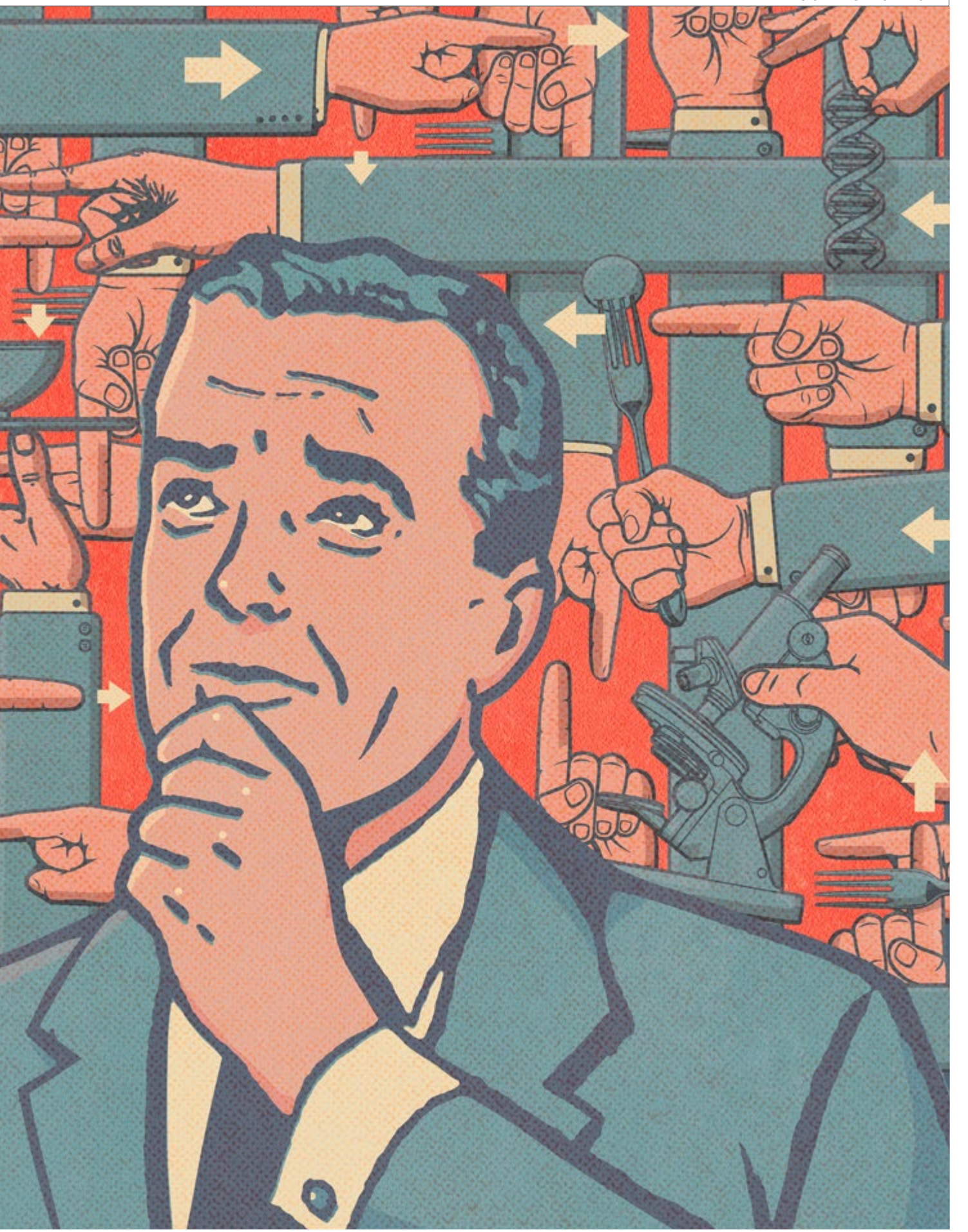
One hundred years of science means one hundred years of new insights. Old findings can end up being radically revised. That may be part and parcel of the scientific project, but it can also sow confusion, especially in today’s fast digital world. ‘It damages our credibility.’

TEXT ASTRID SMIT **ILLUSTRATION** RHONALD BLOMMESTIJN

Research results in the nutritional sciences influence us all in our day-to-day decisions. If major new insights emerge, as has happened a few times in recent decades, so does the dietary advice offered to consumers. For example, in its dietary guidelines of 2006, the Health Council of the Netherlands was still talking about the positive effect of alcohol, telling us that one glass a day for women and two for men would probably reduce the risk of death. In the dietary guidelines of 2015, however, the advice is not to drink any alcohol at all, or at most a glass a day. Alcohol raises the risk of various forms of cancer, says the Health Council now.

These kinds of changes can confuse consumers. Not a problem, says Frans Kok, emeritus professor of Nutrition and Health at Wageningen University & Research. An evolving understanding is all part of the game in science, and it happens in all subject areas. ‘Look at medicine. In the 1970s, heart patients were prescribed complete bed rest. Now they are encouraged to get out of bed as quickly as possible to stop blood clots forming. In the old days, if you got a slipped disc you had an operation and lay flat on your back for six weeks. Nowadays doctors are slower to operate and advise you to keep moving as much as possible.’

There is much less discussion about that, however. ‘That is probably because a patient is in a dependent position,’ explains Kok. ‘What is more, each particular piece of medical advice is relevant to far fewer people. But diet is relevant to everyone, >



MARCEL SCHUTTELAAR
Schuttelaar & Partners Consultancy

'Scientists have a duty to engage in public debate when people tout nonsense'

and everyone has an opinion about it. That is the fate of the nutritional sciences. There's nothing you can do about it. If you don't like it, you should choose another subject.'

CONFUSED

Sander Kersten, professor of Nutrition, Metabolism and Genomics, does find this problematic, though. 'We scientists understand it, but consumers get confused or lose confidence. I have noticed that other scientists get irritated too. The changing dietary recommendations damage our credibility. You can see that in discussions on TV and the internet.'
Another thing that doesn't help is that besides the carefully considered dietary recommendations of the Health Council, there is also a constant stream of reporting on diet based on academic publications. Kok: 'The media are very quick to pick up on diet-related news. It is often a nice titbit between the heavy-duty stuff , and it gets read by a lot of people.' Many of the reports are based on *one* little study, which in just *one* survey found a link between, say, eating chocolate and a lower risk of cardiovascular disease. But it gets into the papers and before you know it, chocolate is 'good for your heart'.

HYPOTHESES

That is often the way it goes with hypotheses. A group of scientists might start a study because they think a substance lowers the risk of cancer or cardiovascular disease, or that it is good for the brain. A press release or article is written, and before they know it, the hypothesis has gained a life of its own and has become a fact in the minds of consumers. A 'fact' which the scientists later retract because the hypothesis was disproven, or could not be proven. An example of this was research done in the early 1980s by Frans Kok and Daan Kromhout, emeritus professor of Public Health Research at Wageningen, on the suspected positive effects of antioxidants. It was thought that they mopped up damaging oxidative radicals, thus reducing risks of cardiovascular diseases and tumours. Vitamin E and flavonoids – found in tea, apples, onions and red wine – were the main antioxidants looked at in the study. But after thorough investigation, vitamin E did not come out as preventing cardiac arrest or cancer. And no link was seen between flavonoids and cancer.

AVOIDING PUBLICITY

In his inaugural lecture a few years ago, Kersten suggested food scientists should avoid publicity wherever possible. Especially if they cannot back up a relationship they have found between diet and health with a biological mechanism. They should also only seek publicity when a specific link between diet and health is shown by several different studies. 'After a first study you really have no more than a hypothesis. Before you know it, that hypothesis starts leading a life of its own. Consumers soon see a hypothesis as a fact,' says Kersten.
But Kromhout does not think this is a practical solution. 'It often takes years before you have hard evidence of a link between diet and health. Are you supposed to wait all that time before you publish your research results? You could wait until the cows come home. Sometimes you have to qualify previous findings or retract them altogether. That is all part of the dynamics of science. What we nutrition scientists should do more often is to engage with the media to put the research results in perspective and in their wider context.'
That is no easy task, says Kerstens. 'The number of reports on diet in the media – especially online – has only increased, and the reporting often lacks nuance. I try my

NEW UNDERSTANDING CHANGES WATER MANAGEMENT

A continuously evolving understanding is inherent to science, and not just the nutritional sciences either. In the field of water management, for example, it was once believed that 'the faster we let water flow away, the better', so Dutch waterways were straightened and rivers were lined with high dykes. A new understanding of the importance of biodiversity led in 1986 to a whole new plan for the Dutch delta, based on a development vision for the Dutch rivers which addressed not just nature development and shipping issues but also agriculture, safety and recreation needs. The plan was controversial but was implemented at several locations. New insights on climate change led to the 'Space for the River' programme, which includes water storage in nature areas. This benefits nature and increases safety. Currently, stone breakwaters are being built alongside the central channels in the big rivers, protecting shipping against extremely low water and promoting biodiversity.

ASTRID POSTMA-SMEETS
Nutrition Centre

'The scientific debate has shifted towards the public arena'

best to make students aware of the impact of a report on nutrition research. And I teach them not to give in too much to the pressure to make their research results known.'

CONFUSING SIGNALS

Kersten is thinking of academic organizations here too. They often stimulate publicity about research as it helps you show the outside world what is being done with public funding. 'In itself a good aim, but the flip side of it is that research results all get put out there, whether they are final or preliminary, so you get a lot of confusing signals,' says Kersten.

Academic journals encourage researchers to seek publicity, too. Kersten: 'A journal recently asked me to tweet about my research results. That was one of the things you were supposed to do before being published in the journal. I did it, since my article is not so much about diet as about a physiological process, but it is too ridiculous for words, really.'

Within the Dutch Academy of Nutrition Sciences, there is much discussion about when and how a nutrition scientist should seek publicity, says Ellen Kampman, professor of Nutrition and Disease at Wageningen University. 'We look at where it has gone wrong, and whether we can agree on codes of conduct.'

There was an example of how things can go awry in the field of nutrition and cancer a few years ago, says Kampman. A colleague, Martijn Katan, stated that fruit and vegetables did not provide protection against cancer. 'I thought it was a dangerously oversimplified comment. In the studies that we can do, it is difficult to demonstrate a link directly, but there is definitely an indirect link with weight. People who eat a lot of fruit and vegetables tend to be slimmer. And overweight is associated with 10 kinds of cancer.'

REFUTING INACCURACIES

Actually, Kampman feels she should throw herself into the public debate much more to put forward her message about nutrition and cancer, and to refute inaccurate reporting. 'But I don't always have time for that. I am responsible for research and education here, and it's a fulltime job to write proposals and acquire projects. Appearing on a TV programme takes up a whole day.'

So she is very happy that, now he has retired, Katan has taken on this public role of media relations. 'He knows how to explain things clearly. And fortunately he now consults the expert if there is something he is not sure about.'

Edith Feskens, Wageningen professor of Nutrition and Health in the Life Cycle, shares the wish to get more involved in public debate. 'Consumers are increasingly vocal and critical, and can make themselves heard more these days through social media. We have got to find better ways of conveying the evolving understanding in our field.' She is not sure how to do that at this point. She recently consulted colleagues in the field of communication, because she wanted to organize a dialogue with the general public.

Astrid Postma-Smeets of the Nutrition Centre is not too worried about the credibility of the nutritional sciences. 'At conferences it is the most normal thing in the world for scientists to criticize each other and to retract findings. Nowadays the debate is more public, which makes people feel as though there is less clarity. Consumers will just have to get used to that. The scientific debate has shifted towards the public arena.' Marcel Schuttelaar of Schuttelaar & Partners consultancy firm adds: 'The problem that dogs scientists is that the general public doesn't seem to understand that discussion among scientists is all part of science, and is necessary for progress. And the media are eager for unqualified statements. So practise explaining in plain language that a single study doesn't tell us everything by a long shot, and how it fits into the puzzle you are working on. Scientists also have a duty to engage in public debate when people are touting nonsense.' ■

49 YEARS OF NUTRITION SCIENCE

'Forty nine years ago we were the first scientists to research in controlled studies how diet affects the body,' says Frans Kok, emeritus professor in Wageningen. 'The medical faculties were not interested at first. They didn't think diet had much impact on health.'

In the mid-1980s, another emeritus professor, Daan Kromhout, found a link between fish consumption and a reduced risk of cardiovascular disease. This research is part of the basis for the Health Council's recommendation to eat oily fish every week. And about 25 years ago, during his time at Wageningen, Martijn Katan, now emeritus professor of Nutritional Science at the VU university in Amsterdam, showed that the fatty acids dubbed 'trans fats' raise blood cholesterol levels considerably, thereby posing a public health risk. That had big consequences for the food industry, which has steadily reduced amounts of harmful fats in its products. Other work by the group led by Ellen Kampman, Wageningen professor of Nutrition and Disease, contributed to research that proved that red and processed meats raise the risk of bowel cancer.

‘I’d love to study here again’

Computers were a rarity; now everything is done online. That is one of the differences that come up when two generations of one family talk about their university days. 'If you failed an exam, it wasn't a disaster.'

TEXT YVONNE DE HILSTER **PHOTOGRAPHY** SVEN MENSCHEL

A lecture theatre in the brand-new chemistry building at the Dreijen in 1961. Women students sat in the front row in those days.

It was by sheer coincidence that Hubert Braun came to Wageningen as a student in 1956. ‘I wanted to be a doctor like my father,’ Hubert – now 82 – explains. ‘But my parents got me to take a test, and that suggested that a technical or agricultural degree would suit me better. I had to do national service after secondary school, and I had my first experience of land surveying. I enjoyed working with numbers like that. A mate of mine who was planning to go to Wageningen told me they taught land surveying there, and that’s how I ended up going to Wageningen too.’

He was in a cohort of about 200 students. ‘In the first year everyone did the same courses, about 10 in total. And everyone joined a student society. You ate there every day; you couldn’t cook at home in your lodgings.’ After passing the first year, Hubert opted for tropical land and water management. He felt a bond with the tropics because his parents had lived in the East Indies, and he wanted nothing more to do with the professor of Plant Sciences. ‘A dreadful person.’ The only foreign student he can remember in his year was someone of Indian origin from Surinam, who was a member of Ceres like him. ‘He always got an egg in the canteen because he didn’t eat meat.’

FAILED

Hubert took 10 years over his degree. ‘When I failed an easy minor course, Mechanical Engineering, I threw myself into the work of the bar committee. It took a long time for me to pluck up the courage to pick up my

Hubert Braun (left) came to Wageningen as a student in 1956. His son Arnoud (right) came in 1888 and met his wife Petra van de Kop, who started in 1990.

studies again. Unlike now, nobody put their foot down and said I couldn't go on like that, not even my parents.' The turning point came during his internship with a soil mapping project in Tabasco, Mexico, which inspired a fascination with the relationships between soil, agriculture and land use. Soon after his graduation in 1966, Hubert married Anneke Bontekoe (who started Farm Domestic Science in 1959). Her father, from a Groningen farming family, had studied in Wageningen before her (Dutch Agriculture, 1925-1931). 'A fellow student told me one day that Anneke was looking for a partner for the student choir and orchestra WSKOV ball – or maybe it was the theatrical society WSTIV,' says Hubert. 'I leapt onto my scooter straightaway and raced off to find Anneke. I already knew her, and I wasn't going to let this chance go by.' You couldn't spend the night together in those days, mind you. 'The landladies didn't allow it.'
That same year, the couple left for the Serengeti in Tanzania, where Hubert would spend five years doing grasslands research. As a consequence, Anneke was the only one in her friendship group who did not get her degree. But it wouldn't have made much difference: not one of her friends got a job, as women were not being taken on anywhere at that time. After the Serengeti, Hubert got a job with the Kenya Soil Survey Project. After 11 exciting years in East Africa, they came back to live in Bennekom.

IMPROVING THE SOIL

Hubert and Anneke's son Arnoud (Soil Science 1988-1995) spent all his primary school years in Kenya. A fantastic time, he says. 'As I remember it, we drove down into the Rift Valley every Sunday to go sailing on a lake.' Arnoud developed a fascination for the landscape and decided to study Soil Science. 'I looked at Physical Geography in Amsterdam and Utrecht too, but if you graduated from those programmes you tended to end up working for an oil company. If you wanted to do something for the world, you were better off going for Soil Science, because then you can improve the soil.'
Arnoud met his wife Petra van de Kop during a field trip to Hungary. Her degree was in Environmental Hygiene (1900-1996) but she took some courses on tropical agriculture and soil issues too. Petra grew up in Santpoort Zuid, near the coast west of Amsterdam. 'My classmates thought it was >

Ton van Dortmont (left) came to Wageningen in 1982, and his wife Dymph Asselbergs (right) in 1985. Their daughter Roos followed in her parents' footsteps in 1916.

very odd of me to go to Wageningen. But I was interested in agriculture and nature, and used to hang around the dairy farm in the village as a child. I just wasn't sure which degree programme to choose.'

To this day, she is grateful to her thesis supervisor. 'I learned systems thinking, and she was the first person to tell me what qualities she saw in me. That didn't happen much in those days; nobody talked about that kind of thing: who are you, and what are your skills?'

After her last internship abroad, Petra no longer had a room of her own and moved in with Arnoud. They got married soon after graduating, and went abroad together. They both had jobs with international organizations and worked in Peru for two years and in Rome for four. They returned to Wageningen in 2003. Arnoud is business developer and director at DIBcoop, which helps companies seeking to invest in emerging markets. Petra started her company KOP & Co in 2010, and advises individuals and organizations on their questions about leadership, careers, collaboration and sustainable innovation.

And now, Arnoud and Petra's eldest daughter Hanne will soon be choosing where to go to university. She enjoyed an open day in Wageningen. 'But I might opt for a University College, where you work in small groups, with a lot of discussion, and you don't have to specialize quite so early on,' says Hanne.

Another couple, Ton van Dortmont (Landscape Architecture 1982-1988) and Dymph Asselbergs (Horticulture 1985-1991) met at Unitas youth club. Ton was the first person in his family to go to university. 'My father was a dairy farmer and he thought Wageningen was a safe bet.'

SETTLING BEER BILL

Ton started out in student residence Rijnsteeg. 'The oldest student on the corridor did the accounts: totting up the telephone calls, the beers drunk, meals eaten, and the allowance you got from the landlord SSH for cleaning. After that I lived with two friends in the Nude neighbourhood for years, in a rented flat that the father of one of them later bought.'

Dymph went to Wageningen because she was interested in flowers and plants. She considered studying plant breeding but wanted less lab work and more time work-

‘You can listen to all lectures online later nowadays’

ing with plants, so she opted for horticulture. The classes taught by one horticulture teacher in the first year were quite an experience. ‘An older man who made quite clear that he thought women going to university was nonsense. They belonged in the kitchen. And half my year were women! It only made us all the more resolute, but we didn’t make a fuss about it, and he retired a bit later.’

Computers were a rarity in those days. ‘I took a course called Introduction to Information Technology,’ says Dymph, ‘but there wasn’t much to it. When I did a study on root formation and collected so much data I didn’t know where to start, my supervisor sent me to the mathematics department. They fed all my data into a computer, and saved my thesis research project.’

FORMING YOUR IDEAS

Ton: ‘For Landscape Design, we spent every afternoon for weeks in the same room for practical work. Our drawings stayed up on the walls there, and we critiqued each other’s work. That was important for forming your own ideas, learning to defend your design, and beginning to stand up for yourself. Teachers gave us feedback too. When I graduated, I was one of the few in my year who had specialized in computer-aided design, whereas most people still felt you ought to draw by hand. But it was that specialization that got me my first job.’ He is now a project developer for onshore wind farms. Dymph works for the Dutch Medicines Evaluation Board. ‘Because you could take such a wide range of courses in Wageningen, I developed a broad knowledge base,’ she says. ‘And in our day you were allowed to fail. You could resit the exam every term, not just after the course had been taught, and if you failed it wasn’t a disaster. It was no problem for me to take six years to get a degree.’

Suddenly she remembers the microfiches you used back then to search for the literature you needed. ‘A horrendous system; I could never find anything.’ Ton explains: ‘They were little blue square plates that you laid on a scanner and looked at through a lens. You searched by moving the plate over the scanner. And you often got referred to yet another microfiche.’

EVERYTHING ONLINE

Nowadays, everything is done online, says their daughter Roos van Dortmont. ‘Searching for literature, registering for courses or exams, looking up your timetable. You can listen to all lectures online later too. But I usually do go along to them.’ Roos started her Biology degree in Wageningen in 2016. ‘Because I grew up in Wageningen I would have preferred to go to another university. But the campus here turned out to be nicer than anywhere else, the atmosphere is good, it is very easy to make friends, and because it is small you are always running into people you know.’ But whereas in her mother Dymph’s day, you and your flatmates took it in turns to cook every day, Roos only eats with her flatmates once a week at the most. ‘Sometimes I eat at the uni, sometimes with people from my course, sometimes at SSR-W, which I belong to, and sometimes with someone from my sorority.’ On her corridor there are students from Nepal, Pakistan, China and Ghana, as well as Dutch students. Her parents can only remember one Spanish, one Belgian and two German students in their residences. Roos’s mother would have found the online lectures very handy. ‘On Thursday night I often only got home at six on the morning and I still went to class at eight thirty. And when I hear what kind of research the university does nowadays, that also makes me think: ‘I would love to study here again.’ ■

Above: studying in the library, 1974.
Below: Asserpark, the first star-shaped block of flats for student housing, opened in 1969.

Tulips from Wageningen

Early last century, plant physiologist Blaauw taught tulip farmers in the Netherlands how to set their flower bulbs' built-in clocks. As a result, Dutch tulips flower at the right moment all over the world. Growth regulation is still an important topic in Wageningen research, but now with the aim of making bulbs climate-proof.

TEXT ALEXANDRA BRANDERHORST **PHOTO** GETTY IMAGES

The very first speculative bubble in the world was the 'tulip mania' which broke out soon after tulips were first imported into the Netherlands. At its peak in 1637, speculators were paying as much for a bag of tulip bulbs as for a row of houses on an Amsterdam canal. Today, although a tulip bulb is no longer worth its weight in gold, almost half the Dutch flower bulb fields are full of tulips. Thanks to Wageningen research of nearly 100 years ago, the Netherlands can export tulips to all the corners of the globe all year round. This most commonly grown Dutch flower bulb is sensitive to temperature fluctuations, however, and therefore to climate change. So scientists are working on how to keep the tulip flowering in the future. 'So that we can all go on enjoying these spring flowers, we are studying how their development and growth adapts to changing climatic conditions,' says Wageningen's 'bulb professor' Richard Immink. With this work, he is following in the footsteps of professor of Plant Physiology Anton Hendrik Blaauw, who started studying growth regulation in tulips in 1918.

Tulips originate from the mountains of Turkey, where they flower abundantly in the relatively short springs between the cold winters and hot summers. In the early 20th century, bulb farmers discovered that they could bring forward the flowering time by a few months by first cooling the flower bulbs and then putting them in a warm greenhouse. Blaauw refined that system and also

discovered that you could delay flowering by six months if you reversed the order, first warming up the bulbs and then cooling them. And that makes them suitable for export to the southern hemisphere, where they arrive by ship in the southern spring. The plant physiologist taught the bulb farmers to use temperature control to set the flower bulbs' in-built clocks precisely. By doing this, he laid the foundations for the global export of tulip bulbs. In 2016, the Netherlands exported 1.2 billion euros-worth of flower bulbs, with the tulip in the lead by a distance.

'With microscopic research, Blaauw established that heat causes the new bud in the heart of the bulb to be formed before the old flower dies. We have followed up his research using modern molecular techniques, and we have discovered that a bulb decides to start flowering weeks before there is anything to show for it in the bulb's growth tip,' explains Immink. His research can make it possible for tulips to form good quality flowers in spite of the mild winters and early springs we get these days. 'We are learning more about the growth process. Growers can use this information to identify the optimal storage conditions for flowering on demand. We will also soon be able to see which tulips are genetically best able to cope with the warmer weather. Using these specimens, breeders will be able to develop beautiful, climate-proof tulip varieties.' ■

www.wur.eu/weather-proof-tulip

CARRYING ON FARMING AS THE RULES CHANGE

‘You need to stay a

‘My father used to milk five cows in one and a half hours; my son can milk 120 cows in that time’

mbitious'

The job of a dairy farmer has changed drastically in the past century. Frank Post and his father talk about how they have adapted their farm over the past few decades. 'We saw the latest machinery at open days at one of Wageningen's experimental farms.'

TEXT MARION DE BOO **PHOTO** MARCEL VAN DEN BERGH
INFOGRAPHIC STEFFIE PADMOS

Gentle mooing can be heard from the calves' barn on the Vosmaat farm near Hoogeveen. A calf with large, velvety, deer-like ears eyes the visitors curiously. 'This is a cross with a Brown Swiss, a very strong and healthy Swiss breed of cattle,' explains dairy farmer Frank Post. A little further along, a newborn calf with striking markings on its eyes sucks on a teat. 'A Montbéliarde,' says Post. For the past few years, Frank Post (40) and his wife Ilona (38) have been crossing their Holstein cows with various other breeds of cattle, including the Swedish Red-and-White, and the meat breed Belgian Blue. 'We want to broaden the genetic basis of our herd. I am a real believer in variation in blood lines,' says Post. 'Holsteins have a very limited genetic range. You have to cross them with other breeds to get strong, healthy cows with a longer productive lifetime. Such mixed-blood animals are very strong — what is known as a "heterosis effect". Our breeding policy is geared to having "sustainable cows": cows that live a long and healthy life rather than cows that have high yields but are soon worn out. Swedish breeders have been selecting for health and high lifetime production levels for a long time.'

Cows have their first calves when they are about two years old. They start producing milk after that. Many dairy cows end up in the abattoir when they are only about four or five because they are already exhausted by then. They are infertile, chronically lame or suffering from udder complaints. That is not sustainable, and such a short period of production after a long breeding phase is not financially appealing either. For a while, farmers whose cows had udder infections or other >

diseases could rent out the unused portion of their milk quota to fellow farmers who were in danger of exceeding their own quota, but milk quotas were abolished in 2015. 'That has made animal health even more important,' says Post. 'On top of that, caring for sick animals costs a lot of time.'

FIT TO BURST

We walk along the duck pond to the large barn where about 120 dairy cows and a further 20 dry cows are chewing on their silage. Two ladies are fit to burst, on the verge of calving. The dog Nala, a Rhodesian ridgeback, walks with us wagging its tail. The gleaming, scrubbed-down milking shed is equipped for milking 22 cows at the same time. 'My father had five cows and it took him one and a half hours to milk them by hand,' says Cor Post (73). 'When we got a milking machine, I was milking 25 cows in one and a half hours. Now my son has a milking shed and he's milking 120 cows in the same time.'
Three generations of the Posts sit around the kitchen table talking about the past, present and future. 'I was one of 11 children,' says Post senior. 'My father had a mixed farm. A bit of arable farming, cows, chickens, pigs. I took it over in 1969. I actually wanted to become a development worker but all of my five older brothers had chosen a different profession and my father hated the idea that no one might take over the farm. I kept table poultry as well for the first few years but I was far more interested in the cows.'
The barn, which was built in around 1900, was originally a deep litter barn where the manure was kept throughout the winter. In around 1940 it was converted to a stall barn in which the manure was discharged via a gutter. In 1970, another conversion turned it into a barn with cubicle stalls where the cows can walk around freely. In 1996, after son Frank decided he wanted to be a farmer as well, the Post family bought a farm with a new cowshed near Hoogeveen. 'That gave a huge boost to the development of our farming business,' says Frank. At over 40 hectares, the farm stretches behind the farm buildings as far as the woods on the horizon.
Ilona is in charge of looking after the calves. 'Your first priority is to keep them alive and then make sure they grow up healthy.' Thanks to that good care and a breeding programme geared to health, calf mortality has fallen to 5 percent on this farm compared with an average of 11 to 12 percent nationally. Frank and Ilona met at agricultural college. 'We both did the livestock farming

INNOVATIONS IN DAIRY FARMING

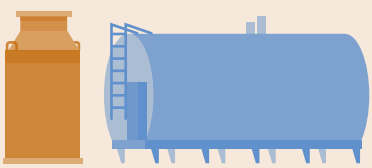
Dairy farming is continually evolving in the Netherlands. A selection of innovations from the past few decades that drew on Wageningen research.

1950

Late 1950s

TAILORED RATIONS

Professor Aren van Es in Wageningen builds respiration chambers to study the energy balance of cows. That research leads to the Milk Feed Unit in the mid-1970s, a method that lets farmers feed their animals much more precisely and economically.



1962

END OF THE MILK CHURN

In 1962, research starts in Wageningen on refrigerated storage of milk on the farm. That is the start of the rapid development of the milk tank, and milk churns disappear from Dutch streets. A quarter of all Dutch dairy farmers have such a tank by the early 1970s.

course and we can both cover all the different tasks, although in practice Frank does more of the technical work and I do more of the admin.'

ACIDIFICATION OF THE ENVIRONMENT

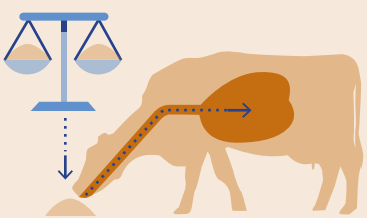
In modern dairy farming, nitrate leaching from the manure into the groundwater and surface water, phosphate accumulating in the soil and ammonia emissions into the air are important issues. As long ago as 1986, the Soil Protection Act set limits on the spreading of manure on farmland. This was followed in 1991 by the EU Nitrate Directive with norms for the maximum contamination of water with nitrates. However, Dutch farmers were given permission to spread more manure as long as the leaching remained below the norms in the Nitrate Directive. In April 2018, the European Commission will meet to discuss whether to continue with this exception. Rules have also been established for phosphate release from manure because of the risk of damage to flora and fauna. Because the Netherlands has exceeded the European norms since the abolition of the milk quota, a system of phosphate rights was introduced at the start of this year for dairy farmers.

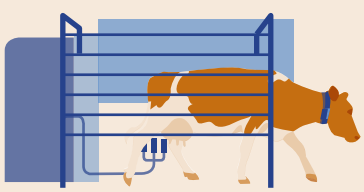
The Post family has been trying for years to get a closed cycle of nitrogen and phosphate on the farm through smart mineral management. 'We grow maize for our own animals and spread the manure on the arable fields,' explains Frank Post. His father started doing this back in the late 1980s. He managed to reduce the nitrogen surplus on his land by over 40 percent in only three >

PHOTO HOLLANDSE HOOGTE

HARM EVERT WAALKENS,
former politician, former member of the WUR Supervisory Board, livestock farmer

'In the early 1970s, inspired by Mansholt, we started a partnership with five farms in Oldambt. We grew to 600 cows with about 15 people working on the farms. There were only three such large farms in the Netherlands and we used to talk to Wageningen researchers about issues such as management, building design and what steps to take. Falling milk prices and rising labour costs meant the partnership had to be dissolved in the early 1980s, with the help of maths wizards at Wageningen Economic Research. We continued with 200 cows and a debt – that teaches you to work hard. In 1994 we switched to organic farming for the beef cattle, and in 1998 for our dairy cattle – something I'm proud of. We had researchers in then too. For the future, I think it's important for WUR to continue to be involved in the public debate. Science produces facts, not opinions.'





2018

Late 1980s
IMPORTANCE OF THE RUMEN

Professor Seerp Tamminga develops a system that gives a better calculation of the cow's protein requirements, and sheds light on the importance of bacteria in the rumen for the supply of protein. The system for providing tailored feed becomes standard soon after its introduction in 1991.

Early 1990s
AUTOMATIC MILKING

Various manufacturers launch milking robots on the market. The basis for this is laid in part by the Farm2000 project in which Wageningen was involved. The dairy training centre in Oenkerk also builds a milking robot with the help of Wageningen students.

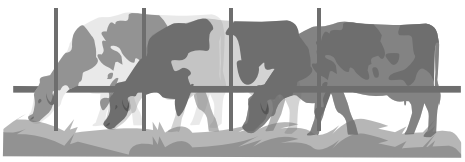
2012
MONITORING MINERALS

The KringloopWijzer is a tool for getting a picture of mineral cycles. This tool, developed in 2012 in Wageningen, shows the surpluses of nitrogen and phosphate, utilization of minerals, and emissions of ammonia and (in a recent update) greenhouse gases. As of 2017, use of the tool is compulsory for all dairy farmers.

THE COWSHED THEN...

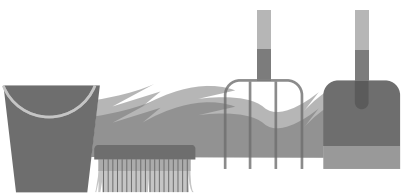
The housing of dairy cows has changed radically over the past century. In the past, changes were made in response to the demand for improved hygiene, efficiency and welfare.

Before 1940, dairy cows stood fixed in one place in deep litter or stall barns.



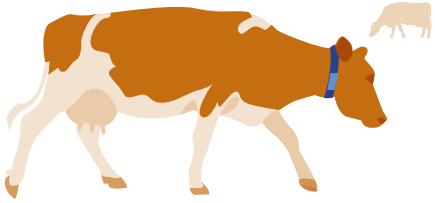
Milking by hand All cows were milked by hand at the start of the last century.

Manual work Even now, most work in the cowshed is done manually, such as feeding the cows several times a day, sweeping the floor and cleaning.



AND NOW

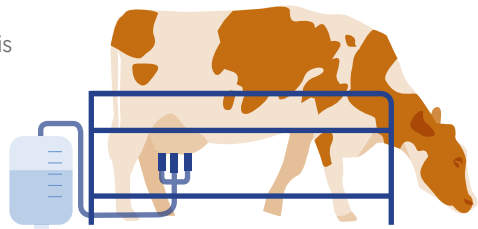
For the future, Wageningen is looking for the optimum combination of environmental burden reduction, better working conditions, improved welfare and a good fit in the landscape.



A few farmers are now experimenting with open barns without cubicle stalls.

Nowadays most cows are kept in spacious barns with cubicle stalls where they can walk around freely and eat, drink and lie down as they wish. Some stalls have comfortable beds, even waterbeds sometimes.

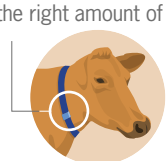
Milking machine
These days, milking is usually done using a milking machine in a milking shed.



Around a quarter of Dutch farmers now have a milking robot, which automatically milks the cow once it voluntarily enters the cubicle.

Automation Farmers are experimenting with further automation of tasks in the most modern barns:

The concentrates system recognizes the cow from the chip in its collar and gives it precisely the right amount of concentrates.



The manure scraper and manure robot automatically clear manure off the floor.

The pusher robot automatically pushes the feed into place.

years. 'Good for the environment and for our wallet,' says Post senior.
He opted for automatic supplies of concentrates, with the computer recognizing each cow from its collar. They are then given precisely the right amount of concentrates, fine-tuned to suit their milk production. They don't miss out on anything, no concentrates are wasted and there is no unnecessary surplus of minerals in the manure. Manure injection systems were also introduced in the late 1980s; they inject manure directly into the soil, which stops ammonia evaporating. 'We had seen this at Aver Heino, one of Wageningen's experimental farms,' says Post senior. 'We used to go to its open days twice a year. You would learn about the most recent research results and see the latest machinery. I think it's a great asset that the Dutch government has always supported its farmers in word and deed. That threesome of research, education and extension has been invaluable for our agriculture and horticulture.'
The Post family has been actively involved in the Cows & Chances programme ever since 2000. In this programme, Wageningen Livestock Research collaborates with 16 'trend-setters'. These dairy farmers record all their farm data and share it with researchers and other farmers. The researchers use the data to find out the actual crop yields, feed and milk production. They analyse the data with the aim of achieving a closed mineral cycle. Thanks to Cows & Chances, policy instruments have been developed such

PHOTO ZLTO

HANS HUIJBERS,
chair of the farmers' association ZLTO

'Wageningen has done a lot for the development of livestock farming through the quantitative experts at Wageningen Economic Research, the innovations – from stall barn to slurry, from horse to tractor – and the triad of research, extension and education. In the past 20 years, Wageningen has become a university with a global reputation. But I would like to see WUR doing more for the sector, looking at the energy transition, the soil transition, adaptation to climate change and how to get rid of chemicals and slurry.'

as BEX, an application for calculating the production of manure by a dairy herd, and a tool (the Kringloopwijzer) for getting a picture of the mineral cycle on a farm. As of 2027, dairy farmers will also have to comply with the EU Water Framework Directive. A farm water tool is now being developed within the Cows & Chances programme. The participants are testing the software and potential measures for improving water quality.
Frank Post: 'The trick is to find measures that are both effective and feasible, such as manure-free zones next to water channels, or a good capture crop to combine with maize. But as soon as you meet one environmental target, they raise the bar again. You have to remain ambitious.'
There are also discussions about grazing in the field and animal welfare, the protection of wild birds in fields and of course the problem of greenhouse gases. Milk farmers also have to limit emissions of nitrous oxide, carbon dioxide and above all methane, for example by making changes to animal feed. 'I like the fact that Wageningen is five to ten years ahead of farming practice in the topics it is tackling in its research agenda,' says Frank Post.

SHARING KNOWLEDGE

Frank's father still helps out but he is also making his old dream come true. He works for the PUM programme, travelling the world to share his knowledge of agriculture with farmers in poor countries. The youngest generation of the Post family is also fully involved in the farm. Abel (16), the oldest of the four children, would ideally like a goat farm while his brother Merijn (14) wants to keep dairy cows and some beef cattle. Abel: 'I think technology will be a priority area in the next few years. You can do more and more with your mobile phone.' Merijn: 'Air quality and cow welfare will get more attention. And you'll have to work more efficiently and have more things automated.' Cor Post used to work 70 hours a week. Frank and Ilona Post still do and Abel and Merijn will undoubtedly continue this tradition. Farming isn't a job; it's a way of life. ■

FOUNDING FATHER ROMMERT POLITIEK

The founding father of modern cattle breeding was the Wageningen professor of Cattle Breeding Rommert Politiek (1926-2014). Ever since the 1950s, this farmer's son from Friesland had criticized the standard breeding policy in which bulls from the Frisian stud book register were selected primarily for their appearance. In inspections, the champions were the best looking, broadest bulls, preferably with quite short legs. Their daughters' milk production did not count. Politiek showed that an unintended effect of this approach was that the Frisian stud book cows were becoming smaller and smaller and were producing less milk. Frisian dairy cattle were lagging far behind the American Holstein cows, which were selected purely for their milk production.
In 1970, Politiek started a large-scale comparative study on the experimental farm Minderhoudhoeve in Flevoland. He set up a new breeding policy aimed at milk production, increased protein levels in the milk – important for cheese-making – and faster milk flows.

Prof. Rommert Politiek teaching livestock farming, 1979.

Dairy cows have now reached the maximum possible at around 30 litres of milk a day. Breeders are gradually starting to look for sustainable dual-purpose cows that can live a long and healthy life and can produce a lot of milk *and* beef.

ELSTAR

The Elstar is the most popular apple in the Netherlands, accounting for 41 percent of its apple orchards in 2011. Its crisp, slightly acidic flavour makes it a tasty apple for eating, cooking and juicing. The Elstar is a cross between the Golden Delicious and the Ingrid Marie, and was developed by Arie Schaap in 1955. The name is a combination of his first name and the place where he lived, Elst. The selection and propagation was done by Tijs Visser at the IVT institute, which has since been merged with Wageningen Plant Research. The apple was launched on the market in the mid-1970s. In 2006 it was joined by its little sister, the Santana, created by Wageningen plant breeders. This apple lacks a certain protein, making it suitable for people with a mild apple allergy.

PYRANOMETER

How much solar radiation reaches the earth? To measure this, professor of Physics and Meteorology D. van Gulik developed a pyranometer in the late 1920s. To this day, weather stations around the world are equipped with this instrument.
The pyranometer measures total short-wave solar radiation. That is decisive for the temperature on the earth, and evaporation levels and photosynthesis in crops. The data it delivers provide information about climate change and are useful for farmers and the leisure industry too. The invention spawned a measurement series that is used a lot in model research. Among meteorologists, the pyranometer is known as the Kipp Solarimeter, after the manufacturer. According to the World Meteorological Organization, this is the best instrument for measuring global solar radiation. The instrument is still being further refined.

Made in Wageningen

Over the past century, Wageningen researchers have enriched the world with a wide range of tools, technologies and food products. A small sample, in the 'Did you know?' category.

TEXT ALEXANDRA BRANDERHORST **PHOTOS** HH AND ANP

SPORELESS OYSTER MUSHROOM

Until not very long ago, oyster mushroom growers had to wear a kind of astronaut's helmet. Unlike other mushrooms, oyster mushrooms release spores from very early on, which cause allergic reactions and irritate the respiratory tract. And the ventilation systems in greenhouses can get blocked, too. Wageningen scientists bred a sporeless oyster mushroom, based on a natural variety which came out sporeless after being crossed with itself. They introduced this characteristic into a commercial variety, whose yield is even higher than that of older varieties. The new oyster mushroom has been marketed since 2006 and goes by the name of SPOPPO. This variety is now used by the vast majority of oyster mushroom producers in north-western Europe and Poland.

EDELMAN DRILL

Many Wageningen Soil Science graduates have a soft spot for the soil drill, also known as the Edelman drill. If only because of the annual soil-drilling student championship. Edelman was professor of Regional Soil Science in Wageningen from 1933 to 1964. During World War II, university staff who refused to swear allegiance to the German occupation government were sentenced to forced labour in Germany. Like many others, Edelman and his colleagues went into hiding. They were put up in the Bommelerwaard area between the Waal and the Maas rivers, where they analysed the soil, digging little holes with a spade. In order to get samples from greater depths, someone came up with the idea of adapting a soil drill that was used for laying cables by the Dutch state telecommunications company and others. After much experimentation, the Edelman drill took shape: fast, easy to use, and capable of extracting uncontaminated soil samples.

BOSKOOP GLORY

The Boskoop Glory is a disease-resistant, cold-tolerant grape which grows in a lot of British, German and Dutch gardens. Its juicy, aromatic purple grapes ripen at the end of August. The Boskoop Glory probably came into existence spontaneously on a Wageningen trial plot in the 1950s, from a cross between two American grape varieties. Researchers had brought dozens of different grape varieties to Wageningen to test which eating grapes could be grown out of doors in the Netherlands. Cuttings of the most promising grape were sent to the nursery in Boskoop, where the new variety got its name. ■

HALF A CENTURY OF ENVIRONMENTAL HEALTH

‘We must keep the earth habitable’

Concern about polluted wastewater from the food industry led to the formation of the Water Purification chair group in the 1960s. Wageningen would help tackle water, soil and air pollution. Now its environmental expertise is a Dutch export product. Not that all the country’s own environmental problems have been solved.

TEXT RENÉ DIDDE **PHOTO** ANP **ILLUSTRATION** PETRA SIEBELINK

'Well, solved, solved... let's just say we have made a considerable contribution to tackling many environmental problems,' says Arthur Mol, rector magnificus and professor of Environmental Policy.

Mol sings the praises of Wageningen water purification techniques, which have contributed to cleaner wastewater around the world, as well as its more basic research on the impact on soil and air of spreading animal manure on the land. 'We have done a lot of research work on that since the 1980s, especially Professor Frans de Haan, who died recently. The problem is not solved yet, unfortunately,' says Mol.

Another strong Wageningen research field which has developed since the 1970s, says Mol, is toxicology and expertise on the accumulation of dangerous substances such as heavy metals and persistent pesticides in soil and water. 'And Wageningen researchers are still working on relevant issues, a current example being the effects of microplastics in the sea.'

DUMPING GARBAGE

Huub Rijnaarts, professor of Environmental Technology, points out another soil-related issue on which Wageningen has made a significant contribution. In the late 1970s, the Netherlands was presented with the bill for decades of dumping toxic, mainly industrial waste. The matter came to light in the South Holland town of Lekkerkerk, where an entire residential neighbourhood turned out to have been built on land that had been raised with industrial waste. Residents became ill and had to vacate their homes.

'At first, the approach to soil decontamination was to dig up huge mountains of soil and burn the pollution out of it in the oven, or get it out with chemicals. That left you with clean, but totally "dead" soil,' says Rijnaarts. 'Thanks to our knowledge of microbiology and process engineering, we found out how to deploy bacteria as garbage collectors. We let groundwater containing the micro-organisms flow over the pollution in a controlled fashion, and slowly but surely the bacteria consumed the muck.' The result, says Rijnaarts, is still living soil that has been decontaminated on the spot, and savings of 100 billion euros since 1990, mainly on the costs of digging, transporting and processing the soil.

Rijnaarts and Mol agree on what has been Wageningen researchers' biggest contribution to solving environmental problems: the anaerobic purification of industrial wastewater, pioneered with beet sugar producer CSM. Scientific discoveries are always teamwork, of course, but much of the credit goes to Gatze Lettinga, who moved to Wageningen from Delft in the late 1960s. 'I knew nothing about anaerobic purification,' says the authority on the subject, now 81. 'I just wanted a change from my Delft research on radioactivity in wastewater. I stumbled upon an article about how mother nature could do the purification work using bacteria that could survive without oxygen.'

BACTERIA PRODUCE BIOGAS

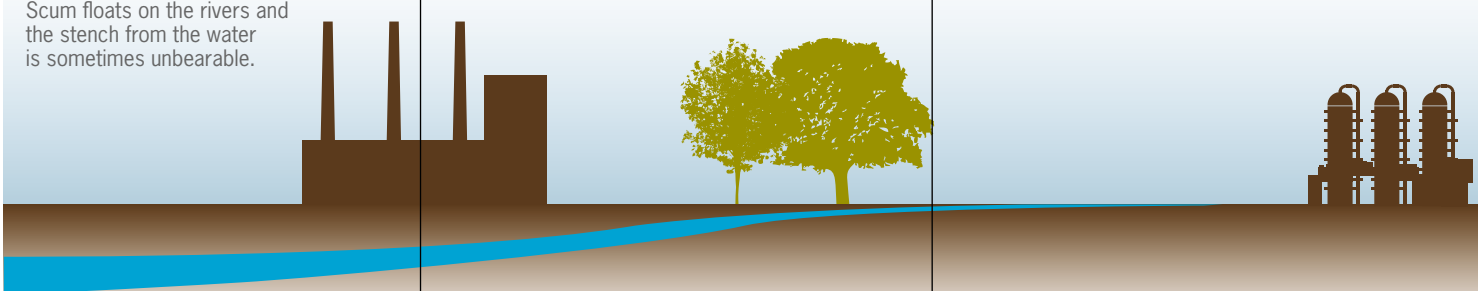
Lettinga developed a prototype for a reactor in which the wastewater from food companies is transported over a bed of sludge: the UASB (upflow anaerobic sludge bed) reactor. 'That process does not require any oxygen and takes up a lot less space than the large conventional concrete water purification tanks with their energy-guzzling aeration pumps,' says Lettinga. As a bonus, the bacteria also produce energy in the form of biogas (methane and a little CO_2). Much less sludge is created and the sludge is well-drained, so useful fertilizer ingredients such as phosphate can be extracted.

The rest is history. There are UASB reactors all around the world, most of them at facto-

During the 20th century, pollution in Europe's surface waters becomes a serious problem. The breakdown of contaminants by microorganisms uses up so much oxygen that fish end up drifting on their backs and the salmon disappear. Scum floats on the rivers and the stench from the water is sometimes unbearable.

In the Rijnmond area, suffocating air pollution from the petrochemicals industry regularly leads to smog alarms.

In the Netherlands, surface water pollution and air pollution acts come into effect. Sewage treatment boards are set up, water boards build wastewater purification plants and restrictions are imposed on discharges of metals, PAHs and nitrogen and phosphate compounds.



Wageningen microbiologists and land development specialists worry about increasing problems with wastewater from the food industry. That leads to the Water Purification chair group being set up as an offshoot of Land Development.

Gatze Lettinga develops a prototype of the UASB reactor, which is now used worldwide for anaerobic wastewater purification.

1965 **1970**

> ‘We have realized by now that waste is not waste’

ries. Dutch technology companies such as Paques and Biothane make a good living out of the invention. Lettinga came in for numerous prestigious prizes and honorary doctorates. Conventional, aerobic water purification plants are still in use, especially for the purification of household wastewater (sewer water). But even there, anaerobic methods are gaining ground.
For the past 15 years researchers including the Wageningen environmental health expert Mark van Loosdrecht (in Delft) and microbiologist Mike Jelten (in Nijmegen) have been developing processes which link up oxygen-free, low-oxygen and oxygen-rich technology. Lettinga sums up developments: ‘Cees Buisman has led work on expanding the process to include removing sulphur from wastewater and gases; Grietje Zeeman is getting more and more support for decentralized sanitation, in which faeces no longer go into the sewer diluted with lots of water, but are digested in the neighbourhood in concentrated form.’ Lettinga recently visited the water company Waternet in Amsterdam, which is designing a decentralized water purification system for the planned homes and hotels at the Marine complex in Amsterdam. ‘Even a big city such as Amsterdam is increasingly working on decentralized solutions.’

WASTEWATER

The Water Purification chair group was established in 1965 as an offshoot of Land Development. Microbiologists and land developers were worried about the growing problems with wastewater from the dairy industry and the potato starch company Avebe. In 1970, the Water Purification department was renamed Water Purification/ Environmental Health, and the degree programme in Environmental Health started up not long after that.

These were the years in which environmental awareness was growing worldwide, partly as an effect of the publication of the Club of Rome’s 1972 report. Post-war economic growth in the Netherlands, which had been stimulated by the discovery of natural gas, ran up against its limits. The Rhine was heavily polluted by chemicals and it took so much oxygen for micro-organisms to break it down that large numbers of dead fish often floated down the river on their backs and salmon had disappeared. The French salt mines with their cartloads of salt waste almost turned the Rhine into seawater. And in the Rijnmond area, the suffocating air pollution from the petrochemical industry frequently caused a smog alert. The Dutch central government responded with legislation on surface water pollution (1969) and air pollution (1970).
The new Environmental Health degree programme was a magnet for engaged students who wanted to enlist scientific arguments to call a halt to environmental pollution, or to work in government or consultancy firms on controlling pollution. Other departments were founded besides Water Purification, including Air Pollution, Soil Science and Soil Fertility, Nature Management, and Toxicology. Jan Hein >

Acid rain: forests and fish die off as acidic air pollution is spread by rain.

The Netherlands pays the price for decades of toxic waste dumping, mainly from industry. In Lekkerkerk, local residents become sick and have to evacuate their homes.

The Soil Protection Act comes into effect on 1 January 1987.

In addition to Water Purification, other new chair groups are set up including Air Pollution, Soil Science & Soil Fertility, and Toxicology.

Conventional soil decontamination (digging up the soil and using chemicals or incineration to clean it) produces ‘dead’ soil. Wageningen’s insights into microbiology and process engineering result in a new method in which bacteria consume the contaminants.

Rhine action programme, aimed at major improvements in water quality in the Rhine.

1980

1986 - 2000

PAUL ROELEVELD,
Royal Haskoning DHV

Drug residues in water

Drug residues in water in sewerage are a growing problem. 'Wageningen University & Research saw this problem coming some years ago, and has done a lot of research on it', says Paul Roeleveld of consultancy firm Royal Haskoning DHV. The search for a solution focuses on a combination of biological and chemical techniques such as reed filters that can capture micropollution and ozone with which waste products can be broken down. 'Even though the concept hasn't totally crystallized yet, we have recently embarked on a collaboration with Environmental Technology. As environmental consultants we are keen to be involved in potential solutions from the early stages of the process.'

Koeman, who created a furore in the late 1960s with a study of the effects of pesticides on Sandwich terns in the Wadden Sea, applied for the chair of the Toxicology chair group. Koeman proved that the wastewater from a factory in Rijnmond, which contained dieldrin, aldrin and telodrin, was behind the drop in the numbers of breeding pairs of Sandwich terns from about 40,000 to 600. His findings got into *Nature*. Shell shut down the factory, Environmental Toxicology was born, and Koeman was welcome in Wageningen. His work there included research on the harmful impact of PCBs.

STUDENT REBELLION

In the 1990s, Environmental Health's basis in the natural sciences was broadened with socio-economic disciplines such as Environmental Sociology, Environmental Policy and Environmental Economics. Thanks to the students, says Arthur Mol, in a reference to the 'Wageningen Spring' in 1980, when students occupied the main building on the Salverdaplein. Across the country students were protesting against the cabinet's plans for a two-phase structure for university studies, but in Wageningen, students also took up the cudgels to defend project-based education and the inclusion of the social, economic and management aspects of agricultural and environmental issues. Interdisciplinary education and research became an article of faith.
So somewhat reluctantly, the university changed tack. Students started to work on actual problems in project groups. Mol: 'The strength of a scientist's mentality is that we come up with all sorts of real, often technical solutions, but since the 1980s we have also realized that we should think about the role of politics, policy and administration and above all, how citizens and companies embrace the solutions we offer.' That was a success, says Mol. The interdisciplinary graduate school WIMEK (Wageningen Institute for environmental and climate research) has since become the biggest research institute in the field of sustainability in the Netherlands.
As an example of a contemporary approach, Mol points to the trend for labels and certification for products. 'That has a scientific side to it in things like the calculation of dust flows and issues related to waste, product life cycle analysis, or how to help consumers understand all the labels, to steer retailers and to involve NGOs.'
It was not all plain sailing in Wageningen over the past 50 years, though. A severe dip, says Mol, was the period just before the turn of the century, when Wageningen started focusing more on agriculture. 'One of the consequences of that was that the Health Studies research group, with epidemiologist and air quality specialist Bert Brunekreef, went off to Utrecht University.' Brunekreef proved that damp houses with mould increase the risk of asthma in children, and he was one of the first scientists to study fine particles. After Brunekreef's departure, Wageningen research on air pollution lost impetus.

ACID RAIN: FOREST DIE-OFF BELOW PREDICTIONS

'We first heard about acid rain in the 1970s. Fish in Scandinavian lakes were dying because of acid air pollution from the UK among other places, falling with the rain. In Germany the issue got rather blown up and politicians were talking about 'mass forest die-off'. Wim de Vries, a professor of integral modelling of nitrogen effects, has been studying the effects of acidifying air pollution on forests for a quarter of a century. There are two broad categories: sulphuric pollution from industry and nitric pollution from animal manure and from traffic.
'Mass forest die-off did not occur, fortunately, mainly because industry introduced measures, such as burning low-sulphur coal and installing filters,'

For a while, Wageningen had a monopoly on academic environmental education in the Netherlands. 'When I came here as a student at the end of the 1970s, apart from Wageningen the only places you could study environmental issues were Leiden and VU Amsterdam, but only at Master's level. A friend and I looked at Environmental Chemistry at the University of Amsterdam too, but we thought it was too limited.' Nowadays there are environmental degree programmes at numerous universities, including applied sciences ones. The Wageningen programme pays a lot of attention to the international nature of environmental issues and is very flexible, says Huub Rijnaarts of Environmental Technology. 'Students here take compulsory core environmental studies courses, but they can then pursue their own interests in elective courses and an element of completely free choice. So if you wanted to, you could focus entirely on the plastic soup issue and study that problem from the technical, policy and ecological angles.'

GLOBAL PERSPECTIVE

This flexibility goes some way to explain the big influx of foreign students, thinks Rijnaarts. 'Plus the fact that we are an international university with English as the language of instruction at Master's level. Dutch students get a global perspective here, and international students go on to get policy, advisory or technical jobs in their own countries, using the environmental knowledge they gained here,' says Rijnaarts. 'There are many examples of Asian graduates who have become contact persons in Asia for Dutch companies and research institutes, contributing to efforts to clean up the soil, water and air in those rapidly growing environmental markets. We support that at the university. Gatze Lettinga pioneered it, and we are carrying it on, especially in China, India, Vietnam and Bangladesh. We have the same ambitions for a number of African countries.'

MANURE SURPLUS

In spite of all the successes of the past 50 years, Gatze Lettinga has no trouble listing several challenges for the future. 'The manure surplus remains a problem that cannot be solved by technical means such as digesting the manure or exporting it as dried pellets,' he says. 'The problem is the structure of intensive farming, which systematically produces a surplus of manure because we don't have enough land. The dumping of a scarce resource such as phosphate is a disgrace. We are destroying agriculture elsewhere in the world, we are laying waste to nature and we don't look after animals properly. I think the answer lies in a regional approach to agriculture and food supplies. That would reduce environmental problems at the same time.' For Huub Rijnaarts, the most important research themes for the future are climate change and the circular economy. 'We have realized now that waste is not waste, but consists of resources which we should reuse with minimal energy consumption and use of space and natural resources. Gatze Lettinga understood that long ago and set to work locally. We should go on doing that sort of thing, inspired by science and focusing on implementation. We need that kind of basic, purposeful commitment to recycling if we are to keep the earth habitable in the long term.
Closing cycles, reusing more material without compromising on quality, and not wasting minerals. There is cause for concern here: all those new chemical substances we produce in increasing amounts and variations, such as drugs, colourings and nanoparticles. That could seriously mess up the recycling game. We must make sure those substances do not get into the water or into materials for reuse, or else that they are removed again promptly. That is an important part of our current research.' ■

> 'New chemicals can ruin the whole recycling show'

www.wur.eu/ete

says De Vries. In manure treatment too, many technical measures were taken, from slurry injectors to gas filters in barns. And yet the problem of acidification from nitrogen is far from solved. 'What the Wageningen research achieved was that we led the way in Europe in creating models that calculate the critical load of nitrogen and sulphur for forests and nature reserves,' says De Vries.
With the Rains model – at IIASA - emeritus professor of Environmental Systems Analysis Leen Hordijk was a pioneer in the development of those models. 'For each region of Europe we calculated what a forest can cope with, which neutralization reactions take place in the soil, and then by how much emissions from industry, traffic and agriculture have to go down. The European administration made use of this data in assigning national emissions ceilings.'

‘All the knowledge of colleagues from other countries; that was an essential experience’

‘It enriched my life in many ways’

The proportion of Wageningen alumni coming from abroad has risen from 1 percent in the 1970s to 40 percent now. Two of them talk about where their Wageningen degree got them to. Gisella Cruz Garcia works on rural food security in South America, while Rui Qing Huang seeks to modernize Chinese horticulture.

TEXT HANS WOLKERS **PHOTOGRAPHY** HH/CHRISTIAN ESCOBARMORA/MIRA-V AND IMAGINECHINA

‘The modern large-scale farming methods used in the tropics are the direct cause of huge environmental problems such as deforestation and climate change,’ says Gisella Cruz Garcia. ‘And besides, this system fails to provide food security for more than one billion people. By making agriculture more diverse as well as making use of wild plant species, we can tackle environmental problems while at the same time increasing food security.’

This impassioned researcher, who was born in Peru, studied Biology at the Agricultural University in La Molina. She met her Dutch husband Paul Peters during field research in the Andes in 2002. ‘He was at university in Wageningen,’ she says. ‘I went back with him, partly because I could study the social sciences in Wageningen. That was a good addition to my knowledge of biology.’

BUYING TECHNOLOGY

Rui Qing Huang first came to the Netherlands with something else in mind. He visited Wageningen in 1986 to get some inspiration for a Chinese horticulture project. ‘I came with eight colleagues and we wanted to learn about the Dutch approach and buy technology for building greenhouses in China,’ says Huang. ‘It made a big impression on me. It was high quality technology. But the most important thing was the good communication between horticulturalists, researchers and industry in the Netherlands. That synergy makes it a strong system.’

In 1988, Huang got a Dutch bursary, as well as leave from his job, to do an MSc and a PhD in the former Extension department. His wife, Xue Ping Qu, came with him and took the MSc in Management of Agricultural Knowledge Systems. In the course of his studies, Huang delved into the Dutch horticulture system in greater depth. ‘I loved the programme I was on,’ says Huang. ‘Not only did I get to see the latest developments in the field of Dutch horticulture, but I also got a grasp of the technical aspects and learned a bit about the political, industrial and logistical angles.’ >

GISELLA CRUZ GARCIA

Age: 40
Studied: BSc in Biology, Universidad Nacional Agraria La Molina (Peru), 1995-2000
MSc Management of Agro-ecological Knowledge and Social Change, Wageningen University, 2003-2005
B.Comm. Food and Business, Zuyd University of Applied Sciences 2005-2007
PhD Wageningen University, 2007-2012
Works: as a research scientist at the International Center for Tropical Agriculture (CIAT – CGIAR)

Huang was delighted not only with the high standard of the degree programme but also with the atmosphere at the university and its international spirit. He especially valued the group assignments with people from various different nationalities and cultures. 'So I have very good memories of my time in Wageningen. It enriched my life in more ways than one,' he says. 'My daughter Ying was born here. Now she is studying Food Technology. It was her own decision; I think it's great that we will all three be Wageningen graduates. Thanks to my experience I understand the different ways of thinking in China and the Netherlands.' The Dutch are direct and think in very black-and-white terms, Huang thinks. The Chinese see all the greys in between as well. Huang: 'Thanks to my time in Wageningen I can communicate fine with both sides.'

ESSENTIAL EXPERIENCE

For Cruz, Wageningen was a non-stop learning process, both within and outside her studies. 'All the knowledge and experience of colleagues from other countries was great. That doesn't go on your CV, but it is essential experience. That motivated me to travel and to study other cultures.'
During her Master's she was already laying the foundation for her later PhD research. She travelled to India to study local knowledge and the cultural significance of wild food plants among the population of the Western Ghats mountain range. In the course of her doctoral research in Thailand, she discovered that the poorer farmers were particularly dependent on wild plants during periods of food scarcity. So food security and high biodiversity go hand in hand, says Cruz.
She completed her PhD in 2012. Her combination of knowledge of wild food plants and of social and cultural aspects of the subject got her a job at the International Center for Tropical Agriculture (CIAT-CGIAR) in Colombia. Here she focuses largely on improving food security in rural areas in South America. 'We moved to Colombia when I got this job,' she explains. 'We both wanted to do that, to get more international experience and to get to know Latin America better. We are both in for adventure and a challenge.'

RUI QING HUANG
Age: 58
Studied: BSc Horticulture, China Agricultural University, 1980-1984
MSc Management of Agricultural Knowledge Information Systems, Wageningen University, 1988-1990
PhD, Wageningen University, 1991-1998.
Works: Director of Beijing Ruixue Global, Co Ltd.

CATCHING UP

The challenge for Huang lies at home in his own country. There is still much to be done in Chinese agriculture, he says. 'Industry was developed first and agriculture lagged behind. Only in the past few years has there been more interest in modernizing agriculture as well,' he says. 'Now the time is ripe to introduce new techniques and to catch up.' Which is not always easy, because Chinese farmers are in a very different position to that of their Dutch counterparts, says Huang. A Chinese farmer has much less land and therefore less scope for generating income. The market position of individual farmers is much weaker, too. In 2002, Huang and his wife set up their own company: Beijing Ruixue Global Co Ltd. In close cooperation with Dutch companies, he develops and builds tailor-made horticulture systems for Chinese market gardeners. 'Our greenhouses are made with Chinese materials, but inspired by Dutch designs. We also import a lot of Dutch technology, such as computer setups, heating systems and CO_2 systems,' adds Huang. 'As a result we have made a sizeable contribution to the development of horticulture in China. As well as assisting a lot of Dutch companies with doing business in China. We can help bridge cultural differences, making it a whole lot easier to do business here.'

RICE, MAIZE AND WHEAT

Cruz is trying to solve problems in agriculture too, but she focuses mainly on the environment and on food security. A big problem, in her view, is the unbalanced food supply in many tropical countries. More than 90 percent of all the calories in the diet comes from just a handful of foods, such as rice, maize and wheat. 'And yet for

Rui Qing Huang and his wife Xue Ping Qu, who also studied at Wageningen.

‘We can help bridge cultural differences, making it a whole lot easier to do business’

thousands of years people lived on a diet of thousands of plant varieties.’
She believes a wider variety of crops should be cultivated. And if agriculture is also more integrated with nature, biodiversity can be preserved and with it, edible wild plants. That is particularly important for the poorer sections of the rural population in Asia and South America, says Cruz. As her research showed, they are more dependent on food from the wild during periods when agricultural products are scarce.
Cruz: ‘This is precisely the group that stands to benefit from greater biodiversity in agriculture and nature. And it is also crucial to preserve local knowledge of edible wild plants.’

Cruz has been back in South America for several years now, but she visits the Netherlands regularly because of her family-in-law. Having lived in Wageningen for 10 years, she feels just as much at home here as in Peru. ‘People in the Netherlands are well organized, practical and efficient. Everything works properly here. And the people are nice and to-the-point: there is no “bla-bla”, you know where you are with them,’ she say. ‘It’s just the weather... it is still tough to cycle through snow, ice, rain and wind.’

TERRIBLE WASTE

As a champion of food security, Cruz was shocked to see at closing time one evening how a supermarket dumped large quantities of unsold food in closed containers. ‘They shut everything firmly so no one could get at it,’ she says indignantly. ‘What a terrible waste.’
Cruz has much to thank Wageningen for, she feels, including her current job. ‘I am still working on the theme of the value and cultural significance of edible wild plants for several different sections of the population,’ she explains. ‘I would like nothing more than to carry on with this work. My research has the potential to have a big impact. Better thought-through farming methods can go hand in hand with high biodiversity, while greatly increasing food security for the local population. That is a win-win situation.’ ■

130 YEARS OF PHILANTHROPY IN AGRICULTURAL EDUCATION

‘So that humble farmers’ sons can expand their knowledge too’

The history of fundraising in Wageningen goes a lot further back than the recognition of the National Agricultural College as an academic institution in 1918. And the role of philanthropy is still growing.

TEXT YVONNE DE HILSTER

A few years after the central government took over the municipal agricultural school in Wageningen in 1876, the Staring Fund wrote to various private individuals and agricultural organizations asking for contributions to scholarships for students. The reason they gave was: ‘so that not just rich farmers, not mainly future gentleman farmers, but also humble farmers’ sons, many of whom are clear-headed and passionately committed to their honest trade’ could go to college ‘to expand their knowledge of agriculture’. University students could get grants in those days, but people should pay for agricultural college themselves, in the government’s view. A few friends of the geologist Winand Staring (1808-1877) established the fund in 1884 when 400 guilders (equivalent to more than 4500 euros today) was left over from a collection for Staring’s gravestone.

INTEREST ONLY

The begging letters met with success, as the archives reveal. The fund received one-off donations and annual pledges of one to five guilders from all over the country, the highest amounts being 25 guilders a year and a 400 guilder lump sum. However, the fund’s statutes stipulate that it can only use the interest on its capital. The directors set a lower limit of 200 guilders interest for a scholarship of 150 guilders. In 1896, when there was 4830 guilders in the coffers, the directors thought it would still take 15 years before they could offer their first scholarship, partly because of ‘the death or withdrawal of donors’.

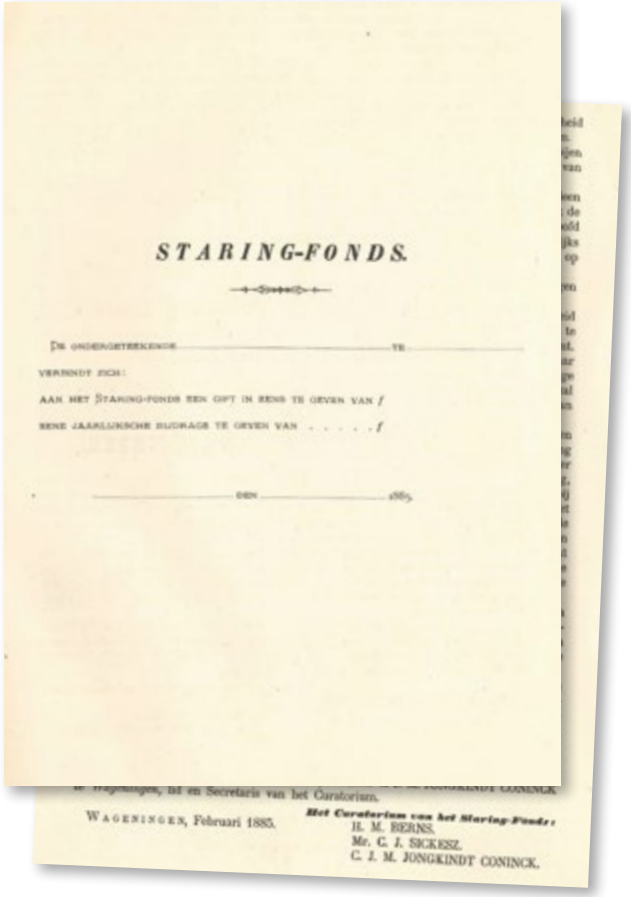
In the decades that followed, other people established funds for supporting Wageningen students with an interest-free loan or a contribution to the costs of a study tour, or for funding guest lecturers, the purchase of equipment or awards for distinguished achievement. Such donations usually come from people with connections with agricultural education, shows a study by former director of the University Fund Wageningen (UFW) Monique Montenarie. The biggest success story was the fund for building the Aula. In the late 1920s, mainly thanks to the ‘generosity of the directors of large Dutch East Indian agricultural companies’, this fund raised over 100,000 guilders (more than 750,000 euros today).

The Agricultural College was also a beneficiary of the occasional legacy. One such legacy was left by Klaas Venema, and was used in 1951 to establish the university fund, for the benefit of the college, its courses, and links between students, alumni and staff. Venema worked for the Far East Trading Company, and spent a year doing research in Wageningen.

In 1956, the government introduced student grants based on their parents’ income. These were replaced 30 years later by a basic grant for all students. From then on, the funds in Wageningen focused on rewarding outstanding achievements and supporting students doing extra activities such as a study tour, an internship abroad, or attending a conference.

RESEARCH TOO

In the early 1990s, the UFW ventured for the first time into fundraising for research. The Wageningen Innovation Fund (WIF) hoped



STARING-FONDS.

De ondergetekende ..... te .....
verbindt zich:
aan het Staring-fonds een gift in eens te geven van f
eene jaarlijksche bijdrage te geven van . . . . . f

..... den ..... 188.

Wageningen, Februari 1885.

Het Curatorium van het Staring-Fonds:
H. M. BERNS,
Mr. C. J. SICKESZ.
C. J. M. JONGKINDT CONINCK.

Friends of the geologist Wijnand Staring, who died in 1877, set up the Staring Fund in 1884.

for contributions from rich alumni and companies, following the model of the US, where universities collect tens of millions from alumni. American alumni sometimes donate an entire building. Due to an economic downturn and a lack of projects that appealed to companies, however, the WIF never really got off the ground.
In that period the SRS foundation, which later became the Anne van den Ban Fund, managed to attract a growing number of donors, thanks to the enthusiasm and efforts of its founders. In its first 10 years, the fund raised half a million guilders (267,000 euros), with which it could provide 16 foreign students with a full grant to study in Wageningen, and another 21 with a contribution.
The formation of a network of prominent alumni – the Wageningen Ambassadors – in 2003 marked the start of a new era. The ambassadors put their networks and financial resources to work for Wageningen's benefit. The university and the alumni association KLV joined forces to do more to keep their alumni engaged. And fundraising has benefitted from the big increase in the number of alumni, and in the number of Wageningen graduates pursuing a career in the private sector. The first big Food for Thought fundraising campaign (2012-2014) generated 15 million euros for trailblazing research projects which could not attract regular funding.

A SAY

The philanthropy boom looks set to continue. The government is increasingly looking to organizations and members of the public for support for good causes. And the post-war generation (the baby boomers) are richer and have fewer children than previous generations. Research by the Erasmus University in Rotterdam and the VU University Amsterdam shows that the Dutch more readily donate to cultural causes than to education and research, because they see the latter as largely the government's responsibility. Nonetheless, the UFW has seen a growing interest in supporting education and research, and in mixed forms of donation and investment, says UFW director Delia de Vreeze. And the fund is keen to collaborate in that. 'Wageningen is also an attractive partner for many people because it addresses the big issues in the world, such as nutrition, natural resources and energy. Here your donation has social impact.' ■

www.wur.eu/wuf

You never lose that

Alumni often say that if you meet someone else from Wageningen, anywhere in the world, you feel an affinity. Why is that? Where does that feeling come from and what triggers it? Five generations tell their story.

TEXT YVONNE DE HILSTER

ANTOON KUHLMANN,
Forestry
1965-1972

'It feels a bit like a homecoming'

'Every time I drive over the hill into Wageningen from Nijmegen, it feels a bit like a homecoming. I think it's a sense of pride, that I once belonged or still belong to a group of people who spend their entire lives working to improve the world. When you hear the tales of people in your year, what they've done all over the world, they're all stars. I feel like that too when I see student society KSV's building Cantil at Stadsbrink: I belong here. I feel much less of a bond with my Forestry degree because my career hasn't had much common ground with this discipline. I get the Wageningen feeling whenever someone from Wageningen is in the news: there's another one, I think then, they get everywhere. A few years ago, I started saving reports on people in my year. I circulate the items in the form of a newsletter once a year. As we no longer bump into one another at weddings, this lets us still chat about the good times.'

CORA VERBURG,
Domestic Science
1974-1981

'It's the critical approach and a desire to be relevant'

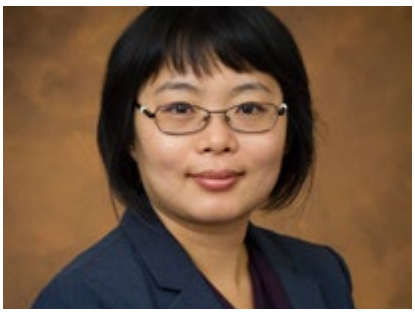
'It is difficult to describe what that Wageningen feeling involves but I get it when I meet someone else from Wageningen, especially if they moved away from the town. It is the general approach: critical (we can always do better), interested in societal issues and a desire to be relevant to society. That is related to the fact that Wageningen people are generalists – that's inherent in the degree programmes. Issues were considered from a broad perspective, in all their complexity. At the student society SSR, we would have talked forever about the participatory society. This makes it easier to communicate with one another compared with people who studied elsewhere. It doesn't matter what your degree subject was. The physical space, Wageningen's green surroundings, and the ability to let your hair down also gave a sense of freedom. All those things make you who you are. You see it too in where people end up: often not in the Wageningen domains.'

Wageningen feeling

LUDO VAN DER MAREL,
Molecular Sciences
1989-1995

'Everything exuded free thinking and energy'

'I think the best term for my Wageningen feeling is liberalism. Everything in Wageningen exuded free thinking, broad-mindedness, energy. I learnt how to be open to contact with others. As students, we more or less automatically did everything together, perhaps in part because we were 400 first-years arriving at the newly renovated Hoevenstein building. We cooked and ate together, and friends were always welcome to join us. Another factor was the variation in the surrounding countryside, with woods, heathland, fields and the river. Swimming in the Rhine or the Grintgat in Rhenen, even if it was a long cycle ride but hey, you went there together. Or a camp fire in the pouring rain. It turned me into a free person. I mainly get that Wageningen feeling when I go to a concert or festival, experiencing personal freedom and enjoying the music and being outdoors. In Wageningen, you had everything a person needs to have an enjoyable life close to hand.'



XIANG BI,
Agricultural Economics and Management
2001-2003

'We had fun cleaning together'

'Wageningen still feels like a second home to me. Initially I lived on an international corridor where everyone had their own kitchen and you never saw anyone. Fortunately I was soon able to move to a corridor with Dutch students, where we ate together as a family, only with eight students. The corridor "leader" made sure we shared the phone bill and we had fun cleaning the place. I also remember the rain, which I wasn't used to, and cycling across the town. Sometimes we had to cycle really fast from one lecture to the next, arriving all cold and wet. Two aspects were important for my life since then: my fieldwork in the Philippines, because I got hands-on experience of doing research abroad and discovered what I wanted to do in life, and my supervisors, who taught me with great patience how to write academic texts. That is another reason why I have fond memories of Wageningen.'

BAS BOTERMAN,
Environmental Sciences and Urban Environmental Management 2005-2012

'We learn that you need to look after the planet'

'You do tend to click with people from Wageningen. I'm not sure what it is exactly. Because people are working on major issues in the environment and development aid? That feeling of affinity is also because of how people see the world. Students at Wageningen go abroad for part of their degree and travel a lot. They find out first-hand that the world is not that big and you need to take good care of what you have. If you've seen in India and China what effect the pressure from a growing world population has, you have no choice but to take it seriously. After I graduated, my work took me abroad a lot for a while, to Egypt and other African countries. I met a lot of people from Wageningen then. Even when they didn't say this, you could often tell from their stories about their background. Wageningen is small so you soon discover you have a shared experience.' ■

Aalt Dijkhuizen PhD, WUR Agrarian Economics 1977, chair of the Agri & Food top sector and former president of the Executive Board of WUR, has been appointed a visiting professor at Fuzhou University in China. 13 November 2017.

Marc Engelsma PhD, WUR Biology 1997, has been appointed deputy head of the Statutory Research Tasks unit for Infectious Animal Diseases. 4 September 2017.

Prof. Louise Fresco, WU Rural Sociology of the Non-Western Regions 1976, won the annual CICERO award of the Nederlandse Debatclub (Dutch debating club) on 31 December 2017. Her latest novel, *De Idealisten*, was published in January.

Prof. Hans Huisman, WUR Soil Science 1993, has been appointed professor holding an endowed chair in Geoarchaeology and Archaeometrics at the University of Groningen. 1 December 2017.

PHOTO HILDE DE WOLF

Peter Karssemeijer MSc,

WUR Plant Sciences 2017, currently WUR PhD candidate, has received the East West Seed graduation award for plant sciences, a sum of 5000 euros. Karssemeijer was the first to investigate how the defence mechanism against aphids in flowering mustard plants affects their attractiveness for pollinators. Karssemeijer hopes that understanding how such ecological interactions work will help us reduce the use of pesticides and make agriculture more sustainable.
27 November 2017.

Ed van Klink PhD, WUR PhD 1994, epidemiologist at Wageningen Bioveterinary Research and Bristol Veterinary School, has become chair of the European College of Veterinary Public Health (ECVPH).
1 October 2017.

Prof. Edith Lammerts van Bueren, WUR Horticulture 1978, has retired from her position as professor by special appointment in Organic Plant Breeding at WUR and researcher at the Louis Bolk Institute.
7 December 2017.

PHOTO WATERSCHAP BRABANTSE DELTA

Carla Moonen MSc,

WUR Agricultural and Environmental Economics 1993, chair of the board of the Zorg en Welzijn pension fund, has joined the board of the World Pension Summit. 1 January 2018.

Kees Slingerland MSc, WUR Zootechnics 1985, former director of the Environmental Sciences Group, has been appointed chair of the supervisory board of the healthcare provider Opella in Ede. 1 January 2018.

Prof. Fons Stams, WUR Molecular Sciences 1979, WUR professor in Microbiology, has been given over three million euros by the Netherlands Organisation for Scientific Research (NWO) for research on the bacterial conversion of synthesis gas into chemical building blocks. 20 November 2017.

Prof. Louise Vet, WUR professor of Evolutionary Ecology, director of the Netherlands Institute of Ecology (NIOO-KNAW), has been awarded honorary membership of the British Ecological Society. 29 August 2017.

Manon de Visser, WUR Biology 2018, won first prize at the Euroleague for Life Sciences (ELLS) Scientific Student Conference 2017 in the category Global Health - Humans & Animals for her oral presentation on her study of the importance of genomics for conservation of the endangered pygmy hog.
18 November 2017.

Prof. Wim de Vries, WUR Soil and Fertilization Sciences 1983, has been appointed professor holding a personal chair in Integrated Nitrogen Impact Modelling.
1 November 2017.

Michiel Wallis de Vries,
WUR Biology 1986, has been reappointed professor by special appointment of Insect Ecology & Conservation.
21 August 2017.

PHOTO GUY ACKERMANS

Emeritus Prof. Pierre de Wit,

WUR Phytopathology 1974, has received the Jakob Eriksson prize for Phytopathology for his ground-breaking research on molecular phytopathology and plant-microbe interactions. He will be given the prize on 29 July 2018 at the International Congress of Plant Pathology in Boston (US).
1 November 2017.

Prof. Liesbeth Zandstra,
WUR Human Nutrition 1995, has been made professor by special appointment in Food Reward and Behaviour.
1 November 2017.

Skier Jochemsen going to Paralympics

Skier **Anna Jochemsen** (32) will be taking part in the Paralympic Games in Pyeongchang, which start on 9 March. She may well make a podium spot given her achievements. 'My Games will have been a success if I get a medal. The Super G and Downhill are quite technical in South Korea, which will help me as I'm fairly light. The fact that I came third in the Olympic test event in 2017 also gives me confidence. Slalom is my favourite event but that's also the one with the toughest competition.'

Jochemsen was able to concentrate fully on her preparations for the Games over the past year. She secured a place in the Paralympic team last season and had graduated in August 2016 (Master's in Nutrition & Health after a Bachelor's in Animal Sciences). She has been a full-time sports professional since then.

Four years ago in Sochi, her Games ended in disappointment after she missed a gate, a ski came loose and she fell. Even so, it was an important experience. 'The Paralympics are quite different from any other championship. In Sochi I learnt that I can keep my cool and stay focused. The pressure is greater now, but I know that once I'm standing at the start, I can shake off the tension and set off down the mountain at full pelt.'

PHOTO TJEERD VENSTRA

Jochemsen skis on one leg because her other leg was not fully grown at birth. She walks with an above-knee prosthesis. You can follow her results via *teamnl.org*.

Cia Kroon is Losser's mayor

Cia Kroon (Domestic Science 1988) officially became mayor of the municipality of Losser in the region of Twente on 7 February. Kroon's previous jobs included director of communications at the Ministry of Education and Science and working as an independent consultant for municipalities. As a member of the VVD political party, she sat on the municipal council of Oegstgeest for ten years and she was an alderman in Lisse from 2013 until the municipal elections in 2014. She moved to Enschede two years ago because of her husband's job. 'You could say I acquired the taste for public administration in Lisse but in fact I first became interested in this back in Wageningen, in the faculty administration. I actually graduated in management science,' says Kroon. 'What attracted me to Losser was the fact that I want to help in the development of rural areas and the connection between town and countryside. I'd like to make good use of my Wageningen knowledge here, just as I did in Lisse where I kept in contact with the university.' Various friends from Kroon's university days attended her inauguration.

PHOTO JOHAN BRILMAN

IN MEMORIAM

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

Mr C.W. Amels PhD,
WUR Forestry 1974. 27 September 2017.
Mr A.L.G.M. Bauwens MSc,
WUR Economics 1951. 11 January 2018.
Mr C.J. van den Bergh MSc,
WUR Agricultural Plant Breeding 1963. 14 January 2018.
Ms H.P.M.M. van Berkel MSc,
WUR Rural Sociology of the Western Regions 1978. 27 January 2016.
Mr N. van Berkel MSc,
WUR Horticulture 1955. 3 July 2017.
Mr N.B.M. Bruin MSc,
LLM, WUR Tropical Land Development 1975. 8 February 2018.
Mr F.L. Dieleman MSc,
WUR Phytopathology 1965. 22 November 2017.
Mr A.P. van Dijk MSc,
WUR Dairy Production 1974. 6 November 2017.
Emeritus Prof. F. de Haan,
WUR Soil and Fertilization Sciences 1962. 8 January 2018.
Ms B.T. Hof-Velde MSc,
WUR Rural Sociology of the Western Regions 1964. 6 January 2018.
Ms S. van Landschoot, BSc student, WUR Biotechnology. 28 January 2018.
Emeritus Prof. J. Lyklema,
Utrecht University Chemistry and Physics 1955, former professor of Physical and Colloid Chemistry at WUR. 31 October 2017.
Ms M.W. Maijenburg MSc,
WUR Biology 2006. 7 November 2016.
Mr J.L.P. van Oorschot PhD,
WUR Horticulture 1952. 16 October 2017.
Mr F.C. Prillevitz MSc, WUR Land Development 1959. 8 December 2017.
Mr A. Quak MSc, WUR Land Development 1953. 4 March 2017.
Mr A.P. Remijn MSc, WUR Environmental Protection (Water Purification) 1983. 1 November 2017.
Mr J.G. Röder MSc, WUR Soil and Fertilization Sciences 1967. 8 October 2017.

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IN MEMORIAM (CONTD)

Mr H.J. Schoemaker MSc, WUR Zootechnics 1951. 26 October 2013.
Mr H. Sijtstra MSc, WUR Horticulture 1952. 2 November 2017.
Ms A.C. Smid-Wiersema MSc, WUR Agricultural Plant Breeding 1954. 17 November 2017.
Mr F. van Tuikwerd MSc (formerly F. Jansen), WUR Forestry 1971. 6 November 2017.
Mr L.G. Vogels MSc, WUR Tropical Rural Economics 1954. 18 December 2016.
Ms A.A. Wichers-ter Cock MSc, WUR Horticulture 1958. 30 October 2017.
Prof. I.S. Zonneveld, WUR Tropical Forestry 1951. 18 December 2017.
Mr E.J. van Zuilen MSc, WUR Tropical Plant Breeding 1952. 21 October 2017.

If you wish to inform us of the death of a fellow former student or relative, you can email alumni@wur.nl, call +31 (0)317-485191 or send a message to University Fund Wageningen, Droevendaalsesteeg 4, 6708 PB Wageningen, The Netherlands.

Essers is Renkum's village poet

Sander Essers (Human Nutrition 1980, WUR PhD 1995) became the municipality of Renkum's new village poet on 1 January for a period of two years. Societies, companies, the municipality and its residents can use him as the village poet in their activities and expect a customized poem. 'He addresses major issues in an original manner with a light touch,' said the jury.
At WUR, Essers worked on the global food problem until his job became redundant about ten years ago. Now he writes short texts, stories, columns, songs and poems. They can be full of satire but sometimes he calls for sympathy for people who want to make a better go of life but can't. 'I like to write lyrics about the little things in life, the imperfections, the beauty, and about topical issues,' says Essers. He bought his first guitar when a student in Wageningen. He had guitar and singing lessons and took workshops in cabaret but only composed songs for special occasions. After he left WUR, he did a weekend course at the Paul van Vliet Academy for cabaret and started a new career as the cabaret artist Dr. Anders. 'That might be taking more time because I'm a little older but I also have more experience of life that I can draw on. And given that I'm already 67, I don't want to take for ever.'
Info: doctoranders.nl


PHOTO RENCO HATENBOER

KLV

KLV | WAGENINGEN ALUMNI NETWORK

The centenary year has started and as the university's alumni association, of course we are celebrating the anniversary too. We hope to meet a lot of KLV members personally at the various events between now and November. After all, the point of a network is to get to know and support each other, to exchange knowledge and to sharpen our thinking on Wageningen themes. By and for our members: that certainly applies to the study circles. Here below is a selection, and a full overview can be found on klv.nl.

100 years WUR
9 March 2015: 100th Dies Natalis. Start of WUR's centenary year. wur.eu/100years
Dialogue
14 March 2018: Wageningen Dialogue, 'Creating Artificial Life'. klv.nl
SKOV
28 March 2018: Seminar SKOV, 'No agricultural development without good seed, but what is good seed?' klv.nl/skov
F&A Next
30 May 2018: F&A Next, Investors meet food and Agri Startups. fanext.com

Young KLV
27 March 2018: Scientific English workshop
18 April 2018: workshop on CV writing
17 May 2018: workshop 'To do a PhD, pleasure or burden?' klv.nl/youngklv

KLV Wageningen Alumni Network is Wageningen University's active and flourishing alumni association. The network has more than 8500 members.

More information
www.klv.nl

KLV

Lian van Enckevort-Stappers

KLV member since 2010

A PASSION FOR

The Wildlife Foundation

Once a week, Lian van Enckevort (Animal Sciences 2012) is a Wildlife Foundation volunteer at Dierenrijk, the family zoo in Nuenen. She gives visitors to the zoo a guided tour of five species of animals, picking different ones every time. Lian tells her audience all about the animals, and the children are allowed to help feed them. Her favourites are the elephants – she can talk about them for ages – and the active little meerkats and coypus. Children's parties get to join her in the kitchen where the feed is prepared. She uses skulls to show them the difference between herbivores and carnivores. 'It is so nice to see children getting enthusiastic.' She also trains new volunteers. 'Something to do with several different species of animals, human-animal relations and education: that is the kind of work I would like.'

In this feature, KLV members talk about what makes them tick.

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Traces of Wageningen in Indonesia

When the brand new Agricultural College of Higher Education produced its first graduates in plant breeding, forestry and soil science after 1918, more than half of them went off to the Dutch East Indies. The Wageningen graduates either joined private research stations belonging to plantation owners, or the agricultural extension service. They set to work on boosting yields and improving production conditions for key crops such as rice, coffee, rubber, cinchona and sugar cane. In the decades that followed, Wageningen's practical approach went down well in the Dutch East Indies because the colonial planters benefitted from this practical knowledge. It also helped that researchers with hands-on experience in Indonesia started teaching new cohorts of students back in Wageningen, writes *Resource*, the magazine for Wageningen University & Research. Wageningen researcher Harro Maat wrote his thesis on the topic in 2001. One example was Johan Ewald van der Stok, who established rice research at the research station in Pasoeroean. When Van der Stok became professor of Tropical Plant Breeding in Wageningen in 1925, he handed over his work on Java to the Wageningen-trained JGJ van der Meulen. Van der Meulen gave tremendous new impetus to rice breeding by crossing the *japonica* variety grown on Java with *indica* varieties from China, thus developing the highly productive Peta rice variety.

Read more about the links between Wageningen and Indonesia in Resource, https://resource.wur.nl/en/show/Cradle-of-a-global-brand.htm