WUR from within: straight, sharp, transparent

No 15

Resource

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FOREWORD

Life on campus

Not all of the campus is silent and deserted, as this issue of *Resource* makes clear. The new education building Aurora is taking shape, for example, with construction continuing as planned; you can have a look on page 22. And see the photo on the next page: WUR staff and students joined the Normal Academic Standards national protest last week to alert the future cabinet to the long-term underfunding of Dutch universities. The WUR campaigners may not have waded into the Forum lake like the demonstrators in The Hague who dived into the lake in front of the parliament building, but their symbolic act was just as powerful. Another eye-catching event was the flock of sheep crossing campus from the Binnenveld to De Dorschkamp (page 6). Then there were the students who did a Covid self-test after their practical; see page 4 to find out how that went. In short, a little bit of 'life on campus' in this issue. Something we could do with.
Finally, not on campus but in *Resource*: a fierce debate about 25 per cent of farm production becoming organic (page 14). Realistic or not? Judge for yourself...

Willem Andrée
Editor-in-chief

PROTEST BERET

Assistant professor Michiel Köhne dresses the Sower statue in the ultimate protest symbol: a beret in Alarm Day red. Management, staff and students from all 14 Dutch universities sounded the alarm on Tuesday 6 April in a protest entitled Normal Academic Standards. The protests were about the untenable level of pressure on higher education caused by long-term underfunding. Köhne: 'WUR is in the relatively luxurious position that we have been getting extra funding as a technical university, at the expense of other universities' budgets – with shocking consequences. I hear of assistant, associate and full professors who no longer get around to research; I hear of researchers who hop from one one-year contract to the next. I am really worried about what this means for academic quality in the Netherlands.' WA

Photo Sven Menschel

Students trial self-test

Students of Human Nutrition tried out Roche's coronavirus self-test last week after completing a practical on Human Infectious Diseases.

For Rolf Marteijn (Nutrition and Health programme director), the trial is a way of getting some experience with self-testing by students. The aim is to use the tests in period six to make it safer to do more teaching on campus and run more field practicals.
Students will be able to do a self-test at home beforehand. Marteijn: 'It creates an extra safety net for people who have no symptoms and are not in quarantine. Testing is voluntary, so it won't be an entrance test for classes. But we will be encouraging it of course.'
Annet Clerx (photo), a BSc student of Nutrition and Health, reads the instructions carefully before doing the test. 'It is quite strange to do this yourself,' she thinks. A tear runs down her cheek – a reflex. 'It doesn't hurt,' she says. It doesn't take long before she has the result: negative. RK

Photo Guy Ackermans

SofaScience

New at *Resource*: SofaScience. A video series in which WUR scientists talk about their research. But not just their research. The *Resource* student editors Anna den Hartog and Laura Bergshoef also ask them about what inspires them. Anna: 'We opted for a living room setting. We are not just interested in the research, but also in their personal story.' The series kicks off with plastics researcher Tim van Emmerik (watch the episode via the QR code). Next up at the end of April will be ecologist and exobiologist Wieger Wamelink.

Extra option for Open Access

To make science as accessible as possible, WUR is going to make use of the 'Taverne amendment'.

This amendment to the Dutch Copyright Act offers scientists the option of putting their articles online – even if they have already been published in a journal – once six months have gone by since the article was published. The amendment is named after VVD MP Joost Taverne, who got it through parliament in 2015. Research carried out with government funding must be freely accessible. This open access publishing is the rule, but the practice is not consistent. By no means all publishers offer open access or facilitate online as well as print versions. The amendment offers the possibility to put printed publications online, albeit with some delay.

> A pilot tested how publishers would respond, but there was no response

It has taken some time for universities to take action. 'There was a joint pilot scheme in 2018/19 to test how the publishers would respond,' says Chantal Hukkelhoven of the Library's Research Support team. After all, they make money from subscriptions to their journals. There was no response.

Personal right

After some preparation, WUR is planning to make use of the Taverne right. The focus lies on the corresponding authors in the first place. They get an email in which the new option is pointed out. Then it's up to them to take action, explains Hukkelhoven. 'The Taverne amendment is a personal right of the researcher.' The articles are only allowed to be put online on Research@WUR's own platform. The procedure is simple. Researchers just have to click on the articles they want to put online in an online form. The library does the rest. RK

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The elections for new PhD representatives for the WUR Council are due to be held in early June. Robin Barten en Frances Widjaja, the PhD students currently on the Council, will step down then after one year in office. If you are interested in taking their place, there is an information session on 15 April at 14:00. You can email robin.barten@wur.nl.

Business travel now by electric car

From now on WUR employees can travel to appointments around the country in an electric BMW i3 supplied by lease car company Amber. The new service is run by Mobility Mixx, and the contract with this company sees the end of WUR's own fleet of cars. Car-sharing is more sustainable and convenient, explains Annet de Haas of Facilities and Services. To reserve a car you need an account with Mobility Mixx, which can be arranged using a WUR email address (see the intranet). It is not compulsory to make use of the shared cars, 'but of course we would like to see everyone making use of them,' says De Haas. As well as shared cars, shared bicycles will become available on campus and elsewhere in Wageningen some time during the summer. RK

Investments in education: 'on target in spite of Covid'

In spite of the Covid crisis, the 'loan system' investments in education are running on schedule in Wageningen, shows the recently published quality agreements report of 2020.

When the loan system was introduced in 2015, the money saved was allocated to universities for making improvements to their education. Universities could decide for themselves how best to spend the money. In Wageningen, plans were made for the period 2019-2014 in consultation with students, staff and the WUR Council. The plans set out how Wageningen's 37 million euros in 'loan system' funding will be invested in the university's education. The money will go towards keeping the education small-scale (by recruiting additional staff); increasing differentiation (through the student challenges, for example); expanding and improving student advisory services; professionalization among the teaching staff; and improved facilities.
Two years on, the implementation of the quality agreements is broadly going to plan, says strategic policy officer Eva Verschoor. 'By now, 37 chair groups have appointed extra staff, and by 2022 even more chair groups will have done so. More study advisors and student psychologists have been appointed. A professionalization fund for teacher has been established and teachers can come up with their own proposals for in-service training.'

'Combining the 'loan system' money with other funds increases the effect of the investment'

Extra effect

Not all the projects are on schedule, though. The Skills project, aimed at making skills a more systematic part of education programmes, is running behind. 'The prerequisites are in place now for starting work on that, and everything is ready for rolling it out,' says Verschoor, who expects skills education to be widely implemented in the course of 2021. According to Verschoor, the loan system funding created a kind of 'tipping point'. 'For example, there is budget for about 0.3 FTEs of extra staff per chair group, but by combining the loan system funding with money from other sources, most groups are hiring more than that 0.3 FTE. And that increases the effect of the investment quite a bit.' LZ

resource-online.nl FULL STORY ONLINE

Across a deserted campus

Photo Roelof Kleis

It's always a nice sight when shepherd Clemens Oude Groeniger and his 'ladies' pay a visit to the campus. The term 'ladies' comes from the shepherd himself. It's his affectionate name for his flock of 130 ewes and 100 lambs. 'Come along, ladies,' you hear him say regularly. This is the spring migration: the winter grazing in the Binnenveld has finished and now it's the turn of the nature areas. Starting with the former rubbish tip near Keijenberg in Bennekom. The shepherd takes the campus route so that he can cross the busy Mansholtlaan safely via the roundabout. RK

Student guidance overview

WUR has compiled an overview for students struggling with queries and problems showing the options for support and guidance.

Imagine you are a student who has run into an issue and needs help. WUR offers many different kinds of support: study advisers, student deans, student psychologists, confidential counsellors, student coaches and so on. You can also work on your problem independently with training or the self-help modules on the online platform GezondeBoel.nl. It's sometimes hard to see the wood for the trees, so now an infographic has been compiled showing where to go. 'The infographic gives students a clear overview,' says student welfare manager Door van der Sloot. 'On the one hand, we give a clear-cut picture of where to go depending on what problem you have, and on the other hand we show what students themselves can do. A student's well-being starts with that student: *they* have to take the first step. This infographic shows the options. There is a lot on offer and this overview helps you to find your way.'

Clarity

It is not always clear for teachers and other advisers either what the options are or who does what, says Van der Sloot. 'The overview was designed with students in mind but it could also be used for staff who help students.'

> 'Students have to take the first step themselves. This infographic shows the options'

To access the overview, go to wur.eu/studentguidance, where you can download the infographic as an interactive PDF: clicking on a support option will take you to the relevant web page. LZ

Call for Spatial Planning minister

A coalition of farmers, nature organizations, academics and administrators has called for an integrated policy for rural areas. According to this group, the new cabinet should deal with the competition for space and the nitrogen problems by prioritizing the production of climate-proof, healthy food in a diverse landscape. The coalition includes a lot of WUR scientists.

The signatories call for a minister of Spatial Planning, Agriculture and Nature and for the appointment of a landscape commissioner tasked with coordinating the designated use of the limited land available in the countryside. They say the government needs to offer farmers, the general public and nature organizations feasible prospects based on a vision that enjoys broad support. Policy goals for the climate, living environment, biodiversity, food and agriculture should be worked out using co-creation.

The coalition wants national coordination of the use of the limited land available in the countryside

The coalition makes seven recommendations. It advocates a national agreement with objectives laid down in law for the climate, biodiversity, nitrogen, soil health, water and the landscape. Those objectives should be translated into indicators for regions and businesses. The coalition also calls for a Land Bank for purchasing, exchanging or writing off farmland so that farms can expand and become less intensive. It also wants a Nitrogen Fund that will let the public sector and businesses invest specifically in reductions in ammonia emissions.
The WUR signatories include the ecologist Louise Vet, the agronomist Imke de Boer, the economist Krijn Poppe, the public administration expert Jeroen Candel and the soil scientists Johan Bouma and Lijbert Brussaard. AS

Vapers like sweet flavours

Both smokers and non-smokers prefer e-cigarettes with sweet or menthol flavours.

The finding comes from research by Erna Krüsemann, who is doing her PhD at Human Nutrition and Health. Her study was commissioned by the Ministry of Health, Welfare and Sport. 'E-cigarettes are less harmful than smoking tobacco, which makes them an attractive alternative for a lot of people,' says Krüsemann. 'But the vapour does contain toxic and addictive substances, so e-cigarettes are not safe.' Vaping increases the risk of health problems for non-smokers, says Krüsemann. E-cigarettes are becoming increasingly popular among young people: in recent years over a quarter of all secondary school students have had one now and then. Krüsemann found that adult smokers, young non-smokers (under 18s) and young adults (20- to 25-year-olds) prefer sweet and menthol flavours to that of tobacco.

> All flavours except tobacco will soon be banned

Partly on the basis of this study, secretary of state for Health, Welfare and Sport Paul Blokhuis has announced plans to ban the use of any flavour other than tobacco in e-liquids, in a bid to make e-cigarettes less attractive. TL

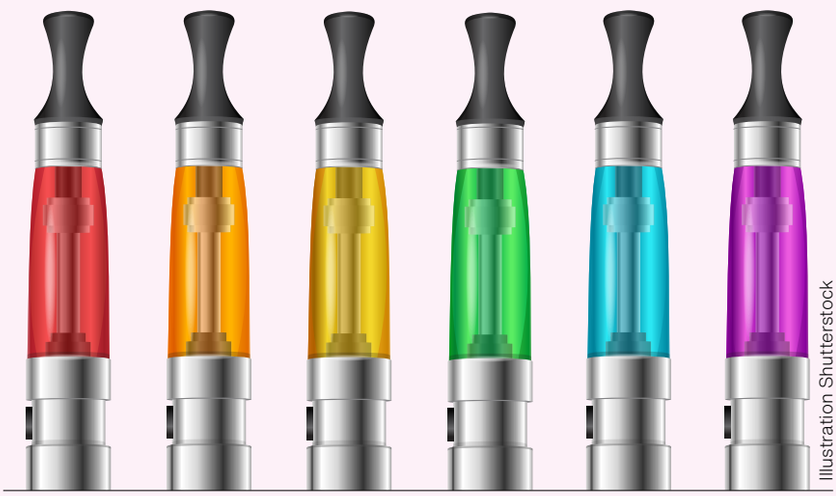


Illustration Shutterstock

Wanted!

Are you a scientist working in the Netherlands and do you have 20 minutes to spare? I could use your help! Please fill in this survey (link via QR code) on current practices, motivations and limitations in the public communication of research. This survey is part of a science communication project conducted by Adina Nerghes / WUR.

A Little Wiser

Do animals prefer left or right?

We all know people are left-handed or right-handed, but does that apply to animals too? Yes, says Behavioural Ecology researcher Bonne Beerda.

Around 90 per cent of people are right-handed, less than 10 per cent left-handed and 1 per cent are ambidextrous. ‘This preference is called lateralization and it has advantages. Lateralization means that tasks are allocated to one of the two halves of the brain, making it easier to carry out two tasks at the same time.’

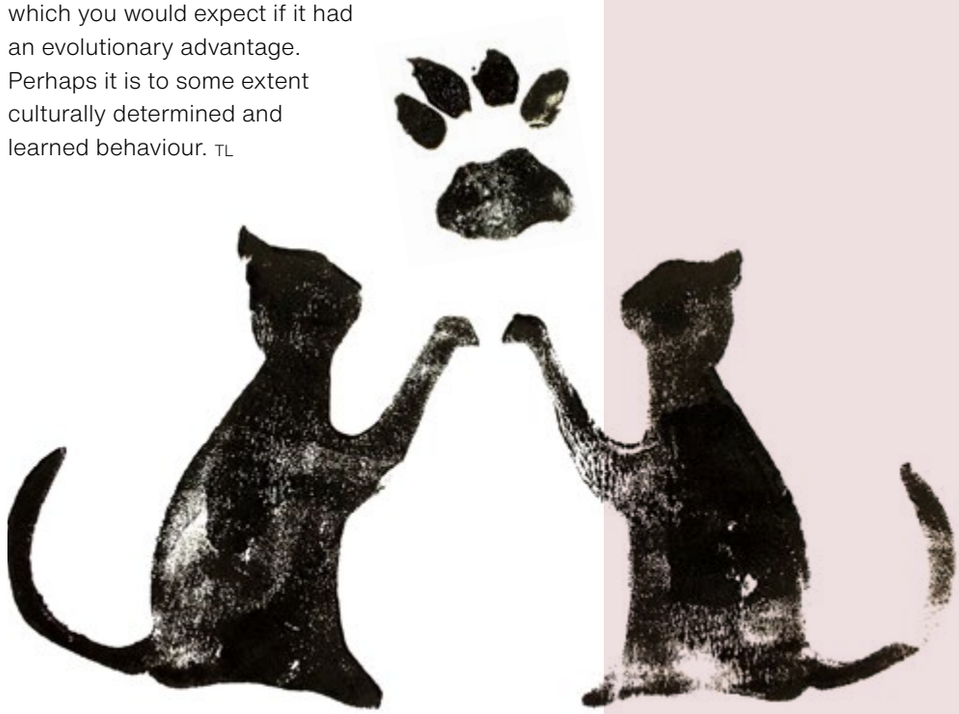
Lateralization also occurs in animals. Around 70 per cent of dogs and 80 per cent of cats have a favourite paw when working, playing or asked by their owner to give a paw. ‘The vast majority of humans prefer their right hand but that is not necessarily the case for animals. About equal numbers of cats are right-pawed and left-pawed whereas dogs have a slight preference for left.’

Some studies of dogs and cats show an association between a lack of lateralization and anxiety. Beerda: ‘We need to be careful though: a lot of research has been done on lateralization, but many of the studies are quite small.’

Lateralization is found in birds too, especially in how they deal with the left and right fields of vision. Beerda: ‘The right field of vision provides input to the left half of the brain, which is specialized in routine tasks such as looking for food. The left visual field provides input to the right half of the brain, which is used more for new things such as scanning for danger. Studies show that chickens are more likely to inspect new objects using their left field of vision. In breeding machines, you can expose eggs to light in the last few days so that the right eye, which is next to the shell, receives more light. That encourages lateralization of the brain halves and makes chickens better able to forage and look out for danger at the same time.’

In addition to dogs, cats and chickens, there are many other animals that have a preferred side, such as primates, mice, parrots and fish.

For most animals, the preference varies with the individual. It is not clear why humans as a whole have a strong preference for right. There is no evidence that right-handed people have more offspring, for example, which you would expect if it had an evolutionary advantage. Perhaps it is to some extent culturally determined and learned behaviour. TL



‘Equal numbers of cats are right-pawed and left-pawed, whereas dogs have a slight preference for left’

Bonne Beerda, Behavioural Ecology researcher

Every day we are bombarded with masses of sometimes contradictory information on pressing issues. In this feature, a WUR scientist gives you something to hold on to. What are the facts of the matter?

Every question makes you a little wiser. Do you dare to ask yours? Email us at redactie@resource.nl

Illustration Marly Hendricks

CoroNaspresso, what else?

Wageningen researchers have developed a Covid-19 self-test that uses a coffee capsule. And it works.

The Wageningen self-test makes use of the virus's genetic material just like the PCR test used at testing centres. But it is different too – a lot cheaper and you can do it at home using ordinary household items. The most striking of which is the reaction vessel you need: a Nespresso coffee capsule. Which is why the test has been dubbed CoroNaspresso.
'Espresso because it means 'fast' in Italian,' explains professor of BioNanoTechnology Aldrik Velders. He has Italian roots himself, as does his colleague Vittorio Saggiomo, who first came up with the concept. The design emerged during the first lockdown last year. 'Vittorio was forced to stay at home and he started tinkering.'
'I really encourage people in the group to be creative and think out of the box,' says Velders. 'Try things out and generate new knowledge that way.'
Saggiomo, a pioneer in the use of 3D printing in science, came up with the coffee capsule idea. He printed a holder for test tubes to go with them and the minilab was ready.

Paraffin

The CoroNaspresso makes use of the LAMP technique (Loop-mediated AMPlification) to amplify small amounts of genetic virus material. This method works at a constant temperature, unlike the PCR test, which requires varying temperatures and therefore calls for laboratory equipment and skills. But how do you ensure a constant temperature with simple equipment?
In this minilab, you do so by using a special paraffin (candlewax) that melts at precisely the desired temperature of 65 degrees Celsius. As it changes between a solid and a liquid state, the substance absorbs heat from the environment (when melting) or emits it (when solidifying). The temperature of the substance itself remains constant throughout this physical process. Compare it with melting ice.

'It is not especially innovative science, but it is practical and creative. And above all, simple and cheap'

The capsule with the paraffin in the holder is the reaction vessel. The test itself is a PCR test tube with the relevant reagent chemicals. After adding the specimen of nasal phlegm, the reaction is set in motion by placing the capsule in a pan containing a litre of hot water (just off the boil). You wait 20 minutes and remove the capsule from the cooling water. The colour of the solution reveals the result: infected or not.

20 cents

'It is not especially innovative science,' says Velders, 'but it is practical and very creative. And the main thing is, it's simple and cheap. Velders thinks the test can be produced for 20 eurocents. The test is no less sensitive than a PCR test. 'And that sensitivity can be further increased with a different detection method. The current one is a colour change based on the acidity level of the specimen.'
The great advantage of the capsules is that they are widely available, and are reusable and recyclable, says Velders. Trials with real specimens, done with microbiologists from TNO Zeist, proved that the test works. Discussions about follow-up studies are under way with TNO Zeist and other potential partners within WUR. The method could also be used for other self-tests that are based on amplifying genetic material. RK

Mixotrophic algae use both oxygen and CO_2

Mixotrophic algae use the mechanisms of both plants and animals to grow. This lets them produce twice as much biomass as ordinary algae and at lower costs, says PhD candidate Fabian Abiusi. It makes algae cultivation a more competitive option.

In ordinary algae cultivation, the algal cells convert CO_2 and energy from daylight into carbon compounds, with oxygen as a 'waste product'. This autotrophic process is also used by plants. To keep the algae growing, the cultivators have to constantly ventilate the reactors to add CO_2 and remove oxygen. That takes energy and makes algal production relatively expensive.

Mixotrophs can combine this process with growth that does not need sunlight. In this second, heterotrophic process, they convert organic materials (sugars) into carbon compounds for cell growth. This second process, which takes place in humans too, utilizes oxygen and releases CO_2. That means the waste product of one process is an input for the other process.

PhD candidate Fabian Abiusi tested the mixotrophic algae *Chlorella sorokiniana* and *Galdieria sulphuraria* in a large, open-air bioreactor in Spain. He found that when sugar was added, the algal reactor no longer needed a system for removing oxygen and adding CO_2. He just had to slowly pump the algal culture around to get a good level of production, meaning he only needed a simple, cheap reactor.

Abiusi used this information to calculate the production costs for mixotrophic cultivation. The costs of *Chlorella sorokiniana*, which is currently grown using autotrophic methods, would fall from 4.9 euros per kilo to 2.6 euros, and the costs of *Galdieria sulphuraria* would come down from 11.8 euros to 4 euros. AS

WUR starts database for sustainable livestock farming

Hannah van Zanten wants to bring together data sets from the FAO, research institutes, food companies and farmers.

How many cows, pigs, chickens and sheep are there in the various countries of the world? What do these farm animals eat, and how much protein do they actually need? These are the kinds of questions that Hannah van Zanten, a researcher at Farming Systems Ecology, wants to answer. 'Then you see that the FAO (the UN's Food and Agriculture Organization, ed.) has a lot of data on animal numbers, but not on something like their nutritional needs. You'll get that information more easily from breeding or animal feed companies.' Van Zanten wants to bring that data together in a global database that will be published online so that anyone can consult it.

> 'We need data from all around the world, not just on terrestrial animals but also on fish in aquaculture'

'It's a hobby that's got out of control,' laughs Van Zanten. 'Together with Renée Cardinaals, a researcher at Farm Systems Ecology, I study the circularity of global food systems, and we need data on animals for that. Such data are often missing or are out of date, so we drew up an online survey. We now have 50,000 email addresses of companies and researchers that have data on livestock animals.'

But 50,000 addresses are not enough, says Van Zanten. 'We need data from all around the world, not just on terrestrial animals but also on fish in aquaculture. We are dealing with a huge range of production systems in different regions.'

There is more information on www.circularfoodsystems.org. AS

Photo Shutterstock

Goodhart's law

Lisa Becking

When a measure becomes the target, it ceases to be a good measure. This law by the British economist Goodhart may also apply to the PhD criterion within WUR's tenure track system. The idea behind the tenure track (TT) is that faculty members demonstrate quality in teaching, research, supervision, acquisition, and management in order to take career steps towards the rank of full professor. The requirement to supervise large numbers of PhD candidates within the TT risks making the acquiring PhD candidates a target in and of itself.
Some numbers. To be promoted, a TT-er must supervise a set number of PhD candidates simultaneously, averaged over the past three years. In the WUR departments ASG, AFSG and PSG, 6 to 7 PhD candidates are required for associate professor 1, and 8 to 10 for full professor. In the departments SSG and ESG one needs 4 to 5 and 5 to 6 PhD candidates to move up the two respective rungs of the ladder. A key point: supervision and PhD graduations before those three years don't count.

Having to supervise large numbers of PhDs for Tenure Track makes getting PhD students a target in itself

On campus there is quite a difference in the numbers: a biologist with an office in Zodiac/Helix/Radix has to supervise almost twice as many PhD candidates as a biologist in Lumen to become a full professor.
What about the rest of the Netherlands? First of all, most universities don't work with averages but include all supervised PhDs, cumulatively over someone's career. That makes the process less focused on continuously getting more candidates, just to be able to keep that three-year average up. Moreover, nationally the required number of candidates is markedly lower and many universities do not even have a quantitative threshold.
What is the rationale for the specific numbers at WUR? I haven't found a clear answer yet. The funding system is frequently referred to. For every PhD defence a chair group receives about 67,000 euros – a premium from the government. The PhD criterion would show that the TT-er is capable of 'leading a financially healthy group'. That is a bit of a bitter pill. Within the TT evaluation, acquisition is already a separate assessment category. What is more, no one seems to indicate that the numbers are a measure of quality as a supervisor and researcher. In fact, it is questionable whether you can guarantee quality while supervising so many PhD candidates at the same time .
In 2019, the PhD criterion was deemed undesirably high by 38 WUR professors in a letter which urged the Executive Board to amend all TT criteria. A committee has been installed to review this. A full revision takes time – understandably. In the meantime, could we just go ahead and normalize the PhD criterion in line with the rest of the country? Then we can stay focussed on the original aim of the TT: academic quality.

Lisa Becking is an assistant professor at the Marine Animal Ecology Group, a researcher at Wageningen Marine Research and a board member of the national Young Academy, partly under the auspices of the Royal Netherlands Academy of Arts & Sciences. She has an eye for art above and below sea level.

Citizen science with a smartphone

Distinction for self-test for allergies

Gina Ross has developed a self-test for food allergies. Fast, reliable and idiot-proof. She got her PhD *cum laude* on the strength of it.

Text Roelof Kleis

Say you're visiting someone and you're offered a biscuit with your tea. Oh dear, the packet has already been thrown out – and you are allergic to peanuts. Do you risk it? If Gina Ross's self-test gets onto the market, there will be an alternative. You follow a couple of steps and wait a moment, and then you know if the biscuit is safe. The only drawback is that your tea has probably gone cold.

Ross's self-test is a miniature lab. You extract the allergen from the biscuit yourself, carry out an immunoassay and get it assessed by an app on your mobile phone. All this takes just a few minutes and requires no previous laboratory experience. Ross trialled the system by getting a 15-year-old secondary school student to use it. He passed with flying colours.

Immunoassays* are tests that make use of antibodies to demonstrate the presence of certain compounds in a sample. That sounds complicated but is actually common practice. 'Half the population has been using them for years,' says Ross, referring to pregnancy tests. The coronavirus self-tests that have been developed recently are also based on the detection of antibodies.

Ross developed the allergy test within the European FoodSmartphone project, which her supervisor Professor Michel Nielan (Wageningen Food Safety Research) coordinates. This project explores the potential use of smartphones for food safety through what is essentially a form of citizen science: using self-tests such as Ross's, consumers can check for themselves whether food is safe for them. 'That is what appeals to me so much about this project,' says Ross. 'It means we are making a kind of decentralized testing system possible.'

***Immunoassay**
Antibodies are proteins that defend the body. They bind alien intruders (allergens), thereby deactivating them. In an immunoassay, a line of antibodies for a particular allergen is stuck onto a strip of paper. This is the test line, and a dissolved allergen that passes over it binds to the test line. Another marked antibody passing over the line binds to the allergen too. The mark used in Gina Ross's self-test is a nano particle of carbon. A single carbon particle is too small to see, but if there are a lot of them together, they are visible, the test line turns black, and the test is positive. If there is no allergen in the solution, no line appears, and the test is negative.

Mould

Ross, who was born in London, is not new to immunoassays, having developed one as a student at Bournemouth University. That project came out of an everyday incident. 'During my final year of undergraduate study, I had severe black mould in our student house, which made me sick. I found out that it could have to do with mycotoxins, and this led me to spend my Master's thesis research on the development of an immunoassay for mycotoxins.'

For FoodSmartPhone, Ross has developed a test for people with allergies to peanuts and/or hazelnuts. She used computer aided design and 3D printers to design an attachment to hold the smartphone that makes it possible to read and interpret the test result in a controlled fashion. 'The test can also be

used without a smartphone,' explains Ross. 'The test line that appears if there are allergens present is visible to the naked eye. But if you want more information, it's useful if it's connected to a smartphone. When you take a photo or a video of a developed or developing strip, you can actually measure the intensity of the test line measurable in comparison to a control line. That makes it possible to quantify allergens: the darker the line, the more allergen is present in the sample.'

Gems

The technique works: Ross is certain of that. She believes the test to be reliable too. But it will still take a while before her self-test goes into production, her supervisor Michel Nielen reports. 'Her work has been identified in Horizon 2020 (a European Commission programme for stimulating science and innovation in industry and the academic world, ed.) as a "key exploitable result", with a view to attracting interest in a follow-up.' But there are a lot of steps involved before that can happen.

Ross took only three and a half years over her PhD. And yet it wasn't all plain sailing. 'There were loads of parts where I thought it wasn't working, and weeks in which nothing worked and I wondered if I would ever get good results again. The writing went really well and smoothly from the start. I had already finished my first paper, a review, during the first year of my PhD. That helped me a lot. And I like working on different things in parallel and doing something new and exciting every day. Science offers you that freedom, with its creative side and the need for out-of-the-box thinking. And that's what makes science so nice, too.'

Consumers can use the test to check for themselves whether food is safe for them

'Talented people like Gina are rare gems.' Nielen makes no secret of his admiration. 'Her drive and curiosity are incredible. It's a treat for a supervisor when a PhD student develops so fast, runs with a project and ends up amazing everyone, even her peer reviewers, with her insights.' ■

Photo Guy Ackermans

One quarter organic is ‘not realistic’

The EU wants one quarter of its agriculture to be organic. That is not a realistic target for the Netherlands, say WUR researchers Wijnand Sukkel (Agroecology) and Katja Logatcheva (market research).

In a paper based on European Commissioner Frans Timmermans’ Farm to Fork strategy, the European Commission sets a goal of increasing the acreage of organic farmland from the current 8.5 per cent (3.7 per cent in the Netherlands) to 25 per cent by 2030. The EU also wants to lower VAT on organic products and hand out ‘bio-cheques’ to people on low incomes.
The Netherlands can learn from previous stimulation programmes, says agroecologist Wijnand Sukkel. ‘The good thing about this plan is that it wants to increase demand as well as supply.’ If that is not done, supply exceeds demand and organic farmers get low prices, as happened during a stimulation programme 20 years ago. This led to an effort to boost demand, which increased the market share of organic produce considerably, ‘but the 10 per cent target of the time was not met,’ says Sukkel.
How can demand for organic products be stimulated? For a start, the price difference between organic and regular products must be drastically reduced, thinks Sukkel. ‘Just lowering VAT is not enough to bridge the difference in cost price for the farmers, which is at least 30 per cent for a lot of products. We could also reward farmers for things like ecosystem services .’

In this article, WUR researchers Wijnand Sukkel and Katja Logatcheva explain that the European Commissions’ target of making 25 per cent of agriculture organic by 2030 is not realistic. But their fellow WUR researchers Rogier Schulte (Farming Systems Ecology) and Han Wiskerke (Rural Sociology) take a different view. Instead of ‘dismissing’ the EU ambition as unrealistic, they see it as the task of science to find ways of reaching the targets set. Read their views on resource-online.nl.

Local

Katja Logatcheva, a market researcher at Wageningen Economic Research, notes that the Netherlands is an agricultural export country, and that it should therefore study whether and how these measures increase demand for organic products in other EU countries. In Germany, for example, there is a growing ‘eat local’ trend that boosts demand for local organic products, in spite of their higher prices. This is not a demand that stands to benefit Dutch producers, Logatcheva points out. She also expects a continued demand for cheaper, non-organic food in Europe and the rest of the world, and that the Netherlands will maintain its strong competitive edge in these markets. Neither of these developments will promote a transition to organic farming in the Netherlands.
The greatest challenge for the Dutch market, according to Logatcheva, is to encourage consumers to start buying organic food en masse. ‘When prices are different, the consumer is sort of punished for buying an organic product. Another controversial point is that traditional agriculture is also becoming more sustainable. If you tax traditional farming in favour of organic businesses, you hamper this move towards greater sustainability.’
Sukkel agrees that the EU should focus its efforts to make agriculture more sustainable on the sector as a whole. ‘Agriculture with a high level of biodiversity, that is resilient to climate change, diseases and pests, and that does not deplete our resources. Organic farming is one step ahead in that respect, but it still has a way to go.’ AS

Photo Shutterstock.com

On Thursday 29 April at 12:00, Resource will be organizing a debate via Teams on ‘Is 25 per cent organic production realistic?’ with Wijnand Sukkel, Rogier Schulte and Ilse Geijzendorffer (Louis Bolk Institute). If you want to join in, keep an eye on our website and social media for the invitation and link.

Let-down

Turning points: sometimes you spot them immediately, sometimes only in hindsight. In this series, members of the WUR community describes a decisive moment they will never forget. This time, Bachelor's student Steven Pieterse talks about when he switched degree programme.

'Last year, I started the Food Technology Bachelor's. Everything was new and exciting and I was really enthusiastic. But the degree programme wasn't what I had expected. Teaching was online because of the coronavirus and I had hardly any contact with my fellow students. The standard was also very advanced and the material was all in English. I only knew the terms I'd learned at school in Dutch, which made the degree even more challenging, and my enthusiasm slowly evaporated.

I reached a low point towards the end of the second period. My motivation had almost gone. Even opening my laptop for the morning lectures was tough. The fact that my bed and desk are just a couple of metres apart didn't help either. It was difficult to keep my studies and my private time separate, and I sank into a lazy rhythm.

I clearly remember the key moment when everything changed. My younger sister was investigating Bachelor's options and asked me what I knew about the Communication & Life Sciences programme in Wageningen. I'd never heard of that degree but when I started reading up about it, I felt interested. I thought, 'This degree is perfect for me'. My study adviser advised me to keep going a bit longer but I couldn't summon up the energy anymore. I stopped my studies before the Christmas holidays and enrolled for Communication & Life Sciences.

'My study adviser advised me to keep going a bit longer but I couldn't summon up the energy anymore'

I've now finished the first module of my new degree. In Communication & Life Sciences, we don't study the material in such depth, but we look more at the broader picture. A lot of the work is done in groups (online), which means I am in daily contact with my fellow students and the teachers. I don't have the language barrier either now because the first year is entirely in Dutch. We'll have some courses in English as of next year but that shouldn't be a problem once I've mastered the material.' NVTWH

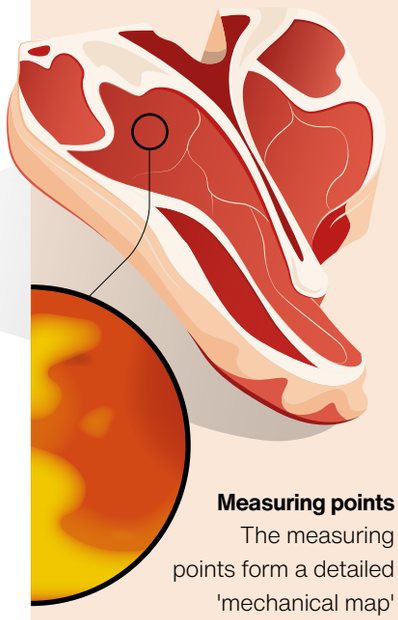
THE TEXTURE OF MEAT SUBSTITUTES COMPARED WITH MEAT

To make meat substitutes sell, it's important that they resemble meat as closely as possible. Sven Boots, a PhD candidate at Physical Chemistry and Soft Materials, developed a system for precisely measuring the texture of meat substitutes and comparing it with that of meat. That can help producers to imitate the texture of meat and improve the 'mouthfeel' of meat substitutes.

Infographic Pixels&inkt

Beef
cooked

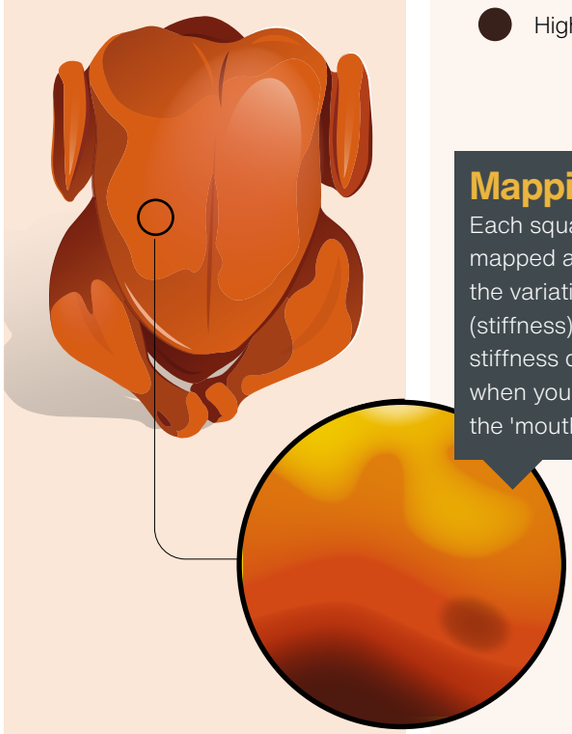
Meat is heterogeneous matter, so even beef is not consistently stiff.



Measuring points
The measuring points form a detailed 'mechanical map'

Chicken
cooked

A mix of colours can be seen in the image of chicken too.



Local stiffness

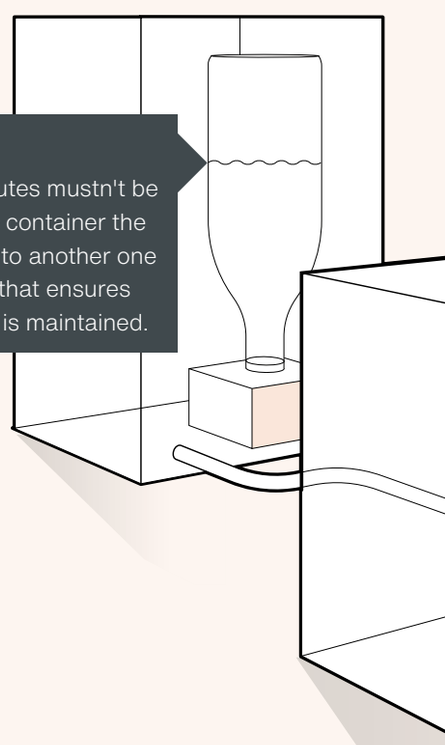
- Low
- Medium
- High
- Highest

Mapping texture

Each square millimetre is mapped and colours indicate the variations in resistance (stiffness). That local variation in stiffness determines how it feels when you chew on the products: the 'mouthfeel'.

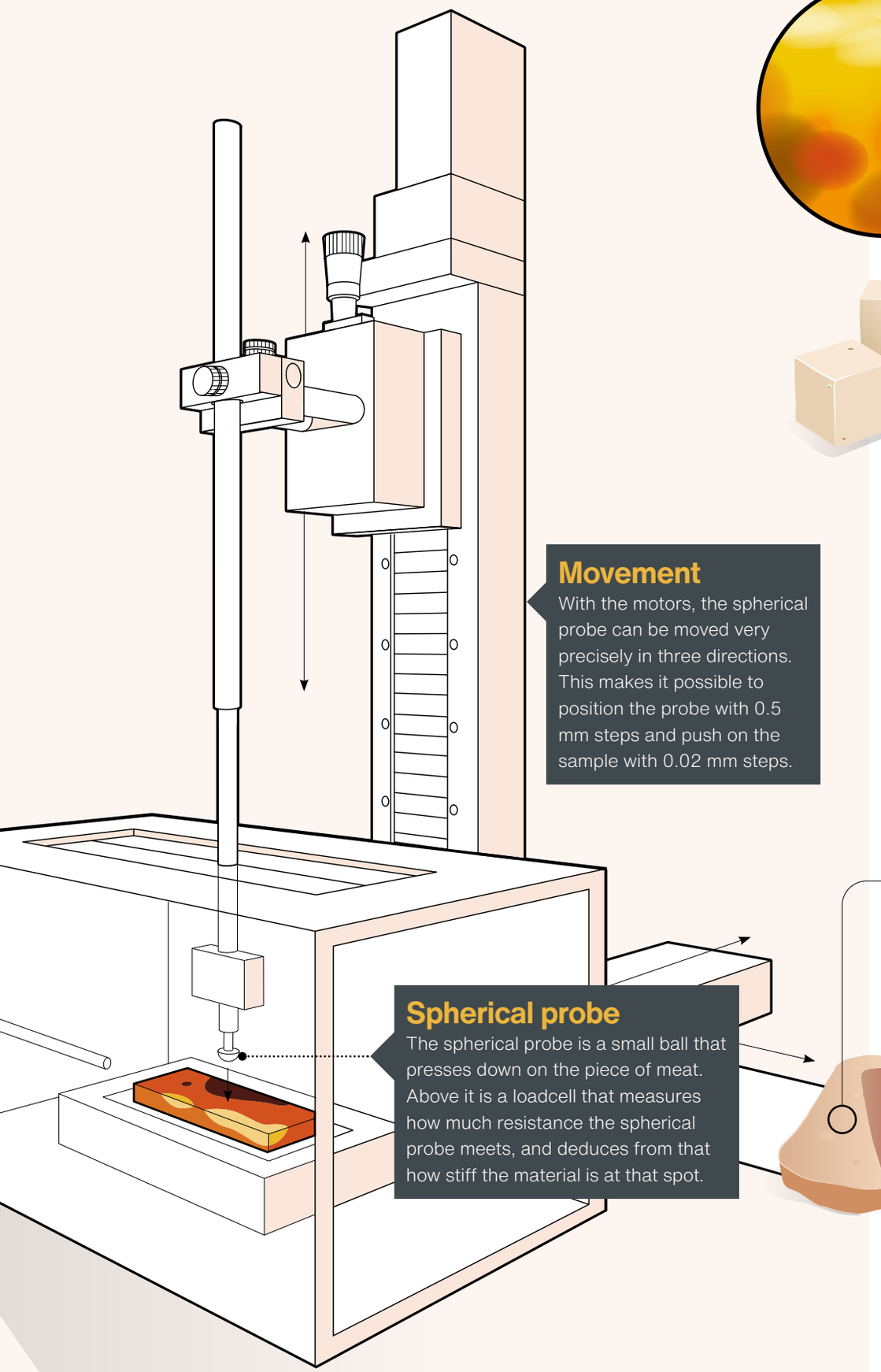
Humidifying

Meat and meat substitutes mustn't be allowed to dry out. The container the food is in is connected to another one with a water reservoir that ensures the right humidity level is maintained.



In practice

A follow-up study starts this year. Boots: 'We are going to use our technique to try to measure the influence of production parameters such as temperature. Then we want to compare the outcomes with the experiences of tasting panels.'

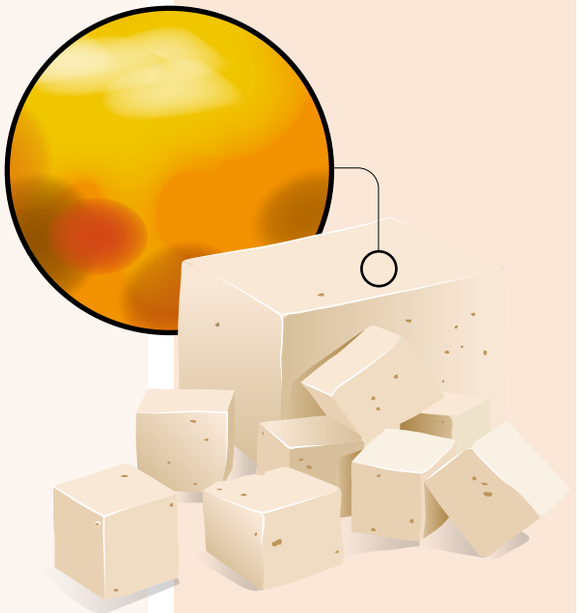


Movement

With the motors, the spherical probe can be moved very precisely in three directions. This makes it possible to position the probe with 0.5 mm steps and push on the sample with 0.02 mm steps.

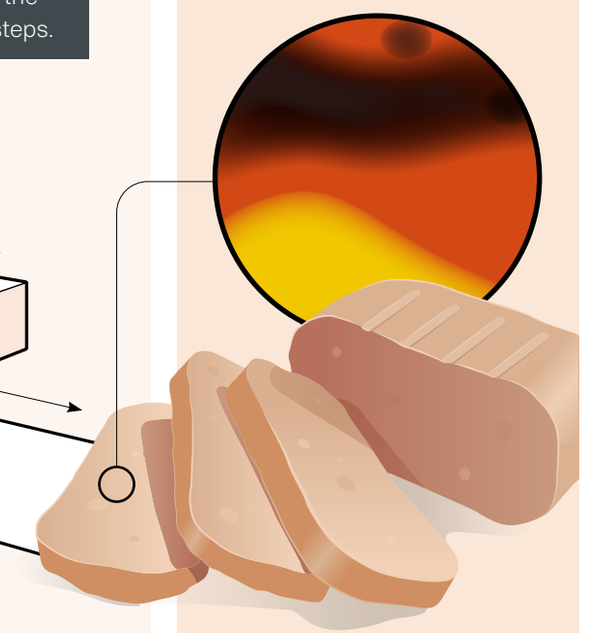
Spherical probe

The spherical probe is a small ball that presses down on the piece of meat. Above it is a loadcell that measures how much resistance the spherical probe meets, and deduces from that how stiff the material is at that spot.



Tofu
raw

Tofu is spongy and not very stiff. It is also homegeneous (its stiffness level is consistent). This can be seen in the mechanical map, which is mainly yellow and white.



Meat substitute

Meat substitutes already vary more in structure than tofu does, and are becoming increasingly similar to meat. .

Broad beans, lupins, soya and peas

‘100,000 HECTARES OF DUTCH PROTEIN CROPS IS AMBITIOUS’

The Ministry of Agriculture wants the Netherlands to be less dependent on soya and for the area used to grow high-protein crops to increase by a factor of five. Soybeans, broad beans, lupins and peas are possible options, say applied researchers at WUR. Arable farmers have the know-how for new protein crops but dairy farmers have the land.

Text Albert Sikkema

According to the ministry of Agriculture’s National Protein Strategy, Dutch farmers should be using 100,000 hectares 10 years from now to grow legumes rich in protein, five times the area currently in use. The Netherlands wants to be less dependent on imports of protein-rich raw materials, in particular soya. To encourage cultivation of these crops, the government has drawn up a Legume Green Deal with businesses in the protein supply chain.

Wageningen Plant Research in Lelystad does a lot of research on high-protein crops. For example, the institute used soya plants adapted to Dutch growing conditions to develop cultivation of the crop in the Netherlands. But this Dutch soya has not been a success so far, and the area under soya production has actually declined in recent years.

‘Dutch soya can’t compete with Brazilian soya for animal feed,’ says research manager Chris de Visser. ‘Yields in the Netherlands are 2.5 to 3 tons per hectare on expensive land, whereas in Brazil you get an extra ton per hectare and production costs are much lower. Dutch farmers don’t earn enough from that, so they prefer to grow cereals.’

Cropping plan

To help understand why grain is the first choice, De Visser explains the cropping plan used by Dutch farmers. They invariably grow potatoes and onions, which are the real cash crops. They alternate these crops with wheat. This cereal is easy to grow, gives relatively high yields of 9 to 10 tons per hectare, suppresses diseases in other crops and combines well with green manure. Growing this grain is not hugely profitable, but it fits in well with the overall cropping plan. Farmers will only start growing more high-protein crops when they become an appealing alternative.

Broad beans are the most promising protein-rich crop at present. The plants are robust and do not easily become diseased, yields are about six tons per hectare and the crop can be used in baby food and meat substitutes, says De Visser. However, broad beans only contain 25 to 30 per cent protein compared to 50 per cent in soymeal (soya from which the oil has been extracted). So you need to make use of the starch in the bean as well, says Visser’s colleague Ruud Timmer. He studies ways of increasing the protein content of broad beans. Other researchers are looking at how to develop a production chain using beans in meat substitutes.

A third candidate that has been around for a while is the lupin. This legume has slightly more protein than the broad bean (30 to 35 per cent) but much lower yields of 2.5 to 3 tons per hectare. ‘Not enough,’ concludes De Visser.

Livestock farmers

A new candidate is the yellow pea. This crop is easy to grow and works well in a

Field with white lupin crops. Photo Shutterstock

cropping plan in combination with grain but there are big harvest risks. Birds go for the peas. Also, the plant collapses as the crop ripens, so the machines are unable to harvest all the pods. An interesting but risky option, concludes Timmer.

The question with all the high-protein crops is how they fit in arable farmers' cropping plans. De Visser does not see much scope in Dutch cropping plans. He believes there are more opportunities in typical cereal-growing countries such as France and Germany, where farmers are looking to diversify cropping plans that now rely on grain. According to him, there is a place in the Netherlands for pulses such as broad beans and lupins, but mainly on livestock farms.

'LIVESTOCK FARMERS HAVE THE LAND, BUT ARABLE FARMERS HAVE THE KNOW-HOW'

Will it work?

As Timmer explains, high-protein crops are a good fit in a cropping plan with grass and maize. 'Dutch dairy farmers like grass and that produces the most protein. But farmers still have to give the cows protein-rich concentrates, especially in winter, to maintain protein levels in the milk. Now they use protein from soymeal that they buy in, but they could grow the protein themselves.'

But there is a problem. 'Livestock farmers have the land for these crops but arable farmers have the know-how. So they need to work together,' says De Visser. For example, a dairy farmer could outsource cultivation of a protein crop to a neighbouring arable farmer.

But dairy farmers can't ignore market forces either: can the animal feed they grow themselves compete with imported animal feed? Timmer sees opportunities first of all in the organic sector. 'Organic farmers have been using legumes to extend their cropping plans for years. These crops fix nitrogen, improve the soil quality and have scented flowers that attract insects. So they also play a role in maintaining biodiversity. That's in keeping with the sustainable aspect of organic food. But are consumers willing to pay more for milk from cows that eat locally grown feed?'

'At the moment, conventional dairy farmers and arable farmers will only start growing more protein-rich crops if they are forced to do so by new laws or if they get financial aid encouraging them to do so,' says De Visser. Not surprisingly, he calls the plan to have 100,000 hectares used for high-protein crops in the Netherlands — five per cent of all agricultural land — ambitious. ■

Innovation in education

. . . thanks to Covid

The Covid crisis is forcing teachers to reassess how they teach and that is leading to new insights and accelerated innovation. Two examples.

Text Luuk Zegers

Arjen Wals, professor of Transformative Learning for Socio-Ecological Sustainability, teaching outdoors. Own photo

Arjen Wals (professor of Transformative Learning for Socio-Ecological Sustainability) likes to use creative teaching methods outdoors on campus. When that wasn't possible because of Covid, he got students to use their own surroundings.

'Environmental Education and Learning for Sustainability is a creative module in which students work on a product that inspires others to become more involved in issues relating to nature and sustainability. We normally do a lot outdoors: a round of introductions sitting on the grass, theatrical stuff, presentations by students.'

'Usually about 35 highly motivated students choose the course but now we suddenly had 70, half of whom were doing it because something else got cancelled due to Covid. Yet they have still developed into a close-knit group, even though there were no joint physical activities.'

'How did we manage this? It all starts with getting to know one another properly. We asked students to make short videos introducing themselves. You can take a different approach, but make sure there is scope for creativity.'

'Most people don't feel comfortable with the online setting – and that includes the teachers. Share your doubts as a teacher with the group. If you are open about that, it creates trust and others are more likely to be candid too.'

'My course is about nature and our surroundings, so it's green time, not just screen time! We gave students outdoor assignments such as: walk 10 minutes from your home and take a photo of something that makes you think "That's sustainable". Then walk back home and take a photo of something where you think "That is totally *not* sustainable". Afterwards, the students shared their photos in groups and discussed them. That combination of being outdoors, focusing on their own living environment and then talking about it with one another really energizes students.'

'I am increasingly aware of what a perfect learning environment the outdoors is. Once the pandemic is over, I plan to keep my lectures online. I will use the time I gain from that to organize more interactive sessions outdoors.'

'I am increasingly aware of what a perfect learning environment the outdoors is'

Together with Han Zuilhof (Organic Chemistry), Bauke Albada (Organic Chemistry) and Harry Bitter (Biobased Chemistry & Technology) came up with the idea of preparing students for practicals by letting them try out things in virtual reality (VR).

‘If you practise in a virtual environment, you can make as many mistakes as you want’

Bitter: ‘Two years ago, we set up a small project in which students could use a VR app to practise setting up glass apparatus and carrying out a complex distillation. The coronavirus outbreak sparked great interest in this project because it’s something you can do at home, unlike a live experiment.’
Albada: ‘The VR idea started because there was so much pressure on teaching staff and lab assistants. We wanted to develop something that could relieve that pressure. If students practice at home, they will be better prepared for the practicals. A lot of students get quite nervous about doing lab work. They often have to put together complex setups of fragile glass, sometimes containing explosive chemicals.

Practising digitally first makes the students better prepared. It gives them self-confidence and they are then keen to get into the lab.’
Bitter: ‘If you can practise in a virtual environment, you can make as many mistakes as you want. And you learn a lot from mistakes. You just press reset and start again. At first, we focused on an app with VR goggles but when Covid came, Bauke thought: “Hey, we can do this on the computer.” So he had the app converted to allow that.’
Albada: ‘The app works really well with VR goggles. You use a laser pointer to point to things, pick them up and assemble them. On a PC you use the mouse. We are constantly improving the app. For example, we added a competitive element so now you can see how well you are doing compared with your fellow students. That triggers students to have another go, and they learn from that too. One student was even faster than me last year. Isn’t that great!’
Bitter: ‘You could only put together a distillation setup at first. But now, thanks to a big SURF grant, we are also simulating more complicated synthesis setups. Eventually, we want a system that’s like working with Lego bricks. The basic principle is incredibly broadly applicable. We are chemists so we started with experimental setups for chemistry but you could develop similar blocks for physicists that look like lasers, mirrors, stands and so on.’
Albada: ‘If students have practised a few times in the VR environment, they know exactly what they need to do in the lab. That gives them more scope to absorb the details of the chemical process. That will save a lot of time and frustration. At the end of the assignment, they see a kind of scorecard with tips and comments for doing the experiment in the lab.’ ■

Harry Bitter of Biobased Chemistry & Technology wearing the VR googles that students can use to practice setting up glass apparatus and performing a complex distillation.
Photo Guy Ackermans

AURORA SEES THE LIGHT OF DAY

The construction of the new education building Aurora is nearing completion. *Resource* got a sneak preview and was suitably impressed. Text Roelof Kleis Photos Anna den Hartog

You'll never see Aurora like this again. With over two months still to go, it is organized chaos inside. But the contours can be clearly made out. Aurora's eyecatcher is the central foyer that almost overwhelms the visitor walking in. The space reaches up to the glass roof on the fifth floor, which lets in a lot of light. The light is increased by the stacked terraces of the upper floors. The second and fourth floors are connected by wide bridges from left to right. Light penetrates to all corners of the building through the triple-glazed glass facades.

What you can't see yet is the greenery. In round concrete tubs on the ground floor, there will be two eight-metre-tall tropical bullet trees (*Bucida buceras*). That might seem tall, says construction coordinator and guide Eric van der Meer (Facilities and Services), but the top floor is 24 metres up. There will be flowerpots on the balustrades of every floor.

The balustrades are a feature in themselves. They are covered in concrete panels with a pattern of branches on them. The panels inside the building are the same as the strips running around the outside walls. There will be workstations along the balustrades and on the bridges, possibly with a system that indicates whether there are any spaces free. The main materials used in Aurora are concrete, glass, steel and wood. All the walls and steel pillars are panelled with larch wood. The staircase to the first floor is right in the middle of the hall. There are lifts too, but they are tucked away, delivering a clear message that taking the stairs is the norm.

The builders (Build 2 learn ULC Wageningen) are supposed to hand over Aurora on 1 July, and Van de Meer expects that the deadline will be met. Work will then continue until the start of the new academic year to get the building furnished. ■

On the outside, Aurora is mainly glass. Concrete panels accentuate the different floors. The panels with patterns of branches continue through the main foyer.

Aurora features a large lecture theatre that seats 450 people. The room can be divided into two smaller classrooms. The view from the window is of the Dassenbos.

The classrooms have higher ceilings than those elsewhere on the campus – 3.80 metres. This was requested by the teachers. Spaciousness supports learning, research has shown. Two of the classrooms are to be used for developing innovative teaching methods.

Aurora will be the first building on campus not to use mains gas. Heat and cold storage will be used to maintain the air and water temperatures in the building. The photo shows part of the machinery room. Floor heating (to 20 degrees) is the basis of the system, and the temperature in the classrooms is fine-tuned using air from the ventilation system. Solar panels on the roof will supply some of the electricity needed.

Fancy a look around Aurora?
Go to Resource-online.nl and watch the video Anna den Hartog made of the building.

The lure of nature during lockdown

Nature likes peace and quiet, as do humans

There is a downside to the popularity of nature areas in Covid times: nature managers are concerned about the crowds, especially now the breeding season has started. How do you weigh up the different interests of visitors and nature? And how do scientists and conservationists see the future of nature recreation after the pandemic?

Text Stijn Schreven

While bars, restaurants, shops and theatres have had to close, nature has remained open. With foreign holidays out of the question, many Dutch people have been spending their leisure time closer to home. Visitor numbers in nature areas have gone up by 30 per cent on average. The nature society Natuurmonumenten sees the growing interest reflected in its own statistics. Not only has the demand for cycle and hiking routes doubled but the society has also welcomed some 40,000 new members — a record.

Nature is a haven during the Covid crisis, explains Sjerp de Vries, an environmental psychologist at Wageningen Environmental Research. He studies the relationship between greenery in people's surroundings and their mental well-being, and how this is taken into account in public policy. 'In the Netherlands and elsewhere, people are spending more time in nature. Having greenery close by is associated with mental well-being: people who spend time outdoors during the pandemic are less depressed and anxious. What is more, people now recognize the benefits of greenery.' Matthijs Schouten, environmental philosopher and emeritus professor of Plant Ecology & Nature Conservation, also sees an increased awareness. 'On the one hand, we realize how lovely nature is and how good it makes us feel, while on the other the pandemic evokes existential questions for some people: "Who are we and what kind of a future do we want as a society?"'

'The crowds can also be a sign that there is not enough nature'

Nature as an object

However, the crowds pose a dilemma for nature managers. They are worried about the increasing disruption caused by dogs off the leash and roaming hikers. Natuurmonumenten press officer Roos Kooiman: 'Last year, our wardens had to tell more people to keep to the rules: stay on the paths, keep your dog on its lead, take your rubbish with you and stay away after dusk.' Some of these people are new visitors who aren't aware of the rules. That new group offers an opportunity to increase public support for nature, which is why nature area managers are jointly launching the campaign 'Welcome to Mother Nature's nursery' for the breeding season (15 March to 15 July). The campaign has two messages: you are welcome, but be aware of how vulnerable wild animals and plants are.

So nature needs peace and quiet, but at the same time people need nature for their mental well-being. And lots of visitors keep nature high up the agenda of policymakers. Which is more important in Covid times: nature or the visitors? Environmental philosopher Schouten sees them as equally important: 'I value human well-being but also the well-being of

other living creatures.' From a historical perspective, it is a typically Western attitude to think we should be able to go where we want, says Schouten. 'We have gradually turned nature into a collection of utilizable objects and space to be colonized. We take the right of access to that space for granted.'
Many non-Western cultures distinguish between zones where humans can do what they want and zones where they are guests and wild animals and plants take precedence. There is also often a third zone for nature alone, such as sacred woods and mountaintops where no humans are allowed. This fits with a world view based on partnership and participation, in which mankind and nature are on an equal footing. Nature organizations try to arrange similar zoning systems.
'Our areas should in principle be open to the public,' explains Kooiman of Natuurmonumenten. A small number of areas are always closed because the nature there is too fragile, and some areas are closed during the breeding season to give nature peace and quiet. 'Recreational use simply causes too much disturbance then.' The nature organization is explicit: 'Ultimately nature takes priority for us, so if the crowds harm nature we may close areas off temporarily.'

Business as usual

Kooiman expects the large numbers of visitors to drop once the Covid measures are relaxed, and that will reduce the problems with disturbance and litter. Even so, she hopes that people will continue to spend time in nature after the pandemic. Environmental psychologist De Vries says that the Covid crisis has given a boost to a process that was already underway: a growing awareness of the value of nature for our well-being. 'It started in 1999 with Operation Tree Hut, when the ministry of Agriculture looked at what nature meant to the Dutch.' The lockdown has put people's mental health under pressure, and access to greenery alleviates that effect. 'The crowds can also be a sign that there is not enough nature available,' says De Vries. He finds it hard to predict whether this will lead to nature-inclusive policies but says now is the right moment to think about it. That is because there is another issue at play: current housebuilding plans could lead to less greenery in cities or increase the distance between people and nature. De Vries: 'I wonder whether the possible negative consequences of this for our mental well-being are being taken into account.'
Philosopher Schouten hopes for a lasting switch in social attitudes: 'I hope very much that we don't go back to business as usual. If 20 per cent of society develop a deeper appreciation for the non-human world around us and for nature, and lead their lives accordingly, the rest will soon follow.' ■

March 2021: banner at the Blauwe Kamer nature area run by Utrechts Landschap. Nature's popularity during lockdown has its downsides: visitors and their dogs can disturb brooding birds, for instance. Photo Stijn Schreven

MARINE FOOD CAN'T SOLVE EVERYTHING

There are high expectations for the production of food at sea, but the options are limited, argues theoretical biologist Jaap van der Meer. 'There isn't much scope for expansion.'

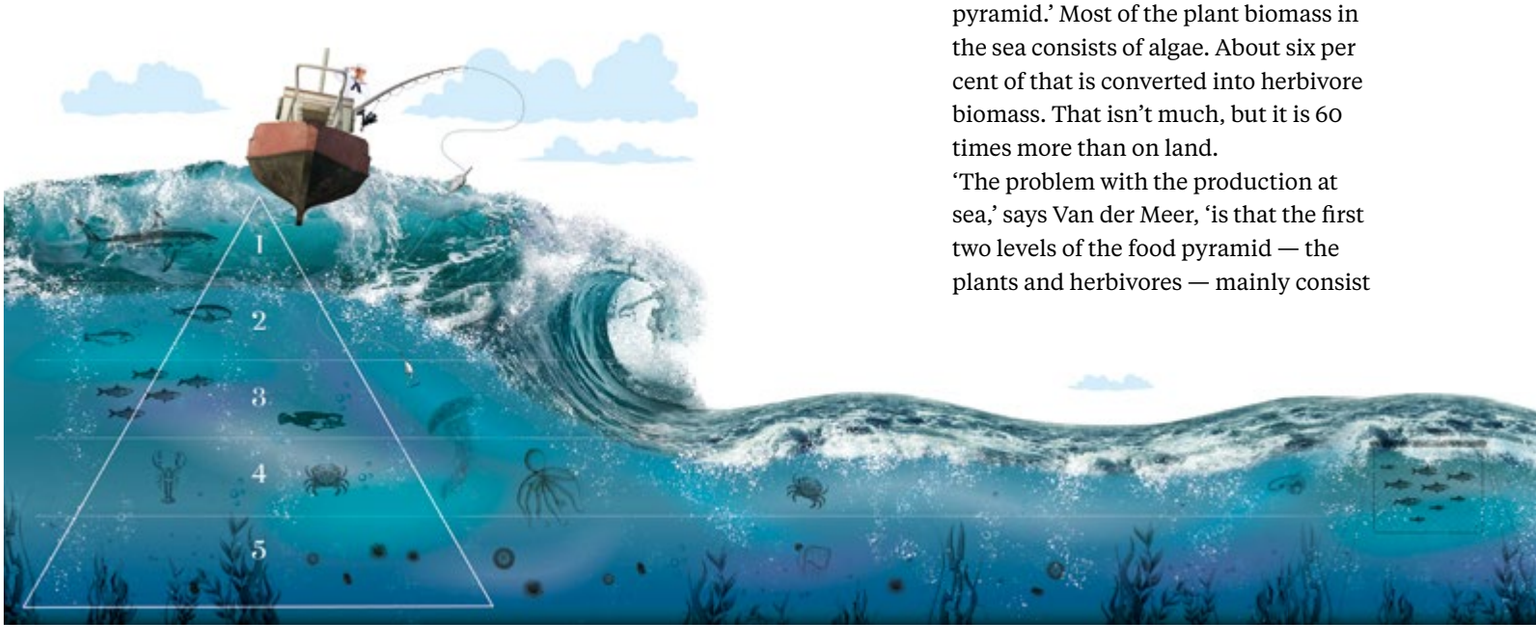
Text Nienke Beintema Illustration Kay Coenen

Feeding the world population is an ever-greater challenge. Organizations including the FAO, the UN and the European Commission have suggested one solution might be to use the sea more. The oceans account for 70 per cent of the Earth's surface but only supply one to two per cent of our food. That could be improved, say proponents of 'Blue Growth', for example by expanding 'mariculture' — cultivating food at sea. 'But unfortunately it isn't that simple,' says Jaap van der Meer of Wageningen Marine Research. He wrote a paper that was published in the journal *Nature Food* in December and has attracted considerable attention. 'There has been a lot of talk over the past 10 years about the opportunities with Blue Growth. But I started to wonder if it was really possible. It turned out nobody had done the maths.'

Few nutrients

In terms of fertility, you can compare most of the ocean with a desert. On the other hand, the conversion of plant matter into animal biomass is much more efficient at sea than on land. On land, only 0.1 per cent of the energy in plants ends up in herbivores. 'Most of the biomass in a forest is in the trees,' explains Van der Meer, 'and they end up rotting on the forest floor. They mainly provide food for fungi and bacteria, which barely filter further up the food pyramid.' Most of the plant biomass in the sea consists of algae. About six per cent of that is converted into herbivore biomass. That isn't much, but it is 60 times more than on land.

'The problem with the production at sea,' says Van der Meer, 'is that the first two levels of the food pyramid — the plants and herbivores — mainly consist



of single-celled algae and plankton less than half a millimetre in size. We can't harvest them efficiently.' That is why at sea we have to rely on the higher trophic levels, fish in particular. Taken as a whole, they only account for a very small proportion of the energy production in the oceans, as 94 per cent of the energy is lost in each step of the marine food chain.

Eating seaweed

Can't we eat seaweed? 'Seaweed is mainly found in a narrow zone along the coast as it needs to attach itself to the seabed,' says Van der Meer. You could grow seaweed in the open seas, for example using floating structures. 'But that is expensive and technically challenging. What is more, large seaweeds are difficult to harvest and they soon rot if you don't dry them properly immediately. That uses a lot of energy and makes this product unsuitable as a staple food.'

According to the theoretical biologist, coastal seas such as the North Sea can only feed a limited number of people. 'Nutrients are a limiting factor there too. Yields are very low, certainly in comparison with a product such as sugar beet.' Fertilization is not an option, in part because that changes the composition of the algae, often increasing the proportion of inedible species. Secondly, many fertilizer components such as phosphorus are scarce resources and they then soon end up in the seabed.

Another option is to grow predatory fish such as salmon in cages. But the salmon eat pellets that contain fishmeal and fish oil — from the sea. So that too is not a solution to the problem of how to feed the world, says Van der Meer.

What about if you give the salmon in fish farms food that comes from the land, such as soya? 'That switch has indeed been made but you are back to a land-based system. So you are using resources that are already in short supply on land and have their own associated problems. You could just as easily give the soya to chickens. That yields just as much.'

'SEAWEED EXTRACTS MAKE CROPS BETTER ABLE TO COPE WITH SALT STRESS'

'IN TERMS OF FERTILITY, YOU CAN COMPARE THE OCEAN WITH A DESERT'

In terms of mariculture, Van der Meer sees shellfish cultivation as the most promising option. Shellfish are low down the food chain and they are high-grade food. But there is limited space in coastal zones and the costs and technology become a limiting factor further from the shore.

Sequestering carbon

But the Blue Growth idea does not have to be ditched completely, as projects at Wageningen Marine Research have shown. Marnix Poelman and colleagues have been investigating how marine production might be possible in certain places. 'These projects are not just about food supplies,' says Poelman, 'but also about sequestering carbon and recycling nutrients. Denmark is already doing this on a small scale.'

And marine production can also help agriculture on land. Seaweed extracts make crops better able to cope with salt stress. And the addition of shellfish to fish feed improves the health of farmed fish. 'There are definitely some good options,' concludes Poelman, 'but we need to be focused and careful in what we do.'

Van der Meer agrees. 'I'm not saying nothing can be done, but we do need to assess the possibilities critically. Blue Growth has been hyped in recent years and I'm trying to put it into perspective.' ■

Key people: Hans Verdaat

They are indispensable on campus: cleaners, caretakers, catering staff, gardeners, receptionists — it's a long list. *Resource* looks up these key people. This time, meet Hans Verdaat (40), research worker at Wageningen Marine Research (WMR) in Den Helder.

Text Milou van der Horst Photo Hans Verdaat

'I've been birdwatching for as long as I can remember. Over time, that came to include marine mammals too. When I was a boy, I wanted to be a forest ranger. I did the Forest & Nature Conservation programme in Velp, and I discovered my love for the sea during my internship. So I went on to do the Coast & Marine Management programme at Van Hall University of Applied Sciences in Leeuwarden and now I've been at WMR for 15 years.

Marine work is a mix of everything I enjoy: biology, safety, logistics and operational tasks. I help organize and carry out research projects. For example, I arrange the materials, transport and permits to carry out measurements, sometimes I hire ships or planes, and I help get the research equipment into the water. In recent years, I have also been responsible for safety on board ships. I make sure people get a medical check-up and have had training, and check that the machinery is certified and the ship fulfils all the requirements. Sometimes it will take me days to prepare for an experiment that is completed in a couple of hours. Despite all the preparations, things often don't go according to plan due to weather conditions or technical issues or because the tides are not as expected. So you need to be flexible for this work and it's not a nine-to-five job either. We often work in the weekends if the weather conditions or tides are better then.

I used to travel abroad regularly before the Covid crisis. The expeditions to Antarctica were particularly special; I took part in four of those. We studied the spread and population sizes of marine mammals, especially whales. These days, I no longer get so excited about seeing a whale but the research there was quite something: you spend 10 weeks with hardly any communication with the outside world, in places where there is little research being done and very few people ever come. It was a privilege to work there.

In the past year, all international studies have been postponed and we have been doing work that had previously been put on hold. Once we are allowed to travel again, we'll see which international research we can pick up quickest — probably Bonaire or Spitsbergen. I can't wait!'

'I no longer get so excited about seeing a whale'

Hans Verdaat with Adélie penguins near Brown Bluff, Antarctica

Campus ◆ residents

UmaMeats

UmaMeats makes hamburgers and sausages with seaweed added to them. By enriching the meat with seaweed, the startup replaces fat with fibres and healthy nutrients, creating healthy, tasty, juicy burgers and sausages. Most of which used to go to the canteens at various companies that wanted to offer their staff a healthier diet. Until the coronavirus crisis struck, and the canteens closed. Then the founder of the startup Mendelt Tillema lost 95 per cent of his turnover from one day to the next.

The founder of the startup Mendelt Tillema lost 95 per cent of his turnover from one day to the next

Tillema studied Plant Sciences and developed a fascination for seaweed, a natural crop for providing a healthy food source without using any extra land. He developed his company in 2018 with the help of Startlife, and he had two products and a market. Then along came Covid-19.

Tillema has used the past year to make further improvements to his seaweed products. He has worked on a better combination of seaweeds for flavour, and for even higher nutritious value. He also worked on creating a smarter production process and improving the supply chain. A Consumer Sciences student is currently doing a study aimed at identifying the best communication strategy for UmaMeats to follow.

UmaMeats is located in the Starthub in Plus Ultra II, and that gives Tillema access to a large network. Recently, for example, he was able to pitch his seaweed burgers to 40 buyers from German food companies who were visiting the campus. AS

There are about 100 companies on the campus. We introduce them to you in *Resource*. This time: UmaMeats in Plus Utra II

All the flavours of the world can be found in our WUR community. Landscape Architecture and Planning Master's student Mercy Amegah (24) takes us to Ghana.

Flavours of WUR

Jollof

Jollof is a popular dish in Africa. It is rice cooked with tomato sauce. This is a quick recipe for making the ever-popular Ghana Jollof. It reminds me of the competition we have back home with Nigeria on whose Jollof tastes the best.'

Ingredients (for 2-3 people):

- 1 red onion
- 2 chili peppers (habanero)
- 2 tomatoes
- 4 tbsp tomato paste
- 1 tsp ginger
- 2 cloves garlic
- Rice (3 cups)
- 300g beef (or any protein source you prefer)
- 1 beef stock cube
- Rosemary and basil
- 1 tsp curry powder
- Salt to taste
- 1 tbsp butter

Beef stew/sauce

1. Cut meat into fine cubes.
2. Chop onion and add half to the meat.
3. Blend ginger, pepper and garlic and add to the meat.
4. Add salt, stock cube, rosemary, basil.
5. Add 1 ½ cups of water and simmer for 10 mins max.

Jollof rice

1. Heat 2 tbsp of oil. Add the remaining chopped onion and 1 tsp of rosemary and fry until caramelized. Then add the tomatoes. Cover to simmer for 5 mins on medium heat.
2. Add the cooked beef and stock to the tomato mix. Stir for a while and add the tomato paste. Add 1 tsp curry and leave to cook for 5 mins. Then add 2 tbsp oil.
3. Add the rice to the sauce. Stir until evenly absorbed. Leave to cook for about two mins and add 4 cups of water. Note: if the rice absorbs a lot of water, add another ½ cup of water. Add salt to taste.
4. Leave to cook for 10-15 min.
5. Check now and then to see if the rice has absorbed the water. When it has, add 1 tbsp butter, turn the heat low and allow it to cook through.
6. Serve.

Mercy Amegah (24)
Landscape Architecture and Planning Master's student from Ghana

In other news science with a wink

NOÛS

The French scientist Camille Noûs was a co-author of more than 200 papers in just one year. This polymath is an expert in all fields, from astrophysics to ecology. The problem is: he/she does not exist. Noûs is a fictional character thought up by the campaign group RogueESR to expose and criticize the academic obsession with numbers of citations and publications.

NOÛS

The fictional C. Noûs works at the equally fictional Laboratoire Cogitamus (!) in Paris. But might there also be a real scientist with that name? Almost. The Scopus database comes up with various people called Nous (minus the circumflex). Two are in the Netherlands, including one C. (Clint) Nous, an engineer from Delft. He currently works for Deloitte. Good for him!

DEAD?

Dead isn't entirely dead, according to a study by the University of Illinois at Chicago. Some genes in brain cells are only expressed after death. These zombie genes can be found in glial cells, which serve to clear up dead cells in the living brain. That explains their activity: the zombies simply don't yet realize the boss is dead.

DOUBLESPEAK

The strategic use of euphemisms influences people's opinions, according to a linguistic study by the University of Waterloo. Test subjects had a different opinion of employees in the meat processing industry compared with workers in a slaughterhouse. Honest! Lying is quite different to not being reminded of something. RK

Diary of a caretaker

Pumpkin

Early one Friday morning I was going through my emails when a photo caught my eye. I saw what looked like an exploded pumpkin scattered across a kitchen table in hundred of little bits. What on earth happened there? The writer of the email asked if I could come round and look at the situation because 'we haven't cleaned it up yet, Eugene; we want you to see what's happened.' Half an hour later, I was standing in the kitchen. The bits of pumpkin were not just on the table – the floor was covered in them too. One of the residents told me it had happened that night: 'I could hear some noises from the kitchen, but I didn't pay any attention to them, and when I came into the kitchen this morning I was shocked by the mess. Eugene, can you guess what happened here?' I scratched my head and said I had no idea. 'Rats! Rats had a party in our kitchen, with a delicious pumpkin from our own garden as the main course!' Shivers ran down my spine at the very idea. I told them we regularly get problems with rats around here, but indoors?

'Do you know how they came in? Through the cat flap!'

'Have you left the windows or doors open?' I asked. 'No, do you know how they came in? Through the cat flap! We don't have a cat but we do have a cat flap.'

So those cheeky rats just went through it. The door to the party venue was open. There might as well have been a sign above it saying 'rats welcome'.

I called pest control and advised them – no surprise here – to close off the cat flap.

Eugene van Meteren works for student housing provider Idealis as a caretaker. He writes about his experiences for Resource. Read all his columns on **resource-online.nl.**

Spring!

Spring has always been my favourite part of the year, as we see new leaves on the trees, blooming of flowers and insects collecting nectar and pollen from flowers. It accentuates the beauty of Mother Earth. In India, the festival of colours, commonly known as Holi, is celebrated during the arrival of spring. Ever since childhood, I have looked forward to spring, especially as it brings beauty everywhere, and Holi.

‘Ever since childhood, I have looked forward to spring. It brings beauty everywhere, and Holi’

At the Holi festival, people of all ages go into the streets for fun and put Holi colour on the faces of others. It is filled with so much fun and love. This year I tried to play it with my international friends keeping in mind the measures and distancing. I really enjoyed introducing the festival, and they loved it. I also went to some beautiful places in the area, like the arboretum, to explore the beauty of newly blooming flowers. I managed to find my most favourite tree of the spring season, the magnolia tree. I also went to the Rhine riverside, sat and enjoyed the view. I think it’s that time of the season when I love to give myself to nature as it soothes me completely.

Life isn’t easy, but there are endless ways to lower the difficulties by giving ourselves a small moment of happiness. Spring is definitely a perfect costless invitation of nature to enjoy being in its arms. So, in between your studies and work, try taking some time to enjoy nature’s beauty.

Blog

Aarzoo Kohra
Aarzoo Kohra is a WUR Master's student in Plant Sciences from India. She lives in Dijkgraaf. She blogs on our website.

Colophon

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[no]WURries

‘My sister and I have always been very close. We are both students; she’s in Utrecht and I’m in Wageningen. Recently she has become more withdrawn and doesn’t want to meet anymore. She says she is in a “Covid cocooning phase”. I’m worried and afraid she is getting depressed. She says she’ll get over it. I want to respect her wish to be left in peace, but I’m very concerned. This is not like her. Should I just turn up uninvited?’

Sanne, Biology student
(full name known to the editors)

Have a chat

‘It is important to find ways to stay in contact with the people you know. So much has changed due to Covid that it helps to keep some things as they were. Contact with friends and family can give you peace of mind and some distraction, and also allow you to let off steam. Talking to them about your concerns can help relieve the tension a bit. Of course it’s fine just to have a chat; it doesn’t always have to be about your worries.’
From ‘dealing with Covid stress’ at Therapieland.nl, which Utrecht University directs students to

Fine to just turn up

‘It’s good that you are discussing your concerns. Discuss them with your sister too. Tell her that you find this tricky, that you are worried but don’t want to impose on her. If she continues to be withdrawn and/or not want to talk about it, discuss it with your parents, for instance, or brothers or sisters, or any friends you have in common. If you care about someone and are worried about them, it’s fine to just turn up.’
Annemarie Teunissen, Biology study adviser and skills trainer

A bubble together

‘Yes, I would pay her a visit but just to do fun things rather than necessarily talk about how she’s doing. Then you aren’t making it such a big deal. Show you are there for her and that it could be nice to be in a bubble together. Have dinner together, watch Netflix, go for a walk in the park — stuff like that. And tell her sometimes how happy you are to have her.’
Pieter, Food Technology student

Gut feeling

‘I think you need to follow your heart. Sisters often have such a strong bond that you sense things before others spot what is going on. Perhaps you can share your worries with someone else who knows your sister well. If that person is concerned too, I wouldn’t hesitate to get on the train to Utrecht. In my experience, your gut feeling is often a reliable indicator in situations like this. Doing nothing isn’t an option in this case, I would say.’
Hermien Miltenburg, WUR parents’ adviser and mother of three university students

NEXT WURRY

‘Because of Covid, I eat my meals with my housemates nearly every day. We take it in turns to cook but unfortunately half my housemates can’t really cook. They just throw it all together and it tastes awful. There’s no chance of a flavoursome sauce either. I don’t want to hurt people’s feelings but it simply doesn’t taste nice. What should I do?’

Rijnveste student
(name known to the editors)

If you have advice or tips for this Wurrier or if you need some advice yourself. ***Email your tips or question (100 words max) by 23 April to resource@wur.nl*** *subject noWURries.*